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Linux Users Risk Infringement ............... 1

Many companies are using and modifying Linux for their own use and for computers that they then sell to customers. In the first article of this issue, Bradley C. Wright, a principal shareholder in Banner & Witcoff, Ltd. in Washington, DC, states that this carries the risk that copyrights and patent rights in computer software bundled with the Linux code will be automatically licensed to anyone that uses Linux. Mr. Wright also points out that companies that use and modify Linux for their own use additionally may be subject to a copyright infringement claim by any of the programmers who have contributed to Linux, or by a third party whose software was illegally incorporated into Linux.

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As explained by William F. Heinze of the law firm of Thomas, Kayden, Horstemeyer & Risley in Atlanta, GA, it is well-established that the best mode for carrying out an invention must be disclosed in sufficient detail in a patent application to allow one of ordinary skill to practice it. Mr. Heinze states that when a client is seeking a patent on software, sufficient disclosure may require including a copy of the program listing in the application. He concludes his article with suggestions that patent attorneys can take to limit the risk that competitors will copy the program directly from the application.

PRACTICE AID

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This month’s practice aid is an asymmetric linking agreement under which Web site A permits Web site B to establish a link to Web site A’s proprietary content, located at a co-branded Content Site within Web site A. The agreement grants Web site B a nonexclusive license to certain Web site A trademarks.

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August/911128143
Companies have for many years relied on commercially available operating systems to power their computers and computer-related products. Most computers are sold with pre-installed operating systems that allow the computers to be used immediately after opening the box. The cost of the operating system is generally included in the cost of the computer. Users who want to upgrade to a different or newer version of the operating system generally must purchase the upgraded or different operating system as a separate product. Examples of commercially available operating systems include Solaris (Sun Microsystems), Windows (Microsoft), Mac OS (Apple Computer), UNIX (various companies), OS/2 (IBM), and others.

Regardless of whether the operating system was purchased with the computer or was installed by the user, the features and capabilities of the operating system are determined by the company that developed the operating system. Although the user can install new application programs on the computer, there is generally no easy way for the user to modify the operating system itself.

In recent years, the Linux operating system has started competing with commercially available operating systems. Originally developed by Linus Torvalds in the early 1990s, Linux is referred to as “open source” software because its source code (i.e., human-readable computer instructions) is freely available and can be modified to suit a particular user’s needs. Linux has been gradually modified over the years by hundreds of independent programmers, each of whom contributed one or more improvements to the original computer code. Although it can be downloaded over the Internet for free, some companies sell prepackaged versions of Linux, including documentation, for a small fee that is still generally less than the cost of buying a commercially available operating system.

Because of its appeal as a “free” operating system, an increasing number of companies, including computer manufacturers IBM and Dell, have begun using and selling computers that incorporate Linux. Proponents believe that Linux is cost-effective because there are no licensing fees and because Linux can be modified to suit a particular user’s needs. Although many people refer to Linux as being “free,” there are a number of legal strings attached to its use. Because computer software is protected by copyright law, any copying, modification, or further distribution of Linux must be done only with permission of the copyright owners.

As explained in more detail subsequently, the supposedly “free” Linux is restricted by a license that allows users to use it only if the users make the source code (including any modifications) available to others. Although this seems simple and fair enough, the fine print in the license may also obligate users who distribute Linux in combination with their own software to give away their rights to copyrights and patents in that software. Failure to follow the license provisions exactly may also subject a company to a claim of copyright infringement by any of the hundreds of programmers who contributed to Linux. By using Linux, a company could inadvertently grant licenses to others to freely use software that has been separately developed, copyrighted, or patented by the company.

**Who Owns Linux?**

Because Linus Torvalds created the initial version of Linux (major portions of which remain in today’s widely distributed Linux) he owns the copyright to at least parts of Linux. Many different computer programmers also have modified Linux with the intention that their contributions be merged into and distributed with the ever-changing software. Consequently, many of these programmers also have a copyright in various parts of the Linux operating system. Under principles of copyright law, each of these copyright owners could potentially assert a claim for copyright infringement against anyone who copies, modifies, or further distributes Linux. All of these programmers will be referred to as “upstream contributors” and their rights in their con-
tributions as "upstream rights." These rights may include copyrights and patent rights.

