

# Utilización y Administración avanzada de sistemas GNU/Linux y aplicaciones Software Libre para estudiantes universitarios

## Configuración de plataforma LAMP - Páctica

David Vaquero Santiago

**Utilización y Administración avanzada de sistemas GNU/Linux y aplicaciones Software Libre para  
estudiantes universitarios** Configuración de plataforma LAMP - Páctica  
por David Vaquero Santiago

Copyright (c) 2007 Copiar Pegar Digital S.L., David Vaquero Santiago <pepesan\_mall@yahoo.es>.

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 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".

Historial de revisiones

Revisión 1.0 11-04-2007 Revisado por: David Vaquero Santiago

# Tabla de contenidos

<b>1. Introducción a la Instalación de LAMP</b>	<b>1</b>
1.1. Introducción	1
<b>2. Configuración de Servicios LAMP</b>	<b>2</b>
2.1. Configuración de un Servidor DNS	2
2.2. Configuración de un dominio DNS	2
<b>3. Instalación de LAMP</b>	<b>4</b>
3.1. Instalación de una LAMP en OpenSuse 10.2	4
3.2. Configuración de Mysql	23
3.3. Instalación y configuración de PhpMyadmin	26
<b>A. GNU Free Documentation License</b>	<b>27</b>
A.1. PREAMBLE	27
A.2. APPLICABILITY AND DEFINITIONS	27
A.3. VERBATIM COPYING	28
A.4. COPYING IN QUANTITY	29
A.5. MODIFICATIONS	29
A.6. COMBINING DOCUMENTS	31
A.7. COLLECTIONS OF DOCUMENTS	31
A.8. AGGREGATION WITH INDEPENDENT WORKS	32
A.9. TRANSLATION	32
A.10. TERMINATION	32
A.11. FUTURE REVISIONS OF THIS LICENSE	33
A.12. ADDENDUM: How to use this License for your documents	33

# Lista de figuras

2-1. Ejemplo de interfaz y configuración de un Servidor DNS	2
3-1. Entrada a YAST desde KickOff	4
3-2. Cuadro de diálogo para introducir la contraseña de administrador	5
3-3. Acceso a herramienta de instalación y desinstalación de Software	5
3-4. Acceso a herramienta de instalación y desinstalación de Software	6
3-5. Acceso a herramienta de instalación y desinstalación de Software	6
3-6. Pantalla principal de instalación y desinstalación de paquetes	7
3-7. Acceso a herramienta de instalación y desinstalación de Software	8
3-8. Paquetes individuales seleccionados	9
3-9. Paquetes individuales seleccionados	9
3-10. Descarga de paquetes	10
3-11. Configuración de paquetes y Servicios	10
3-12. pregunta de seguir instalando o no paquetes	11
3-13. Pregunta de seguir instalando o no paquetes	11
3-14. Acceso a la configuración de Apache y PHP	12
3-15. Control de acceso por puerto e IP's	12
3-16. Control de lenguajes de scripting	13
3-17. Configuración de parámetros básicos	14
3-18. Configuración de Sitios Web Virtuales	15
3-19. Datos básicos de un Sitio Web Virtual	16
3-20. Datos de Scripting de un Sitio Web Virtual	17
3-21. Datos de Scripting de un Sitio Web Virtual	18
3-22. Configuración del arranque del servidor	19
3-23. Aplicación de las configuraciones del servidor web	20
3-24. Visualización de prueba del servidor web	21
3-25. Visualización de prueba del módulo PHP	23
3-26. Entrada al editor de niveles de ejecución	23
3-27. Visualización de prueba del servidor web	24
3-28. Pantalla del resultado del proceso (con éxito)	25
3-29.	25

# Capítulo 1. Introducción a la Instalación de LAMP

## 1.1. Introducción

En el presente manual se van a definir a fondo aquellas tareas necesarias para poner en funcionamiento una plataforma LAMP. Por simplicidad el manual está dedicado a su instalación y configuración en una OpenSuse 10.2.

