Developing An Open Source Option for NASA Software

Patrick J. Moran

NASA Ames Research Center, M/S T27A-2
Moffett Field, CA, 94035, USA
patrick.j.moran@nasa.gov

NAS Technical Report NAS-03-nnn
April 7, 2003

Abstract

We present arguments in favor of developing an Open Source option for NASA software; in particular we discuss how Open Source is compatible with NASA’s mission. We compare and contrast several of the leading Open Source licenses, and propose one – the Mozilla license – for use by NASA. We also address some of the related issues for NASA with respect to Open Source. In particular, we discuss some of the elements in the “External Release of NASA Software” document (NPG 2210.1A) that will likely have to be changed in order to make Open Source a reality within the agency.

Contents

1 Introduction 3

2 Why Open Source Software? 4
  2.1 NASA Perspective .......................... 4
  2.2 Software Users’ Perspective .............. 5
  2.3 Software Developers’ Perspective ....... 5
  2.4 PITAC Perspective .......................... 6
  2.5 Academia Perspective ..................... 6
  2.6 Department of Energy Perspective ...... 7

3 The Leading Open Source Licenses 7
  3.1 GNU General Public License ................ 7
  3.2 GNU Lesser General Public License ....... 8
  3.3 Mozilla Public License ..................... 8
  3.4 BSD License ............................... 8
1 Introduction

In the past decade the rapid growth of the Internet has changed how we use computers. For software developers, the widespread network availability and growth of network-aware tools have led to new forms of distributed development and collaboration. Software distribution has also changed. Distributions in the past, requiring sending disks and tapes through the postal service, have in many cases been superseded by the simpler and more rapid distributions enabled by the network.

One of the more exciting developments has been the growth in what is known as Open Source software. From the name alone it might seem that Open Source simply means that when software is distributed, source code is included. But Open Source is more than that. Open Source is about enhanced software quality, more efficient software development, and increased collaboration. An organization known as the Open Source Initiative (OSI) [21] provides the most widely recognized guidelines as to what constitutes Open Source; in particular the OSI provides guidance with respect to how to balance the intellectual property rights concerns of developers with openness. The OSI's contribution is particularly important because there is the temptation by many to use the terms “open” and “open source” rather loosely, and in particular to apply the adjectives to software that in reality is not particularly open. An article by Tim O'Reilly (of O'Reilly & Associates, one of the most prolific computer science book publishers) also provides help with clarifying what Open Source is about [34]. Currently, the largest Open Source software hosting site, SourceForge, provides the home to over 36,000 Open Source projects.

For NASA, the adoption of an Open Source option for software distribution would lead to three main benefits:

1. improved software development;
2. enhanced collaboration, in particular across organizational boundaries;
3. more efficient and effective dissemination.

The first benefit is described by the OSI as “when programmers can read, redistribute, and modify the source code for a piece of software, the software evolves. People improve it, people adapt it, people fix bugs. And this can happen at a speed that, if one is used to the slow pace of conventional software development, seems astonishing” [21]. In one sense, Open Source enables a type of peer review for software. The second benefit is important because NASA's overall mission to “understand and protect our home planet, to explore the universe and to search for life” [32] is not one that NASA can effectively achieve alone. To be successful, NASA will need to work with other government agencies, academia and industry. Open Source makes those types of collaborations easier. Finally, from the beginning NASA has been directed to “provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof” [8]. An Open Source distribution, coupled with the opportunities provided by the Internet, would enable far greater dissemination than has ever been achieved before.

In this report we propose that NASA develop an Open Source option for software developed within the agency. We say option because we are not proposing that all
NASA software be released Open Source. We recognize that some software, because of export control, ownership or commercialization concerns, may not be suitable for Open Source. Nevertheless, we expect that many NASA projects would be appropriate for, and would benefit greatly from, an Open Source distribution. In the following sections we begin with some of the rationale behind Open Source. Next we consider some of the leading Open Source licenses and their properties. We also address some associated issues that impact potential Open Source distribution for NASA software, in particular issues related to NPG 2210.1A, the “External Release of NASA Software” guideline. We propose one particular license, the Mozilla public license, for consideration. And finally, we conclude with some proposed next steps.

2 Why Open Source Software?

There are many arguments in favor of Open Source software. Which argument resonates with the listener depends on one's viewpoint. Here we discuss some of the key perspectives.

2.1 NASA Perspective

The functions of NASA were prescribed in the “National Aeronautics and Space Act of 1958”, NASA's charter [8]. The charter states that NASA shall:

1. plan, direct, and conduct aeronautical and space activities;

2. arrange for participation by the scientific community in planning scientific measurements and observations to be made through use of aeronautical and space vehicles, and conduct or arrange for the conduct of such measurements and observations;

3. provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof;

4. seek and encourage, to the maximum extent possible, the fullest commercial use of space; and

5. encourage and provide for Federal Government use of commercially provided space services and hardware, consistent with the requirements of the Federal Government.

(Emphasis added). An Open Source distribution option for NASA software would provide for the widest dissemination of the work, with minimal overhead.

A more recent expression of NASA's priorities comes in the form of the NASA Mission Statement (found for example in the NASA 2003 Strategic Plan [32]):

- To understand and protect our home planet,

- To explore the universe and search for life,

- To inspire the next generation of explorers ... as only NASA can.
To most effectively achieve the first two goals NASA will need to work closely with other government laboratories, universities, and industry. Open Source software lowers the barriers to collaboration and enables sharing with minimal overhead. The third goal would also benefit if NASA were to adopt an Open Source option. NASA produces software specifically intended for teachers and children; for example, see the applications sponsored by the NASA Learning Technologies Project [30]. Schools, especially K-12, tend to be especially sensitive to software cost. Open Source would enable easier transfer of software from NASA to teachers and students with little or no cost to the recipients. Open Source would also make it easier for more advanced students and teachers to add new features to the software and contribute those features back to NASA, so that they may be shared by other schools. Imagine the excitement and pride fostered in a student when his or her work was appreciated not only by classmates but by peers worldwide.

2.2 Software Users' Perspective

The appeal of Open Source software for users is based on more than simply the desire to avoid paying money or to make a political statement. The decision to utilize a particular software library or application has serious implications because most non-trivial software requires a significant amount of time and effort to master and use effectively. Software that is available Open Source is easier to evaluate before making a deeper commitment. Furthermore, software used by NASA researchers tends to come from other NASA researchers, other government laboratories, university researchers, or small companies. Not all software comes from multi-billion-dollar giants. A significant consideration when deciding whether to adopt a software package is the expected longevity of the source. Budget cuts, personnel changes, rearranged priorities or bad business decisions may all lead to software that goes from reasonably supported to unsupported. In cases of closed or proprietary software, there may be no recourse for the user. Open Source software, on the other hand, leaves open the option of stepping in to keep the software alive. For example, the software underlying the Apache web server was initially developed and distributed Open Source by NCSA. When development and support from NCSA slowed, users stepped up to keep the project active. This is not to say releasing software Open Source magically means that programmers will step in when needed – many Open Source projects die in obscurity – but when the technology is important enough (the Apache server continues to play an important role in the infrastructure of the Internet) then the motivation will be there.

2.3 Software Developers' Perspective

Software developers are necessarily software users. They understand first hand why potential users of their own software prefer Open Source. Software developers also appreciate the potential value that users can provide in terms of testing, bug fixes, extensions and new ideas.

Researchers also understand that software frequently functions as a common platform for collaboration. Open Source encourages such collaborations by minimizing
unnecessary and unwarranted restrictions on transfer, in particular when those collaborations cross boundaries between government laboratories, academic laboratories, and industry.

2.4 PITAC Perspective

In 2000 a President's Information Technology Advisory Committee (PITAC) was convened to address the subject of "Developing Open Source Software to Advance High End Computing" [15]. The committee included participants from industry, academia and government laboratories. Bill Feiereisen, the former chief of the NAS division, was one of the NASA representatives. The committee produced three recommendations [15]:

1. The Federal Government should encourage the development of Open Source Software as an alternate path for software development for High End Computing.
2. The Federal Government should allow open source development efforts to compete on a "level playing field" with proprietary solutions in government procurement of high end computing software. Requests for Proposals (RFPs) from Federal agencies for high end computing software, tools, and libraries should include provisions allowing these efforts to be carried out using open source.
3. An analysis of existing open source licensing agreements should be undertaken, and the results should be distributed to all agencies funding high end computing. The analysis should describe characteristics of each license and give specific examples of situations in which it may be preferable to use one type over another. The use of common licensing agreements should be encouraged.

While the committee's focus was on high-end computing, much of the rationale behind their findings could be applied to the broader information technology arena.