A company that copies, uses, or modifies Linux will be referred to as being "downstream" of all those who made contributions to the particular version of Linux before them. The company will be "upstream" of any later users or contributors who use the company's modified version of Linux. For example, if a computer manufacturer modifies Linux to operate on its computers, it will distribute a modified version of Linux when it sells the computers with the modified Linux. Keeping track of all the potential copyright owners and their respective rights is a seemingly impossible undertaking. Even more troublesome is determining what, if any, copyright infringement damages might be available to a particular copyright owner, given that Linux is generally distributed free of charge (i.e., no lost profits), and given that statutory infringement damages and attorney fees are not available unless the copyright owners register their copyright before infringement begins.  

Open Source Licenses

Richard Stallman, a harsh critic of patenting computer software, started the Free Software Foundation in the 1980s to promote the idea that all software should be free for all to use without restrictions, especially restrictions involving copyrights or patents. (The word "free" in this context refers to the freedom to modify and further distribute the software, rather than nonpecuniary distribution.) One of his earliest projects was to develop a clone of the UNIX operating system that was to be free for all to use. Known as GNU, a recursive acronym for "GNU's Not UNIX," Stallman's software was distributed for others to copy, modify, and distribute.  

Although critical of legal restrictions on software, Stallman ironically needed to rely on such restrictions to ensure that his software was freely distributed. This is because under US copyright law, programmers who modify Stallman's software automatically obtain a copyright in the improvements, and further releases of the modified software could subject downstream users to a charge of copyright infringement by those programmers. Assuming that the improvements also were patentable, those programmers might also obtain patent rights in their improvements, subjecting downstream users to patent infringement.

Stallman ensured that his software could continue to be improved and distributed without restriction by distributing it subject to a software license. The license is embedded in the source code released by Stallman, such that anyone reading the code will see it. Referred to as the GNU General Public License or GPL, this license essentially releases downstream users from charges of copyright infringement as long as they agree that their additions and modifications to the software will be made free from any restrictions. The GPL asserts that free programming "is threatened constantly by software patents" and that the license requires that "any patent must be licensed for everyone's free use or not licensed at all."  

The GPL, which has been widely incorporated into a multitude of software over the years, can be found at www.gnu.org/copyleft/gpl.html. A slimmed-down variant of this license, known as the GNU Lesser General Public License or Lesser License, is intended for use with special types of software known as libraries. Unfortunately, both licenses are fraught with ambiguities, probably reflecting the fact that a nonlawyer drafted them. More problematically, different variants of so-called open source licenses have cropped up over the years, as different programmers and entities sought to craft their own special restrictions on software. The GNU project's Web site lists dozens of such licenses, some with bizarre names such as "The License of Zope," and attempts to categorize them according to whether they are compatible with GPL.  

Much of Linux has been distributed subject to the GPL. Stallman asserts that there are millions of "Linux-based variants of the GNU system," and argues that people should refer to them not as Linux but as "GNU/Linux." According to the Free Software Foundation, the GPL is intended to permit programmers and companies to use the software freely and to modify it, subject to various conditions and obligations. There are, however, many upstream contributors, each of whom may have contributed modifications to any particular version of Linux. This makes it difficult to evaluate whether a particular version of Linux is subject to potentially different and conflicting licenses. Moreover, some upstream contributors may have incorporated another's software into Linux without the right to do so.

Thus, there is a risk that Linux software obtained from any particular source, such as Red Hat Software, may not be fully covered by the GPL license. There is always the possibility that an upstream contributor incorporated modifications that it had no right to incorporate, and had no right to license, or will assert that it had rejected the GPL license terms. Either situation
could result in a copyright infringement claim based on parts of Linux that were not licensed. Some third-party vendors, such as Debian, apparently try to ensure that all of their software is licensed under GPL.⁸

The GPL contains a number of clumsily worded terms and conditions that purportedly grant a license to copy, distribute, and modify the software to which it pertains, in this case, Linux. The license imposes a number of duties on the licensee, such as providing notice of any modifications made by the licensee; providing a written offer to distribute a machine-readable copy of the source code; and publishing a copy of the GPL with the code.

