

Reference Manual

ufdbGuard version 1.17
the internet filter for the Squid web proxy

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1 Introduction

ufdbGuard is a URL filter software suite that can be used with the Squid web proxy to block unwanted web sites on the internet. URLfilterDB is the URL database that ufdbGuard uses to determine which web sites are restricted. ufdbGuard also features the capability to enforce Google's SafeSearch, https tunnel detection and verification of https/SSL certificates.

You may register as a trial user at www.urlfilterdb.com to receive a 60-day trial license for the URL database. The trial license is for an operational URL filter without restrictions.

Internet access restriction tools are usually implemented to increase the productivity and shield users from unwanted web content. ufdbGuard is also a network protection tool blocking access to proxies and tunnels.

To be able to use an internet access restriction tool, it is necessary to have a well-defined internet usage policy. It is highly recommended to share this policy with all employees and define clearly what is expected from employees.

1.1 What is URL Filtering?

URL filtering is a mechanism to block access to certain types of websites. Usually the reason to use URL filtering is to achieve higher productivity and to lower bandwidth usage.

Users browse the internet and often without knowing it, they usually use a web proxy like Squid that is in between a PC and the internet. Squid and ufdbGuard can verify if a user has access to a particular (part of) a website that is visited. Approved websites can be visited without restriction. In case that a (part of) a website is restricted; the web browser displays a message that access is prohibited.

1.2 What is Tunnel Detection?

Users who want to circumvent company internet and security policies, may use so-called *tunnels* to break through the firewall that protects your internal network from attacks from the outside. Tunnels can be extremely harmful since in most cases the antivirus protection is circumvented and tunnels can be *bidirectional*, i.e. the firewall is open to attacks from the outside through the tunnel. ufdbGuard detects and blocks these tunnels.

SSH tunnels are one of the most dangerous types of tunnels where an entire corporate local network can be exposed to anybody on the internet. The reader is urged to get familiar with the risks of (SSH) tunnels to be able to implement a proper security fence. Security officers and senior management are advised to verify that a security solution is implemented to block tunnels.

1.3 Latest Major Enhancements

Version 1.10 of ufdbGuard introduced a new unique feature to dynamically detect proxy tunnels. Section 3.1 contains an explanation about proxy tunnels are and why they are considered security threats.

Version 1.12 of ufdbGuard introduced a new feature to enforce SafeSearch on the Google search engine and family filters on other search engines. This feature reduces the number of adult images that a user can see using on the website of the search engine.

Version 1.14 of ufdbGuard introduced a lightweight http server which can be used as a server for the redirection messages. The redirection messages are displayed for a user when access is disallowed.

Version 1.15 introduces a GUI for the configuration of ufdbGuard. The GUI is based on the popular administration tool *webmin*.

1.4 Copyright

The ufdbGuard software suite is free. To protect the ownership and the freedom of use of ufdbGuard, there is a copyright and you have a license to use and modify the software freely, known as the GPL version 2 license. The license is here: www.gnu.org/licenses/old-licenses/gpl-2.0.html.

The URLfilterDB database is a commercial product and has a copyright by URLfilterDB. You need a license to use the database which is defined in The Terms of Contract document that can be downloaded at the website: www.urlfilterdb.com.

1.5 Feedback

We welcome feedback from clients and those who test our software. Feel free to send your questions and feedback to the support desk: support@urlfilterdb.com.

2 Prerequisites

ufdbGuard runs on all flavors of UNIX and is usually installed on the same system where Squid is installed. Squid can be downloaded at www.squid-cache.org. ufdbGuard needs 20 MB disk space and 80 MB memory. The required CPU power is compared to Squid relatively low, so it can run on one CPU for small to medium sized user groups. For large user groups, it is highly recommended to use a dual-CPU system and to use top-of-the-line dual-core servers for very large environments.

For all systems, ufdbGuard must be compiled with a C compiler. Most UNIX distributions come with the free GNU C compiler, gcc (see also gcc.gnu.org) or a native C compiler. In addition, the `wget`, `make` and `install` commands are required which are all included in most UNIX distributions.

ufdbGuard uses a compressed database and therefore requires the compression library bz2. This library is installed on most UNIX systems. In case that it is not on your system, it can be installed from your UNIX distribution CDs or downloaded from www.bzip.org. It also uses openssl and needs the openssl header files which are included in your UNIX distribution (usually the package name is openssl-devel).

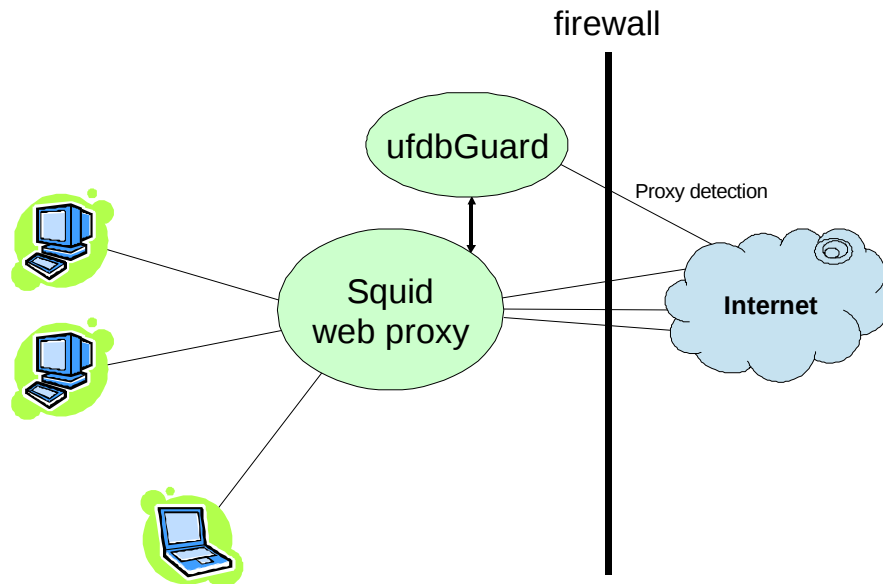
3 Architecture

Squid is a popular web proxy that is used as an internet cache and is usually part of the internet security solution where users are not given direct access to the internet. Squid is free and can be downloaded from www.squid-cache.org.

Squid uses child processes called *redirectors* or *URL rewriters* to verify URLs for blocking. The redirectors are lightweight processes (`ufdbguardclient`) that communicate with a multithreaded daemon process (`ufdbguarddd`). The daemon has only one copy of the URL database in memory and does the actual URL verification. The daemon sends a reply indicating OK or BLOCKED to the redirector which sends the answer to Squid.

The `ufdbguarddd` daemon uses a UNIX socket to communicate with `ufdbguardclient`. Alternatively, a TCP socket can be used with port 3977. `ufdbguarddd` and `ufdbguardclient` can be configured to use an alternative TCP port number.

In the next simplified diagram, all pieces are put together: the web browser on a PC connects to the Squid web proxy who uses ufdbGuard to block access to websites.



ufdbGuard enforces the internet usage policy

Each request to retrieve a page from a website is first verified with ufdbGuard. It is extremely fast with 50,000 URL verifications/sec so blocking unwanted web sites is very easy.

