# Administración de archivos

## con

# **Midnight Commander**

Trabajo Práctico Curso Administración GNU/Linux Nivel I UADER - GUGLER Guillermo Hertel <u>guillermohertel@yahoo.com.ar</u> Julio de 2012

Copyright (C) 2012 HERTEL GUILLERMO JAVIER Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.3 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

## Índice de contenido

Introducción	4
Sobre Midnight Commander (MC)	4
Instalación	4
Ejecución y visión general de la aplicación	5
Navegar por el sistema de archivos	6
Opciones de visualización y algunas configuraciones	7
Listado	7
Vista rápida	8
Información	9
Vista en Árbol	10
Ordenar	.10
Filtro	11
Trabajo con archivos	11
Creando directorios - F7	11
Copiar archivo/s – F5	12
Renombrar/mover - F6	13
Borrar - F8	14
Buscar Archivos	15
Permisos y Dueño	16
Visualizar y Éditar textos – F3 y F4	16
Conclusión	17
Fuentes de información:	17
GNU Free Documentation License	.18

## Introducción

El presente trabajo práctico tiene como objetivo dar a conocer al lector de manera informativa esta aplicación, lejos de cubrir todas las utilidades que Midnight Commander permite, se describe como se realizan algunas de estas operaciones básicas en el manejo de archivos, como son las de copiar, mover, borrar, etc.

Esta pequeña guía se realizó principalmente con la orientación de la ayuda y operación misma de Midnight Commander.

## **Sobre Midnight Commander (MC)**

MC es un administrador de archivos con licencia GNU. Está aplicación que corre en modo texto te permite trabajar en consola o en una terminal de xwindow.

Además de permitir entre otras cosas buscar, copiar, mover, eliminar archivos y directorios, cuenta también con un visor y editor de texto plano.

Puede ejecutar comandos, como así también permitir conexiones ssh y ftp.

La última versión estable liberada al momento es: Midnight Commander v4.8.1.3 (stable release).

Para más información la página oficial es www.midnightcommander.org

## Instalación

En Debian luego de entrar a la consola o terminal como root escribimos:

apt-get install mc (enter)

## Ejecución y visión general de la aplicación

Para ejecutar la aplicación estando en consola escribimos:

### mc (enter)

Izquierdo Archivo Utilidades	Opciones	Derech	0 (ato (patwork)			[A]>
<pre>/ n Nombre //bin //boot //dev //etc //bin /lost+found /media /mnt /opt /proc /root /sbin /selinux /srv /sys /tmp //usr /var @initrd.img @vmlinuz</pre>	Tamaño         fecha I           4096         4 sep           3280         24 jun           4096         13 ene           12288         19 dic           16384         4 sep           4096         12 mar           4096         23 jun           4096         23 jun           4096         20 may           4096         21 jul           4096         23 jun           4096         21 jul           4096         24 jun           4096         24 jun           4096         4 sep           0         24 jun           4096         4 sep           0         24 jun           4096         4 sep           0         24 jun           4096         4 sep           28         4 sep           25         4 sep           25         4 sep	(^)>> Modifi 2011 22:41 22:42 13:58 2011 2011 2011 2011 2011 2011 2011 2011 22:41 01:09 00:20 2010 2011 22:41 2010 2010 2010 2011	<pre>/etc/network 'n / /if-down.d /if-post-down.d /if-pre-up.d /if-up.d /run interfaces interfacesk</pre>	Nombre	Tamaño DIR-ANT 4096 4096 4096 277 277	. [^]≻ fecha Modifi 24 jun 22:42 3 mar 2010 3 mar 2010 3 mar 2010 16 nov 2011 24 jun 22:41 4 sep 2011 20 nov 2011
/bin	_ 1201M/0122M (	124)	DIR-ANT		1201M/	(0122M (12%)
Ayudita: Para examinar un archivo RPM ba	sta pulsar <int< th=""><th>ro&gt; sob</th><th>re él.</th><th></th><th>()//</th><th>9123M (13%) -</th></int<>	ro> sob	re él.		()//	9123M (13%) -
guille@debian:/\$ 1Ayuda 2Menú 3Ver 4Ed	itar <mark>5</mark> Copia	ar	6RenMov 7Mkg	dir <mark>8</mark> Borrar	9 <mark>Menú</mark>	[^] 10 <mark>Salir</mark>
						· · · · · · · · · · · · · · · · · · ·

La pantalla consistente en dos paneles nos muestra el sistema de ficheros y nos posibilita visualizar al mismo tiempo en cada panel un directorio y su contenido.

