Online Troubleshooting Resources : HOWTO

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This document will direct Linux users to resources available on the Internet that provide access to a vast amount of Linux-related information useful in troubleshooting problems

1. Introduction

The traditional means of troubleshooting computer-related problems involves consulting user's manuals, books, friends - probably enticed with goodies - and, when all the former do not yield a solution, calling the technical support service of the vendor of the product in question. And, we all know pleasant and reliably efficacious the latter stratagem is. Unfortunately, this is the norm in the sphere of commercial proprietary products.

In contradistinction, Linux, and related distributions, utilities and applications software, has largely been developed according to the Open Source (http://www.opensource.org) model, wherein developers have used electronic communication over the Internet - typically in the form of publically-accessible Mailing Lists- to collaborate with their peers in the refinement of the associated source code. Such collaboration has also traditionally involved the online publication of user's manuals, lists of Frequently-Asked-Questions (FAQ's) , knowledge bases, release notes, formal guides such as this document (HOWTO's) and tutorials. In addition, users often assist others through the forum of Usenet and other newsgroups and the posted messages are readily accessible in the form of searchable archives. These linux-related newsgroups are renowned for their high level of user participation. In significant measure, Linux may be considered a product of the Internet.

Considered together, these resources enable access to a large, ever-expanding factual database, and my intent is to encourage and direct the reader to utilize these repositories when faced with an issue not addressed in the documentation that is included with each distribution of Linux. Linux veterans who assist newcomers through the forum of Usenet soon become aware of the frequency with which certain technical questions are repeatedly posted - questions the answers to which are readily available in one or more of the existent online repositories. So, to diminish the likelihood of being "flamed" in response to your posted question on Usenet or irc , read further!

Armed with a browser, Linux users may rapidly become adept at troubleshooting their systems. The key is knowing how and where to look. My objective is to guide the user - particularly the Linux newbie - in this quest.

2. Document Updates

The latest version of this document will always be available at An eclectic compendium for Linux newbies (http://www.newbielinux.com), my website for Linux newbies.

2.1. Copyright and License

2.2. Feedback and Corrections

I always welcome feedback and constructive criticism.In particular, I wish to be notified about any errors in this document and resources you believe deserving of inclusion, but not presently covered herein. Because the assessment of the value of a particular resource is inherently subjective, I do not guarantee that I will include it, but I will certainly give any suggestion thoughtful consideration. In anticipation, Thanks.

3. HOWTO's and mini-HOWTO's

These documents are associated with the Linux Documentation Project (http://www.linuxdoc.org). There is a HOWTO Index Page (http://www.linuxdoc.org/HOWTO/HOWTO-INDEX-3.html) that I suggest you bookmark in your browser.

These HOWTO's are written by Linux users and are periodically updated by the authors. Many authors provide the latest version at a personal website and a hyperlink to the latter is typically provided in the document.This version may be newer than that available at the website. The document may be published online before its inclusion into the database.

Note also that other HOWTO's are available, the authors of which have not submitted them to the LDP. It is definitely worthwhile trying to find these using an Internet search engine as I describe in a subsequent section.

These documents are particularly useful when you decide to provide or access a new service with your Linux system, or when you embark on a technically complex project. For example, you may have the option of accessing the 'net with a DSL or Cable Modem service - excellent guides are available in the form of HOWTO's.

In addition, authors often include references and links to sites that they have found useful. You may find the information you need at one of these hyperlinked sites rather than in the HOWTO itself. For example, I found Linux Network Drivers (http://cesdis1.gsfc.nasa.gov/linux/drivers/), the primary site for information about Network Interface Card drivers , in the Ethernet HOWTO.

4. Frequently-Asked-Questions (FAQ's)

A list of FAQ's is a traditional accompaniment to Linux-related applications, utilities, and the like. An FAQ is typically provided online by the developer/s of the product in question, and enterprising users sometimes host an "unofficial" FAQ as well. Search for the latter with an Internet search engine.

The FAQ is the first document to peruse when troubleshooting a particular application. In addition, FAQ's exist for Linux distributions, window managers, and the so-called desktop environments (KDE and Gnome).

For Linux newbies, I provide links to three FAQ's that collectively address many of the questions posted to the Usenet newsgroups :

- The Linux FAQ (http://www.fokus.gmd.de/linux/FAQ/Linux-FAQ.html)
- The XFree86 X - Window System FAQ (http://www.xfree86.org/FAQ)
- The Linux Kernel mailing list FAQ (http://www.tux.org/lkml/)

5. Online Support Sections

These sections are typically found at the websites of Linux distributions, and often contain a variety of helpful documents with information not easily encompassed within a FAQ. Look for sections with one or more of the following titles:

- Installation Support

Knowledge or Solutions Databases

Tips and Tricks

Errata, Fixes and Updates

White Papers

Technical Guides

Hardware Guide or Compatibility List

Security Information

Some websites provide a site search engine that will facilitate your quest for a solution.