In case that the daemon is not running or when the daemon is loading a new version of the URL database, all URL verifications get an immediate OK and no web site is blocked. A database reload typically takes between 15 and 25 seconds.

ufdbGuard can be used with any URL database that comes in either a flat file format or the proprietary .ufdb format. The ufdbGuard software suite comes with a utility ufdbGenTable to generate an .ufdb database file from a flat file.

3.1 URL redirection

Squid sends each URL that it receives from a browser to ufdbGuard for inspection. If ufdbGuard finds a URL that needs to be blocked according to the local internet usage policy, it sends a substitution URL to Squid. This substitution URL is then used by Squid and content of the substitution URL is sent back to the browser.

A substitution URL is by default similar to this:

```
http://www.urlfilterdb.com/cgi-bin/URLblocked.cgi?category=adult&username=John&url=www.sex.com
```

So for each blocked URL, an appropriate message is retrieved which was generated by URLblocked.cgi at www.urlfilterdb.com.

For reasons of efficiency, it is recommended to use the lightweight http daemon, ufdbhttpd, which has a built-in URLblocked.cgi. ufdbhttpd is part of the ufdbGuard software suite, can easily serve 1000 requests/sec, and is recommended for all environments except the very large ones.

Very large environments should use a web server on their LAN and install URLblocked.cgi on a web server. The webserver must be able to incorporate perl scripts.

3.2 Dynamic Proxy Tunnel Detection

The https protocol is encrypted and designed for secure online transactions like online banking. Unfortunately, the https protocol is also a security risk since anybody can type "proxy tunnel" at Google and find out how to transfer data to and from any system on the internet *bypassing firewalls and internet access security measurements* using the https protocol. This is possible since https is encrypted and most security measurements like antivirus software, malware detection and intrusion detection systems cannot scan encrypted data.

ufdbGuard has a unique protection mechanism that detects abuse of the https protocol and blocks all unauthorized transfers of data with these so-called proxy tunnels.

Proxy tunnels can also be used with reverse port forwarding (using ssh) which means that from any system on the internet an unauthorized connection can be made into the protected network. It also does not matter how good the firewall is! As long as https is allowed and there is not a proper countermeasure against proxy tunnels, a security risk exists.

The ufdbguardd daemon verifies all websites that are accessed with the https protocol and detects all popular proxy tunnels.

3.3 Enhanced HTTPS Security

As stated earlier, the https protocol is a useful protocol where secrecy is desired. Financial transactions are a good example where HTTPS is desired. Unfortunately, because HTTPS is encrypted, the HTTPS protocol is also used by applications that may introduce security issues like proxy tunnels, remote access software and viruses. To enhance the security of HTTPS connections on the internet, two configuration options control the use of HTTPS. See section 5.4 for more information.

4 Software Installation

It is assumed that the Squid web proxy is already installed, configured and operational. Please refer to the documentation of Squid to make it operational (see also www.squid-cache.org).

4.1 Upgrading from a Previous Version

A previous version can simply be overwritten by a new version. CAVEAT: you must stop Squid and ufdbGuard to overwrite executables, so you must stop them before a 'make install'.

When an upgrade is performed, it is recommended to perform all installation steps including the last step, retrieval of database update in section 4.8.

When an upgrade is performed, the default configuration file (`ufdbGuard.conf`) is not installed to prevent loss of previous settings. It is recommended to read the sections about configuration options and to add settings for the new options to the existing configuration file.

4.2 User Account

The ufdbGuard software suite should be installed with the same user account as the Squid software. Usually the username `squid` is used but it can be any name.

NOTE: the following steps in this section should be done as the aforementioned user.

4.3 Installation Directory

ufdbGuard can be installed in any directory. However, it is logical to put ufdbGuard together with Squid. In this manual, the word `TOPDIR` refers to the top level installation directory for ufdbGuard. Examples of `TOPDIR` are `/local/squid` or `/usr/local/squid` depending on your choice.

4.4 Unpack Software

The tar file that contains the ufdbGuard software suite must be unpacked in a source directory of your choice, e.g. /local/src.

Unpack the ufdbGuard tar file in the source directory:

```
$ cd /local/src
$ tar xzf ufdbGuard-latest.tar.gz
```

A directory with the name ufdbGuard-1.16 contains the software.

4.5 Configure the Software Build

Before ufdbGuard is compiled, it needs to be configured and told what the TOPDIR of your choice is:

```
$ cd ufdbGuard-1.16
$ ./configure --prefix=TOPDIR
```

So, assuming that TOPDIR is /usr/local/squid, the configure command becomes:

```
$ ./configure --prefix=/usr/local/squid
```

The command ./configure --help displays a description on how to configure alternative locations and username.

UfdbGuard is installed with the assumption that Squid runs with user account squid. If squid is run with a different user account, you should use the --with-ufdb-user option.

ufdbGuard will use UNIX sockets whenever they are available. To force the usage of TCP sockets which have more system overhead, use the configure command with the option --without-unix-sockets.

The most common error is that the development packages for openssl and bzlib are not installed. The configure command checks for this and gives appropriate messages. For most operating systems, one can find the packages openssl-devel and bzip2-devel on the installation media.

4.6 Compile Software

Now compile the software suite:

```
$ cd src
$ make
```

4.7 Install Software

In case that you perform an upgrade and Squid is already running with ufdbgclient redirectors, Squid must be stopped to be able to perform a proper installation. After the installation, Squid is started after ufdbGuard.

Stop any running instances of Squid:

```
$ su -
# /etc/init.d/squid stop
```

Stop any running instances of ufdbGuard. I.e.

```
$ su -
# /etc/init.d/ufdb stop
```

The programs can now be installed. Note that you must be root.

```
# cd src
# make install
```

It is recommended to start the `ufdbguardd` daemon at system boot and before Squid is started. The start script is in the `init.d` directory (this may vary depending on the OS). Optionally modify `UFDB_OPTIONS` to use the `-T` option to use the test mode.

4.8 Get Daily Updates

The script `ufdbUpdate` takes care of downloading a new version of the URL database and signaling `ufdbGuard` that a new version is downloaded. Daily updates are available for everyone with a permanent or trial license of URLfilterDB. The `ufdbUpdate` script should be run twice per day by the cron scheduler. There are 3 things to do:

- make sure that the `squid` user is allowed to run crontab jobs (`crontab -l` should give no errors)
- enter the username and password in `ufdbUpdate` that you received when you purchased a license or received a trial license.
- choose an appropriate time at the end of the day and in the early morning to run `ufdbUpdate`

Edit the `ufdbUpdate` script to include the username and password that you received when the (trial) license was received:

```
$ vi /usr/local/squid/bin/ufdbUpdate
```

```
...
DOWNLOAD_USER=lic99999
DOWNLOAD_PASSWORD=aa22bb
```

Users that evaluate the URL database may use the `demoXX` username and password.

