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Date: September 18, 2020

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```
<one line to give the program's name and a brief idea of what it does.>  
Copyright (C) <year> <name of author>
```

```
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.
```

```
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```

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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.

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```
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
```

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```
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```

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```

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```
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```

```
<signature of Ty Coon>, 1 April 1990  
Ty Coon, President of Vice
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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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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,

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(principal original author of dtc and libfdt)
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```
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```

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```
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```

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```
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```

```
<signature of Ty Coon>, 1 April 1989  
Ty Coon, President of Vice
```

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```

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If such an object file uses only numerical parameters, data

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I2C TOOLS FOR LINUX
=====

This package contains an heterogeneous set of I2C tools for the Linux kernel as well as an I2C library. The tools were originally part of the lm-sensors project but were finally split into their own package for convenience. The library is used by some of the tools, but can also be used by third-party applications. The tools and library compile, run and have been tested on GNU/Linux.

The latest version of the code can be downloaded from:
https://i2c.wiki.kernel.org/index.php/I2C_Tools

CONTENTS

The various tools included in this package are grouped by category, each category has its own sub-directory:

- * eeprom
Perl scripts for decoding different types of EEPROMs (SPD, EDID...) These scripts rely on the "eeprom" kernel driver. They are installed by default.
- * eeprog, eepromer
Tools for writing to EEPROMs. These tools rely on the "i2c-dev" kernel driver. They are not installed by default.
- * include
C/C++ header files for I2C and SMBus access over i2c-dev. Installed by default.
- * lib
The I2C library, used by eeprog, py-smbus and tools. Installed by default.
- * py-smbus
Python wrapper for SMBus access over i2c-dev. Not installed by default.
- * stub
A helper script to use with the i2c-stub kernel driver. Installed by default.
- * tools
I2C device detection and register dump tools. These tools rely on the "i2c-dev" kernel driver. They are installed by default.

LICENSE

Check the documentation of individual tools for licensing information. The library is released under the LGPL version 2.1 or later, while most tools are released under the GPL version 2 or later, but there are a few exceptions.

INSTALLATION

There's no configure script, so simply run "make" to build the library and tools, and "make install" to install them. You also can use "make uninstall" to remove all the files you installed. By default, files are installed in /usr/local but you can change the location by editing the Makefile file and setting PREFIX to wherever you want (or setting its value on the make command line). You may change the C compiler and the compilation flags as

well, and also decide which flavors of the library will be built.

In cases where you need to compile only the static or dynamic variant of the library, you can use `BUILD_STATIC_LIB` and `BUILD_DYNAMIC_LIB` at compile time:

```
$ make BUILD_DYNAMIC_LIB=1 BUILD_STATIC_LIB=0
```

If you disable both, the compilation will abort with an error message.

If you want to compile the tools against the static version of the library you can do:

```
$ make USE_STATIC_LIB=1
```

Optionally, you can run "make strip" prior to "make install" if you want smaller binaries. However, be aware that this will prevent any further attempt to debug the library and tools.

If you wish to include sub-directories that are not enabled by default, then just set them via the `EXTRA` make variable. For example, to build `py-smbus`, do:

```
$ make EXTRA="py-smbus"
```

DOCUMENTATION

The main tools have manual pages, which are installed by "make install". See these manual pages for command line interface details and tool specific information.

The other tools come with simple text documentation, which isn't installed.

QUESTIONS AND BUG REPORTS

Please post your questions and bug reports to the `linux-i2c` mailing list:

```
linux-i2c@vger.kernel.org
```

with Cc to the current maintainer:

```
Jean Delvare <jdelvare@suse.de>
```

For additional information about this list, see:

```
http://vger.kernel.org/vger-lists.html#linux-i2c
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*-----
*
* stdio.c
* by Mark Gates <mgates@nlanr.net>
```

```
* and Ajay Tirumalla <tirumala@ncsa.uiuc.edu>
* -----
* input and output numbers, converting with kilo, mega, giga
* ----- */
```

=====

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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) <year> <name of author>
```

```
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., 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 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.

Iw license

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Copyright (c) 2007 Mike Kershaw
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Preamble

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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.