# Capítulo 2. Configuración de Servicios LAMP

## 2.1. Configuración de un Servidor DNS

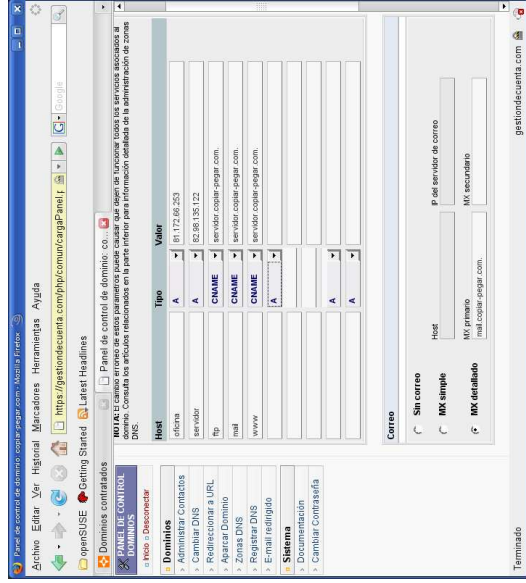
Debido que las distintas posibilidades a la hora de gestionar un dominio son tan variadas, en el presente manual se va a suponer que se dispone de un dominio contratado y que se sabe la dirección ip de cada una de las máquinas que van a ir dentro del dominio.

## 2.2. Configuración de un dominio DNS

Una vez que hayamos accedido a la herramienta de configuración dispondremos de in interfaz a través del cual podremos modificar las entradas del dominio. Disponemos básicamente de tres tipo de entradas: A o entradas de maquinas (relacionan una ip con un nombre dentro del dominio), CNAME relacionan mediante un alias un nombre de máquina con otro nombre y MX que relaciona el servidor por correo por defecto con un nombre de máquina.

A continuación de puede ver una figura en el que se ve cómo configurar dichas entradas:

Figura 2-1. Ejemplo de interfaz y configuración de un Servidor DNS



Una vez guardados los cambios espere entre 24 y 48h a que dichos cambios surtan efecto. Después de que haya pasado dicho plazo, pruebe a entrar mediante el navegador web para ver si funciona correctamente.

## Capítulo 3. Instalación de LAMP

### 3.1. Instalación de una LAMP en OpenSuse 10.2

En OpenSuse 10.2 esta tarea es muy sencilla, describimos ahora todos los pasos:

- Entre en el Menú de Acciones (KickOff) en el apartado de PC y pulse en el Configurador de administración YAST.

Figura 3-1. Entrada a YAST desde KickOff



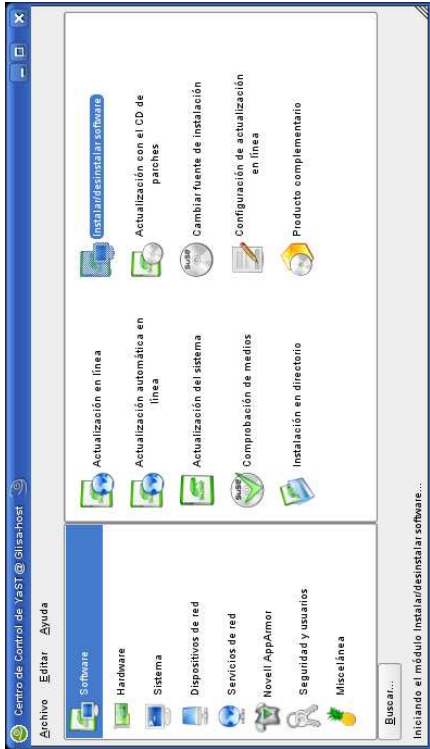
- Valídesse como Superusuario. En cuanto intente entrar en YAST deberá introducir la contraseña del SuperAdministrador (root) y pulsar en el botón Aceptar.

Figura 3-2. Cuadro de dialogo para introducir la contraseña de administrador.



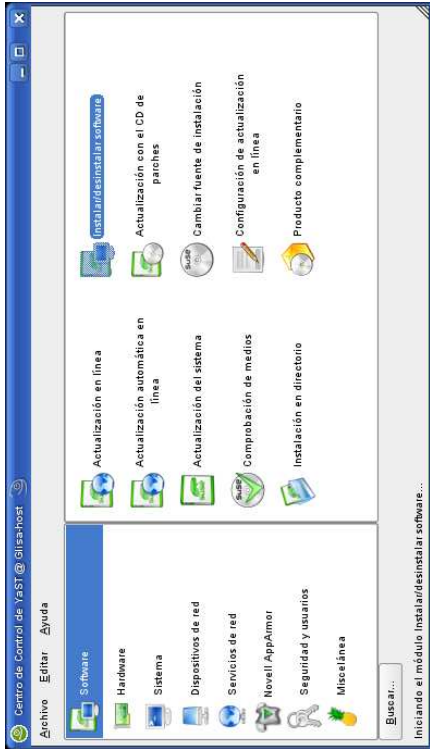
- En la pestaña de Software pulse en el icono de Instalar/desinstalar Software.