If you have a problem with a newly installed distribution, look here first as bugs and their fixes are typically posted here. You may find a detailed guide that will help you accomplish a task such as upgrading your kernel or the version of the XFree86 X - Window System you are using.

I recommend you spend some time at the website of the distribution you are using, familiarizing yourself with what is available.

6. Usenet Newsgroup Archives

The ability to search for and retrieve information from archived posts to the linux-related (Usenet) newsgroups represents a powerful means of troubleshooting in Linux.

Search engines permit one to search the archives by stipulating the forum, keywords, authors, dates, language and combinations thereof. Because the number of linux-related newsgroups is large, the likelihood of finding useful information is high.

I would like to relate a brief anecdote to demonstrate the efficacy of this approach. The first time I attempted to build a kernel, I was presented with this error message when I invoked a “make” command:

make[1]: as86: Command not found make[1]: *** [bootsect.o] Error 127
make[1]: Leaving directory ‘/usr/src/linux/arch/i386/boot’ make: *** [zImage]
Error 2

I had no idea what as86 was, but I entered it as the keyword in the SUBJECT field of the Power Search utility at deja.com (see below) , and was presented with a large number of posts from folks who had encountered the same problem. Respondents had provided the reason and solution: I did not have an assembler/linker necessary to create machine code, and the bin86 package provided it. I downloaded and installed a RPM package of the latter and was on my way. This entire process took about 10 minutes (I do have an ADSL connection to the 'net !).

There are two websites that provide access to Usenet archives using a search engine as described in the following sections.

6.1. Power Search at deja.com

The Power Search page (http://www.deja.com/home_ps.shtml) allows you to search using keywords and other parameters.I suggest you spend some time becoming familiar with the Search Language (http://www.deja.com/help/help_lang.shtml) nuances. In particular, note the value of using the wildcard symbol. You will be repaid time and again for your efforts. I typically enter the following for a "routine" search:

LANGUAGE : English

SUBJECT : try different keywords, thinking of a subject line you would use for a post

FORUM : *linux* or comp.os.linux.*

Another version of this search engine is this Customized Power Search Page (http://www.exit109.com/~jeremy/news/deja.html). Customize this page to your liking (I like the " DejaClassic" option), and then choose " Save Settings."

The DejaSearch utility (http://homemade.hypermart.net/dejasearch/) is another application that you may use. It will print out the retrieved posts in one HTML file for your perusal. By using this, you will not have to page back and forth in your browser.

6.2. Searchlinux.com (CNET Linux Help)

The Searchlinux website (http://www.searchlinux.com) is relatively new, with many of the same features as deja.com. It has "basic" and "advanced" search options. The latter does not have as many options as the Power Search feature at deja.com. It has a nice one-click option whereby one may view one's own posts and associated replies

7. Internet Search Engines

I frequently use a Search Engine to retrieve helpful or necessary information from the 'net. These engines catalogue pages from commercial, personal and academic websites, as well as Mailing Lists and the like.

Of course, there are a large number of available Search Engines, and I suggest you try several before giving up on a particular quest. Research has shown that any one of them catalogues but a small portion of existent web pages. It is worthwhile becoming very familiar with the operational details of at least one non-directory engine to maximize the efficiency and efficacy of your search efforts. You probably already have a favorite - I like Google.com, and will discuss it in a little more detail.

7.1. Google.com

This engine has several novel features that are described in its Why use Google.com page (http://www.google.com/why_use.html) In particular, the engine often returns the most useful pages first ; in fact, I have often found that the first listed page contains the information I need. Because it caches web pages, it is relatively fast at displaying requested items. It has a so-called GoogleScout (TM) feature that provides additional relevant links with each item returned.

In addition, it has a specialized Linux Search Engine (http://www.google.com/linux) that I use as my primary Internet search tool. It searches the database of linux-related pages at Google.com further promoting search efficiency. Try it- I am confident you will bookmark it immediately.

8. Mailing List Archives

As you might expect, there are a very large number of linux-related Mailing Lists that enable developers and users to communicate and collaborate on projects. These Lists cover every conceivable aspect of Linux, from the technical arcana of kernel development to the relatively unfocused discussion of issues at the newbie level. Subscribers to a particular Mailing List are generally very knowledgeable in the List's topic, and detailed and useful information is often retrievable. The communications are publically accessible through Internet search engines and in the form of online Mailing List Archives. You will typically see archived pages when you conduct a search using an Internet search engine.

Not all Mailing Lists are associated with an online archive, but this is increasingly the case. Similarly, not all archives have an associated search engine.

Initially, try locate the Mailing List Archive you are interested in by typing a keyword/s and "mailing list archive" in an Internet search engine.

For a listing of linux-related Mailing Lists, peruse websites such as the Linux Resource Exchange (http://www.linuxrx.com/Lists/Lists.perl) and the Linux Online Mailing Lists (http://www.linux.org/help/lists.html)

A relatively new, excellent Mailing List resource is Geocrawler (The Knowledge Archive) (http://www.geocrawler.com). This is a continuously updated, searchable archive of a large number of Lists that also allows one to register and subsequently post to any particular Mailing List. Its user interface is simple and its search function delivers messages very quickly. I highly recommend this site.