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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 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.

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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

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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) <year> <name of author>
```

```
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.

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Version 2.1, February 1999

```
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59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
Everyone is permitted to copy and distribute verbatim copies
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```

[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.]

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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.

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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 an 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 this to be true is not precisely defined by law.

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 include 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 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.

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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

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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 this to be true is not precisely defined by law.

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.

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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 a brief idea of what it does.>  
Copyright (C) <year> <name of author>
```

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```

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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!

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Version 2.1, February 1999

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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

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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.

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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.

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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.

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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 an 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.

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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 this to be true is not precisely defined by law.

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 include 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 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.

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.

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Version 2, June 1991

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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 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.

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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:

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- 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.

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Libzlib license

ZLIB DATA COMPRESSION LIBRARY

zlib 1.2.11 is a general purpose data compression library. All the code is thread safe. The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files <http://tools.ietf.org/html/rfc1950> (zlib format), [rfc1951](http://tools.ietf.org/html/rfc1951) (deflate format) and [rfc1952](http://tools.ietf.org/html/rfc1952) (gzip format).

All functions of the compression library are documented in the file `zlib.h` (volunteer to write man pages welcome, contact zlib@gzip.org). A usage example of the library is given in the file `test/example.c` which also tests that the library is working correctly. Another example is given in the file `test/minigzip.c`. The compression library itself is composed of all source files in the root directory.

To compile all files and run the test program, follow the instructions given at the top of `Makefile.in`. In short `./configure; make test`, and if that goes well, `make install` should work for most flavors of Unix. For Windows, use one of the special makefiles in `win32/` or `contrib/vstudio/`. For VMS, use `make_vms.com`.

Questions about zlib should be sent to [<zlib@gzip.org>](mailto:zlib@gzip.org), or to Gilles Vollant [<info@winimage.com>](mailto:info@winimage.com) for the Windows DLL version. The zlib home page is <http://zlib.net/>. Before reporting a problem, please check this site to verify that you have the latest version of zlib; otherwise get the latest version and check whether the problem still exists or not.

PLEASE read the zlib FAQ http://zlib.net/zlib_faq.html before asking for help.

Mark Nelson [<markn@ieee.org>](mailto:markn@ieee.org) wrote an article about zlib for the Jan. 1997 issue of Dr. Dobb's Journal; a copy of the article is available at <http://marknelson.us/1997/01/01/zlib-engine/>.

The changes made in version 1.2.11 are documented in the file `ChangeLog`.

Unsupported third party contributions are provided in directory `contrib/`.

zlib is available in Java using the `java.util.zip` package, documented at <http://java.sun.com/developer/technicalArticles/Programming/compression/>.

A Perl interface to zlib written by Paul Marquess [<pmqs@cpan.org>](mailto:pmqs@cpan.org) is available at CPAN (Comprehensive Perl Archive Network) sites, including <http://search.cpan.org/~pmqs/IO-Compress-Zlib/>.

A Python interface to zlib written by A.M. Kuchling <amk@amk.ca> is available in Python 1.5 and later versions, see <http://docs.python.org/library/zlib.html> .

zlib is built into tcl: <http://wiki.tcl.tk/4610> .

An experimental package to read and write files in .zip format, written on top of zlib by Gilles Vollant <info@winimage.com>, is available in the contrib/minizip directory of zlib.

Notes for some targets:

- For Windows DLL versions, please see win32/DLL_FAQ.txt
- For 64-bit Irix, deflate.c must be compiled without any optimization. With -O, one libpng test fails. The test works in 32 bit mode (with the -n32 compiler flag). The compiler bug has been reported to SGI.
- zlib doesn't work with gcc 2.6.3 on a DEC 3000/300LX under OSF/1 2.1 it works when compiled with cc.
- On Digital Unix 4.0D (formely OSF/1) on AlphaServer, the cc option -std1 is necessary to get gzprintf working correctly. This is done by configure.
- zlib doesn't work on HP-UX 9.05 with some versions of /bin/cc. It works with other compilers. Use "make test" to check your compiler.
- gzopen is not supported on RISCOS or BEOS.
- For PalmOs, see <http://palmzlib.sourceforge.net/>

Acknowledgments:

The deflate format used by zlib was defined by Phil Katz. The deflate and zlib specifications were written by L. Peter Deutsch. Thanks to all the people who reported problems and suggested various improvements in zlib; they are too numerous to cite here.