En la parte superior de la pantalla se encuentra el menú y en la inferior las operaciones que se pueden realizar con las teclas de función, como por ejemplo activar la ayuda al presionar la techa (F1). Por sobre estas se encuentra la linea de comandos donde MC ejecuta el comando que ingresemos y la "Ayudita" donde se ofrece una descripción o sugerencia de como realizar alguna operación.

## Navegar por el sistema de archivos

Al ingresar a la aplicación el cursor nos muestra que estamos posicionados en la linea de comandos.

Para activar el menú: (además de con el mouse) se activa con la tecla (F9)y con las teclas de dirección (izq, der, arriba, abajo) nos desplazamos por estos.

Con la tecla Esc (escape) volvemos a la linea de comandos.

Presionando la tecla Tab nos posiciona en uno de los paneles el cual nos permite con las teclas de dirección desplazarnos por el contenido del directorio que muestra, también podemos utilizar las teclas inicio y fin, presionando enter sobre el directorio resaltado nos muestra el contenido de este, para regresar al directorio padre ir al principio de la lista con la tecla inicio y presionar enter en el directorio (/..). Al presionar seguidamente la tecla tab nos podemos desplazar desde un panel a otro.

Puede resultar útil las siguientes combinaciones de teclas:

Presionando la combinación Alt + c podremos ingresar directamente la ruta del directorio a visualizar.

Con Alt + s podremos buscar un archivo o directorio dentro del panel activo, la aplicación queda esperando el tipeo de caracteres que coincidan con el archivo o directorio, llevando el cursor al que coincida.

También es posible visualizar los archivos comprimidos como por ejemplo los tar.gz, al presionar enter sobre el archivo nos mostrará su contenido.

## **Opciones de visualización y algunas configuraciones**

## Listado

Bueno es tener en cuenta que podemos modificar la visualización de los paneles, tanto en el Menú Izquierdo como en el Derecho tenemos distintas opciones. Al presionar F9 - I - L (selecciona la opción Listado del menú izquierdo) nos muestra una pantalla donde podemos configurar el tipo de listado que deseamos obtener en el panel izquierdo.



Nota: Con las teclas de dirección se recorre las opciones y con la tecla de espacio se puede seleccionar alguna opción.

### Vista rápida

La siguiente opción de los menús de paneles llamada vista rápida permite visualizar en un panel el contenido del archivo del otro panel en el que esta posicionado el cursor.

En el ejemplo de la siguiente imagen se selecciono la vista rápida en el panel derecho y en el izquierdo con las flechas de dirección se esta posicionado en un archivo de texto plano de configuración de red (/etc/network/interfaces) el cual se puede observar su contenido.

Izquierdo Archivo Utilidades	Opciones Derech	o ^
<pre>/-tc/network 'n Nombre / /if-down.d /if-post-down.d /if-pre-up.d /if-up.d /run interfaces interfacesok</pre>	. [^] > Tamaño fecha Modifi DIR-ANT 24 jun 22:42 4096 3 mar 2010 4096 3 mar 2010 4096 3 mar 2010 4096 16 nov 2011 4096 24 jun 22:41 277 4 sep 2011 277 20 nov 2011	Archivo: interfaces Línea 1 Col 0 100% # This file describes the network interfaces available on you r system # and how to activate them. For more information, see interfa ces(5). # The loopback network interface auto lo iface lo inet loopback
		# The primary network interface allow-hotplug ethO iface ethO inet dhcp
		k
⊥interfaces Avudita: iEl meior VES! Al <entrar> en u</entrar>	— 1198M/9123M (13%) — un archivo comprimido s	e ve su contenido.
guille@debian:/etc/network\$ 1 <mark>Ayuda 2</mark> Menú 3 <mark>Ver 4</mark> Ec	litar <mark>5</mark> Copiar	6RenMov 7Mkdir 8Borrar 9Menú 10Salir