Most ominously, the GPL obligates the licensee to automatically grant a no-cost license to the entire world in any new software that is distributed or published by the licensee, if it “in whole or in part contains or is derived from [Linux] or any part thereof.”⁹ This provision, when read in conjunction with other ambiguous portions of the GPL, could form the basis for quite a bit of mischief. In particular, companies that use, modify, or further distribute Linux may unwittingly give away copyrights and patent rights to other software that “contains or is derived from” any part of Linux. For example, if a company develops a complex computer program that analyzes seismic data for oil exploration purposes that uses a very small utility from a Linux library, the entire computer program apparently will become free for the entire world to use, even if the company had patented or copyrighted that program. This provision of the license gives it an almost virus-like quality—once it attaches to a piece of software, it propagates to any further variations, improvements, or “derived” software.

The GPL contains a confusing definition of “derived” software, on the one hand seemingly equating it with the legal definition of derivative works under copyright law, but on the other hand including any software “containing the Program [Linux] or a portion of it, either verbatim or with modifications and/or translated into another language.”¹⁰ Even more confusingly including software that “in whole or in part contains or is derived from the Program [Linux].”¹¹ Yet another provision of the license states that “But when you distribute the same sections as part of a whole that is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.”¹² Even a lawyer could not have written a more ambiguous clause. How a court will sort out all these circular and inconsistent definitions is unknown; in the meantime, companies are using Linux and potentially subjecting themselves to these ambiguities. What this means is that a company may not be able to determine with certainty what rights it is giving up if it uses, modifies, or further distributes Linux.

**Avoiding the GPL**

Assuming for the moment that the GPL is enforceable in a court of law, one might wonder whether it is possible to avoid its effect by taking certain actions or by inaction. As most software licenses, the GPL is a contract that is interpreted pursuant to state law. Nevertheless, an essential feature of any contract, including any license, is that a party to a license must manifest assent to the terms of the license. What if a company rejects the terms of the GPL license and uses Linux anyway? For those who merely want to install Linux on a computer and use it without modifying it in any way, there may be a way around the restrictive license provisions, at least as to copyright infringement.

US copyright law allows a copyright owner to prohibit others from (1) copying the work; (2) preparing derivative works; and (3) distributing copies of the work to the public. Other rights are not directly implicated with respect to computer software.¹³ These rights are subject to various limitations, such as the limitation in 17 U.S.C. section 117 that permits the owner of a copy of a computer program to make another copy and to adapt the computer program if the copying or adaptation is essential to using the program in conjunction with a machine. This limitation might benefit a company (e.g., a computer manufacturer) if it were to purchase all of its copies of Linux from another source, such as Red Hat Software. If the sale from Red Hat (or other source) is deemed to make the company the legal owner of each of the copies of the Linux software, then the company could use those legally obtained copies under the provisions of section 117, as long as each individual copy were loaded onto one machine.

The adaptation right in section 117 is subject to the limitation, however, that any adaptations may be transferred to another person or company only with the authorization of the copyright holder.¹⁴ In other words, the right to transfer the legally obtained copy does not extend to transferring adapted copies. Consequently,
the company could not adapt Linux to operate on a
particular machine and then transfer the modified
Linux to customers under this provision. However, the
customers might be able to configure the machines to
adapt Linux in a particular manner without running
afoot of section 117. There are few court decisions ad-
ressing this provision under the copyright statute, thus
leading to some uncertainty in its application.
Moreover, the provisions of section 117 do not provide
defense to a claim of patent infringement if an up-
stream contributor has patented an improvement that
found its way into Linux.