Figura 3-3. Acceso a herramienta de instalación y desinstalación de Software



- En la pestaña de Software pulse en el icono de Instalar/desinstalar Software.

Figura 3-4. Acceso a herramienta de instalación y desinstalación de Software



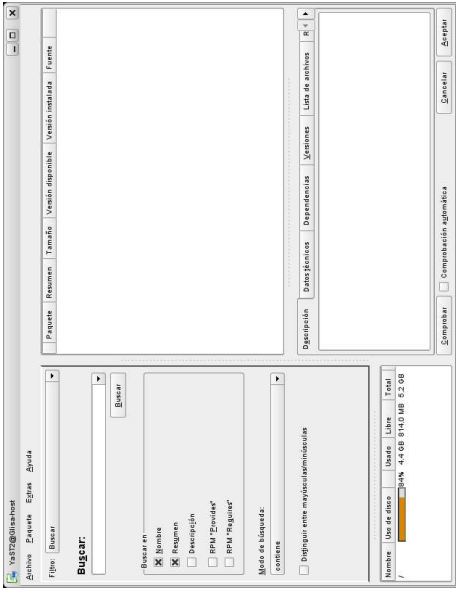
- Una vez haya entrado en la herramienta se actualizarán los listado de Software disponibles para su manejo.

Figura 3-5. Acceso a herramienta de instalación y desinstalación de Software



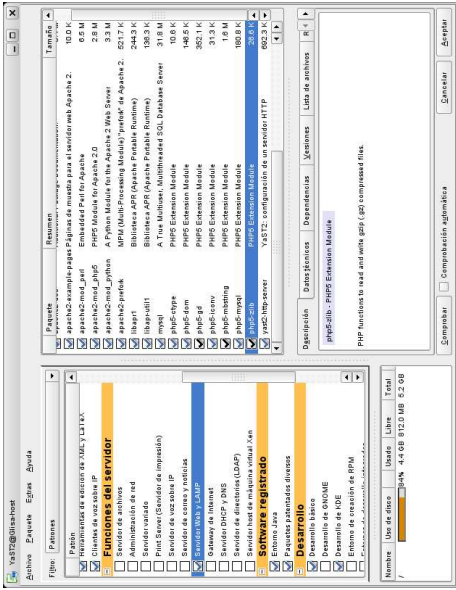
Cuando haya terminado de gestionar los listados, aparecerá una pantalla similar a la siguiente:

Figura 3-6. Pantalla principal de instalación y desinstalación de paquetes.



- En la parte superior derecha de la pantalla aparece una etiqueta llamada filtro y una lista desplegable. pulse en ella y seleccione Patrones. Aparecerá un listado en la parte de la izquierda de la pantalla similar al siguiente:

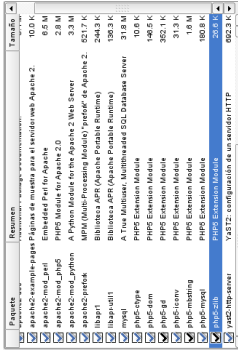
Figura 3-7. Acceso a herramienta de instalación y desinstalación de Software



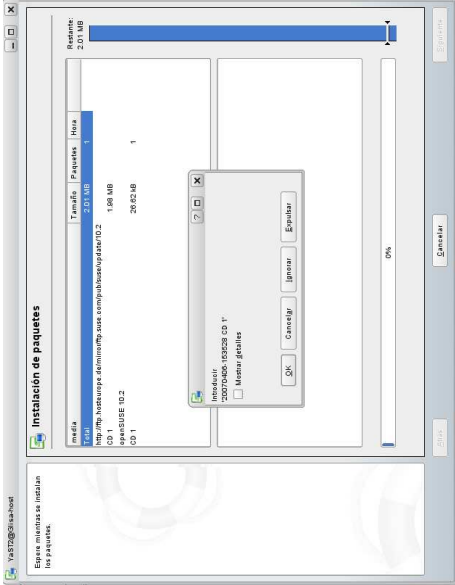
En dicho listado aparecen grupos de paquetes con funcionalidades acompañados de una caja de selección al lado izquierdo de cada uno de ellos. Para seleccionar alguno de ellos pulse con el botón izquierdo en cualquiera de las cajas de selección, esta caja aparecerá marcada con un símbolo de visto bueno, también verá que en la parte de la derecha de la pantalla principal, los paquetes individuales aparecerán todos seleccionados. Para deseleccionar un patrón repita la misma operación, verá que el símbolo de visto bueno desaparecerá de la caja de selección.