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Mark Adler

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Mod-ttymidi license

ttymidi is a GPL-licensed program that allows external serial devices to interface with JACK MIDI clients.

COMPILATION

The ttymidi source code is comprised of a single C file. To compile it, just run the following command:

```
make
```

This program depends on JACK, so you should have the development headers for that installed. In Debian or Ubuntu, you can install it by running:

```
apt-get install libjack-jackd2-dev
```

After you compile ttymidi, you may wish to copy it to /usr/bin for easy access. This can be done simply by following command:

```
sudo make install
```

USAGE

First, you need an external device that can send MIDI commands through the serial port. To find out more about programming an external device, read the TTYMIDI SPECIFICATION section. If you are using an Arduino board (<http://www.arduino.cc>), read the instructions under the arduino folder. Once your device is programmed and connected to your PC's serial port, follow the instructions below.

To connect to ttyS0 at 2400bps:

```
ttymidi -s /dev/ttyS0 -b 2400
```

To connect to ttyUSB port at default speed (115200bps) and display information about incoming MIDI events:

```
ttymidi -s /dev/ttyUSB0 -v
```

ttymidi also creates a JACK MIDI input port that feeds incoming MIDI events back to the serial port.

If you would like to use a GUI to connect your MIDI clients, there are many available. One of my favorites is qjackctl.

TTYMIDI SPECIFICATION

The message format expected by ttyMIDI is based on what I could gather about the MIDI specification online. I tried to make it as similar as possible to the specification, but some differences exist. The good news is that as long as you follow the specification described below, everything should work.

Every MIDI command is sent through the serial port as 3 bytes. The first byte contains the command type and channel. After that, 2 parameter bytes are transmitted. To simplify the decoding process, ttyMIDI does not support "running status", and it also forces every command into 3 bytes. So even commands which only have 1 parameter must transmit byte #3 (transmitting a 0 in this case). This is described in more details in the table below:

byte1	byte2	byte3	Command name
0x80-0x8F	Key # (0-127)	Off Velocity (0-127)	Note OFF
0x90-0x90	Key # (0-127)	On Velocity (0-127)	Note ON
0xA0-0xA0	Key # (0-127)	Pressure (0-127)	Poly Key Pressure
0xB0-0xB0	Control # (0-127)	Control Value (0-127)	Control Change
0xC0-0xC0	Program # (0-127)	Not Used (send 0)	Program Change
0xD0-0xD0	Pressure Value (0-127)	Not Used (send 0)	Mono Key Pressure (Channel 1-16)
0xE0-0xE0	Range LSB (0-127)	Range MSB (0-127)	Pitch Bend
Not implemented:			
0xF0-0xF0	Manufacturer's ID	Model ID	System

Byte #1 is given as COMMAND + CHANNEL. So, for example, 0xE3 is the Pitch Bend command (0xE0) for channel 4 (0x03).

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The following individuals contributed in part to the Network Time Protocol Distribution Version 4 and are acknowledged as authors of this work.

