

Last update: 15 Mar 2014

Motsognir – The mighty gopher server

User manual

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<http://sourceforge.net/projects/motsognir/>
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Introduction

Motsognir is a robust, reliable and easy to install open-source gopher server for Unix-like systems. Motsognir is a standalone daemon that supports server-side CGI applications and PHP scripts, is plainly compatible with UTF-8 filesystems, and is entirely written in ANSI C without external dependencies. It supports both IPv4 and IPv6 'out of the box', without requiring any special configuration.

Gopher is a distributed document search and retrieval network protocol designed for the Internet. Its goal is to function as an improved form of Anonymous FTP, enhanced with hyperlinking features similar to that of the World Wide Web.

I wrote Motsognir primarily for fun, but it appears to have become a strong gopher server implementation with some very nice points: easy to install, lightweight, portable, secure...

The Motsognir gopher server is meant to be used for small projects (like home servers), but should scale well on bigger architectures as well. All the configuration is done via a single configuration file, which has very reasonable defaults. That makes Motsognir easily maintainable, and allows the administrator to have full knowledge of what features are allowed/enabled on the server.

Installation

Installing Motsognir on your system is very easy on most systems. On the first place, you will have to build it. Assuming you have the basic GNU development tools installed (make, gcc), building Motsognir should be as straight-forward as:

```
# make
```

This will generate a 'motsognir' executable. You will need to install it on your system:

```
# make install
```

Now, all you have to do is edit your /etc/motsognir.conf file to make it suit your needs, and then launch motsognir:

```
# /usr/sbin/motsognir
```

Last note: If you wish to store the motsognir.conf file outside of /etc/, this is possible as well, but you will have to instruct motsognir about its location every time you run it:

```
# /usr/sbin/motsognir --config /my/custom/location/motsognir.conf
```

Configuration file

The Motsognir's configuration file is located by default in `/etc/motsognir.conf`, and should be readable by the user which will run the motsognir service. The configuration file is a plain-text file, containing some tokens with values. All lines beginning with the `"#"` character are ignored (and can be used to put some comments in the configuration file).

If any of the parameter is missing from the configuration file, or have an empty value, Motsognir will load a default value instead. Here is an example of a self-explanatory configuration file:

```
#####
#
#   CONFIGURATION FILE FOR THE MOTSOGNIR GOPHER SERVER   #
#
#####

## Server's hostname ##
# The hostname the gopher server is reachable at. This setting is
# mandatory, because the gopher protocol is heavily relying on
# self-pointing links.
GopherHostname=gopher.mydomain.net

## Gopher TCP port ##
# The TCP port on which the public Gopher server listens on.
# Usually, gopher servers are published on port 70. Default: 70.
GopherPort=70

## Root directory ##
# That's the local path to Gopher resources.
# The default path is /var/gopher/
GopherRoot=/var/gopher/

## Activate the verbose mode ##
# Here you can enable/disable the verbose mode. In verbose mode,
# Motsognir will generate much more logs. This is useful only in
# debug situations.
# Possible values: 0 (disabled) or 1 (enabled). Disabled by default.
Verbose=1

## CGI support ##
# The line below enables/disables CGI support. Read the manual
# for details.
# Possible values: 0 (disabled) or 1 (enabled). Disabled by default.
GopherCgiSupport=0

## PHP support ##
# There you can enable PHP support.
# Possible values: 0 (disabled) or 1 (enabled). Disabled by default.
GopherPhpSupport=0
```

```
## Run as another user ##
# If you start motsognir under a root account, you might want to configure
# it so it drops root privileges as soon as it doesn't need them anymore and
# switches to another user. This is recommended for increased security,
# unless you already run Motsognir as a non-root user.
# To do so, provide here the username of the user that Motsognir should run
# as. Default = no value.
RunAsUser=

## Default gophermap #
# If you wish that your server would use a default gophermap when displaying
# a directory that do not have a gophermap, you can specify here a path to
# the gophermap file you'd like to use.
DefaultGophermap=

## Caps.txt support ##
# Caps.txt is a specific file-like selector, which allows a gopher client to
# know more about the server's implementation (for example what the path's
# delimiter is, where is the server located, etc). When enabled, Motsognir
# will answer with caps-compatible data to requests for "/caps.txt".
# Caps support is enabled by default (CapsSupport=1).
CapsSupport=1

## Caps additionnal informations ##
# If Caps support is enabled, you can specify there some additional
# informations about your server. These informations will be served
# to gopher clients along with the CAPS.TXT data.
# Example:
# CapsServerArchitecture=Linux/i386
# CapsServerDescription=This is my server
# CapsServerGeolocationString=Dobrogoszcz, Poland
CapsServerArchitecture=
CapsServerDescription=
CapsServerGeolocationString=

# [End of file here]
```