- Seleccione el patrón denominado Servidor Web y LAMP.

Figura 3-8. Paquetes individuales seleccionados.

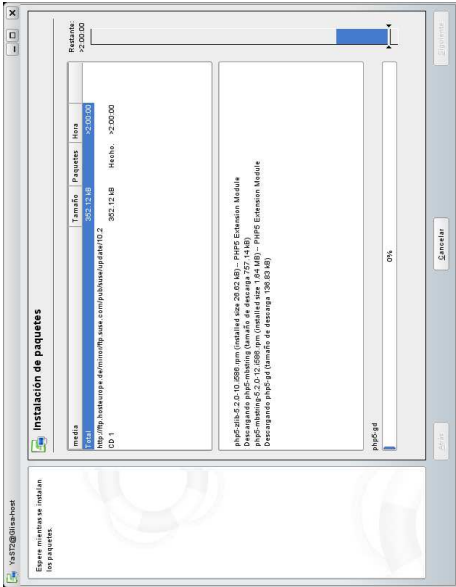


- Pulse en el botón Aceptar. Aparecerá la pantalla de descarga de paquetes desde los medios:  
**Figura 3-9. Paquetes individuales seleccionados.**



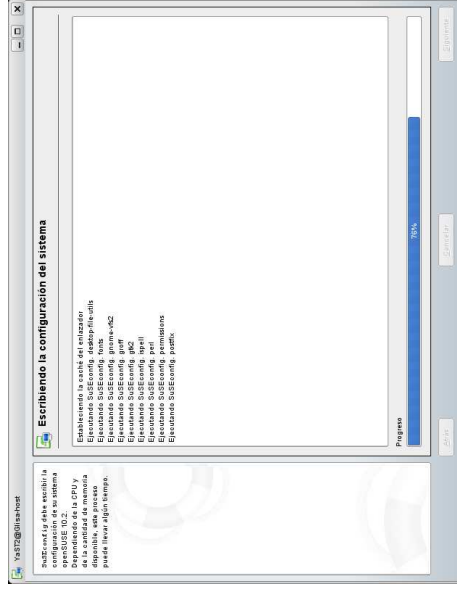
Introduzca el CD o DVD de instalación de OpenSuse 10.2, y pulse en el botón Ok. Se iniciará la descarga de paquetes individuales.

**Figura 3-10. Descarga de paquetes.**



A continuación se configurán los paquetes y servicios con YAST.

**Figura 3-11. Configuración de paquetes y Servicios.**



- A continuación pulse en el botón No en el cuadro de diálogo.

**Figura 3-12. pregunta de seguir instalando o no paquetes.**



Se cerrará la venta de instalar y Desinstalar paquetes.

- A continuación pulse en el botón No en el cuadro de diálogo.

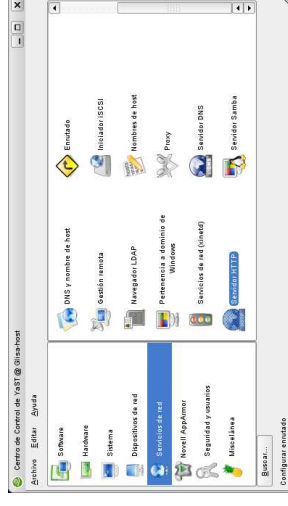
**Figura 3-13. Pregunta de seguir instalando o no paquetes.**



Se cerrará la venta de instalar y Desinstalar paquetes.