2.5 Academia Perspective

In the past decade within universities there has been a trend towards the commercialization of software. More recently some notable voices have pointed out that commercialization may not be the best choice in all cases. Larry Smarr, founder of the National Center for Supercomputing Applications (NCSA) and generally acknowledged as a leading visionary in information technology, has stated:

Some universities are dead set against giving [software code] away. But I don't think universities should be in the moneymaking business. They ought to be in the changing-the-world business, and open source is a great vehicle for changing the world [14].

While "changing the world" is a lofty goal, it is an appropriate one. Replace "universities" with "NASA centers" in Smarr's statement and you would be echoing the
sentiments of many in NASA, in particular those who are actually developing the software that would be eligible for an Open Source distribution.

NCSA, it should be noted, is the birthplace to several key information technologies, including HDF [17] and the Mosaic web browser. Those technologies were effectively distributed open source; their open distribution was key to their widespread adoption. HDF is used extensively by NASA, in particular for Earth science data [33]; successors to Mosaic are used by virtually anyone who uses a computer.

2.6 Department of Energy Perspective

The Department of Energy (DOE) is similar to NASA in many respects. Like NASA, DOE is responsible for research laboratories, and like NASA DOE produces software in pursuit of its mission. Also, like NASA DOE is grappling with how best to disseminate that technology, given intellectual property and export control concerns. One difference though between DOE and NASA is that DOE national laboratories are staffed by management and operating contractors, not civil servants. In recent years the trend at DOE has been towards Open Source. Appendix H provides a partial list of DOE-related projects that are available Open Source. Both Chromium [13] and Globus [18] are used at Ames, some of the other packages may be as well.

3 The Leading Open Source Licenses

The following sections provide brief descriptions of some of the leading Open Source licenses. There are currently over 30 licenses recognized by the Open Source Initiative [21], but the majority of Open Source projects are covered by a relatively small set of the licenses. See Appendix I. There are also numerous semi-open-source licenses that do not qualify fully as Open Source as defined by the OSI [21]. Since the focus of this report is Open Source we do not include evaluations of those licenses here. If there is enough interest – and resources – we can add licenses to this evaluation if necessary.

Two of the more helpful sources providing an overview of these licenses and others are the Mozilla “Frequently Asked Questions” file [29] and an “Evaluation of Public Software Licenses” by Rosenberg [36].

Finally, it should be noted that there have been very few court cases where the validity of software licenses in general has been put to the test.

3.1 GNU General Public License

The GNU General Public License (or GPL) was developed by the Free Software Foundation [6]. Unlike the BSD License [13] (see below), it maintains free source code by a fairly complex set of rules. It requires that any “derivative works” based on software covered by the GPL also be covered by the GPL, and that source code to these works be made publicly available. This means that anyone does that is derived from GPL code (derivative works) must also be made free. This ensures that the resource of free source code will not be diminished by someone taking the
code, modifying it slightly, and keeping it to themselves, but it also tends to discourage
the use of GPL derivative work in commercial development by traditional software
companies and other for-profit organizations [29]. Maxwell [28] provides a relatively
critical evaluation of the GPL. The full text for the GPL can be found at [19] and also
in Appendix C of this report.

3.2 GNU Lesser General Public License

The GNU Library General Public License was also developed by the Free Software
Foundation [6]. It is similar to the GPL, but it introduces the idea that a library of
functions covered by the LGPL may be used by a program without the program being
a derivative work of the library. This allows the program to be issued under different
terms than the LGPL. This makes the LGPL less restrictive (the developer is compelled
to release the source code to less of his or her work) than the GPL. (Only changes to
the library itself would have to be made public.) [29]. The full text for the LGPL can
be found at [20] and also in Appendix D of this report.

3.3 Mozilla Public License

The Mozilla Public License (MPL) attempts to strike a middle ground between promot-
ing free source development by commercial enterprises and protecting free source de-
velopers. Like the GPL, it requires that any and all changes to code (derivative works)
covered by the license must be made publicly available. However, it also allows
you to combine covered code with other code to create a larger work without requiring that
other code to be covered by the license. This is similar to, but even less restrictive, than
the LGPL [29]. There is also a “Netscape Public License” (NPL) which adds amend-
ments to the MPL granting Netscape certain additional rights that allow the company
to make its client source code free while still attending to business needs such as the
development of other products (e.g. servers) and the fulfillment of previously existing
contracts [29]. We do not further consider the NPL here. The full text for the MPL can
be found at [7] and also in Appendix E of this report.

3.4 BSD License

The Berkeley Systems Distribution (BSD) license is another free software license that
was developed by the University of California at Berkeley. It is very non-restrictive in
its terms, basically allowing anyone to do anything with code covered by the license,
but requiring a reference to the copyright holder in accompanying documentation –
essentially requiring only credit where credit is due. This makes the license acceptable
to commercial developers, but opens others to the possibility that their work may be
incorporated into products that may be proprietary to someone else [29]. The full text
for the BSD license can be found at [13] and also in Appendix F.
Table 1: A summary of properties for some of the leading Open Source licenses, inspired by [11]. Y indicates that the property does apply to the license, N indicates that the property does not apply. The headings GPL, LGPL, MPL, BSD and PD stand for GNU General Public License (Appendix C), GNU Lesser General Public License (Appendix D), Mozilla 1.1 Public License (Appendix E), Berkeley Software Distribution License (Appendix F), and Public Domain, respectively. Public Domain is not a license, but it is included for comparison purposes. “Public Domain” essentially means “all rights waived” by the author.

4 License Properties

As should be apparent from the previous section, not all Open Source licenses are the same. Table 1 lists some of the key properties for various leading licenses, plus public domain. Public domain is not a license, but is included for comparison. 

Caveat: The following analysis is not written by a law professional — seek the advice of such a professional before making legal decisions.

4.1 Recognized by the Open Source Initiative

The terms “open” and “open source” get used frequently these days, not always with the same meaning. The Open Source Initiative (OSI) [21] provides the most widely agreed upon criteria for deciding whether a license should be considered open source. Currently there are over 30 OSI-recognized licenses (see Appendix I, Table 3), including those submitted by GNU, IBM, Sun and Apple. Knowing that a license is OSI approved gives a potential software user some assurance about what to expect from the license. Without some type of assurance, a potential user may feel obligated to get a legal analysis of the license before proceeding — potentially a significant inhibitor to a wider distribution.

4.2 Attribution Required

By “attribution” we mean that the licensee must give the author credit. For Open Source software, this typically means recognition beyond what is buried in the source code files. For example, the GPL license requires that applications that are executed from a command line print an announcement listing the copyright notice, warranty, and redistribution conditions. Among the over 30 licenses recognized by the Open Source Initiative is in fact an “Attribution Assurance License” [21] whose focus is attribution.
Other examples of licenses designed to ensure attribution — though focused on other types of creative works such as images and audio — can be found at Creative Commons [3].

4.3 Redistribution Allowed

No restrictions on redistribution is one requirement for OSI approved licenses. See the first criterion in the Open Source Definition (Appendix B). All the licenses considered here require that they remain with the software if it is redistributed, whether or not the redistributed work is a derivative.

4.4 License Trumps in Derivative Works

Most licenses allow for derivative works where there is more than one license that applies. The exception is the GNU General Public License (GPL). The GPL requires that any derivative work be licensed solely under the GPL. This the so-called “license capture” or “viral” property.

4.5 Derivatives Must Be Open Source Software

The GNU and Mozilla licenses require that derivative works be Open Source. This is potentially a valuable requirement for NASA, since it provides some assurance that the agency will have access to enhancements. This requirement also prevents certain types of “forking”, where a user branches off from the NASA development in a closed way. In particular, this requirement would rule out cases where the branch goes proprietary. Weaker licenses, such as the BSD license, do not have this protection.

4.6 Commercialization Allowed

It is a common misunderstanding that open source licenses prohibit commercialization. In particular, some assume that the GPL does not allow commercialization. This is not the case — Linux is one of the most prominent examples where software with the GPL is sold for a profit. On the other hand, some open source licenses may prohibit use in certain business models. For example, one could not use a business model depending on closed, proprietary software with GPL code. Other licenses, such as the BSD license, do allow redistribution in a closed, proprietary form.

5 Associated Issues

Getting to Open Source depends on more than simply choosing the appropriate license. Here we point out some of the associated issues. Note, all these issues are potential “show stoppers”. It is important to consider these issues carefully before proceeding.
5.1 Export Control

Before releasing scientific and technical information (STI) NASA requires that one submit a “NASA Scientific and Technical Document Availability Authorization” (NF1676). NASA Ames also requires an “Export Control Public Domain Declaration” (ARC1676A). We assume that software considered eligible for open source distribution is declared “Publically Available” on NF1676. Copyright, patents and licensing enable NASA to openly distribute STI while still having control over intellectual property. Export control for STI not “Publically Available” means preventing access to the STI by some foreign citizens or entities. This is fundamentally not compatible with an open distribution.