Directory listings

As any other gopher server, Motsognir will present to gopher clients listings of available directories with a specific presentation. A specific requirement of the Gopher protocol is that it needs to provide a "type" for every resource. To detect that gopher type, Motsognir is simply basing on the file's extension. Below is a table containing all relations between gopher filetypes and real file extensions (at least that's the way Motsognir handles them):

Gopher type	Description	Files binded to this gopher type
0	Plain text file	*.txt
1	Directory listing	All directories
2	CSO search query	-
3	Error message	-
4	BinHex encoded text file	-
5	Binary (PC-DOS) archive file	-
6	UUEncoded text file	-
7	Search engine query	-
8	Telnet session pointer	-
9	Binary file	All files which doesn't fit into any other category
g	GIF image file	*.gif
h	HTML file	*.htm, *.html, *.gopherlink containing an "URL" selector
i	Informational message	-
I	Image file (other than GIF)	*.jpg, *.jpeg, *.png, *.bmp, *.pcx, *.ico, *.tif, *.tiff, *.svg, *.eps
s	Audio file	*.mp3, *.mp2, *.wav, *.mid, *.wma, *.flac, *.mpc, *.aiff, *.aac
P	PDF file	*.pdf
M	MIME encoded message	-
;	Video file	-

Then, once all filetypes present in a given directory are known, Motsognir will send a directory listing to the remote gopher client.

Gophermaps

There are situations when you would like to have the absolute control on how the server will display a directory. That's why Motsognir supports gophermaps. If Motsognir finds a file called "gophermap" (without any extension) in a directory, then it doesn't check the directory content, and simply outputs to the user the content of the gophermap. Note, that if you enable CGI and/or PHP support, Motsognir will also look for respectively gophermap.cgi and gophermap.php files. A gophermap file contains gopher entries as described by the RFC 1436. There's an example of a gophermap file (of course `<tab>` have to be replaced by real tabs):

```
iWelcome to my gopher server!<tab>fake<tab>null<tab>0
i<tab>fake<tab>null<tab>0
0About my server<tab>/about.txt<tab>mygopher.domain.net<tab>70
1Download<tab>/download<tab>mygopher.domain.net<tab>70
1A link to a friend's server<tab><tab>friend.domain.net<tab>70
hMy Website<tab>URL:http://mywebsite.com<tab><tab>
```

You can omit the server's address and server's port parts in your gophermap files (unless these are dynamically generated via CGI or PHP). If you don't specify a port, Motsognir provides the one your server is using (usually 70). If you don't specify a host, Motsognir provides your server's hostname. If you specify a relative selector (not beginning by a / character) instead of an absolute path, Motsognir sticks on the path of the currently browsed directory (but only if the host part is omitted, or pointing to your own server).

Therefore, a simpler form of the above gophermap could look like that:

```
iWelcome to my gopher server!
i
0About my server<tab>about.txt
1Download<tab>download
1A link to a friend's server<tab>friend.domain.net<tab>70
hMy Website<tab>URL:http://mywebsite.com
```

A special feature of Motsognir regarding gophermap files is the ability to generate a dynamic file listing inside a gophermap, using a special `%FILES%` directive. Example:

```
iWelcome to my gopher server!
i
0About my server<tab>about.txt
i
iBelow are all the files I have in this directory:
%FILES%
i
iEnjoy!
```

Motsognir provides you with a feature that allows you to set a server-wide gophermap to be

used by any directory that do not have its own gophermap. This is the 'default' gophermap. The default gophermap have to be declared in the Motsognir's configuration file, via the 'DefaultGophermap' directive.

CGI support

Motsognir supports CGI application, which allows to run custom scripts and applications interacting with the gopher client.

Let's see how CGI works.

Each time a client requests the URL corresponding to your CGI program, the server will execute it in real-time, then the output of your program will go more or less directly to the client. In fact, when it comes to answer to the client, the CGI application will output a gopher response (ie. a plain text file for file type #0, a directory listing for file type #1, etc...). This response will be caught by Motsognir, and forwarded to the gopher client as being the request's answer.