- A continuación necesita activar el servidor Apache y el PHP. Para lo cual debe entrar en YAST en la pestaña Servicios de red en el icono Servidor HTTP;

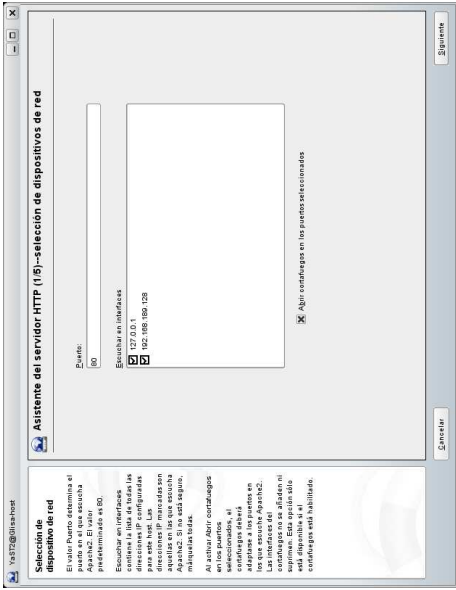
### Figura 3-14. Acceso a la configuración de Apache y PHP



- Después aparecerá la primera pantalla de configuración de Apache. En ella deberán aparecer: el puerto por el que escuchará las peticiones web (por defecto 80) y las direcciones ip por las que se permite que escuche el servidor web (127.0.0.1 por defecto). Pulse en el botón Siguiente.



Figura 3-15. Control de acceso por puerto e IP's.



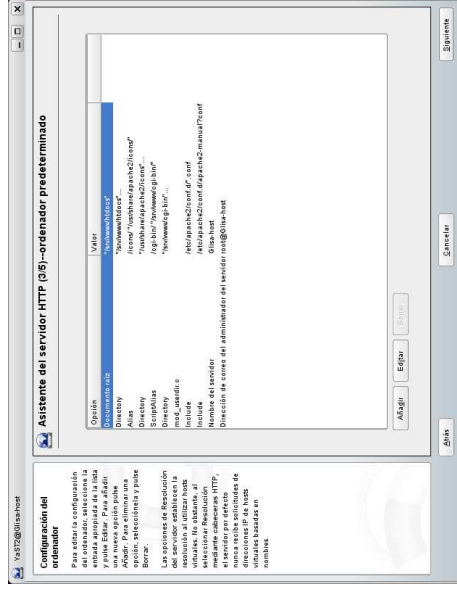
- A continuación deberá marcar (si no lo está hecho ya) el cuadro de selección al lado de Habilitar lenguaje de guiones PHP5. Pulse en Siguiente.

Figura 3-16. Control de lenguajes de scripting.



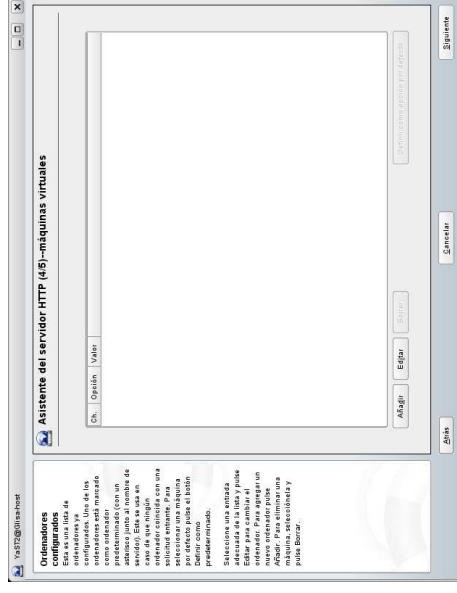
- A continuación puede ser los parámetros básicos del servidor, tales como directorio principal, dirección de correo del administrador, etc. Pulse en Siguiente.

**Figura 3-17. Configuración de parámetros básicos.**



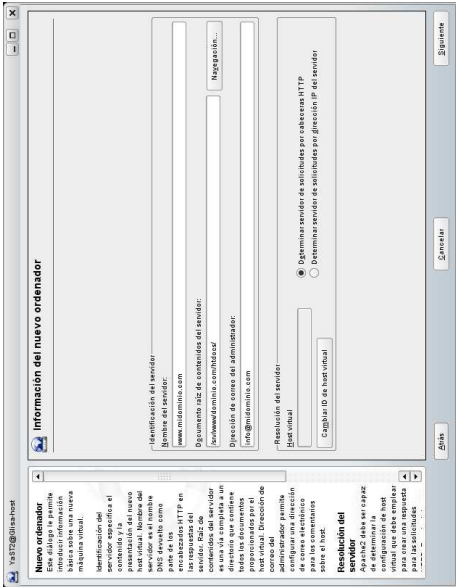
- Después podrá ver los Sitios Web Virtuales que maneja el servidor; si no desea manejar ninguno más pulse en Siguiente. Si desea configurar un nuevo Sitio Web Virtual pulse en añadir y siga los siguientes pasos.