5.2 “External Release of NASA Software” (NPG2210.1A)

The primary document governing the release of NASA software is the “External Release of NASA Software”, NPG 2210.1A [31]. The NPG mentions Open Source in one place, Section 2.2.2:

“Approved for Public Domain Release” - This release category is the broadest release category possible and may be approved only if Software Accepted (As-Built) Baseline has been categorized as Public Domain Software as defined in paragraph 2.1.7. This release category indicates there are no export restrictions on the software and should be approved with great care and requires concurrence by Agency Export Control officials. Once software has been Approved for Public Domain Release, all other release types could be allowed; however some may be inappropriate, e.g., if no further development is envisioned, then a Beta Release would be inappropriate. This type of release also meets the requirements of open source software as defined by the Open Source Initiative. Either an SUA or an Open Source license is required.

There are problems with how NPG 2210.1A handles Open Source. First, the NPG lumps Open Source with Public Domain, but as should be clear from this report (especially for those readers dedicated enough to read through all the appendices), Open Source and Public Domain are not the same thing. We want the protections that an Open Source license can give us. Second, the guideline misses the point of Open Source. The NPG envisions Open Source for projects for which there is “no plan for further development or beta testing” (NPG Section 2.1.7). The NPG sees Open Source for essentially completed projects, whereas most software developers expect that placing software into Open Source means the beginning of new development activity, not the end. The interactions enabled by Open Source software are a significant part of the value of OSS to NASA and software developers. The NPG implies that software release is an infrequent, major occurrence. Open Source developers expect changes to be small, incremental and relatively frequent.

Finally, there is the issue of tracking. Section 3.9, “Release Records and Metrics Reporting” states that every software release must have a software release record, and that every record must include “the recipient’s name, address, phone number, e-mail
address, date of transfer, and version of software transferred.” (Section 2.1.14). This type of tracking is not appropriate for Open Source, for several reasons:

**Breaks Down With Redistribution** The first criterion of the Open Source definition [16] is that redistribution must be allowed. All it would take is for one recipient to post the software to a site such as SourceForge, and the tracking would become essentially meaningless. NASA would likely be significantly undercounting the number of users. The same problem would apply to Public Domain software, since placing software in the Public Domain would mean among other things that NASA would be waiving the right to prohibit redistribution.

**Burdensome** Requiring that a potential user fill out forms with personal information will deter a significant number of people. It's a bit like requiring a prenuptial agreement before a first (and possibly somewhat blind) date. Requirements that the user fill out some sort of web form also would be contrary to the “License must be technology-neutral” criterion in the Open Source definition. See Appendix B.

**Arbitrary** NASA disseminates a great deal of scientific and technical information (STI), including – but not limited to – journal publications, technical reports, and images. The various types of STI have far more in common with software than difference. Like software, the other types of STI have to be evaluated with respect to export control criteria. Like software, they also have be evaluated with respect to intellectual property, and the standard legal protections of copyright, patents and licenses can apply to all the above. Insisting on the types of tracking NPG 2210.1A imposes for software for other types of STI would likely be treated as a bad joke. For example, would NASA demand the mailing list from a journal publisher before allowing it to publish an article authored by a NASA researcher? Clearly, NASA is making a trade-off: the value of NASA scientists participating effectively in the community outweighs attempting to track every recipient of the STI. More data is usually a good thing, but it must always be balanced against the acquisition cost. The Department of Energy laboratories are facing essentially the same trade-off. As we can infer from recent releases (see Appendix H), DOE is coming to the realization that the value of genuine Open Source with unencumbered distribution outweighs the bureaucratic instinct towards additional control and protectiveness.

### 5.3 Contractor Rights

Much of the software authored within NASA is written by contractors. Rights to software authored by contractors varies depending on the contract that they are working under. Thus to a certain extent contractor software rights have to be handled on a case-by-case basis based on the type of contract or other agreement. Under standard procurement contracts (excluding SBIR), contractors must request and receive permission to assert copyright from the contracting officer before copyright ownership can be established by the contractor entity in software produced under the contract. NPG
2210.1A states that the contracting officer will require an acceptable commercialization plan. The official text (Section 3.4.3.2.1) [31] reads:

NASA can direct its contractors to assert their copyright and assign it to the U.S. Government when software is created under a NASA contract. If the contractor provides an acceptable plan to commercialize the software and the Contracting Officer, in consultation with the Center Patent or Intellectual Property Counsel, provides the contractor written permission to assert copyright in the software code, the contractor may retain the copyright with the Government retaining a license for use by and for the Government. This license does not, however, include the right to distribute the software to the public.

Clarification from the Ames Patent Counsel indicates that the final sentence of the quote above is referring specifically to a “Government purpose” license. Furthermore, guidance from the Ames Patent Counsel indicates that Section 3.4.3.2.1 does not preclude an Open Source distribution by the contractor. Thus, for work with contractor involvement, one path to Open Source mode may possibly be through the commercialization avenue.

As discussed earlier in this report, there are many advantages to adopting an Open Source distribution, most notably: improved software development, enhanced collaboration, and more effective dissemination. Commercialization is not necessary to realize these advantages, thus requiring that the contractor produce a “plan to commercialize” may not always be appropriate. On the other hand, it should be noted that commercialization is not incompatible with these advantages. Improving software quality certainly would lead towards code that would have higher value and commercial potential in the long term. Enhanced collaboration would tend to produce software with more users, and in particular users who have a vested interest in seeing the software continue to thrive. In the long term those users may see value added in a commercialization that provides systems integration and support (think, for example, Linux). Enhanced dissemination would also tend to create a larger user base, and a large user base would enable more commercial opportunities.

In the long term it may be worthwhile for the government to address software distribution, and in particular Open Source, in the initial request for proposals and statement of work.

5.4 Copyright for Government-Employee Authored Work

NPG 2210.1A [31], Section 3.4.3.2, states:

Software created solely by an officer or employee of the U.S. Government as part of that person’s official duties is a work of the U.S. Government. Copyright protection is not currently available in the United States for a work of the U.S. Government. However, the Government can claim foreign copyrights for software created by its employees and can receive and hold copyrights transferred to it by assignment.
In cases where a work is a joint effort between civil servant and contractor, the options look better. Section 3.4.3.2.2 of the NPG states [31]:

Software that is a joint work between NASA employees and NASA contractors is protected under copyright and, absent an agreement to the contrary, is co-owned by the U.S. Government and the contractor, with each having an independent right to use or license the use of the work with an obligation to account for royalties.

How much contractor involvement is required in order to be considered “joint work” is unclear.

6 Proposed NASA Open Source License

As described in the previous sections, there are many licenses to choose from for distributing software, even if we limit ourselves to those licenses recognized by the Open Source Initiative [21]. We propose that version 1.1 of the Mozilla Public License (MPL, see Appendix E) be considered for use with NASA Open Source Software, for the following reasons:

- the license is recognized by the Open Source Initiative [21], there would be no need to develop yet another license and submit it to the OSI for approval;
- by requiring that derived work also be Open Source, NASA has some assurance that derivative works will be available to the agency;
- the license was developed with input from legal and technical experts and subjected to public review, it appears to be one of the more carefully written licenses available;
- the license does not have the GPL “license capture” feature, in general it does not have the political baggage of the GNU licenses.

From the SourceForge statistics (see Appendix I, Table 3), there are currently 294 projects using the MPL 1.1, and an additional 240 using the 1.0 version of the MPL. These counts are far less than the GNU and BSD license totals, but still significant.