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6. [7]Karl Berry <karl@owl.HQ.ileaf.com> syslog to file option
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25. [26]Jeff Johnson <jbj@chatham.usdesign.com> massive prototyping overhaul
26. [27]Hans Lambermont <Hans.Lambermont@nl.origin-it.com> or [28]<H.Lambermont@chello.nl> ntpsweep
27. [29]Poul-Henning Kamp <phk@FreeBSD.ORG> Oncore driver (Original author)
28. [30]Frank Kardel [31]<kardel (at) ntp (dot) org> PARSE <GENERIC> (driver 14 reference clocks), STREAMS modules for PARSE, support scripts, syslog cleanup, dynamic interface handling
29. [32]Johannes Maximilian Kuehn <kuehn@ntp.org> Rewrote sntp to comply with NTPv4 specification, ntpq saveconfig
30. [33]William L. Jones <jones@hermes.chpc.utexas.edu> RS/6000 AIX modifications, HPUX modifications
31. [34]Dave Katz <dkatz@cisco.com> RS/6000 AIX port
32. [35]Craig Leres <leres@ee.lbl.gov> 4.4BSD port, ppsclock, Magnavox GPS clock driver
33. [36]George Lindholm <lindholm@ucs.ubc.ca> SunOS 5.1 port
34. [37]Louis A. Mamakos <louie@ni.umd.edu> MD5-based authentication
35. [38]Lars H. Mathiesen <thorinn@diku.dk> adaptation of foundation code for Version 3 as specified in RFC-1305
36. [39]Danny Mayer <mayer@ntp.org>Network I/O, Windows Port, Code Maintenance
37. [40]David L. Mills <mills@udel.edu> Version 4 foundation, precision kernel; clock drivers: 1, 3, 4, 6, 7, 11, 13, 18, 19, 22, 36
38. [41]Wolfgang Moeller <moeller@gwdgv1.dnet.gwdg.de> VMS port
39. [42]Jeffrey Mogul <mogul@pa.dec.com> ntptrace utility
40. [43]Tom Moore <tmoores@fieval.daytonoh.ncr.com> i386 svr4 port
41. [44]Kamal A Mostafa <kamal@whence.com> SCO OpenServer port
42. [45]Derek Mulcahy <derek@toybox.demon.co.uk> and [46]Damon Hart-Davis <d@hd.org> ARCRON MSF clock driver
43. [47]Rob Neal <neal@ntp.org> Bancomm refclock and config/parse code maintenance
44. [48]Rainer Pruy <Rainer.Pruy@informatik.uni-erlangen.de> monitoring/trap scripts, statistics file handling
45. [49]Dirce Richards <dirce@zk3.dec.com> Digital UNIX V4.0 port
46. [50]Wilfredo Snchez <wsanchez@apple.com> added support for NetInfo

- 47. [51]Nick Sayer <mrapple@quack.kfu.com> SunOS streams modules
- 48. [52]Jack Sasportas <jack@innovativeinternet.com> Saved a Lot of space on the stuff in the html/pic/ subdirectory
- 49. [53]Ray Schnitzler <schnitz@unipress.com> Unixware1 port
- 50. [54]Michael Shields <shields@tembel.org> USNO clock driver
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- 52. [56]Harlan Stenn <harlan@pfcs.com> GNU automake/autoconfigure makeover, various other bits (see the ChangeLog)
- 53. [57]Kenneth Stone <ken@sdd.hp.com> HP-UX port
- 54. [58]Ajit Thyagarajan <ajit@ee.udel.edu>IP multicast/anycast support
- 55. [59]Tomoaki TSURUOKA <tsuruoka@nc.fukuoka-u.ac.jp>TRAK clock driver
- 56. [60]Brian Utterback <brian.utterback@oracle.com> General codebase, Solaris issues
- 57. [61]Loganaden Velvindron <loganaden@gmail.com> Sandboxing (libseccomp) support
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*
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A. HISTORY OF THE SOFTWARE

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Python was created in the early 1990s by Guido van Rossum at Stichting Mathematisch Centrum (CWI, see <http://www.cwi.nl>) in the Netherlands as a successor of a language called ABC. Guido remains Python's principal author, although it includes many contributions from others.

In 1995, Guido continued his work on Python at the Corporation for National Research Initiatives (CNRI, see <http://www.cnri.reston.va.us>) in Reston, Virginia where he released several versions of the software.

In May 2000, Guido and the Python core development team moved to BeOpen.com to form the BeOpen PythonLabs team. In October of the same year, the PythonLabs team moved to Digital Creations, which became Zope Corporation. In 2001, the Python Software Foundation (PSF, see <https://www.python.org/psf/>) was formed, a non-profit organization created specifically to own Python-related Intellectual Property. Zope Corporation was a sponsoring member of the PSF.