Nevertheless, it may be possible for a company to re-
ject the GPL and to copy and distribute Linux in the
limited manner described without being subjected to a
claim of copyright infringement. In that case, many of
the risks and obligations under the GPL, discussed sub-
sequently, will be avoided.

Validity of the GPL Generally

Is the GPL a valid contract that can be enforced
against one who violates its provisions or who raises it
as a defense in an infringement lawsuit brought by one
of the many copyright owners of Linux? No reported
court decisions have addressed the validity or effect of
this license. Although section 5 of the GPL asserts that
merely modifying or distributing software that is sub-
ject to the license indicates acceptance of the GPL, a
court is not likely to agree with this assertion. The GPL
is in the nature of a unilateral contract, because the offer
of a license by each “upstream” copyright holder, that
is, by each prior contributor to the Linux software, can
be accepted by performance under the contract mani-
festing acceptance. Merely copying and modifying the
software is consistent with acceptance of the GPL, but
it is equally consistent with rejection of the GPL by a
party intending to infringe or believing that there are
no enforceable rights in the software.

A court probably will conclude that both the GPL
and the Lesser License are unilateral contracts that can
be validly accepted under certain conditions. However,
in order to invoke the provisions of the license, a user
will need to manifest its assent to one of the licenses by
an affirmative act (e.g., by further distributing the Linux
software including a notice that the software is covered
by one of these licenses). The mere act of copying or
using the Linux software, without more, is indis-
tinguishable from an act of copyright infringement and
does not constitute acceptance of the license terms.

Conversely, a company could affirmatively reject the
GPL by including with any distributed software an af-
firmative statement that any software modified or fur-
ther distributed by the company is not subject to the
licenses, and that no further license is granted to the
modified or further distributed software. (Of course, re-
jecting the GPL carries its own risks, because it could
subject the company to copyright infringement.)
Including a notice that the software is distributed under
the GPL likely will be considered a manifestation of ac-
ceptance of the GPL. Similarly, making source code
available in accordance with the terms of the GPL like-
ly will be taken as manifestation of acceptance of the
contract.

Linking Linux Libraries with
Application Programs

The Linux software distributed by various vendors
includes not only the Linux kernel, but so-called li-
braries of functions that can be linked and used by ap-
application programs. The Lesser License is apparently
intended to cover such situations.

The Lesser License asserts that linking and using the
Linux libraries constitutes copyright infringement be-
cause it allegedly creates a “derivative work” based on the
library. It is doubtful that this definition of “derivative
work” will be accepted by a court, particularly because it
seems to ignore the provisions of 17 U.S.C. section 117.
As explained, the legal owner of a copy of a computer
program is entitled to make one copy of that program in
order to operate it on the computer. Therefore, assuming
that a company owns a legal copy (i.e., it purchases each
copy separately) of Linux for each computer that it in-
tends to provide to customers, it seems that the compa-
nymay could link its software to such Linux libraries (which
essentially “copies” the linked library routines) without
departing from the protections of 17 U.S.C. section 117,
and such linked applications could be transferred to cus-
tomers under 17 U.S.C. section 117(b).

Although there are no reported court decisions on
this specific point, it seems that merely linking library
subroutines into an application program, even if comput-
er instructions in those library subroutines are modified
to operate together with the application program, should
not constitute creation of a derivative work.

Obligations under the GPL

The GPL states that it applies to “most of the Free
Software Foundation’s software and to any other pro-
Linux Users Risk Infringement

program whose authors commit to using it.” Figure 1 briefly summarizes the rights granted by the license; the obligations of the licensee; and (as interpreted by this author), the action that will be necessary to constitute an acceptance of the license.

**Obligations under the Lesser License**

The Lesser License states that it is intended for use with specially designed software packages, such as libraries, and permits linking of such libraries with non-free programs. The term “library” is defined as a collection of software functions and/or data prepared so as to be conveniently linked with application programs to form executables.