## Información

La siguiente opción de los menús de paneles llamada información permite visualizar en un panel información detallada del archivo/directorio del otro panel en el que esta posicionado el cursor.



## Vista en Árbol

La siguiente opción de los menús de paneles llamada **árbol** permite visualizar en un panel información en forma de árbol de directorios, seleccionando con las teclas de dirección un directorio y presionando la tecla enter en el otro panel muestra su contenido. Con la tecla F3 borra de la figura del árbol ese directorio. Con la tecla F2 actualiza la vista de ese directorio.



### Ordenar

La siguiente opción de los menús de paneles llamada Ordenar permite visualizar el contenido del panel ordenado según el criterio seleccionado en la pantalla que a continuación se muestra. La selección se realiza con la tecla espacio y dando enter en aceptar. Para trasladarse en las opciones con las teclas de dirección y con la tecla Tab.



### Filtro

La siguiente opción de los menús de paneles llamada filtro puede utilizarse para visualizar en un panel información filtrada según algún criterio, como por ejemplo al introducir \*.png se mostrara en este panel los archivos que cumplan con esta condición, ademas de los directorios y enlaces del mismo.

Filtro	
Teclee la expresión para filtrar nombres de archivo	
*.png	[^]
[< Aceptar >] [ Cancelar ]	

## Trabajo con archivos

Las siguientes operaciones se pueden realizar acudiendo al menú archivo, o presionando las teclas de función que describe la barra inferior.

### **Creando directorios - F7**

Comencemos con un ejemplo de creación de un directorio de prueba llamado en este caso "practica", nos posicionamos dentro del directorio donde deseamos crearlo y presionando F7 nos despliega una ventana donde solicita que tecleemos el nombre del directorio a crear, luego aceptar para concluir.



### **Copiar archivo/s – F5**

Creo que una de las funciones mas utilizadas puede ser esta, siendo muy sencilla de realizar en mc, una vez que sabemos desplazarnos por la estructura de directorios, ya que para realizar un copia basta con posicionarse en el archivo a copiar y presionar F5, desplegándose una ventana donde nos solicita el lugar de destino y con presionar aceptar se completa la operación, aquí lo interesante y práctico es que toma como destino por defecto el directorio que se visualiza en el otro panel, así que antes de comenzar a copiar lo recomendable es que en un panel se busque el directorio a donde se copiará (destino) y en el otro se seleccione el archivo/directorio a copiar.

Como ejemplo vamos a realizar la copia del archivo sources.list que se encuentra en /etc/apt/ en el directorio "practica" creado en el punto anterior, para esto en el primer panel procedemos a buscar el archivo a copiar y en el segundo nos posicionamos dentro del directorio "practica" que será el lugar donde se copiará.

IZquierdo Archivo Otitidades	operones	Derec				
r< /etc/apt			≻ır<— ~/practica			[^]≻ <sub>1</sub>
'n Nombre	Tamaño fe	cha Modifi	i  'n	Nombre	Tamaño	fecha Modifi
/	DIR-ANT 29	jun 22:08	8  /		DIR-ANT	29 jun 22:21
/apt.conf.d	4096 8	sep 201	1			
/preferences.d	4096 25	ene 2011	1			
/sources.list.d	4096 8	sep 201	1			
/trusted.gpg.d	4096 25	ene 2011	1			
listchanges.conf	99 4	sep 201:	1			
secring.gpg		sep 201:	1			
sources.list	1045 31	may 01:0	1			
sources.list.save	1044 30	) may 23:40	0			
sources.list~			1			
trustdb.gpg	1200 4	sep 201:	1			
trusted.gpg	11255 8	sep 2013	1			
trusted.gpg~			1			

Presionamos la tecla de función F5, nos despliega una ventana con opciones por defecto.