Test the update script with the verbose option:

```
# su - squid
$ /usr/local/squid/bin/ufdbUpdate -v
```

The output should be similar to:

```
new database downloaded:
-rw-r--r-- 1 root root 5121312 Dec 6 18:04 /tmp/urlfilterdb-latest.tar.gz
done.
```

To install the cron job, edit the crontab table of the user `squid` and add the appropriate lines:

```
$ crontab -e
```

To run the URL database update each day at 10:00 PM and 6:15 AM, add these two lines:

```
00 22 * * * /usr/local/squid/bin/ufdbUpdate
15 6 * * * /usr/local/squid/bin/ufdbUpdate
```

At this time, you may want to verify that the Squid housekeeping is also executed. Verify that the crontab has an entry to run “`squid -k rotate`” (see the squid manuals for more details). It is a common misconception that this command only rotates the logfile of Squid but it also does necessary housekeeping. Note that the Squid housekeeping must be done when there is a low load (e.g. at 03:00 AM).

5 Configuration

This chapter and chapter 7 and 8 describe the features and configuration syntax for ufdbGuard in detail. Chapter 9 describes the GUI for the features. It is recommended to read first chapters 5, 7 and 8 to get a better understanding of all features before one starts to use the GUI.

5.1 Know your Internet Usage Policy

Before one can start with the configuration of ufdbGuard, an internet usage policy must already be defined and state which web site categories are considered unwanted and therefore must be blocked by ufdbGuard. The HR department might be a good starting point to find out which categories of the database must be used to block access to parts of the internet.

NOTE: the default configuration of ufdbGuard blocks only adult, security, proxies, gambling and warez!

In addition, there is an option to define categories that are managed by the local administrator: *alwaysallow* and *alwaysdeny* to define URLs that should be allowed or denied according to the local policy. Section 7 explains on how to configure these categories.

It is recommended to start with the URL filter in the test mode. In this mode, sites are not blocked but only logged in the log file. An analysis of the log file may help in defining the appropriate Internet Usage Policy and to find out which sites should never be blocked (see also section 7.1). At last a free tip: to prevent a storm at the helpdesk or system administrator, it is advised to inform users about (change in) the implementation of a URL filter *before* it is implemented.

The ufdbGuard software suite includes a tool to analyse the behaviour of users (see section 11). This tool can also be used in determining or adjusting the Internet Usage Policy.

5.2 Automatic Improvements of the URL Database

Although the URL database is updated daily, it may happen that some web sites are not included in the URL database and therefore users might be able to visit inappropriate websites. UfdbGuard has a configuration option to collect a sample of these uncategorized domains and to upload them to URLfilterDB for inclusion in the database. This option is ON by default. Privacy is guaranteed since no identification of client, source or user is included, just the domain name is registered for categorization.

To *prevent* analysis of uncategorized URLs, the *analyse-uncategorised-urls* configuration option must be set to OFF. It is recommended to leave this option ON to receive more updates in the database. URLfilterDB has a policy to categorize URLs within 24 hours so that they are always included in the next day's URL database.

5.3 Proxy Tunnel Detection

Proxy tunnels are a security risk and it is strongly recommended to use detection of proxy tunnels. Enable proxy tunnel detection in the configuration file `ufdbGuard.conf` with the following line:

```
check-proxy-tunnel queue-checks
```

This option queues checks for proxy tunnels to be detected a few seconds later. It means that a proxy *can* be used but only for 1-2 seconds. Alternatively, proxy tunnels can be detected in an aggressive mode, where all https traffic is tested for proxies *before* access is given. The aggressive mode introduces some delays for https traffic and is therefore only recommended in extremely high security environments. If proxy tunnels are allowed, the value for `check-proxy-tunnel` can be `off` or `log-only`. All valid options are:

```

check-proxy-tunnel queue-checks      # recommended
check-proxy-tunnel aggressive
check-proxy-tunnel log-only
check-proxy-tunnel off

```

NOTE: when the “aggressive” detection method is used, the number of threads in the `ufdbguardd` daemon and the number of redirector processes must be increased to 64. Therefore, change in `squid.conf` the parameter `redirect_children` or `url_rewrite_children` to 64 and restart squid. To start the `ufdbguardd` daemon with 64 worker threads, the command line option `-w 64` must be used. To use this option, the variable `UFDB_OPTION` in `/etc/init.d/ufdb` must be set.

5.4 Control HTTPS Usage

Most websites that use HTTPS for legitimate business reasons use an SSL certificate that is signed by a well-known certificate authority and have a fully qualified domain name in the URL for maximum security and a clear identification of the website, while most websites that use HTTPS for other reasons, have self-signed SSL certificates and IP addresses instead of domain names. Access to HTTPS websites can be controlled with 2 options.

The following options are default in `ufdbGuard.conf`:

```

enforce-https-with-hostname on
enforce-https-official-certificate on

```

It is recommended to keep these options on to have a increased protection level against phishing sites and proxies. In case that a legitimate website uses an IP address in the URL or an SSL certificate that is not signed by a trusted authority, it is recommended to add this site to the locally trusted websites (see section 7.1).

Setting the above two options is not enough since there is not yet a category defined for it. The default configuration file has a category “security” that includes these options:

```

category security
{
    domainlist security/domains
    option      enforce-https-with-hostname on
    option      enforce-https-official-certificate on
    redirect    ...
}

```

Finally, include the category `security` into the ACLs (see section 5.6) to block https abuse.

5.5 Which HTTP Server to use for Redirection Messages

Whenever a website is blocked, Squid receives a redirection URL from `ufdbguardd`. This URL must point to a web server that can display and appropriate error message. Version 1.15 introduced a new lightweight http daemon with a built-in `URLblocked.cgi`: `ufdbhttpd`.

There are 3 options for serving redirection messages:

1. use `ufdbhttpd` on a non-privileged port on host `myhost.mylan`:
`http://myhost.mylan:8080/cgi-bin/URLblocked.cgi`
2. use the perl script `URLblocked.cgi` on your own internal web server:
<http://myhost.mylan/cgi-bin/URLblocked.cgi>
3. use `URLblocked.cgi` of `URLfilterDB`:
`http://www.urlfilterdb.com/cgi-bin/URLblocked.cgi`

Option 1 is preferred for all but very large environments. Option 2 is preferred for very large environments. You need to have a web server like apache with mod_perl enabled to implement option 2.

The default configuration file comes with option 3 preconfigured. If option 1 or 2 is used, the `redirect` statements must be changed accordingly. E.g., change the lines with

```
redirect http://www.urlfilterdb.com/cgi-bin/URLblocked.cgi?color=orange&...
```

into

```
redirect http://myhost.mylan:8080/cgi-bin/URLblocked.cgi?color=orange&...
```

ufdbhttpd is lightweight and can be installed on the same server where ufdbguardd is installed.

For option 2: the perl script `URLblocked.cgi` is included in the distribution in the directory `samples`. The perl script uses some images which are also in the `samples` directory and which need to be installed on the webserver. The reader is referred to the documentation of the used web server on how to install this perl script.