The Lesser License also states that a computer program that merely links to libraries is not a “derivative work” of the library, and thus falls outside the scope of the Lesser License. However, according to the Lesser License, when a computer program is linked with the library, it will become an executable that is a derivative of the library, and thus is covered by the license. Figure 2 briefly summarizes the provisions of the Lesser License.

**Risks of Using, Modifying, or Distributing Linux**

Many of the ambiguities and potential traps inherent in the GPL and Lesser License have been mentioned. The following describes some of the risks that companies might incur in using, modifying, or redistributing Linux.

First and foremost, a company runs the risk of being sued for copyright infringement for copying, modifying, or further distributing copies of Linux or its constituent parts. This flows naturally from section 106 of the copyright statute, which provides copyright owners with the exclusive right to copy, prepare derivative works, or further distribute copyrighted software. Any of the many originators or contributors

### Figure 1

<table>
<thead>
<tr>
<th>Rights Granted by License</th>
<th>Obligations of License</th>
<th>Action Necessary to Accept License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy and distribute source code without changes.</td>
<td>Publish on each copy a copyright notice; disclaimer of warranty; GPL notice; and copy of the GPL license. See end of GPL for examples.</td>
<td>Distribute source code including copyright notice; disclaimer of warranty; GPL notice; and copy of the GPL license.</td>
</tr>
<tr>
<td>Modify code, and copy and distribute modified code.</td>
<td>All of the above, and: 1. Place notice in all modified files, indicating change and date of change. 2. Must license any new code you distribute that contains or is derived from the original code without charge under terms of GPL. 3. If modified code normally prints announcements, must print or display copyright notice, disclaimer of warranty, redistribution rights, and instructions for viewing GPL license. 4. Exception: Above duties do not apply to identifiable sections that are not derived from the original code, and that are distributed separately from the original code.</td>
<td>All of the above, and: 1. Distribute modified code with notice indicating change and date of change; 2. Indicate that modified code is subject to GPL license; and 3. Print or display copyright notice, disclaimer of warranty, redistribution rights, and instructions for viewing GPL, unless code is not interactive.</td>
</tr>
<tr>
<td>Copy and distribute object or executable code (including unchanged and modified)</td>
<td>All of the above, and any one of the following: 1. Distribute machine-readable source code corresponding to the modified object or executable code on a medium; OR 2. Distribute written offer, valid for 3 years, to give any third party a machine-readable copy of the corresponding source code; OR 3. Distribute offer that you received with the original code to obtain source code (not allowed for commercial distribution).</td>
<td>All of the above, and any one of the following: 1. Distribute machine-readable source code corresponding to the modified object or executable code; OR 2. Distribute written offer, valid for 3 years, to give any third party a machine-readable copy of the corresponding source code; OR 3. Distribute offer that you received with the original code to obtain source code.</td>
</tr>
</tbody>
</table>
of the Linux kernel or libraries could potentially assert a claim for copyright infringement. Although this decidedly is not in the spirit of the "free software" movement, a big enough target that invoked the ire of a group of computer programmers could subject itself to such a lawsuit. Many of these programmers belong to organizations that openly deride and taunt large companies that have software patents or that don’t agree with their views. Except for the strategy of using a single purchased copy of Linux on each computer without modification (as discussed supra), the company must rely on the GPL for defense. If the company failed to abide by the GPL provisions exactly, or violated one of the explicit prohibitions in the license that negates the license, the license defense could be completely compromised.

Second, assuming that a company scrupulously abided by the GPL provisions and modified Linux for its use, the company might unwittingly give away its copyrights and patent rights to any of its software that be-