	Copiar
Copiar archivo "sources.list"	aplicando la máscara:
*	
	[x] Usando patrones shell
a:	
/home/guille/practica/	
[ ] seguir enLaces	[ ] entrar en subDirectorios
[x] Preservar atributos	[ ] enlaces simbólicos Estables
[< Aceptar >]	[ en 2º planO ] [ Cancelar ]

Solo resta aceptar para concluir con la operación requerida en el ejemplo.

Izquierdo Archivo Utilidades	Opcior	nes	Derect	10			
<pre>/etc/apt</pre>			—.[^]≻	∣r≪— ~/practica –			[^]> <sub>]</sub>
'n Nombre	Tamaño	fecha	Modifi	'n	Nombre	Tamaño fe	echa Modifi
/	DIR-ANT	29 ju	n 22:08	/		DIR-ANT 29	9 jun 23:02
/apt.conf.d	4096	8 se	p 2011	sources.list		1045 3	1 may 01:01
/preferences.d	4096	25 en	e 2011				
/sources.list.d	4096	8 se	p 2011				
/trusted.gpg.d	4096	25 en	e 2011				
listchanges.conf	99	4 se	p 2011				
secring.gpg		4 se	p 2011				
sources.list	1045	31 ma	y 01:01				
sources.list.save	1044	30 ma	y 23:40				
sources.list~		4 se					
trustdb.gpg	1200	4 se	p 2011				
trusted.gpg	11255	8 se	p 2011				
trusted.gpg~		4 se					

Para seleccionar mas de un archivo podemos hacerlo con la tecla insert.

### **Renombrar/mover - F6**

Para mover un archivo de un directorio a otro lo seleccionamos en un panel y al apretar F6 lo moverá al directorio visualizado en el otro panel. Similar a copiar con la diferencia de que deja de existir en donde estaba.

Si lo que deseamos es renombrarlo lo que podemos hacer es completar la ruta modificando el nombre, como ejemplo podemos modificar el nombre del archivo sources.list que teníamos en el directorio practica renombrandolo como sources.list.copia lo cual deberíamos completar en el cuadro de dialogo de la siguiente forma:



Luego de aceptar el archivo ha quedado renombrado

### **Borrar - F8**

Nunca está demás recomendar cautela al utilizar esta opción, y sobre todo tener en cuenta con el tipo de usuario con el que estamos trabajando, ya que si lo hacemos como root podríamos lamentar el borrado accidental de algún archivo.

Dicho esto la eliminación de archivos se realiza luego de seleccionar el o los archivos a borrar y luego se presiona la tecla F8, como ejemplo vamos a eliminar el archivo sources.list.copia del ejemplo anterior, lo seleccionamos, presionamos F8 y nos pedirá confirmación a través de un mensaje.



Cabe destacar que esta confirmación la solicita si está configurada para la misma, siendo recomendable que este activada, lo podemos chequear dirigiéndose a el menú -Opciones - Confirmación, de lo contrario borrara el/los archivos sin más.

	Confirmación
[x] [×] [×] [×]	confirmar eLiminación confirmar sObrescritura confirmar Ejecución confirmar Salida confirmar eliminación de Favoritos
	[< Aceptar >] [ Cancelar ]

### **Buscar Archivos**

Otra de las utilidades que dispone esta aplicación es la de realizar una búsqueda de archivos para lo cual debemos ir al Menú Utilidades - buscar archivos.

Como ejemplo vamos a buscar el archivo "interfaces", como podemos ver en el siguiente cuadro de dialogo, estando posicionados en el directorio raíz se va al menú utilidades/buscar archivos.