5.6 Main Configuration Settings ufdbGuard

Use your favorite editor to edit the configuration file and define which categories must be blocked.

```
$ vi /usr/local/squid/etc/ufdbGuard.conf
```

There are 5 sections with a comment 'EDIT THE NEXT LINE'. Find each section and change the configuration where needed.

The first section defines the locations of the log directory and the blacklist database directory. This section does not have to be changed if the initial choice of these locations during the configuration of ufdbGuard (see section 4.5) has not changed. The section looks like this:

```
# EDIT THE NEXT LINE FOR LOCAL CONFIGURATION
dbhome /usr/local/squid/blacklists
logdir /usr/local/squid/logs
```

The second section defines the IP address range of your local network. The section looks like this:

```
src allSystems {
    ip 10.0.0.0/8
}
```

The appropriate network subnet must be entered in this section. `10.0.0.0/8` and `192.168.0.0/16` are the most common values for this. Consult your network administrator for assistance.

The third section defines the usage and settings of ufdbhttpd, the lightweight http daemon:

```
http-server { port= 8080, interface= all, images="/usr/local/squid/images" }
```

If you don not use ufdbhttpd, then transform the line above into a comment (with a #).

The fourth and fifth sections are close to each other and define the list of categories to be blocked (one list for the systems with IP address defined in `allSystems` and one list for all other systems). Change the list of categories to be blocked. The default list of blocked categories contains the categories security, adult, proxies, gambling, violence and warez. The fourth section looks like this:

```
acl {
    allSystems {
        # EDIT THE NEXT LINE
        pass !security !adult !proxies !gambling !violence !warez any
    }
}
```

To block a category, it needs to be present with an exclamation mark (!) that is used as a blocking indicator. So to block the *adult* category, `!adult` must be present in the line that starts with `'pass'`. If you prefer to allow gambling, the definition `"!gambling"` must be removed.

At a site that only blocks security, adult and proxies, the section looks like this:

```
acl {
    allSystems {
        # EDIT THE NEXT LINE
        pass !security !adult !proxies any
    }
}
```

The fifth section is very similar to the fourth section and defines which categories to block for computer systems that are not part of `allSystems`.

5.7 Ensure Access to Internal and 3rd Party Websites

The domain name of your company may be included in the URL database of URLfilterDB. To ensure access to all own websites, the category *alwaysallow* should be configured (see section 7.1).

To prevent unhappy users, one should carefully examine which own sites and sites of 3rd parties are used for regular daily activities and make sure that these sites can be accessed without restriction. Therefore, it is recommended to run a few days in test mode (see section 5.9.1) and add sites of important 3rd parties to the category *alwaysallow* (see section 7.1).

5.8 Configure the Style of Messages

When a URL is prohibited to be visited, a message is displayed that access is forbidden. The size and background color can be set by the administrator.

The options for the background color are: orange (default), white, black, grey and red. The options for the font size of the message are: normal (default) and small.

To change the style of a message, edit the configuration file and change the default settings of all `redirect` rules.

```
$ vi /usr/local/squid/etc/squid.conf
...
redirect http://www.urlfilterdb.com/cgi-bin/URLblocked.cgi?admin=
%A&mode=default&color=orange&size=normal&clientaddr=%a&clientname=%n&clientuser=
%i&clientgroup=%s&targetgroup=%t&url=%u
...

```

Substitute the default value for a new value according to the options specified earlier in this section.

The default error message includes an explanation why the URL is blocked, the URL, the email address of the administrator and a link for more information. Alternatively the output can be configured to be very simple and just consist of the word "Forbidden" (in different languages) and the category of the URL in red. To use this style one should set the *mode* parameter to `simple-red`.

The *mode* parameter can have additional values specific for advertisements only. Valid values for *mode* are: transparent (default), noads, square, and cross. The transparent mode displays nothing, the noads mode displays "no ads", the square mode shows a grey square and the cross mode shows a transparent cross.

5.9 Configure Squid

To let Squid use the URL filter (in Squid terminology the URL filter is a *redirector* or a *URL rewriter*), the following 2 parameters must be added to the squid configuration file.

```
$ vi /usr/local/squid/etc/squid.conf
```

Add the following 2 lines for Squid 2.5:

```
redirect_program /usr/local/squid/bin/ufdbgclient -l /usr/local/squid/logs
redirect_children 16
```

Or add the following 2 lines for Squid 2.6 and newer:

```
url_rewrite_program /usr/local/squid/bin/ufdbgclient -l /usr/local/squid/logs
url_rewrite_children 16
```

NOTE: by default, the `ufdbguardd` cannot support more than 32 `ufdbgclient` processes so do not use more than 32 `redirect_children`. Please contact the support desk in case you think more children are required.

5.9.1 Test Mode

`ufdbGuard` has a test mode where internet access is not blocked and where the log file contains lines which web sites would have been blocked in normal mode.

In case that you want to use the test mode, add the `-T` option for `ufdbguardd`. The `/etc/init.d/ufdb` (might be elsewhere for your OS) file should then have a line like this:

```
UFDB_OPTIONS="-T"
```

In test mode, the log file of `ufdbguardd` contains lines like this:

```
TEST BLOCK adult www.sex.com
```

5.9.2 Configuration for 2 servers

In case that `ufdbguardd` runs on a different system then where Squid runs, you can specify the server name and port number with the following options for `ufdbgclient`:

```
-S servername -p 3977
```

The `squid.conf` file should then have a line like this:

```
redirect_program /local/squid/bin/ufdbgclient -S urlchecker01 -p 3977
```

5.10 Monitoring

`ufdbGuard` uses 2 log files and the system log to write messages to. The location of the log files depends on the choice that was made during the configuration phase (see section 4.5). The names of the log files are `ufdbguardd.log` and `ufdbgclient.log`. The location and name of the system log is OS-dependant and is usually `/var/log/messages` or `/var/adm/syslog.log`.

It is recommended that the log files are regularly inspected, either manually or automatically. Serious errors have a 5-star indicator (*****).

6 Start the URL Filter

To start the URL filter daemon:

```
# /etc/init.d/ufdb start
```

Now you can restart squid to use the URL filter:

```
# /etc/init.d/squid reload
```

or

```
# /etc/init.d/squid stop
```

```
# /etc/init.d/squid start
```

7 Exception Rules

In cases where exceptions to the categories of URLfilterDB are desired, an administrator can define 2 extra categories that are managed by the administrator and never by URLfilterDB.

7.1 Allow Extra Sites

A common case is that you want to ensure access to your own websites and websites of 3rd parties that are used for normal activities. To grant users access to the company websites, the URL `yourcompany.com` needs to be added to the category *alwaysallow*.

For universities that want to allow access to all other universities in the United States, a simple `edu` in the *alwaysallow* list. In the UK, only `ac.uk` needs to be included!

Edit the file that contains the extra sites that should always be allowed:

```
$ cd /usr/local/squid
$ vi blacklists/alwaysallow/domains
```

Add the appropriate URLs and always remove a leading `www.:`

```
yourcompany.com
news.google.com
google.com/news
```

Additional domains can be added according to the local internet usage policy. For example, if news should be blocked but access to CNN allowed, then `cnn.com` should be added also. Alternatively, when news should be blocked but Google news allowed, `news.google.com` and `google.com/news` should be added.