7 Conclusion

We have presented arguments in favor of an Open Source distribution option for NASA software. We have discussed how Open Source is compatible with the mission of NASA, in particular in terms of software creation, collaboration and dissemination. Also, we have reviewed several of the leading Open Source licenses and proposed one – the Mozilla Public License – as a template for a NASA. Finally, we have pointed out some of the sections within NPG 2210.1A, the “External Release of NASA Software” document, that may not be compatible with an Open Source distribution option.
We propose two next steps. First, we should work to develop consensus on a license that would be appropriate for NASA Open Source release. This report is intended to move that discussion forward. Second, we need to address the issues highlighted in Section 5. Most of these issues stem from problems with NPG 2210.1A [31]. Some issues, such as how much contractor participation is necessary in order to make a civil-servant/contractor work "joint" probably only require clarification from a more authoritative source. Other issues, such as the NPG sections that are contrary to Open Source, will likely require amendments to the guidelines.
A Acronyms

AFPL  Aladdin Free Public License.
BSD  Berkeley Software Distribution.
COSMIC  Computer Software Management and Information Center.
CTO  Commercial Technology Office.
DAA  Document Availability Authorization.
DNS  Domain Name System.
DOD  Department of Defense.
DOE  Department of Energy.
DRM  Digital Rights Management.
EAR  Export Administration Regulations.
EULA  End-User License Agreement.
FSF  Free Software Foundation.
FTP  File Transfer Protocol.
GNU  "What's GNU? GNU's not Unix!".
GPL  GNU General Public License.
GUI  Graphical User Interface.
HDF  Hierarchical Data Format.
HEC  High-End Computing.
IETF  Internet Engineering Task Force.
IP  Intellectual Property.
IPG  Information Power Grid.
ITAR  International Traffic in Arms Regulations.
LGPL  GNU Lesser General Public License.
MPL  Mozilla Public License.
NDA  Non-Disclosure Agreement.
NSF  National Science Foundation.
B Open Source Definition

This is Version 1.9 of the Open Source Definition [21]. The indented, italicized sections below appear as annotations to the Open Source Definition (OSD) and are not a part of the OSD.

Introduction

Open source doesn’t just mean access to the source code. The distribution terms of open-source software must comply with the following criteria:

1. Free Redistribution

The license shall not restrict any party from selling or giving away the software as a component of an aggregate software distribution containing programs from several different sources. The license shall not require a royalty or other fee for such sale.

Rationale: By constraining the license to require free redistribution, we eliminate the temptation to throw away many long-term gains in order to make a few short-term sales dollars. If we didn’t do this, there would be lots of pressure for cooperators to defect.

2. Source Code

The program must include source code, and must allow distribution in source code as well as compiled form. Where some form of a product is not distributed with source code, there must be a well-publicized means of obtaining the source code for no more than a reasonable reproduction cost—preferably, downloading via the Internet without charge. The source code must be the preferred form in which a programmer would modify the program. Deliberately obfuscated source code is not allowed. Intermediate forms such as the output of a preprocessor or translator are not allowed.

Rationale: We require access to un-obfuscated source code because you can’t evolve programs without modifying them. Since our purpose is to make evolution easy, we require that modification be made easy.

3. Derived Works

The license must allow modifications and derived works, and must allow them to be distributed under the same terms as the license of the original software.

Rationale: The mere ability to read source isn’t enough to support independent peer review and rapid evolutionary selection. For rapid evolution to happen, people need to be able to experiment with and redistribute modifications.
4. Integrity of The Author’s Source Code

The license may restrict source-code from being distributed in modified form only if the license allows the distribution of "patch files" with the source code for the purpose of modifying the program at build time. The license must explicitly permit distribution of software built from modified source code. The license may require derived works to carry a different name or version number from the original software.

Rationale: Encouraging lots of improvement is a good thing, but users have a right to know who is responsible for the software they are using. Authors and maintainers have reciprocal right to know what they’re being asked to support and protect their reputations.

Accordingly, an open-source license must guarantee that source be readily available, but may require that it be distributed as pristine base sources plus patches. In this way, "unofficial" changes can be made available but readily distinguished from the base source.

5. No Discrimination Against Persons or Groups

The license must not discriminate against any person or group of persons.

Rationale: In order to get the maximum benefit from the process, the maximum diversity of persons and groups should be equally eligible to contribute to open sources. Therefore we forbid any open-source license from locking anybody out of the process.

Some countries, including the United States, have export restrictions for certain types of software. An OSD-conformant license may warn licensees of applicable restrictions and remind them that they are obliged to obey the law; however, it may not incorporate such restrictions itself.

6. No Discrimination Against Fields of Endeavor

The license must not restrict anyone from making use of the program in a specific field of endeavor. For example, it may not restrict the program from being used in a business, or from being used for genetic research.

Rationale: The major intention of this clause is to prohibit license traps that prevent open source from being used commercially. We want commercial users to join our community, not feel excluded from it.

7. Distribution of License

The rights attached to the program must apply to all to whom the program is redistributed without the need for execution of an additional license by those parties.

Rationale: This clause is intended to forbid closing up software by indirect means such as requiring a non-disclosure agreement.
8. License Must Not Be Specific to a Product

The rights attached to the program must not depend on the program’s being part of a particular software distribution. If the program is extracted from that distribution and used or distributed within the terms of the program’s license, all parties to whom the program is redistributed should have the same rights as those that are granted in conjunction with the original software distribution.

Rationale: This clause forecloses yet another class of license traps.

9. The License Must Not Restrict Other Software

The license must not place restrictions on other software that is distributed along with the licensed software. For example, the license must not insist that all other programs distributed on the same medium must be open-source software.

Rationale: Distributors of open-source software have the right to make their own choices about their own software.

Yes, the GPL is conformant with this requirement. Software linked with GPLed libraries only inherits the GPL if it forms a single work, not any software with which they are merely distributed.

10. The License must be technology-neutral

No provision of the license may be predicated on any individual technology or style of interface.

Rationale: This provision is aimed specifically at licenses which require an explicit gesture of assent in order to establish a contract between licensor and licensee. Provisions mandating so-called “click-wrap” may conflict with important methods of software distribution such as FTP download, CD-ROM anthologies, and web mirroring; such provisions may also hinder code re-use. Conformant licenses must allow for the possibility that (a) redistribution of the software will take place over non-Web channels that do not support click-wrapping of the download, and that (b) the covered code (or re-used portions of covered code) may run in a non-GUI environment that cannot support popup dialogues.
C GNU General Public License

This is the GNU General Public License (GPL), Version 2, June 1991 [19].

Copyright (C) 1989, 1991 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.
TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each licensee is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.

b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.

c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for
GNU General Public License

This is the GNU General Public License (GPL), Version 2, June 1991 [19].

Copyright (C) 1989, 1991 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation’s software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author’s protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors’ reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone’s free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.
TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION
AND MODIFICATION

0. This License applies to any program or other work which contains a notice placed
by the copyright holder saying it may be distributed under the terms of this General
Public License. The "Program", below, refers to any such program or work, and a
"work based on the Program" means either the Program or any derivative work under
copyright law: that is to say, a work containing the Program or a portion of it, either
verbatim or with modifications and/or translated into another language. (Hereinafter,
translation is included without limitation in the term "modification"). Each licensee is
addressed as "you".

Activities other than copying, distribution and modification are not covered by this
License; they are outside its scope. The act of running the Program is not restricted,
and the output from the Program is covered only if its contents constitute a work based
on the Program (independent of having been made by running the Program). Whether
that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program’s source code
as you receive it, in any medium, provided that you conspicuously and appropriately
publish on each copy an appropriate copyright notice and disclaimer of warranty; keep
intact all the notices that refer to this License and to the absence of any warranty; and
give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at
your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus
forming a work based on the Program, and copy and distribute such modifications or
work under the terms of Section 1 above, provided that you also meet all of these
conditions:
   a) You must cause the modified files to carry prominent notices stating that you
changed the files and the date of any change.
   b) You must cause any work that you distribute or publish, that in whole or in part
contains or is derived from the Program or any part thereof, to be licensed as a whole
at no charge to all third parties under the terms of this License.
   c) If the modified program normally reads commands interactively when run, you
must cause it, when started running for such interactive use in the most ordinary way,
to print or display an announcement including an appropriate copyright notice and a
notice that there is no warranty (or else, saying that you provide a warranty) and that
users may redistribute the program under these conditions, and telling the user how to
view a copy of this License. (Exception: if the Program itself is interactive but does not
normally print such an announcement, your work based on the Program is not required
to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections
of that work are not derived from the Program, and can be reasonably considered
independent and separate works in themselves, then this License, and its terms, do not
apply to those sections when you distribute them as separate works. But when you dis-
tribute the same sections as part of a whole which 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.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:
   a) Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
   b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,
   c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program 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.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and
conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients’ exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public 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.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software
Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

**NO WARRANTY**

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

**How to Apply These Terms to Your New Programs**

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

one line to give the program's name and a brief idea of what it does.

Copyright (C)

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation; either version 2 of the License, or (at your option) any later version.
This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

Gnomovision version 69, Copyright (C) year name of author Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type 'show w'. This is free software, and you are welcome to redistribute it under certain conditions; type 'show c' for details.