**Figura 3-18. Configuración de Sitios Web Virtuales.**



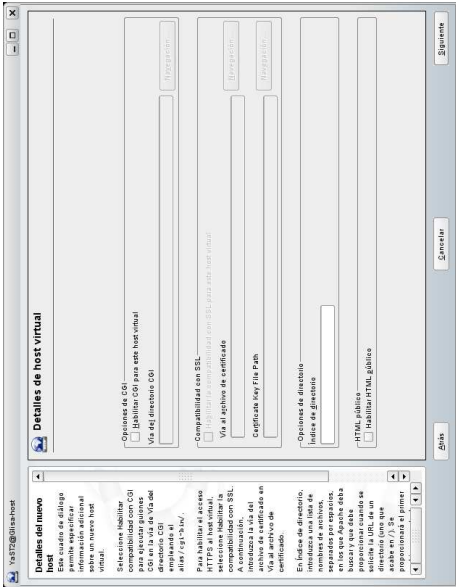
- A continuación introduzca los parámetros de configuración del nuevo servidor virtual: nombre del servidor, directorio principal del Sitio Web Virtual y el correo del administrador del sitio web virtual. Pulse en el botón **Siguiente**.

Figura 3-19. Datos básicos de un Sitio Web Virtual.



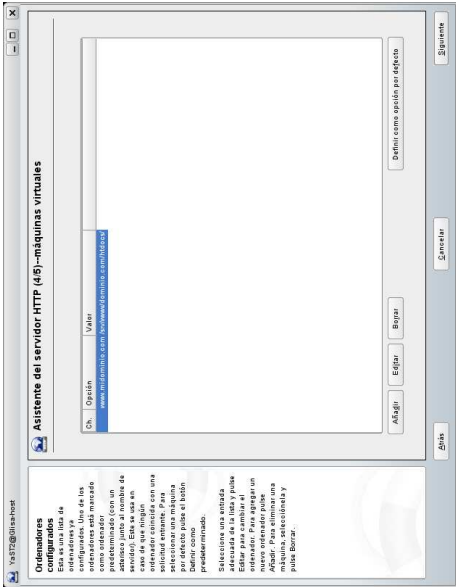
- A continuación introduzca otros parámetros de configuración del nuevo servidor virtual: acceso a CGI, HTML público, etc.,. Pulse el botón Siguiente.

Figura 3-20. Datos de Scripting de un Sitio Web Virtual.



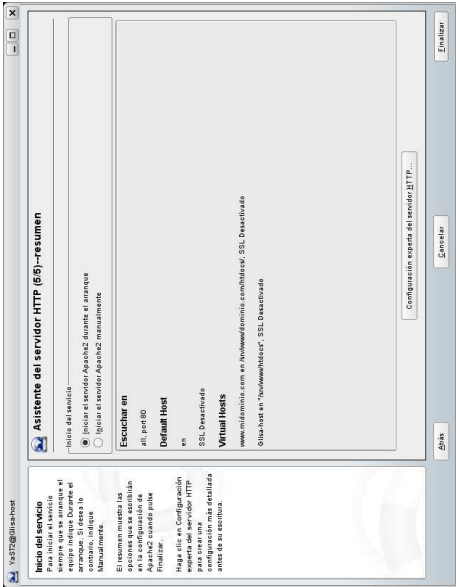
- Después de añadir el nuevo sitio Web Virtual. Pulse en Siguiente.

Figura 3-21. Datos de Scripting de un Sitio Web Virtual.



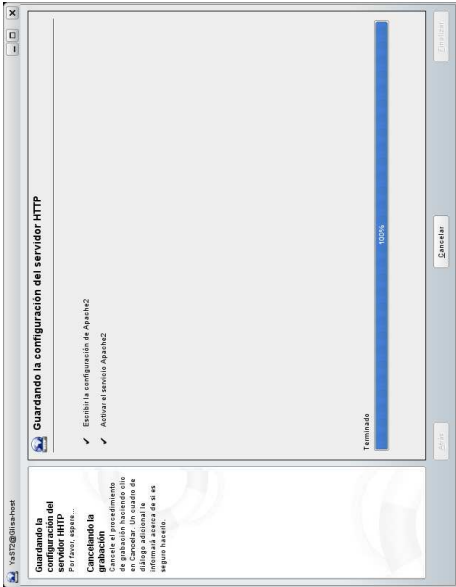
- Después de configurar los Sitios Web Virtuales, marque la opción Iniciar el servidor web en el arranque. Pulse en Siguiente.