`ufdbGuard` only uses proprietary database files, so generate an `.ufdb` database file from the ASCII file with `ufdbGenTable`:

```
$ cd /usr/local/squid
$ bin/ufdbGenTable -n -t alwaysallow -d blacklists/alwaysallow/domains
```

The above command generates the file `blacklists/alwaysallow/domains.ufdb` and should be invoked each time that the domains file is changed. Then activate the category by editing the `ufdbGuard.conf` file and uncomment the category definition for *alwaysallow*. The configuration file should have the following lines:

```
category alwaysallow
{
    domainlist alwaysallow/domains
    redirect ...
}
```

Also add the category *alwaysallow* to the ACL `allSystems`. The ACL should then start with

```
pass alwaysallow !adult ...
```

Finally signal the `ufdbguardd` daemon about the new configuration:

```
# /etc/init.d/ufdb reconfig
```

7.2 Block Extra Sites

In case that you want to block access to a site that is not in any category, you can add this site to the category *alwaysdeny*. For example, `google.com` is not in any category but if you like to block access to this popular search engine, `google.com` can be included in the *alwaysdeny* category. Analogous to the

alwaysallow category, the domain (without leading `www.`) must be added to the category domains file, and the ACL `allSystems` must be extended.

Edit the file that contains the extra sites that should always be blocked:

```
$ cd /usr/local/squid
$ vi blacklists/alwaysdeny/domains
```

Add the appropriate URLs (always remove a leading `www.`):

```
google.com
```

`ufdbGuard` only uses proprietary database files, so generate an `.ufdb` file from the ASCII file with `ufdbGenTable`:

```
$ cd /usr/local/squid
$ bin/ufdbGenTable -n -t alwaysdeny -d blacklists/alwaysdeny/domains
```

The above command generates the file `blacklists/alwaysdeny/domains.ufdb` and should be invoked each time when the domains file is changed. Then activate the category by editing the `ufdbGuard.conf` file and uncomment the category definition for `alwaysdeny`. The configuration file should have the following lines:

```
category alwaysdeny
{
    domainlist alwaysdeny/domains
    redirect ...
}
```

Also, add the category `alwaysdeny` to the ACL `allSystems`. The ACL should then start with

```
pass alwaysallow !alwaysdeny !adult ...
```

Finally signal the `ufdbguardd` daemon about the new configuration:

```
# /etc/init.d/ufdb reconfig
```

7.3 Block Extra Sites – a more Advanced Example

If *parts* of a website need to be blocked, the method described in the previous section does not provide a solution. Suppose we allow users to watch CNN news but do not want them to look at the CNN news videos.

It was observed that the CNN videos are made available through the following URLs:

```
http://www.cnn.com/video
http://edition.cnn.com/video
http://vid.cnn.com
```

Since access to `www.cnn.com` is allowed and access to `www.cnn.com/video` is not, a *domain block* is not an option, but a so-called *url block* is. Therefore, in this example the above URLs need to be divided into 2 categories: those which can be blocked with domain blocks and those which can be blocked with url blocks.

The block referring to a domain goes into the file `.../alwaysdeny/domains`:

```
vid.cnn.com
```

and the blocks referring to a full URL go into the file `.../alwaysdeny/urls`:

```
cnn.com/video 1
edition.cnn.com/video
```

The `ufdbGenTable` command has an extra “-u” option to include the url blocks and the command to generate a new `.ufdb` file including all options becomes this:

```
$ cd /usr/local/squid/blacklists
$ ../bin/ufdbGenTable -n -t alwaysdeny -d alwaysdeny/domains -u alwaysdeny/urls
```

Do not forget to signal the `ufdbguardd` daemon about the new configuration:

```
# /etc/init.d/ufdb reconfig
```

8 Advanced Options

8.1 Blocking Adult Images produced by Search Engines

Search engines like Google, Yahoo and MSN have a capability to search for images and allow users to view adult images that can not be blocked in a simple way since the images come from Google, Yahoo and MSN themselves and in general one would not like to block all images from the search engines.

Google² and Yahoo offer a *safesearch*TM feature which blocks most adult images. `UfdbGuard` has the configuration parameter `safe-search` that enforces the safesearch policies of the search engines. The default value for the parameter is ON.

The `safe-search` feature enforces safe searches for the following search engines: A9, Alltheweb, Ask, Blinkx, Buscamundo, Dogpile, Excite, Foxnews, Google, Infospace, Live, Lycos, Metacrawler, Metaspy, MSN, Webcrawler, webpile and Yahoo.

8.2 Different Policies for Different Users

Suppose that `ufdbGuard` is used in a bank. The internet usage policy could be defined as: block sex, chat, dating, entertainment, finance, news, webmail. This policy can be appropriate for most users but not for staff working in a dealing room where access to news and finance-related sites is required. This section explains how to achieve this.

Always be careful with the order of rules and make sure that the more privileged user (groups) is defined first in the ACL.

8.2.1 Policy based on IP Address

If the dealing room has a separate IP subnet, the *dealingroom* policy can be defined in the following way in the `ufdbGuard` configuration file.

```
src dealingroom {
    ip 10.4.0.0/16      # in this example the dealingroom uses this subnet
}
```

¹ Note that there is no leading `www.` since the URL filter works internally with stripped URLs that do not contain a `www.` part.

² Google SafeSearch filtering is a trademark of Google.

```

acl {
  # more privileged users first
  dealingroom {
    pass !security !adult !warez any
  }
  allSystems {
    pass !security !adult !chat !dating !entertain !news !warez any
  }
  default {
    pass none
    # the following redirect is for the pseudo category 'none'
    redirect http://www.urlfiterdb.com/cgi-bin/URLblocked.pl?...
  }
}

```

8.2.2 Policy based on Username

Internet access policies can also be based on a list of usernames. In this example, a list of usernames is used to use the dealingroom policy. The SRC definition defines which users are members of the group *dealingroom*.

```

src dealingroom {
  userlist /usr/local/squid/etc/dealers
}

```

The file `/usr/local/squid/etc/dealers` should contain the usernames of all dealers. The final policy definition is the same as a policy based on IP address:

```

acl {
  # more privileged users first
  dealingroom {
    pass !security !adult !dating any
  }
  allSystems {
    pass !security !adult !chat !dating !entertain !news !webmail any
  }
  default {
    pass none
    redirect http://www.urlfiterdb.com/cgi-bin/URLblocked.pl?...
  }
}

```

CAVEAT: additional configuration is required to make Squid able to find out which users are using Squid. You may configure squid to use user authentication or you have to install `identd` on all PCs to support this feature. Please read the Squid documentation for more information and do not forget to use `acl foo ident REQUIRED`.