The hypothetical commands 'show w' and 'show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than 'show w' and 'show c'; they could even be mouse-clicks or menu items–whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program 'Gnomovision' (which makes passes at compilers) written by James Hacker.

signature of Ty Coon, 1 April 1989
Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.
GNU Lesser General Public License

This is the GNU Lesser General Public License, Version 2.1, February 1999 [20].
Copyright (C) 1991, 1999 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

[This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages—typically libraries—of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights.

We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free
program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom. The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

**TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION**

0. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".
A "library" means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The "Library", below, refers to any such software library or work which has been distributed under these terms. A "work based on the Library" means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term "modification".)

"Source code" for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

a) The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event the application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful.

(For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)
These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, 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.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a "work that uses the Library". Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a "work that uses the Library" with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a "work that uses the library". The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a "work that uses the Library" uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for
If such an object file uses only numerical parameters, data structure layouts and
accessors, and small macros and small inline functions (ten lines or less in length), then
the use of the object file is unrestricted, regardless of whether it is legally a derivative
work. (Executables containing this object code plus portions of the Library will still
fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object
code for the work under the terms of Section 6. Any executables containing that work
also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a "work
that uses the Library" with the Library to produce a work containing portions of the
Library, and distribute that work under terms of your choice, provided that the terms
permit modification of the work for the customer's own use and reverse engineering
for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used
in it and that the Library and its use are covered by this License. You must supply
a copy of this License. If the work during execution displays copyright notices, you
must include the copyright notice for the Library among them, as well as a reference
directing the user to the copy of this License. Also, you must do one of these things:

a) Accompany the work with the complete corresponding machine-readable source
code for the Library including whatever changes were used in the work (which must
be distributed under Sections 1 and 2 above); and, if the work is an executable linked
with the Library, with the complete machine-readable "work that uses the Library", as
object code and/or source code, so that the user can modify the Library and then relink
to produce a modified executable containing the modified Library. (It is understood that
the user who changes the contents of definitions files in the Library will not necessarily
be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable
mechanism is one that (1) uses at run time a copy of the library already present on the
user's computer system, rather than copying library functions into the executable, and
(2) will operate properly with a modified version of the library, if the user installs one,
as long as the modified version is interface-compatible with the version that the work
was made with.

c) Accompany the work with a written offer, valid for at least three years, to give
the same user the materials specified in Subsection 6a, above, for a charge no more
than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated
place, offer equivalent access to copy the above specified materials from the same
place.

e) Verify that the user has already received a copy of these materials or that you
have already sent this user a copy.

For an executable, the required form of the "work that uses the Library" must in-
clude any data and utility programs needed for reproducing the executable from it.
However, as a special exception, the materials to be distributed need not include any-
thing that is normally distributed (in either source or binary form) with the major com-
ponents (compiler, kernel, and so on) of the operating system on which the executable
runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:
   a) Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.
   b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library 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.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

   If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.
It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public 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.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY
WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

one line to give the library's name and an idea of what it does. Copyright (C) year name of author
This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version.
This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details.
You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA.
Also add information on how to contact you by electronic and paper mail.
You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:
Yoyodyne, Inc., hereby disclaims all copyright interest in the library 'Frob' (a library for tweaking knobs) written by James Random Hacker.
signature of Ty Coon, 1 April 1990 Ty Coon, President of Vice That's all there is to it!
It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public 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.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY
WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License).

To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

one line to give the library’s name and an idea of what it does. Copyright (C) year name of author

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version.

This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU Lesser General Public License for more details.

You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Also add information on how to contact you by electronic and paper mail.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library 'Frob' (a library for tweaking knobs) written by James Random Hacker.

signature of Ty Coon, 1 April 1990 Ty Coon, President of Vice That's all there is to it!
E Mozilla Public License

The Mozilla license can be found at Mozilla.org [7] and also at the OSI [21].

MOZILLA PUBLIC LICENSE
Version 1.1

1. Definitions.

1.0.1. “Commercial Use” means distribution or otherwise making the Covered Code available to a third party.

1.1. “Contributor” means each entity that creates or contributes to the creation of Modifications.

1.2. “Contributor Version” means the combination of the Original Code, prior Modifications used by a Contributor, and the Modifications made by that particular Contributor.

1.3. “Covered Code” means the Original Code or Modifications or the combination of the Original Code and Modifications, in each case including portions thereof.

1.4. “Electronic Distribution Mechanism” means a mechanism generally accepted in the software development community for the electronic transfer of data.


1.6. “Initial Developer” means the individual or entity identified as the Initial Developer in the Source Code notice required by Exhibit A.

1.7. “Larger Work” means a work which combines Covered Code or portions thereof with code not governed by the terms of this License.

1.8. “License” means this document.

1.8.1. “Licensable” means having the right to grant, to the maximum extent possible, whether at the time of the initial grant or subsequently acquired, any and all of the rights conveyed herein.

1.9. “Modifications” means any addition to or deletion from the substance or structure of either the Original Code or any previous Modifications. When Covered Code is released as a series of files, a Modification is:

A. Any addition to or deletion from the contents of a file containing Original Code or previous Modifications.

B. Any new file that contains any part of the Original Code or previous Modifications.
1.10. "Original Code" means Source Code of computer software code which is described in the Source Code notice required by Exhibit A as Original Code, and which, at the time of its release under this License is not already Covered Code governed by this License.

1.10.1. "Patent Claims" means any patent claim(s), now owned or hereafter acquired, including without limitation, method, process, and apparatus claims, in any patent Licensable by grantor.

1.11. "Source Code" means the preferred form of the Covered Code for making modifications to it, including all modules it contains, plus any associated interface definition files, scripts used to control compilation and installation of an Executable, or source code differential comparisons against either the Original Code or another well known, available Covered Code of the Contributor's choice. The Source Code can be in a compressed or archival form, provided the appropriate decompression or de-archiving software is widely available for no charge.

1.12. "You" (or "Your") means an individual or a legal entity exercising rights under, and complying with all of the terms of, this License or a future version of this License issued under Section 6.1. For legal entities, "You" includes any entity which controls, is controlled by, or is under common control with You. For purposes of this definition, "control" means (a) the power, direct or indirect, to cause the direction or management of such entity, whether by contract or otherwise, or (b) ownership of more than fifty percent (50%) of the outstanding shares or beneficial ownership of such entity.

2. Source Code License.

2.1. The Initial Developer Grant.

The Initial Developer hereby grants You a world-wide, royalty-free, non-exclusive license, subject to third party intellectual property claims:

(a) under intellectual property rights (other than patent or trademark) Licensable by Initial Developer to use, reproduce, modify, display, perform, sublicense and distribute the Original Code (or portions thereof) with or without Modifications, and/or as part of a Larger Work; and

(b) under Patents Claims infringed by the making, using or selling of Original Code, to make, have made, use, practice, sell, and offer for sale, and/or otherwise dispose of the Original Code (or portions thereof).

(c) the licenses granted in this Section 2.1(a) and (b) are effective on the date Initial Developer first distributes Original Code under the terms of this License.

(d) Notwithstanding Section 2.1(b) above, no patent license is granted: 1) for code that You delete from the Original Code; 2) separate from the Original Code; or 3) for infringements caused by: i) the modification of the Original Code or ii) the combination of the Original Code with other software or devices.
2.2. Contributor Grant.

Subject to third party intellectual property claims, each Contributor hereby grants You a world-wide, royalty-free, non-exclusive license

(a) under intellectual property rights (other than patent or trademark) Licensable by Contributor, to use, reproduce, modify, display, perform, sublicense and distribute the Modifications created by such Contributor (or portions thereof) either on an unmodified basis, with other Modifications, as Covered Code and/or as part of a Larger Work; and

(b) under Patent Claims infringed by the making, using, or selling of Modifications made by that Contributor either alone and/or in combination with its Contributor Version (or portions of such combination), to make, use, sell, offer for sale, have made, and/or otherwise dispose of: 1) Modifications made by that Contributor (or portions thereof); and 2) the combination of Modifications made by that Contributor with its Contributor Version (or portions of such combination).

(c) the licenses granted in Sections 2.2(a) and 2.2(b) are effective on the date Contributor first makes Commercial Use of the Covered Code.

(d) Notwithstanding Section 2.2(b) above, no patent license is granted: 1) for any code that Contributor has deleted from the Contributor Version; 2) separate from the Contributor Version; 3) for infringements caused by: i) third party modifications of Contributor Version or ii) the combination of Modifications made by that Contributor with other software (except as part of the Contributor Version) or other devices; or 4) under Patent Claims infringed by Covered Code in the absence of Modifications made by that Contributor.