Figura 3-22. Configuración del arranque del servidor.



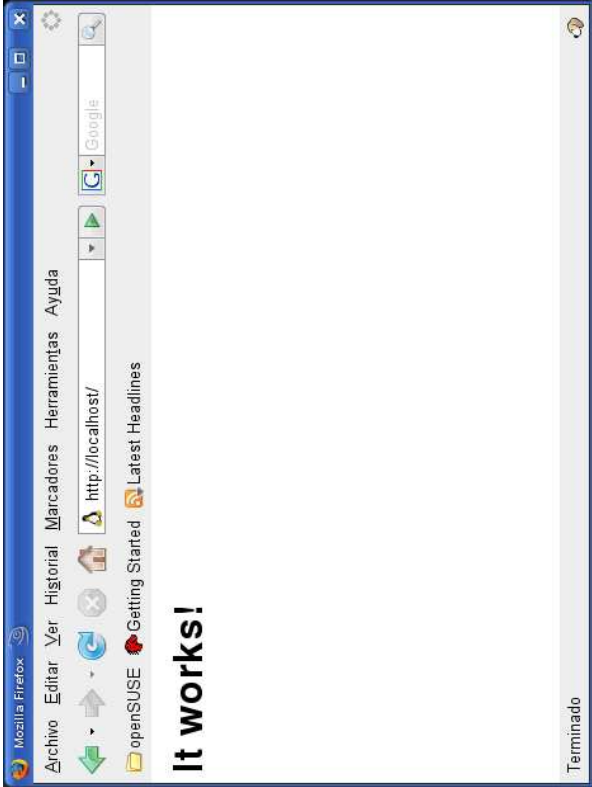
- A continuación se configurará el servidor web y se rearrancará si es necesario. Pulse en Finalizar.

Figura 3-23. Aplicación de las configuraciones del servidor web.



- A continuación introduzca la url en el navegador web y compruebe que se visualiza correctamente.

Figura 3-24. Visualización de prueba del servidor web.



- Ahora es necesario comprobar si el módulo de php funciona correctamente, para lo cual es necesario crear un fichero index.php en el directorio principal del dominio del Sitio Web Virtual. Para ello necesita abrir una terminal con permisos de superadministrador, esto se puede conseguir si va al Menú de Acciones, pestaña Aplicaciones, submenú Sistema, submenú Terminal, icono Programa de terminal - modo de superusuario. Le solicitará la contraseña del superadministrador (root), introduzca la pulse en el botón OK.

Una vez abierta la terminal ejecute los siguientes comandos:

```
echo "" >/srv/www/htdocs/index.php
```

```
chmod 777 /srv/www/htdocs/index.php
```

Evidentemente la ruta debe coincidir con la localización del directorio raíz del Sitio Web Virtual

Después, abra su navegador e introduzca la url seguido de /index.php En nuestro ejemplo [www.midominio.com/index.php](http://www.midominio.com/index.php) Si se abre correctamente podrá ver la información del módulo php instalado en su Apache.

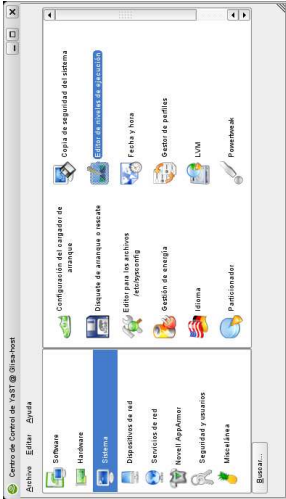
Figura 3-25. Visualización de prueba del módulo PHP.



## 3.2. Configuración de Mysql

A fin de poder arrancar automáticamente en el arranque el servidor Mysql es necesario modificar los niveles de arranque. Para lo cual entre en YAST y vaya a la pestaña Sistema y entre en el editor de niveles de ejecución.

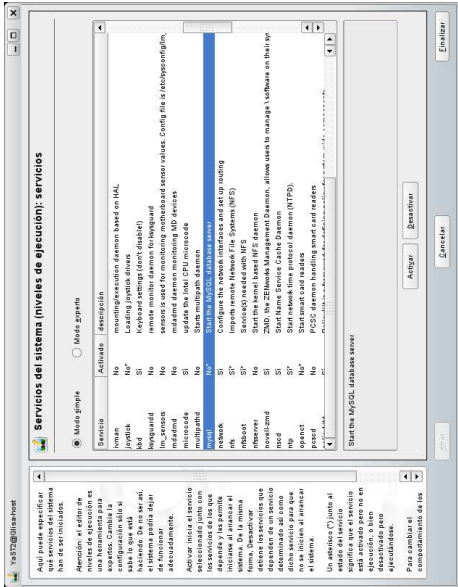
Figura 3-26. Entrada al editor de niveles de ejecución.