8.2.3 Policy based on UNIX Groupname

Internet access policies can also be based on a UNIX group. In this example, a groupname is used to use the dealingroom policy. In this case, the SRC definition defines that the group `dealer` represents the dealingroom.

```
src dealingroom {
    unix group dealer
}
```

The group `dealer` must be a valid UNIX group name. The final policy definition is the same as a policy based on IP address:

```
acl {
    # more privileged users first
    dealingroom {
        pass !security !adult !dating any
    }
    allSystems {
        pass !security !adult !chat !dating !entertain !news !webmail any
    }
    default {
        pass none
        redirect http://www.urlfilterdb.com/cgi-bin/URLblocked.pl?...
    }
}
```

CAVEAT: additional configuration is required to make Squid able to find out which users are using Squid. You may configure squid to use user authentication or you have to install `identd` on all PCs to support this feature. Please read the Squid documentation for more information and do not forget to use `acl foo ident REQUIRED`.

8.2.4 Policy based on Domain Name

Internet access policies can also be based on the domain name of a PC. In this example, the PCs in the dealingroom have a unique domain name that can be used to define a policy.

Let's assume that the dealingroom PCs have a name like `pc31.dealingroom.bank.com`, and then the `src` definition for the `dealingroom` group is as follows:

```
src dealingroom {
    domain dealingroom.bank.com
}
```

NOTE: To use this feature, the reverse name lookup must be enabled in `squid.conf`:

```
log_fqdn on
```

8.3 Multiple ACLs

In case that there are exceptions for (groups) of users, multiple ACLs will be used (see also the examples for a dealingroom in the previous sections).

The order of ACLs is important since the first ACL that matches a URL/user/IP will be used. The following example demonstrates this. Suppose there is an administration PC that should have access to all websites and that the PC has a fixed IP address: `10.2.3.4`. The configuration file should have the ACL for the administration PC *in front of* the ACL `allSystems`. Otherwise, the administration PC is considered part of `allSystems`!

```

src adminpc {
    ip 10.2.3.4
}
src allSystems {
    ip 10.0.0.0/8
}
acl {
    adminpc {
        pass any
    }
    allSystems {
        pass !security !adult !chat !dating !entertain !news !webmail any
    }
    default {
        pass none
        redirect http://www.urlfiterdb.com/cgi-bin/URLblocked.pl?...
    }
}

```

Note that the `redirect` statement is required because the pseudo-category 'none' is used.

8.4 Whitelisting

Whitelisting is used in case that users are only allowed to visit a predefined set of websites. In this case, the ACL for `allSystems` contains the categories *alwaysallow* and *none*. The ACL in the configuration file looks like this:

```

acl {
    allSystems {
        pass alwaysallow none
        # the following redirect is for the pseudo category 'none'
        redirect http://www.urlfiterdb.com/cgi-bin/URLblocked.pl?...
    }
    default {
        pass none
        redirect http://www.urlfiterdb.com/cgi-bin/URLblocked.pl?...
    }
}

```

Note that the extra `redirect` statement is required because the pseudo-category 'none' is used.

8.5 Extended Logging

`ufdbGuard` has 2 options for extended logging. The keyword `logblock` followed by `on` or `off` tells `ufdbGuard` whether to register blocked URLs in its logfile. The keyword `logall` followed by `on` or `off` tells `ufdbGuard` whether to register *all* URL verifications in its logfile.

Warning: `logall on` requires many resources and has a performance impact on `ufdbGuard`. Use this option with care and for short periods only.

8.6 Logfile Rotation

`ufdbGuard` rotates its logfile automatically whenever it grows beyond 200 MB. When the logfile is rotated, the file `ufdbguardd.log` to `ufdbguard.log.1` and recreates `ufdbguardd.log`. A maximum of 8 logfiles are kept.

On receipt of the USR1 signal, ufdbguardd also rotates the logfile. The most convenient way to do this is to use `/etc/init.d/ufdb rotatelog`, which takes care of sending the USR1 signal to the right process.

The maximum logfile size is configurable with a parameter in the configuration file. The following line sets the maximum size to 50 MB.

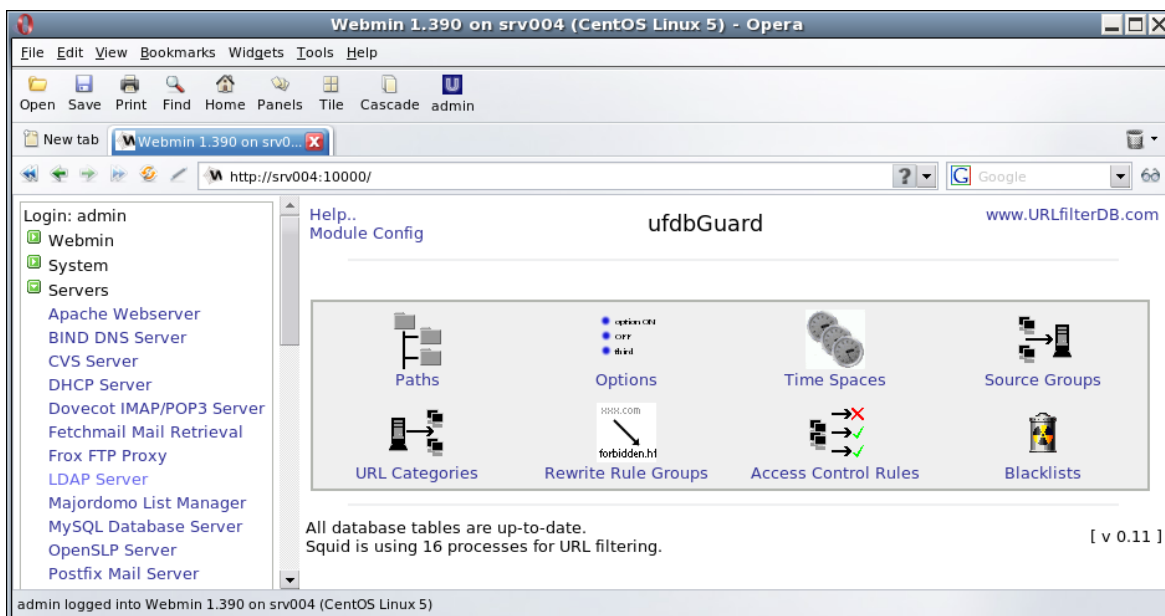
```
max-logfile-size 50000000
```

9 Web-based configuration

ufdbGuard can be configured easily by editing the configuration file `ufdbGuard.conf`. Alternatively, the web-based configuration can also be used. The web-based configuration is a module for webmin (see www.webmin.com). Expand the *Servers* in the list of webmin modules on the left pane. The ufdGuard module is at the bottom of the list of the Server modules.

On first usage of the ufdGuard module for webmin, a check is performed that Squid is using ufdGuard for URL filtering and offers the option to automatically adjust the configuration of Squid to do so.

After the initial check, the main ufdGuard configuration window appears (see the next figure). Always configure the main parameters first and Click on *Module Config* in the left upper corner. After the module configuration the other parameters can be defined.



main webmin/ufdbGuard configuration window

The main window offers the configuration of the following items.