### Figure 2

<table>
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<th>Obligations of License</th>
<th>Action Necessary to Accept License</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copy and distribute library source code (same as GPL).</td>
<td>Same as GPL, except applies to libraries only.</td>
<td>Same as GPL (see Figure 1), except refers to Lesser License instead of GPL.</td>
</tr>
</tbody>
</table>
| Modify library code, and copy and distribute modified library code. | All of the above, and:  
1. Must only modify library in such a way that it remains a library.  
2. Place notice in all modified files, indicating change and date of change.  
3. Modified library must be licensed at no charge to all third parties under terms of Lesser License.  
4. If a library function refers to an application program for data or function, the library function must still function in the event the application does not supply the data or function. | All of the above, and:  
1. Place notice in modified library files, indicating change and date of change.  
2. Indicate that modified library code is subject to Lesser License. |
| Copy and distribute object or executable library code (including unchanged and modified). | All of the above, and:  
Must accompany code with corresponding machine-readable source code on a medium. | All of the above, and:  
Distribute machine-readable source code corresponding to object or executable code. |
| Link application programs with library code and distribute the executable. | All of the following:  
1. Must permit modification of application for customer’s own use, and reverse engineering for debugging purposes.  
2. Must give prominent notice with application program that library is used and that library is covered by Lesser License.  
4. If application displays copyright notices, include copyright notice for the library.  
5. Do one of the following:  
a. Provide machine-readable source code for the library (including any changes) and source or object code of the application, so that user can modify the library and relink to produce modified executable.  
b. Use a shared library mechanism for linking with the library.  
c. Provide written offer with application valid for 3 years to give items in (a).  
d. Offer access to copy items in (a) from a designated place.  
e. Verify that user has already received items in (a). | All of the following:  
1. Give prominent notice with application program that the library is covered by Lesser License.  
2. Supply copy of Lesser License.  
3. If application displays copyright notices, include copyright notice for library.  
4. Do one of the following:  
a. Provide machine-readable source code for the library (including any changes) and source or object code of the application, so that user can modify the library and relink to produce modified executable.  
b. Use a shared library mechanism for linking with the library.  
c. Provide written offer with application valid for 3 years to give items in (a).  
d. Offer access to copy items in (a) from a designated place.  
e. Verify that user has already received items in (a). |
comes intermingled with Linux or parts of Linux. This flows from the GPL provisions mandating that any modified versions of Linux (and any other computer software that is "derived from" or "contains parts of" Linux), and from the ambiguous nature defining what is "derived from" Linux.

Consequently, a programmer working for the company might unwittingly incorporate a part of "free" Linux software into one of the company's flagship software products, thus unknowingly forfeiting any copyrights or patent rights that the company might have in such products. Some commentators have suggested that this provision could be circumvented by building a wall around the Linux-based programs, such that the company's products do not directly interface with Linux. 18

Third, a company that abides entirely by the GPL might nevertheless be sued by a copyright owner whose works were improperly incorporated into Linux by an upstream contributor. For example, if a rogue programmer took a copyrighted library function from a third party and incorporated that function into part of Linux, that third party could still come after all Linux users for copyright infringement. In that case, the GPL is of no effect, because that copyright owner never assented to having the copyrighted function incorporated into Linux. In this respect, every downstream user must rely on the good faith and licensed activities of all upstream contributors. Any break in the chain can prove disastrous for all downstream users. The Free Software Foundation appears to recognize this problem, but it does not propose a solution.

Fourth, a company that distributes its software bundled together with Linux, even if its software does not incorporate parts of Linux, and even if Linux is not modified, might unintentionally grant a license to its software (i.e., free from any copyright or patent restrictions), due to the vague and confusing definitions provided in the GPL. This flows from the clause in the license that "when you distribute the same sections as part of a whole ..., the distribution of the whole must be on the terms of this License."

Finally, as set forth in Figures 1 and 2, accepting the GPL or Lesser License incurs numerous obligations, such as distributing software to third parties or main-

Notes
10. www.gnu.org/copyleft/gpl.html, at paragraph 0.
16. See e.g., Lewis Galoob Toys, Inc v. Nintendo of Am., Inc., 964 F.2d 965, 969 (9th Cir. 1992) (suggesting, but not holding, that combining a spell-checker function with a word processing program does not constitute a derivative work); Secure Services Tech. v. Time and Space Processing, 722 F. Supp. 1354, 1363 (E.D. Va. 1989) (changing binary codes in fax machine protocol did not constitute "derivative work" because of insufficient originality).