Los pasos a seguir son los siguientes:

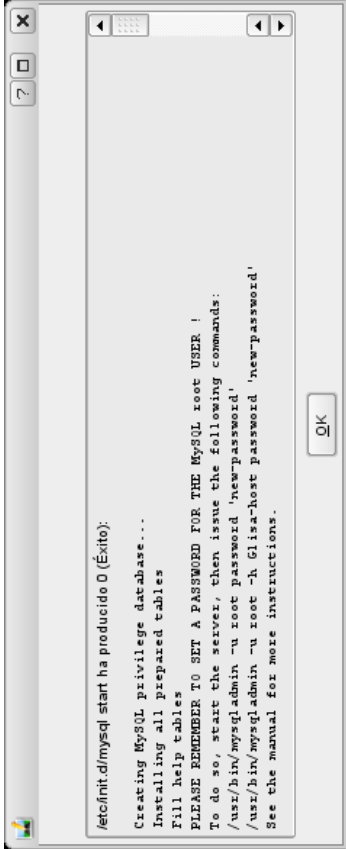
- A continuación selecciones el servicio Mysql con el botón derecho del ratón y pulse el botón Activar situado abajo a la izquierda de la pantalla.

Figura 3-27. Visualización de prueba del servidor web.



Una vez activado el servicio sandrá una pantalla con el resultado (debería marcar un éxito en el proceso de activación). Pulse en el botón Ok. Después pulse en el botón finalizar.

Figura 3-28. Pantalla del resultado del proceso (con éxito).



Después pulse el botón Finalizar para que se apliquen los cambios.Cuando salga la pantalla de validación pulse en Si.

Figura 3-29..



Sería conveniente recordar que el usuario por defecto de mysql tras la instalación es root y no dispone de una contraseña asignada.

A fin de poder gestionar correctamente Mysql pasaremos al siguiente paso, Instalar la aplicación Web Phpmyadmin

### 3.3. Instalación y configuración de PhpMyadmin

Para poder gestionar de una manera sencilla Mysql, instalaremos Phpmyadmin, una herramienta de gestión de Mysql vía web. Así mataremos dos pájaros de un tiro.

Los pasos a seguir son los siguientes:

- Descargarse la última versión de Phpmyadmin, por ejemplo desde aquí: <http://ovh.dl.sourceforge.net/sourceforge/phpmyadmin/phpMyAdmin-2.10.0.2-all-languages-utf-8-only.tar.gz>

cuando nos pregunte el navegador qué hacer con el le diremos que queremos guardarlo en el disco duro, en el escritorio por ejemplo.

- Una vez descargado el fichero deberemos descomprimirlo, para lo cual pulsamos sobre él para abrirlo y descomprimirlo tb en el escritorio
- Después debe copiar el contenido de la carpeta que incluya el index.php al directorio /srv/www/phpmyadmin

Debe recordar que para hacer esto es necesario reaalizar esta operación como superadministrador del sistema.

- Después debe modificar los permisos de la carpeta para que el usuario root tenga permisos de acceso a los ficheros.
- Después debe comprobar mediante el navegador que tiene acceso a la url [http://localhost/phpmyadmin.index.php](http://localhost/phpmyadmin/index.php). En nuestro ejemplo: <http://www.midominio.com/phpmyadmin/index.php>

# Ap ndice A. GNU Free Documentation License

## A.1. 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. Secondly, 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.

## A.2. 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.

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.



### A.3. 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.

### A.4. 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.

If 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.

### A.5. 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:

#### GNU FDL Modification Conditions

- 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 if 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 retile 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.

## A.6. 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".

## A.7. 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.

## A.8. 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.

## A.9. 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.

## A.10. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided for under this License. Any other attempt to copy, modify, sublicense or distribute the Document is void, and will automatically terminate your rights under this License. However, parties who have received copies, or

rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

## A.11. 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.

## A.12. 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:

### Sample Invariant Sections list

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 1.2 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:

### Sample Invariant Sections list

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.