You may also find Mailing List archives at the following locations :

- The website of the distribution of Linux you use.
- The website/s of the Window Manager and/or Desktop Environment you use.
- The website dedicated to the application or project in question.
- The Mail Archive (http://www.mail-archive.com/lists.html)
- Mailing List Archives (http://www.uwsg.indiana.edu/hypermail/)
- The Linux Mailing List Archives (http://kernelnotes.org/lnxlists/)
- Tux Mailing List Archives (http://www.tux.org/hypermail/)

This is not a complete listing of archives and you may find additional sites with an Internet search engine. But, this should certainly get you going.

9. Online User's Manuals

Some of the major Linux distributions and Window Managers/Desktop Environments publish their user's manual online. If the entire manual is not online, installation and configuration guides are typically found at the relevant website . This also applies to major applications like the Gimp (GNU Image Manipulation Program).

So, for those users who do not have the printed manual, a wealth of installation and configuration guidance is generally available online.

10. Online Unix References and Tutorials

As Linux is a Unix-like operating system, a general familiarity with fundamental Unix concepts such as the Unix directory hierarchy and file permissions is essential. Fortunately, there are many Unix tutorials online that collectively cover everything a user might need to know to use Linux. I suggest you bookmark the following as an online reference library :

The Digital Unix Manual (http://www.dicamp.univ.trieste.it/du96/unix/TOC.html) is a great reference as seen in this Table of Contents

UNIXhelp (http://www.ucs.ed.ac.uk/~unixhelp/servers.html) is mirrored on many servers around the world. It is a useful resource for newbies.

Unix is a Four Letter Word... (http://www.linuxbox.com/~taylor/4ltrwrd/Unix.html) is another resource suitable for newbies.

11. Miscellaneous Resources

In this section, I provide a number of links to websites that I have found useful while learning to use Linux. This is an eclectic collection, but keep these handy.

11.1. Release Notes and Available Documentation related to the XFree86 X - Window Server

This documentation accompanies each version of XFree86, and is available at the XFree86 website (http://www.xfree86.org/). Whenever you have trouble with your X environment, peruse the notes applicable to your videocard/chipset. These typically provide details about the configuration of the X - window system relative to your card, and will enumerate any "options" you have to include in the XF86Config file that governs X.

11.2. GNU Texinfo pages

A great collection of pages is available at the Geek Girl.com website (http://www.geek-girl.com/unix.html#texinfo). Included are links to pages on the following:

Bash - The Bourne-again shell

Configure - used when compiling programs from source code

G++ - the GNU C++ compiler

Gcc - the C compiler

Libc - the GNU C library

Make - a program for directing recompilation

Note that some of these are included in the "docs" that come with Linux distributions. In general, these are detailed technical documents of particular interest to developers. However, if like me, you are not a programmer, you may peruse the introductory sections of these documents to get insight, for example, into those configureand make commands you use when installing applications from source code.

11.3. GNU Software and Manuals

Many important programs that are frequently utilized by the Linux user are GNU utilities - for example, the tar (archive) and gzip (compression) programs. Descriptions of these programs are located at the GNU.org website (http://www.gnu.org/software/software.html#DescriptionsOfGNUSoftware) where many Online Manuals (http://www.gnu.org/manual/manual.html) may also be found.

These manuals typically provide a lot more information than is found in the corresponding man page on your system. For example , compare the man page and online manual for the tar utility.

11.4. Glossary of Linux-related terms

The First Linux (http://www.firstlinux.com/guide/) online guide has a nice collection of terms and definitions, sorted alphabetically. Go here if you encounter a term that you have not seen before or do not understand.

11.5. An online dictionary of computer and technology terms

The PC Webopedia (http://www.pcwebopedia.com/) consists of a large online dictionary of computer-related terms and a search engine that provides links to documents that discuss each item in more detail. For example, I used this site to learn the differences between ISA and PCI buses.

11.6. A detailed Guide to Personal Computers

The Topic Index to the voluminous hardware guide at PC guide.com (http://www.PCguide.com/topic.html) will give you a great idea of the contents of this website. I used it quite frequently when first installing Linux and configuring the X Window System. I learnt a lot about videocards and monitors, including the concepts of screen resolution, color depth etc., useful when troubleshooting X - display problems.

11.7. Gary's Encyclopedia

Gary Momarison's website (http://members.aa.net/~swear/pedia/index.html) contains a very large number of sorted Linux-related links. You may use the "find" function in your browser to find links in a particular category. Peruse this website to appreciate what it has to offer.

12. Concluding Comments

If you are a Linux newbie, you may want to create a Troubleshooting folder in your browser's bookmark list, into which you put the hyperlinks I have included in this document, as well as those pertinent to the distribution of Linux and the Window Manager/Desktop Environment you use.

As you use these links , you will quickly become adept at troubleshooting online.

Cheers and happy searching !