Paths	define directories for the URL database and the log files
Options	define various options
Time Spaces	optionally define time slot rules for internet access
Source Groups	define user groups
URL Categories	a list of predefined URL categories which can be extended with locally defined URL categories (e.g. alwaysallow)
Rewrite Rule Groups	optionally define URL rewrite rules

Access Control Rules	define the ACLs: which user groups are blocked by which URL categories
Blacklists	Edit user-defined URL blacklists (e.g. alwaysallow)
View Log	A simple viewer that shows the last 2500 lines of the logfiles.

10 Performance Tuning

10.1 Upgrade C libraries

UNIX distributions that have a glibc 2.3.4³ or older are recommended to be upgraded. This is due to a bug in the regular expression matching subroutines in the standard C library which is fixed in glibc 2.3.5. On these older systems, ufdbguardd will work flawlessly but at the expense of a performance penalty since only one single thread is allowed to perform lookups based on regular expressions at any point in time. Since ufdGuard cannot distinguish version 2.3.4 from 2.3.5 but can distinguish version 2.3.x from 2.4, an upgrade to version 2.4 is recommended.

10.2 Squid performance

The following is recommended to improve the performance of Squid:

- use Linux 2.6 instead of earlier versions since the multithreading code in the libraries and kernel is much more efficient.
- use the `noatime` mount option for the file system with the cache. If `reiserfs` is used, also use the `notail` mount option.
- use squid 2.6.STABLE22 or newer and configure it to use `epoll` (`--enable-epoll`) or `kqueue` (`--enable-kqueue`). At the time of this writing versions 2.7 and 3.0 exist but there is not enough data available to make a recommendation about these versions.
- use a proper number of open files during the configuration phase of squid because at the time that `configure` is run, it is determined what the maximum number of open files can be during the runtime of squid. You may need to use the `ulimit` command and configure the kernel. There is no official guideline for a proper value for the number of open files, but you may find that `100+2.5*NUSERS` with a minimum of 1024, is appropriate.
- use a moderately sized disk cache; a very large cache might have a slightly larger cache hit ratio, but the housekeeping of the cache requires more memory and CPU resources. Note that a larger number of cached objects also requires more physical memory for the index.
- Use a moderately sized memory cache. Allow enough memory for the kernel's file system cache and remember that the configuration parameter `cache_mem` specifies only the amount of memory to be used for objects and the total process size is usually 2-3 times the amount of `cache_mem`.
- use more than one disk for the disk cache, use only one cache directory per disk and do not stripe unless you are using an advanced disk array with internal striping.
- on multi-processor systems based on Intel, disable hyperthreading; use only real CPU cores.
- do not forget to run `“squid -k rotate”` from cron as user `squid` because it also does important housekeeping of the cache. Perform the housekeeping on a moment when Squid is not used much, preferably in the middle of the night.

³ consult your system documentation on how to retrieve version information about the glibc library

- visit <http://wiki.squid-cache.org> for more tips.

10.3 Linux 2.6 performance

For large sites that have both Squid and URLfilterDB running on a system with Linux 2.6 and with 2 or more real CPU cores, additional performance can be gained by optimizing the CPU cache efficiency. Since squid is a very CPU intensive application, we reserve CPU 0 for squid. By configuring ufdbGuard to use the other CPUs, squid will automatically have exclusive access to CPU 0. On a system with Xeon processors and hyperthreading disabled, we reserve CPUs 0 for Squid to give it exclusive use of the memory cache of the Xeon processor. The remaining CPUs can be used by ufdbguarddd and the process is bound to these remaining CPUs by including the cpus keyword in the ufdbGuard.conf file.

By separating the processes over different CPUs with their own memory caches, the caches are used in an optimal way.

<i>system</i>	<i>for optimal performance, use</i>
2 simple CPUs	cpus 1
2 Xeon CPUs without hyperthreading	cpus 1
2 Xeon CPUs with hyperthreading	cpus 2,3
4 simple CPUs	cpus 1,2,3
1 dual core	cpus 1
2 dual core	cpus 2,3
1 quad core	cpus 2,3
dual quad core	cpus 4,5,6,7

10.4 Solaris performance

Use a multi-core system and use a processor set for Squid and disable interrupts for this processor set.

11 Analysis of User Behaviour

To learn more about which types of websites are visited by the users and how much bandwidth they use, the tool ufdbAnalyse is introduced in version 1.15.

ufdbAnalyse reads a Squid log file, strips all non-relevant information and uploads up to 100 MB of data to URLfilterDB for analysis. The stripped result file has no details about persons, passwords, session parameters or times, and the processing is done in compliance with our privacy policy (see section 14).

The support desk will send an email with the outcome of the analysis. The output contains for each URL category the #URLs, percentage of URLs, Kbytes and percentage of Kbytes. An example of the output is below.

The log files contain 51479 lines of which 2250 contain HTTP error codes. 49229 lines were processed for URLfilterDB categories.

Category	#URLs	%	KB	%
Adult	1935	4.0	78204	15.7
Audio & video	128	0.3	58207	11.7

Advertisements	2449	5.0	2296	0.5	
Chat	18	0.1	56	0.1	
Dating & Personals	190	0.4	4425	0.9	
Drugs	0	0.0	0	0.0	
Entertainment	6379	13.0	59174	11.9	
External Applications	0	0.0	0	0.0	
Finance & Investment	1623	3.3	12780	2.6	
Forums	152	0.3	817	0.2	
Gambling	119	0.3	482	0.1	
Games	413	0.9	2565	0.6	
Illegal	0	0.0	0	0.0	
Jobs	357	0.8	3042	0.6	
News	2055	4.2	22224	4.5	
Weblogs & private sites	882	1.8	5902	1.2	
Web Proxies	148	0.3	812	0.2	
Security violations	0	0.0	0	0.0	NOTE: cannot be detected offline
Shops	3733	7.6	32542	6.5	
Sports	813	1.7	6938	1.4	
Toolbars	23	0.1	290	0.1	
Travel	2586	5.3	21847	4.4	
Hacking & warez	9	0.1	89	0.1	
Violence & hate	0	0.0	0	0.0	
Web-based email	105	0.3	809	0.2	
Own domain	1556	3.2	3249	0.7	
Allowed sites	23556	47.9	183274	36.7	

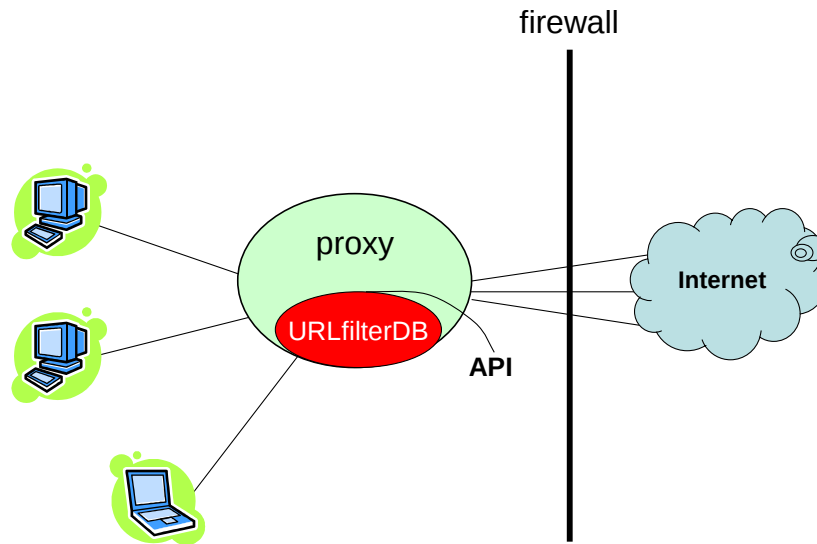
The `ufdbAnalyse` command uses options to specify the logfile, the own domain, your email address and your full name:

```
$ cd /usr/local/squid/bin
$ ./ufdbAnalyse -l ../logs/access.log -d mydomain.com -e "me@mydomain.com" -n "Kim Li"
```