The Motsognir gopher server provides some information to the CGI application, by setting some environment variables. Note, that for security reasons – and unlike some other CGI implementations - Motsognir will never feed CGI scripts with any command-line parameters.

Motsognir will set several environment variables, which can be read by the called CGI script. Here is the complete list of these variables:

QUERY_STRING	The URL parameters, as provided by the client
SERVER_SOFTWARE	The name and version of the server software
SERVER_NAME	The server's hostname, DNS alias, or IP address, used for self-referencing links
GATEWAY_INTERFACE	The revision of the CGI specification, as supported by the server
REMOTE_ADDR	The IP address of the remote client
REMOTE_HOST	Same as REMOTE_ADDR
SCRIPT_NAME	Script name (for self-referencing links)
SERVER_PORT	The port number to which the request was sent

Note, that the QUERY_STRING variable will contain data inputed by the user. For type #7 items, it will contain the search string (on type #7 items, the gopher client usually asks the user for a query, using some kind of pop-up). For any other item's type, the QUERY_STRING variable will contain the part of the URL after the first "?" character (if any). For example, for a request on "gopher://mygopher.server.com/0/myprog.cgi?hellothere", the QUERY_STRING variable will contain the data "hellothere".

How to enable CGI support in Motsognir

If you would like to use CGI applications on your Motsognir server, you will have to enable CGI support in the Motsognir's configuration file (GopherCgiSupport = 1). You will also have to make sure that your CGI programs use the extension *.cgi.

PHP support

PHP is a scripting language that is very popular in the web world. You can use it with gopher, as well. Motsognir provides PHP support since its v1.0. The PHP concept is very similar to CGI (historically, PHP was in fact born as a set of custom CGI scripts), therefore you are advised to read the chapter about CGI first. Most of it applies to PHP, too.

The main difference is that instead of trying to directly execute PHP files, Motsognir will feed them to your system's php interpreter, and collect the result.

To pass data to your PHP application, you will have to rely on the QUERY_STRING environment variable.

How to enable PHP support in Motsognir

First of all, make sure that php is available on your system. Then, simply enable the parameter in Motsognir's configuration file (GopherPhpSupport = 1). Note, that all your php files must have the extension *.php to be recognized by Motsognir.

Example

Here below is a simple example of a PHP file that could be used as a dynamic (PHP) gophermap with Motsognir.

```
<?php
echo "iHello, this is a php-driven gophermap\tx\tx\t0\r\n";
echo "i\tx\tx\t0\r\n";
echo "iCurrent date is " . date(DATE_RFC822) . "\tx\tx\t0\r\n";
echo "iServer powered by {$_SERVER['SERVER_SOFTWARE']} \tx\tx\t0\r\n";
echo "i\tx\tx\t0\r\n";
echo "iGo back\t\t{$_SERVER['SERVER_NAME']} \t\t{$_SERVER['SERVER_PORT']} \r\n";

?>
```

Caps.txt support

Motsognir supports caps.txt since version 0.99.1. Caps.txt is a file-like selector, which allows a gopher client to know more about the server's gopher implementation (like what is the path delimiter character, how are structured server's paths, what the server's location is, etc).

Caps.txt support is configurable via the Motsognir's configuration file, using following tokens:

```
## Caps.txt support ##
# Caps.txt is a specific file-like selector, which allows a gopher client to
# know more about the server's implementation (for example what the path's
# delimiter is, where is the server located, etc). When enabled, Motsognir
# will answer with caps-compatible data to requests for "/caps.txt".
# Caps support is enabled by default (CapsSupport=1).
CapsSupport=1

## Caps additional informations ##
# If Caps support is enabled, you can specify there some additional
# informations about your server. These informations will be served
# to gopher clients along with the CAPS.TXT data.
# Example:
# CapsServerArchitecture=Linux/i386
# CapsServerDescription=This is my server
# CapsServerGeolocationString=Dobrogoszcz, Poland
CapsServerArchitecture=
CapsServerDescription=
CapsServerGeolocationString=
```

If you would like to have full access to what Motsognir sends in Caps.txt data, you might consider disabling the caps.txt support in Motsognir (CapsSupport=0), and simply host your own caps.txt file in the server's root. Here is an example of such custom caps.txt file:

```
CAPS
CapsVersion=1
ExpireCapsAfter=3600
PathDelimiter=/
PathIdentity=.
PathParent=..
PathParentDouble=FALSE
PathKeepPreDelimiter=FALSE
ServerSoftware=Motsognir
ServerSoftwareVersion=1.0
ServerArchitecture=Linux/i386
ServerDescription=This is my gopher server
ServerGeolocationString=Dobrogoszcz, Poland
```

Security considerations

Like with any unix daemon, there are a few security aspects that one should always keep in mind. Even the most carefully written programs can have bugs, some of which could be exploited by malicious persons. This is the reason why a system administrator should apply some security limitations even to simplest or most trusted daemons.