All Python releases are Open Source (see <http://www.opensource.org> for the Open Source Definition). Historically, most, but not all, Python releases have also been GPL-compatible; the table below summarizes the various releases.

Release	Derived from	Year	Owner	GPL-compatible? (1)
0.9.0 thru 1.2		1991-1995	CWI	yes
1.3 thru 1.5.2	1.2	1995-1999	CNRI	yes
1.6	1.5.2	2000	CNRI	no
2.0	1.6	2000	BeOpen.com	no
1.6.1	1.6	2001	CNRI	yes (2)
2.1	2.0+1.6.1	2001	PSF	no
2.0.1	2.0+1.6.1	2001	PSF	yes
2.1.1	2.1+2.0.1	2001	PSF	yes
2.1.2	2.1.1	2002	PSF	yes
2.1.3	2.1.2	2002	PSF	yes
2.2 and above	2.1.1	2001-now	PSF	yes

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<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

That's all there is to it!

systemd System and Service Manager

DETAILS:

<http://0pointer.de/blog/projects/systemd.html>

WEB SITE:

<https://www.freedesktop.org/wiki/Software/systemd>

GIT:

[git@github.com:systemd/systemd.git](https://github.com/systemd/systemd.git)
<https://github.com/systemd/systemd>

MAILING LIST:

<https://lists.freedesktop.org/mailman/listinfo/systemd-devel>

IRC:

#systemd on [irc.freenode.org](https://www.freenode.org)

BUG REPORTS:

<https://github.com/systemd/systemd/issues>

AUTHOR:

Lennart Poettering
Kay Sievers
...and many others

LICENSE:

LGPLv2.1+ for all code
- except src/basic/MurmurHash2.c which is Public Domain
- except src/basic/siphash24.c which is CC0 Public Domain
- except src/journal/lookup3.c which is Public Domain
- except src/udev/* which is (currently still) GPLv2, GPLv2+
- except tools/chromiumos/* which is BSD-style

REQUIREMENTS:

Linux kernel >= 3.13
Linux kernel >= 4.2 for unified cgroup hierarchy support

Kernel Config Options:

CONFIG_DEVTMPFS
CONFIG_CGROUPS (it is OK to disable all controllers)
CONFIG_INOTIFY_USER
CONFIG_SIGNALFD
CONFIG_TIMERFD
CONFIG_EPOLL
CONFIG_NET
CONFIG_SYSFS
CONFIG_PROC_FS
CONFIG_FHANDLE (libudev, mount and bind mount handling)

Kernel crypto/hash API

CONFIG_CRYPT_USER_API_HASH
CONFIG_CRYPT_HMAC
CONFIG_CRYPT_SHA256

udev will fail to work with the legacy sysfs layout:

CONFIG_SYSFS_DEPRECATED=n

Legacy hotplug slows down the system and confuses udev:

CONFIG_UEVENT_HELPER_PATH=""

Userspace firmware loading is not supported and should be disabled in the kernel:

CONFIG_FW_LOADER_USER_HELPER=n

Some udev rules and virtualization detection relies on it:

CONFIG_DMIID

Support for some SCSI devices serial number retrieval, to create additional symlinks in /dev/disk/ and /dev/tape:

CONFIG_BLK_DEV_BSG

Required for PrivateNetwork= in service units:

CONFIG_NET_NS

Note that systemd-located.service and other systemd units use PrivateNetwork so this is effectively required.

Required for PrivateUsers= in service units:

CONFIG_USER_NS

Optional but strongly recommended:

CONFIG_IPV6

CONFIG_AUTOFS4_FS

CONFIG_TMPFS_XATTR

CONFIG_{TMPFS,EXT4_FS,XFS,BTRFS_FS,...}_POSIX_ACL

CONFIG_SECCOMP

CONFIG_SECCOMP_FILTER (required for seccomp support)

CONFIG_CHECKPOINT_RESTORE (for the kcmp() syscall)

Required for CPUShares= in resource control unit settings

CONFIG_CGROUP_SCHED

CONFIG_FAIR_GROUP_SCHED

Required for CPUQuota= in resource control unit settings

CONFIG_CFS_BANDWIDTH

Required for IPAddressDeny= and IPAddressAllow= in resource control unit settings

CONFIG_CGROUP_BPF

For UEFI systems:

CONFIG_EFIVAR_FS

CONFIG_EFI_PARTITION

We recommend to turn off Real-Time group scheduling in the kernel when using systemd. RT group scheduling effectively makes RT scheduling unavailable for most userspace, since it requires explicit assignment of RT budgets to each unit whose processes making use of RT. As there's no sensible way to assign these budgets automatically this cannot really be fixed, and it's best to disable group scheduling hence.