Al aceptar el anterior cuadro nos va a mostrar una pantalla con los archivos encontrados en el cual nos podemos desplazar con las teclas de cursor y al darle enter nos va a llevar en el panel al lugar del mismo. Cabe destacar que admite el uso de comodines, en este ejemplo también se hubiera podido poner \*interfa\*, Para otro tipo de búsqueda como por ejemplo de un paquete deb podría colocarse \*.deb, etc.

### Permisos y Dueño

En el caso de ser necesario de cambiar Dueño o permisos en el menú archivo están las opciones para cambiar permisos, otra para cambiar dueño y otra llamada cambiar dueño y permisos que posibilita en la misma ventana cambiar ambos.



Para cambiar estos luego de ingresado en la ventana se puede realizar presionando la letra correspondiente y en dueño/grupo al presionar enter nos despliega opciones de los mismos.

## Visualizar y Editar textos – F3 y F4

Otra de las útiles opciones que cuenta Midnight Commander es la de poder visualizar textos y poder editarlos también de acuerdo a lo que requiera el usuario basta con seleccionar el archivo de texto y presionar F3 o F4 para poner el visor o editor en marcha respectivamente.

## Conclusión

Creo que al dar los primeros pasos en consola las operaciones mas comunes que se realizan con archivos o directorios pueden resultar un poco complicadas, o al menos por cuestiones de sintaxis o falta de experiencia algo lentas, es aquí donde Midnight Commander puede ser de gran ayuda.

Es una aplicación pequeña en tamaño, rápida y fácil de instalar, así como también veloz en su ejecución, y al no depender de la utilización de un gestor de ventanas su utilización consume pocos recursos.

Por otro lado creo que esta aplicación por su funcionalidad puede serle útil a todo tipo de usuario, tanto a principiantes como a experimentados.

## Fuentes de información:

Ayuda de Midnight Commander

Paginas del manual: man mc

Página oficial <u>www.midnight-commander.org</u>

http://es.wikipedia.org/wiki/Midnight Commander

Las Capturas de pantallas fueron realizadas a Midnight Commander versión 4.7.0.9.

### **GNU Free Documentation License**

Version 1.3, 3 November 2008

#### 0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document "free" in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or noncommercially. Secondarily, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of "copyleft", which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License in order to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference.

### 1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The "Document", below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as "you". You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A "Modified Version" of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A "Secondary Section" is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or authors of the Document to the Document's overall subject (or to related matters) and contains nothing that could fall directly within that overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them. The "Invariant Sections" are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The "Cover Texts" are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License. A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A "Transparent" copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not "Transparent" is called "Opaque".

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or PDF produced by some word processors for output purposes only.

The "Title Page" means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, "Title Page" means the text near the most prominent appearance of the work's title, preceding the beginning of the body of the text.

The "publisher" means any person or entity that distributes copies of the Document to the public.

A section "Entitled XYZ" means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here XYZ stands for a specific section name mentioned below, such as "Acknowledgements", "Dedications", "Endorsements", or "History".) To "Preserve the Title" of such a section when you modify the Document means that it remains a section "Entitled XYZ" according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License.

#### 2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or noncommercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies.

#### 3. COPYING IN QUANTITY

If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

If you publish or distribute Opaque copies of the Document numbering more than 100, you must either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document.

#### 4. MODIFICATIONS

You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

- A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any, be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission.
- B. List on the Title Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement.
- C. State on the Title page the name of the publisher of the Modified Version, as the publisher.
- D. Preserve all the copyright notices of the Document.
- E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices.
- F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below.
- G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document's license notice.
- H. Include an unaltered copy of this License.
- I. Preserve the section Entitled "History", Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled "History" in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence.
- J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the "History" section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission.
- K. For any section Entitled "Acknowledgements" or "Dedications", Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein.
- L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles.
- M. Delete any section Entitled "Endorsements". Such a section may not be included in the Modified Version.
- N. Do not retitle any existing section to be Entitled "Endorsements" or to conflict in title with any Invariant Section.
- O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their titles to the list of Invariant Sections in the Modified Version's license notice. These titles must be distinct from any other section titles.