3. Distribution Obligations.

3.1. Application of License.

The Modifications which You create or to which You contribute are governed by the terms of this License, including without limitation Section 2.2. The Source Code version of Covered Code may be distributed only under the terms of this License or a future version of this License released under Section 6.1, and You must include a copy of this License with every copy of the Source Code You distribute. You may not offer or impose any terms on any Source Code version that alters or restricts the applicable version of this License or the recipients’ rights hereunder. However, You may include an additional document offering the additional rights described in Section 3.5.

3.2. Availability of Source Code.

Any Modification which You create or to which You contribute must be made available in Source Code form under the terms of this License either on the same media as an Executable version or via an accepted Electronic Distribution Mechanism to anyone to whom you made an Executable version available; and if made available via Electronic
Distribution Mechanism, must remain available for at least twelve (12) months after the
date it initially became available, or at least six (6) months after a subsequent version
of that particular Modification has been made available to such recipients. You are
responsible for ensuring that the Source Code version remains available even if the
Electronic Distribution Mechanism is maintained by a third party.

3.3. Description of Modifications.

You must cause all Covered Code to which You contribute to contain a file document-
ing the changes You made to create that Covered Code and the date of any change. You
must include a prominent statement that the Modification is derived, directly or indi-
rectly, from Original Code provided by the Initial Developer and including the name
of the Initial Developer in (a) the Source Code, and (b) in any notice in an Executable
version or related documentation in which You describe the origin or ownership of the
Covered Code.


(a) Third Party Claims. If Contributor has knowledge that a license under a third
party's intellectual property rights is required to exercise the rights granted by
such Contributor under Sections 2.1 or 2.2, Contributor must include a text file
with the Source Code distribution titled "LEGAL" which describes the claim and
the party making the claim in sufficient detail that a recipient will know whom
to contact. If Contributor obtains such knowledge after the Modification is made
available as described in Section 3.2, Contributor shall promptly modify the LE-
GAL file in all copies Contributor makes available thereafter and shall take other
steps (such as notifying appropriate mailing lists or newsgroups) reasonably cal-
culated to inform those who received the Covered Code that new knowledge has
been obtained.

(b) Contributor APIs. If Contributor's Modifications include an application pro-
gramming interface and Contributor has knowledge of patent licenses which are
reasonably necessary to implement that API, Contributor must also include this
information in the LEGAL file.

(c) Representations. Contributor represents that, except as disclosed pursuant to Sec-
tion 3.4(a) above, Contributor believes that Contributor's Modifications are Con-
tributor's original creation(s) and/or Contributor has sufficient rights to grant the
rights conveyed by this License.

3.5. Required Notices.

You must duplicate the notice in Exhibit A in each file of the Source Code. If it is not
possible to put such notice in a particular Source Code file due to its structure, then You
must include such notice in a location (such as a relevant directory) where a user would
be likely to look for such a notice. If You created one or more Modification(s) You may
add your name as a Contributor to the notice described in Exhibit A. You must also
duplicate this License in any documentation for the Source Code where You describe recipients’ rights or ownership rights relating to Covered Code. You may choose to offer, and to charge a fee for, warranty, support, indemnity or liability obligations to one or more recipients of Covered Code. However, You may do so only on Your own behalf, and not on behalf of the Initial Developer or any Contributor. You must make it absolutely clear than any such warranty, support, indemnity or liability obligation is offered by You alone, and You hereby agree to indemnify the Initial Developer and every Contributor for any liability incurred by the Initial Developer or such Contributor as a result of warranty, support, indemnity or liability terms You offer.

3.6. Distribution of Executable Versions.

You may distribute Covered Code in Executable form only if the requirements of Section 3.1-3.5 have been met for that Covered Code, and if You include a notice stating that the Source Code version of the Covered Code is available under the terms of this License, including a description of how and where You have fulfilled the obligations of Section 3.2. The notice must be conspicuously included in any notice in an Executable version, related documentation or collateral in which You describe recipients’ rights relating to the Covered Code. You may distribute the Executable version of Covered Code or ownership rights under a license of Your choice, which may contain terms different from this License, provided that You are in compliance with the terms of this License and that the license for the Executable version does not attempt to limit or alter the recipient’s rights in the Source Code version from the rights set forth in this License. If You distribute the Executable version under a different license You must make it absolutely clear that any terms which differ from this License are offered by You alone, not by the Initial Developer or any Contributor. You hereby agree to indemnify the Initial Developer and every Contributor for any liability incurred by the Initial Developer or such Contributor as a result of any such terms You offer.

3.7. Larger Works.

You may create a Larger Work by combining Covered Code with other code not governed by the terms of this License and distribute the Larger Work as a single product. In such a case, You must make sure the requirements of this License are fulfilled for the Covered Code.

4. Inability to Comply Due to Statute or Regulation.

If it is impossible for You to comply with any of the terms of this License with respect to some or all of the Covered Code due to statute, judicial order, or regulation then You must: (a) comply with the terms of this License to the maximum extent possible; and (b) describe the limitations and the code they affect. Such description must be included in the LEGAL file described in Section 3.4 and must be included with all distributions of the Source Code. Except to the extent prohibited by statute or regulation, such description must be sufficiently detailed for a recipient of ordinary skill to be able to understand it.
5. Application of this License.

This License applies to code to which the Initial Developer has attached the notice in Exhibit A and to related Covered Code.

6. Versions of the License.

6.1. New Versions.

Netscape Communications Corporation ("Netscape") may publish revised and/or new versions of the License from time to time. Each version will be given a distinguishing version number.

6.2. Effect of New Versions.

Once Covered Code has been published under a particular version of the License, You may always continue to use it under the terms of that version. You may also choose to use such Covered Code under the terms of any subsequent version of the License published by Netscape. No one other than Netscape has the right to modify the terms applicable to Covered Code created under this License.

6.3. Derivative Works.

If You create or use a modified version of this License (which you may only do in order to apply it to code which is not already Covered Code governed by this License), You must (a) rename Your license so that the phrases "Mozilla", "MOZILLA", "MOZPL", "Netscape", "MPL", "NPL" or any confusingly similar phrase do not appear in your license (except to note that your license differs from this License) and (b) otherwise make it clear that Your version of the license contains terms which differ from the Mozilla Public License and Netscape Public License. (Filling in the name of the Initial Developer, Original Code or Contributor in the notice described in Exhibit A shall not of themselves be deemed to be modifications of this License.)

7. DISCLAIMER OF WARRANTY.

COVERED CODE IS PROVIDED UNDER THIS LICENSE ON AN "AS IS" BASIS, WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES THAT THE COVERED CODE IS FREE OF DEFECTS, MERCHANTABILITY, FIT FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE COVERED CODE IS WITH YOU. SHOULD ANY COVERED CODE PROVE DEFECTIVE IN ANY RESPECT, YOU (NOT THE INITIAL DEVELOPER OR ANY OTHER CONTRIBUTOR) ASSUME THE COST OF ANY NECESSARY SERVICING, REPAIR OR CORRECTION. THIS DISCLAIMER OF WARRANTY CONSTITUTES AN ESSENTIAL PART OF THIS LICENSE. NO USE OF ANY COVERED CODE IS AUTHORIZED HEREUNDER EXCEPT UNDER THIS DISCLAIMER.
8. TERMINATION.

8.1.

This License and the rights granted hereunder will terminate automatically if You fail to comply with terms herein and fail to cure such breach within 30 days of becoming aware of the breach. All sublicenses to the Covered Code which are properly granted shall survive any termination of this License. Provisions which, by their nature, must remain in effect beyond the termination of this License shall survive.

8.2.

If You initiate litigation by asserting a patent infringement claim (excluding declaratory judgment actions) against Initial Developer or a Contributor (the Initial Developer or Contributor against whom You file such action is referred to as “Participant”) alleging that:

(a) such Participant’s Contributor Version directly or indirectly infringes any patent, then any and all rights granted by such Participant to You under Sections 2.1 and/or 2.2 of this License shall, upon 60 days notice from Participant terminate prospectively, unless if within 60 days after receipt of notice You either: (i) agree in writing to pay Participant a mutually agreeable reasonable royalty for Your past and future use of Modifications made by such Participant, or (ii) withdraw Your litigation claim with respect to the Contributor Version against such Participant. If within 60 days of notice, a reasonable royalty and payment arrangement are not mutually agreed upon in writing by the parties or the litigation claim is not withdrawn, the rights granted by Participant to You under Sections 2.1 and/or 2.2 automatically terminate at the expiration of the 60 day notice period specified above.

(b) any software, hardware, or device, other than such Participant’s Contributor Version, directly or indirectly infringes any patent, then any rights granted to You by such Participant under Sections 2.1(b) and 2.2(b) are revoked effective as of the date You first made, used, sold, distributed, or had made, Modifications made by that Participant.

8.3.