CONFIG_RT_GROUP_SCHED=n

It's a good idea to disable the implicit creation of networking bonding devices by the kernel networking bonding module, so that the automatically created "bond0" interface doesn't conflict with any such device created by systemd-networkd (or other tools). Ideally there would be a kernel compile-time option for this, but there currently isn't. The next best thing is to make this change through a modprobe.d drop-in. This is shipped by default, see modprobe.d/systemd.conf.

Required for systemd-nspawn:

CONFIG_DEVPTS_MULTIPLE_INSTANCES or Linux kernel \geq 4.7

Note that kernel auditing is broken when used with systemd's container code. When using systemd in conjunction with containers, please make sure to either turn off auditing at runtime using the kernel command line option "audit=0", or turn it off at kernel compile time using:

CONFIG_AUDIT=n

If systemd is compiled with libseccomp support on architectures which do not use socketcall() and where seccomp is supported (this effectively means x86-64 and ARM, but excludes 32-bit x86!), then nspawn will now install a work-around seccomp filter that makes containers boot even with audit being enabled. This works correctly only on kernels 3.14 and newer though. TL;DR: turn audit off, still.

glibc \geq 2.16

libcap

libmount \geq 2.30 (from util-linux)

(util-linux *must* be built without --enable-libmount-support-mtab)

libseccomp \geq 2.3.1 (optional)

libblkid \geq 2.24 (from util-linux) (optional)

libkmod \geq 15 (optional)

PAM \geq 1.1.2 (optional)

libcryptsetup (optional)

libaudit (optional)

libacl (optional)

libselinux (optional)

liblzma (optional)

liblz4 \geq 1.3.0 / 130 (optional)

libgcrypt (optional)

libqrencode (optional)

libmicrohttpd (optional)

libpython (optional)

libidn2 or libidn (optional)

gnutls \geq 3.1.4 (optional, \geq 3.6.0 is required to support DNS-over-TLS with gnutls)

openssl >= 1.1.0 (optional, required to support DNS-over-TLS with openssl)
elfutils >= 158 (optional)
polkit (optional)
tzdata >= 2014f (optional)
pkg-config
gperf
docbook-xsl (optional, required for documentation)
xsltproc (optional, required for documentation)
python-lxml (optional, required to build the indices)
python >= 3.5
meson >= 0.46 (>= 0.49 is required to build position-independent executables)
ninja
gcc, awk, sed, grep, m4, and similar tools

During runtime, you need the following additional dependencies:

util-linux >= v2.27.1 required
dbus >= 1.4.0 (strictly speaking optional, but recommended)
NOTE: If using dbus < 1.9.18, you should override the default policy directory (--with-dbuspolicydir=/etc/dbus-1/system.d).
dracut (optional)
polkit (optional)

To build in directory build/:
meson build/ && ninja -C build

Any configuration options can be specified as -Darg=value... arguments to meson. After the build directory is initially configured, meson will refuse to run again, and options must be changed with:

mesonconf -Darg=value...
mesonconf without any arguments will print out available options and their current values.

Useful commands:
ninja -v some/target
ninja test
sudo ninja install
DESTDIR=... ninja install

A tarball can be created with:
git archive --format=tar --prefix=systemd-222/ v222 | xz > systemd-222.tar.xz

When systemd-hostnamed is used, it is strongly recommended to install nss-myhostname to ensure that, in a world of dynamically changing hostnames, the hostname stays resolvable

under all circumstances. In fact, `systemd-hostnamed` will warn if `nss-myhostname` is not installed.