You may add a section Entitled "Endorsements", provided it contains

nothing but endorsements of your Modified Version by various parties--for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25 words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity for or to assert or imply endorsement of any Modified Version.

#### 5. COMBINING DOCUMENTS

You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work.

In the combination, you must combine any sections Entitled "History" in the various original documents, forming one section Entitled "History"; likewise combine any sections Entitled "Acknowledgements", and any sections Entitled "Dedications". You must delete all sections Entitled "Endorsements".

#### 6. COLLECTIONS OF DOCUMENTS

You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow this License in all other respects regarding verbatim copying of that document.

#### 7. AGGREGATION WITH INDEPENDENT WORKS

A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an "aggregate" if the copyright resulting from the compilation is not used to limit the legal rights of the compilation's users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document's Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate.

#### 8. TRANSLATION

Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

If a section in the Document is Entitled "Acknowledgements", "Dedications", or "History", the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title.

#### 9. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, or distribute it is void, and will automatically terminate your rights under this License.

However, if you cease all violation of this License, then your license from a particular copyright holder is reinstated (a) provisionally, unless and until the copyright holder explicitly and finally terminates your license, and (b) permanently, if the copyright holder fails to notify you of the violation by some reasonable means prior to 60 days after the cessation.

Moreover, your license from a particular copyright holder is reinstated permanently if the copyright holder notifies you of the violation by some reasonable means, this is the first time you have received notice of violation of this License (for any work) from that copyright holder, and you cure the violation prior to 30 days after your receipt of the notice. Termination of your rights under this section does not terminate the licenses of parties who have received copies or rights from you under this License. If your rights have been terminated and not permanently reinstated, receipt of a copy of some or all of the same material does not give you any rights to use it.

#### 10. FUTURE REVISIONS OF THIS LICENSE

The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See http://www.gnu.org/copyleft/.

Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License "or any later version" applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation. If the Document does not specify a version as a draft) by the Free Software Foundation. If the Document specifies that a proxy can decide which future versions of this License can be used, that proxy's public statement of acceptance of a version permanently authorizes you to choose that version for the Document.

#### 11. RELICENSING

"Massive Multiauthor Collaboration Site" (or "MMC Site") means any World Wide Web server that publishes copyrightable works and also provides prominent facilities for anybody to edit those works. A public wiki that anybody can edit is an example of such a server. A "Massive Multiauthor Collaboration" (or "MMC") contained in the site means any set of copyrightable works thus published on the MMC site.

"CC-BY-SA" means the Creative Commons Attribution-Share Alike 3.0 license published by Creative Commons Corporation, a not-for-profit corporation with a principal place of business in San Francisco, California, as well as future copyleft versions of that license published by that same organization.

"Incorporate" means to publish or republish a Document, in whole or in part, as part of another Document.

An MMC is "eligible for relicensing" if it is licensed under this License, and if all works that were first published under this License somewhere other than this MMC, and subsequently incorporated in whole or in part into the MMC, (1) had no cover texts or invariant sections, and (2) were thus incorporated prior to November 1, 2008.

The operator of an MMC Site may republish an MMC contained in the site under CC-BY-SA on the same site at any time before August 1, 2009, provided the MMC is eligible for relicensing.

#### ADDENDUM: How to use this License for your documents

To use this License in a document you have written, include a copy of

the License in the document and put the following copyright and license notices just after the title page:

Copyright (c) YEAR YOUR NAME. Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.3 or any later version published by the Free Software Foundation; with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts. A copy of the license is included in the section entitled "GNU Free Documentation License".

If you have Invariant Sections, Front-Cover Texts and Back-Cover Texts, replace the "with...Texts." line with this:

with the Invariant Sections being LIST THEIR TITLES, with the Front-Cover Texts being LIST, and with the Back-Cover Texts being LIST.

If you have Invariant Sections without Cover Texts, or some other combination of the three, merge those two alternatives to suit the situation.

If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.