If You assert a patent infringement claim against Participant alleging that such Participant’s Contributor Version directly or indirectly infringes any patent where such claim is resolved (such as by license or settlement) prior to the initiation of patent infringement litigation, then the reasonable value of the licenses granted by such Participant under Sections 2.1 or 2.2 shall be taken into account in determining the amount or value of any payment or license.
8.4.

In the event of termination under Sections 8.1 or 8.2 above, all end user license agreements (excluding distributors and resellers) which have been validly granted by You or any distributor hereunder prior to termination shall survive termination.

9. LIMITATION OF LIABILITY.

UNDER NO CIRCUMSTANCES AND UNDER NO LEGAL THEORY, WHETHER TORT (INCLUDING NEGLIGENCE), CONTRACT, OR OTHERWISE, SHALL YOU, THE INITIAL DEVELOPER, ANY OTHER CONTRIBUTOR, OR ANY DISTRIBUTOR OF COVERED CODE, OR ANY SUPPLIER OF ANY OF SUCH PARTIES, BE LIABLE TO ANY PERSON FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES OF ANY CHARACTER INCLUDING, WITHOUT LIMITATION, DAMAGES FOR LOSS OF GOODWILL, WORK STOPPAGE, COMPUTER FAILURE OR MALFUNCTION, OR ANY AND ALL OTHER COMMERCIAL DAMAGES OR LOSSES, EVEN IF SUCH PARTY SHALL HAVE BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. THIS LIMITATION OF LIABILITY SHALL NOT APPLY TO LIABILITY FOR DEATH OR PERSONAL INJURY RESULTING FROM SUCH PARTY’S NEGLIGENCE TO THE EXTENT APPLICABLE LAW PROHIBITS SUCH LIMITATION. SOME JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THIS EXCLUSION AND LIMITATION MAY NOT APPLY TO YOU.

10. U.S. GOVERNMENT END USERS.


11. MISCELLANEOUS.

This License represents the complete agreement concerning subject matter hereof. If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable. This License shall be governed by California law provisions (except to the extent applicable law, if any, provides otherwise), excluding its conflict-of-law provisions. With respect to disputes in which at least one party is a citizen of, or an entity chartered or registered to do business in the United States of America, any litigation relating to this License shall be subject to the jurisdiction of the Federal Courts of the Northern District of California, with venue lying in Santa Clara County, California, with the losing party responsible for costs, including without limitation, court costs and reasonable attorneys’ fees and
expenses. The application of the United Nations Convention on Contracts for the International Sale of Goods is expressly excluded. Any law or regulation which provides that the language of a contract shall be construed against the drafter shall not apply to this License.

12. RESPONSIBILITY FOR CLAIMS.

As between Initial Developer and the Contributors, each party is responsible for claims and damages arising, directly or indirectly, out of its utilization of rights under this License and You agree to work with Initial Developer and Contributors to distribute such responsibility on an equitable basis. Nothing herein is intended or shall be deemed to constitute any admission of liability.

13. MULTIPLE-LICENSED CODE.

Initial Developer may designate portions of the Covered Code as “Multiple-Licensed”. “Multiple-Licensed” means that the Initial Developer permits you to utilize portions of the Covered Code under Your choice of the NPL or the alternative licenses, if any, specified by the Initial Developer in the file described in Exhibit A.

EXHIBIT A -Mozilla Public License.

“The contents of this file are subject to the Mozilla Public License Version 1.1 (the “License”); you may not use this file except in compliance with the License. You may obtain a copy of the License at http://www.mozilla.org/MPL/

Software distributed under the License is distributed on an “AS IS” basis, WITHOUT WARRANTY OF ANY KIND, either express or implied. See the License for the specific language governing rights and limitations under the License.

The Original Code is ____________________________________________
The Initial Developer of the Original Code is _______________________
Portions created by ______________________ are Copyright (C) ________
____________________ All Rights Reserved.

Alternatively, the contents of this file may be used under the terms of the _____ license (the “[___] License”), in which case the provisions of [_____] License are applicable instead of those above. If you wish to allow use of your version of this file only under the terms of the [_____] License and not to allow others to use your version of this file under the MPL, indicate your decision by deleting the provisions above and replace them with the notice and other provisions required by the [___] License. If you do not delete the provisions above, a recipient may use your version of this file under either the MPL or the “[___] License.”

[NOTE: The text of this Exhibit A may differ slightly from the text of the notices in the Source Code files of the Original Code. You should use the text of this Exhibit A rather than the text found in the Original Code Source Code for Your Modifications.]
The following is a BSD license template [13]. To generate your own license, change
the values of OWNER, ORGANIZATION and YEAR from their original values as
given here, and substitute your own.

Note: The advertising clause in the license appearing on BSD Unix files was offi-
cially rescinded by the Director of the Office of Technology Licensing of the University
of California on July 22 1999. He states that clause 3 is "hereby deleted in its entirety."

Note the new BSD license is thus equivalent to the MIT License, except for the
no-endorsement final clause.

(OWNER) = Regents of the University of California
(ORGANIZATION) = University of California, Berkeley
(YEAR) = 1998

In the original BSD license, both occurrences of the phrase "COPYRIGHT HOLD-
ERS AND CONTRIBUTORS" in the disclaimer read "REGENTS AND CONTRIB-
UTORS".

Here is the license template:
Copyright (c) (YEAR), (OWNER)
All rights reserved.
Redistribution and use in source and binary forms, with or without modification,
are permitted provided that the following conditions are met:

- Redistributions of source code must retain the above copyright notice, this list of
  conditions and the following disclaimer.

- Redistributions in binary form must reproduce the above copyright notice, this
  list of conditions and the following disclaimer in the documentation and/or other
  materials provided with the distribution.

- Neither the name of the (ORGANIZATION) nor the names of its contributors
  may be used to endorse or promote products derived from this software without
  specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND
CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES,
INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MER-
CHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DIS-
CLAIMED. IN NO EVENT SHALL THE COPYRIGHT OWNER OR CONTRIB-
UTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL,
EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIM-
ITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS
OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER
CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT,
STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE)
ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF AD-
VISED OF THE POSSIBILITY OF SUCH DAMAGE.
G  Glossary

Copyright A copyright protects expression of an original work of authorship; a copyright provides the owner with exclusive rights and the ability to authorize others to exercise those rights. A copyright does not protect an underlying idea or concept.

License A license is a contract specifying the rights that one is granting to others.

Patent A patent protects novel, useful and non-obvious inventions; it provides rights to exclude others from making, using and offering to sell an invention in the U.S. or importing into the U.S. A patent protects an underlying idea or concept.

Public Domain With public domain, the owner of a work assigns all of his or her rights to a work to all.

UCITA The Uniform Computer Information Transactions Act (UCITA) is a proposed state contract law developed to regulate transactions in computer information products such as computer software, online databases, software access contracts or e-books.
H DOE-Related Open Source Projects

The following are Open Source projects associated with Department of Energy laboratories. This list is not exhaustive, rather it is provided to give a rough idea of the number and variety of Open Source projects sponsored by the department.

Alexandria Alexandria is a component software repository; a next-generation Netlib that supports fuzzy searches and browsing APIs via dynamically generated Babel language bindings [22]. (Copyright Regents of UC; LGPL; served from LLNL).

Babel Babel is a tool for mixing C, C++, Fortran77, Java, and Python in a single application. Babel is the foundation for a multilanguage scientific component framework [23]. (Copyright Regents of UC; LGPL; served from LLNL).

Chromium Chromium is a flexible framework for scalable real-time rendering on clusters of workstations, based on the Stanford WireGL project code base [1]. (BSD License; SourceForge).

Climate Data Analysis Tools CDAT is an open-source, Python-based environment for scientific calculations and graphics with focus on the needs of climate modelers. It is coordinated by the Program for Climate Model Diagnosis and Intercomparison, LLNL [2]. (Cites contract between DOE and UC; custom open source, excludes commercialization without notifying DOE or LLNL; SourceForge).

DMX DMX is a project to develop a complete Distributed Multihead X system, which will enable XFree86 (as well as any system with a standard X server) to distribute the X desktop across large display walls [4]. (SourceForge).

Gauntlet Gauntlet is a multi-language, multi-platform software testing framework. It can harvest results from multiple platforms via XML/email and browse session histories through the web [24]. (Copyright Regents of UC; LGPL, served from LLNL).

Globus The Globus Project is developing fundamental technologies needed to build computational grids. Grids are persistent environments that enable software applications to integrate instruments, displays, computational and information resources that are managed by diverse organizations in widespread locations [18]. Much of the Globus work takes place at Argonne National Laboratories. (Copyright U. of Chicago and U. of Southern California. License “open source” but not in OSI list of approved licenses, served from ANL).