Running Motsognir as a non-privileged (non-root) user

A system daemon is usually not supposed to be run as root. In the (unlikely!) situation where an attacker would gain control over Motsognir, having the process running as an unprivileged user would greatly reduce the panel of harmful actions that could be performed on your server. However, there is a problem: you will usually want to run your gopher server under the standard TCP/70 port...and this being a low port requires the process to have root privileges. That's why Motsognir provides a special configuration option called 'RunAsUser'. This option allows to set the username we'd like Motsognir to use, and then, when Motsognir will be launched, it will first open ("bind") the listening port, and then drop its privileges and switch to the configured user.

Choose your file permissions wisely

If your Motsognir server runs as a non-privileged user, then it makes much sense to limit permissions on files that it serves. If the gopher server is not supposed to modify a file, this file should be set as 'read-only' and owned by root. This way, even if Motsognir becomes compromised, it still won't be able to modify these files.

Trap the daemon inside a chroot jail

The principle of a chroot jail is simple: run a process inside a 'virtualized' environment with a modified root path (for example, mapping a chroot / on /srv/gopher/). This technique is used to make it impossible for the process to access any file outside the chroot jail. A process can need some files, like shared libraries, or configuration files, to run properly. If chrooting a process, one would need to put all these files into the chroot as well (and the process' executable file itself!). To avoid these problems, Motsognir provides a 'chroot' configuration parameter that, once set, will make Motsognir run, load its configuration, and only then perform a chroot to the designated directory.

Note, that if you use any kind of dynamic files (*.cgi or *.php), you will need to take care to put all dependencies of these applications inside the chroot jail, too. This includes a shell at /bin/sh, all system libs that your applications might require, etc. Often a working /proc will also be needed.

Frequently asked questions (FAQ)

Q: Does Motsognir support special (nationalized) character sets in file names?

A: *Yes, it does. Motsognir implements support for UTF-8 encoded URLs, therefore it is able to handle any existing language. Note, that it requires the local server's filesystem to be using UTF-8 too, otherwise only the basic ASCII set will be handled.*

Q: Can I use Motsognir for commercial purpose, or adapt it to my own needs?

A: *Yes, you definitely can. Motsognir is released under the GNU/GPLv3 license, therefore everyone is free to use it, modify it, and even sell it. However, you can't claim that you are the author of this software, and you must provide the source code of any modification you do on it (and you can't EVER drop the GPL licensing). Note, that if you add any feature or fix to Motsognir, I would be happy to add your code to the official release.*

Q: Is there any way to run server-side applications on Motsognir?

A: *Motsognir supports executable CGI scripts, which allows to run custom server-side scripts.*

Q: What's the maximum file size that Motsognir can serve?

A: *Motsognir itself can serve files which are up to 8 exbibytes (EiB) big. However, there are chances that your filesystem will limit you much sooner (for example EXT3 supports files up to 2 TiB of size, while EXT4 supports files up to 16TiB).*

Q: What does "Motsognir" stand for?

A: *In Norse mythology, Mótsognir is the father of the Dwarves. Mótsognir is the creation of Odin and his brothers, Vili and Vé, who fashioned him out of Ymir's blood and bones in the form of a maggot. He got a roughly humanoid appearance and a human-like intelligence, which the rest of the Dwarves later inherited. (source: wikipedia)*

Q: Does Motsognir support the HTTP protocol?

A: *No. Motsognir is a gopher server. Gopher is a protocol different from HTTP. However, if you send by mistake a HTTP request to Motsognir (for example using a URL like `http://yourserver:70/`), he will politely answer to you with a HTTP error message, explaining what the mistake was.*

Q: Is this a real 'FAQ'?

A: *No, I totally made up most of these questions. If you'd like to know more, feel free to ask me directly.*

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