12 Integration with 3rd Party Products

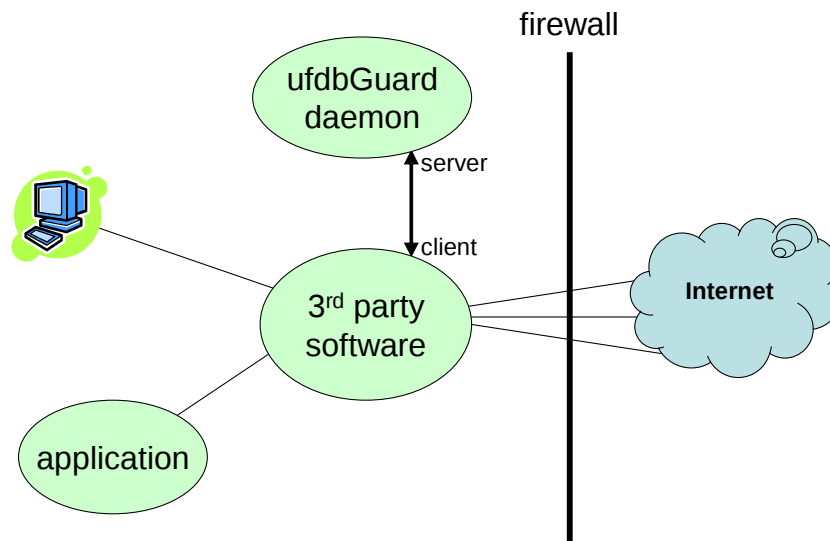
`ufdbGuard` also has an API that allows it to be easily integrated with 3rd party products. With the use of the API, you have access to the core functions of `ufdbGuard` and can perform URL verifications from any program written in C with the same speed: 50,000 URL verifications per second on an Intel Core 2 Duo CPU with 4 MB cache at 2.4 GHz.

The following diagram gives a simplified overview of how a 3rd party product could operate. In this example, a proxy is linked with the `URLfilterDB` library for extremely fast URL verifications due to the lack of any interprocess communication overhead.



the URLfilterDB library is part of the web proxy

Alternatively, the next diagram shows any 3rd party can copy the simple code of ufdbgclient and incorporate this in 3rd party software and act as a client to the ufdbguardd daemon.



ufdbGuard daemon processes URL verification requests

You may contact the support desk for additional information and licensing for 3rd parties using the URL database.

13 Frequently Asked Questions

ufdbGuard does not block

The most common reasons are either a configuration error (check `ufdbguardd.log`) or that the daemon is not active (verify with `ps -ef | grep ufdbguardd`).

Another common reason is that your trial license has expired.

Verify the log file for warning messages. The most serious errors have a 5-star indicator (*****).

I want to allow access to site *myfavoritesite.com*

See section 7.1. Do not forget to run `ufdbGenTable` after each change.

Can I define or add new categories ?

Yes. The `ufdbGuard` software suite includes a utility to convert a plain ASCII file into a URLfilterDB database file.

Can I use ufdbGuard with a free database?

The `ufdbGuard` software is free and can be used with free URL databases if the database is in `.ufdb` format or in an ASCII format.

Which URLs are in the database?

URLfilterDB does not disclose the content of their database. You are encouraged to test the database yourself to find out its effectiveness for your userbase. Please refer to section 13.1 for a more detailed description of what you may find in each URL category.

What does it cost?

The URL filter software is free. Prices for a subscription to the URL database are on the website and you can request a quote online. The prices are in EURO and we use a fair exchange rate for countries that prefer to be billed in US dollars. Non-profit and educational institutions receive a 40% discount.

Any other question

Please contact the support staff at support@urlfilterdb.com to answer any other question.

13.1 URL Categories

The URL database of URLfilterDB uses the following URL categories.

Ads

Advertisements, traffic trackers and web page counters.

Proxies

Sites that can be used to download content of other sites, URL rewriting sites and VPNs. Proxies are commonly used in an attempt to circumvent a URL filter.

Adult

Sites suitable for adults only (not only sexual content).

Warez

Illegal software, illegal software codes, hacker's sites.

Toolbars

A toolbar is an extension to a web browser that may violate your privacy or make private files public.

Illegal

Illegal acts

Violence

Violent behavior, aggressive sales of arms.

Gambling

Gambling.

Drugs

Hard drugs, soft drugs, penis enlargement drugs, medicines.

Webmail

Private email accessible with a web browser.

Dating

Love, dating, romantic poetry, and friend sites.

Chat

IRC and chat.

Forum

Sites where people exchange non-business information in a forum.

Private

Blogs and sites of private persons, private web disk, and private file stores.

Audio-Video

Audio and video streams (a TV station is usually in the entertainment category).

Sports

Sports.

Finance

Banks, insurance companies, stock markets, stock brokers

Jobs

Job applications

Games

Games and sites about games

Entertainment

Entertainment, lifestyle, hobby, arts, museums, food, fashion, electronic cards, magazines, horoscopes, desktop wallpapers, clip art, photos, portals, events, fan sites, meditation, baby-related, child sites, file sharing, religion, non-business private interest.

Shops

Shops, price comparisons, and auctions aimed at consumers (b2b is excluded).

Travel

Travel agencies, airliners, tourism sites, hotels, holiday resorts.

News

News and opinions.

External Applications

Web-based document editors, spreadsheet applications, desktops, groupware, etc.

Security

This is an administrative category to be able to enforce strict https usage options (see section 5.4).

Checked

URLs that are verified not to be part of any category and hence always allowed by the URL filter. This “hidden” category is used to track uncategorized URLs.

URLs may be part of 2 categories, e.g. www.usatoday.com is news while www.usatoday.com/sport is both news and sport. The nature of the content is more important than the strict definition, so an advertisement with a nude person is classified as adult rather than advertisement, and a forum about games is classified as games rather than a forum.

The general impression is also taken into account when a site is categorized. For example, most buyers at ebay.com are consumers rather than business users and therefore ebay.com is considered a shop for consumers and part of the shops category.

14 Privacy Policy

The privacy policy is defined in our Terms of Service document which can be downloaded from the website: www.urlfilterdb.com.

15 More Information

More information can be found on the internet at the following addresses.

URLfilterDB	www.urlfilterdb.com
Squid	www.squid-cache.org