MeshTV MeshTV is an interactive graphical analysis tool for visualizing and analyzing data on two- and three-dimensional (2D, 3D) meshes. It is a general purpose tool that handles many different mesh types, provides different ways of viewing the data, and is virtually hardware/vendor independent while still providing graphics at the speed of the native graphics hardware [25]. (Copyright UC; excludes commercialization; served from LLNL)
**Numerical Python** Numerical Python adds a fast, compact, multidimensional array language facility to Python [9]. (Copyright Regents of UC; Python License; SourceForge).

**Quorum** Quorum is an online parliamentary system that enables the proposing, discussion, and voting on motions via the web. This software is used to accelerate standardization efforts for geographically disperse groups [26]. (Copyright Regents of UC, LGPL; served from LLNL).

**Silo** Silo is a library which implements an application programing interface (API) designed for reading and writing scientific data. It is a high-level, portable interface that was developed at Lawrence Livermore National Laboratory to address difficult database issues, such as different, incompatible file formats and libraries, most of which used non-standard features of the Cray compilers. In addition, none of the previous libraries had portable binary file formats [27]. (Copyright UC: excludes commercialization; served from LLNL)
I Open Source License Usage Statistics

This appendix provides some statistics on Open Source licenses in the form of two tables. The first is from a Department of Defense survey of software that they use that has an Open Source license. The second provides a breakdown of Open Source licenses used by projects in the “Trove” at SourceForge.net, the largest Open Source site.

An accounting of the licenses associated with the Open Source software used within NASA would be likely produce similar totals to that in the DOD survey [11]. The relatively high totals for GPL and LGPL software is probably due to all the GNU-licensed elements in Linux (or, as Richard Stallman would prefer – “GNU/Linux”).

Table 3 summarizes current Open Source license usage (February 2003) within the SourceForge Trove, sorted by descending count. The statistics are provided by the site itself [10]. Not all Open Source Software projects are hosted at SourceForge, but many leading ones are. The statistics show the leading license contenders: over 90% of the projects are covered by the top four.
<table>
<thead>
<tr>
<th>License</th>
<th>DOD Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPL</td>
<td>58</td>
</tr>
<tr>
<td>BSD</td>
<td>7</td>
</tr>
<tr>
<td>Apache</td>
<td>6</td>
</tr>
<tr>
<td>Closed (from open)</td>
<td>4</td>
</tr>
<tr>
<td>Community (U.S. government only)</td>
<td>4</td>
</tr>
<tr>
<td>LGPL</td>
<td>3</td>
</tr>
<tr>
<td>ACE/TAO License</td>
<td>2</td>
</tr>
<tr>
<td>Proprietary with source access</td>
<td>2</td>
</tr>
<tr>
<td>SATAN License</td>
<td>2</td>
</tr>
<tr>
<td>Aladdin Ghostscript Free Public License</td>
<td>1</td>
</tr>
<tr>
<td>Artistic</td>
<td>1</td>
</tr>
<tr>
<td>C++ Boost License</td>
<td>1</td>
</tr>
<tr>
<td>Colt Distribution Licenses</td>
<td>1</td>
</tr>
<tr>
<td>Freeware</td>
<td>1</td>
</tr>
<tr>
<td>Gnuplot License</td>
<td>1</td>
</tr>
<tr>
<td>Government Public Domain</td>
<td>1</td>
</tr>
<tr>
<td>IBM Public License</td>
<td>1</td>
</tr>
<tr>
<td>ISC License</td>
<td>1</td>
</tr>
<tr>
<td>MIT/X11 License</td>
<td>1</td>
</tr>
<tr>
<td>MITRE</td>
<td>1</td>
</tr>
<tr>
<td>Mozilla</td>
<td>1</td>
</tr>
<tr>
<td>OpenMAP</td>
<td>1</td>
</tr>
<tr>
<td>OpenSSL</td>
<td>1</td>
</tr>
<tr>
<td>Publicly available government software</td>
<td>1</td>
</tr>
<tr>
<td>Qmail License</td>
<td>1</td>
</tr>
<tr>
<td>RTLinux Open Patent License Version 2</td>
<td>1</td>
</tr>
<tr>
<td>Sendmail License</td>
<td>1</td>
</tr>
<tr>
<td>VTK License</td>
<td>1</td>
</tr>
<tr>
<td>WU-FTPD License</td>
<td>1</td>
</tr>
<tr>
<td>Zlib License</td>
<td>1</td>
</tr>
<tr>
<td>Zope License</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>110</td>
</tr>
</tbody>
</table>

Table 2: License distribution for Open Source software used by the DOD [11].
<table>
<thead>
<tr>
<th>License</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>GNU General Public License (GPL)</td>
<td>26080</td>
<td>72</td>
</tr>
<tr>
<td>GNU Library or Lesser General Public License (LGPL)</td>
<td>3760</td>
<td>10</td>
</tr>
<tr>
<td>BSD License</td>
<td>2518</td>
<td>7</td>
</tr>
<tr>
<td>Artistic License</td>
<td>945</td>
<td>3</td>
</tr>
<tr>
<td>Apache Software License</td>
<td>587</td>
<td>2</td>
</tr>
<tr>
<td>MIT License</td>
<td>582</td>
<td>2</td>
</tr>
<tr>
<td>Mozilla Public License 1.1 (MPL 1.1)</td>
<td>294</td>
<td>1</td>
</tr>
<tr>
<td>Mozilla Public License 1.0 (MPL)</td>
<td>240</td>
<td>1</td>
</tr>
<tr>
<td>Qt Public License (QPL)</td>
<td>186</td>
<td>1</td>
</tr>
<tr>
<td>zlib/libpng License</td>
<td>178</td>
<td>*</td>
</tr>
<tr>
<td>Python License (CNRI Python License)</td>
<td>159</td>
<td>*</td>
</tr>
<tr>
<td>Common Public License</td>
<td>136</td>
<td>*</td>
</tr>
<tr>
<td>IBM Public License</td>
<td>55</td>
<td>*</td>
</tr>
<tr>
<td>Open Software License</td>
<td>50</td>
<td>*</td>
</tr>
<tr>
<td>Python Software Foundation License</td>
<td>47</td>
<td>*</td>
</tr>
<tr>
<td>Academic Free License (AFL)</td>
<td>41</td>
<td>*</td>
</tr>
<tr>
<td>Sun Industry Standards Source License (SISSL)</td>
<td>37</td>
<td>*</td>
</tr>
<tr>
<td>Jabber Open Source License</td>
<td>31</td>
<td>*</td>
</tr>
<tr>
<td>Apple Public Source License</td>
<td>29</td>
<td>*</td>
</tr>
<tr>
<td>Sun Public License</td>
<td>25</td>
<td>*</td>
</tr>
<tr>
<td>Nethack General Public License</td>
<td>19</td>
<td>*</td>
</tr>
<tr>
<td>Zope Public License</td>
<td>17</td>
<td>*</td>
</tr>
<tr>
<td>University of Illinois/NCSA Open Source License</td>
<td>16</td>
<td>*</td>
</tr>
<tr>
<td>Intel Open Source License</td>
<td>14</td>
<td>*</td>
</tr>
<tr>
<td>W3C License</td>
<td>11</td>
<td>*</td>
</tr>
<tr>
<td>Open Group Test Suite License</td>
<td>10</td>
<td>*</td>
</tr>
<tr>
<td>Eiffel Forum License</td>
<td>8</td>
<td>*</td>
</tr>
<tr>
<td>MITRE Collaborative Virtual Workspace License (CVW)</td>
<td>6</td>
<td>*</td>
</tr>
<tr>
<td>wxWindows Library Licence</td>
<td>6</td>
<td>*</td>
</tr>
<tr>
<td>Ricoh Source Code Public License</td>
<td>6</td>
<td>*</td>
</tr>
<tr>
<td>Sleepycat License</td>
<td>5</td>
<td>*</td>
</tr>
<tr>
<td>Attribution Assurance License</td>
<td>4</td>
<td>*</td>
</tr>
<tr>
<td>Nokia Open Source License</td>
<td>4</td>
<td>*</td>
</tr>
<tr>
<td>Vovida Software License 1.0</td>
<td>2</td>
<td>*</td>
</tr>
<tr>
<td>Historical Permission Notice and Disclaimer</td>
<td>1</td>
<td>*</td>
</tr>
<tr>
<td>X.Net License</td>
<td>1</td>
<td>*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>36110</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 3: A summary of license usage for projects registered with the “Trove” on the SourceForge site. Percentages that would round to 0 are noted by *.
References


52