`nss-systemd` must be enabled on `systemd` systems, as that's required for `DynamicUser=` to work. Note that we ship services out-of-the-box that make use of `DynamicUser=` now, hence enabling `nss-systemd` is not optional.

Note that the build prefix for `systemd` must be `/usr`. (Moreover, packages `systemd` relies on - such as D-Bus - really should use the same prefix, otherwise you are on your own.) `-Dsplit-usr=false` (which is the default and does not need to be specified) is the recommended setting, and `-Dsplit-usr=true` should be used on systems which have `/usr` on a separate partition.

Additional packages are necessary to run some tests:

- `busybox` (used by `test/TEST-13-NSPAWN-SMOKE`)
- `nc` (used by `test/TEST-12-ISSUE-3171`)
- `python3-pyparsing`
- `python3-evdev` (used by `hwdb` parsing tests)
- `strace` (used by `test/test-functions`)
- `capsh` (optional, used by `test-execute`)

USERS AND GROUPS:

Default `udev` rules use the following standard system group names, which need to be resolvable by `getgrnam()` at any time, even in the very early boot stages, where no other databases and network are available:

`audio`, `cdrom`, `dialout`, `disk`, `input`, `kmem`, `kvm`, `lp`, `render`, `tape`, `tty`, `video`

During runtime, the journal daemon requires the "`systemd-journal`" system group to exist. New journal files will be readable by this group (but not writable), which may be used to grant specific users read access. In addition, system groups "`wheel`" and "`adm`" will be given read-only access to journal files using `systemd-tmpfiles.service`.

The journal remote daemon requires the "`systemd-journal-remote`" system user and group to exist. During execution this network facing service will drop privileges and assume this `uid/gid` for security reasons.

Similarly, the network management daemon requires the "`systemd-network`" system user and group to exist.

Similarly, the name resolution daemon requires the "systemd-resolve" system user and group to exist.

Similarly, the coredump support requires the "systemd-coredump" system user and group to exist.

NSS:

systemd ships with four glibc NSS modules:

nss-myhostname resolves the local hostname to locally configured IP addresses, as well as "localhost" to 127.0.0.1/::1.

nss-resolve enables DNS resolution via the systemd-resolved DNS/LLMNR caching stub resolver "systemd-resolved".

nss-mymachines enables resolution of all local containers registered with machined to their respective IP addresses. It also maps UID/GIDs ranges used by containers to useful names.

nss-systemd enables resolution of all dynamically allocated service users. (See the DynamicUser= setting in unit files.)

To make use of these NSS modules, please add them to the "hosts:", "passwd:" and "group:" lines in /etc/nsswitch.conf. The "resolve" module should replace the glibc "dns" module in this file (and don't worry, it chain-loads the "dns" module if it can't talk to resolved).

The four modules should be used in the following order:

```
passwd: compat mymachines systemd
group:  compat mymachines systemd
hosts:  files mymachines resolve [!UNAVAIL=return] dns myhostname
```

SYSV INIT.D SCRIPTS:

When calling "systemctl enable/disable/is-enabled" on a unit which is a SysV init.d script, it calls /usr/lib/systemd/systemd-sysv-install; this needs to translate the action into the distribution specific mechanism such as chkconfig or update-rc.d. Packagers need to provide this script if you need this functionality (you don't if you disabled SysV init support).

Please see src/systemctl/systemd-sysv-install.SKELETON for how this needs to look like, and provide an implementation at the marked places.

WARNINGS:

systemd will warn during early boot if /usr is not already mounted at this point (that means: either located on the same file system as / or already mounted in the initrd). While in systemd itself very little will break if /usr is on a separate, late-mounted partition, many of its dependencies very likely will break sooner or later in one form or another. For example, udev rules tend to refer to binaries in /usr, binaries that link to libraries in /usr or binaries that refer to data files in /usr. Since these breakages are not always directly visible, systemd will warn about this, since this kind of file system setup is not really supported anymore by the basic set of Linux OS components.

systemd requires that the /run mount point exists. systemd also requires that /var/run is a symlink to /run.

For more information on this issue consult

<https://www.freedesktop.org/wiki/Software/systemd/separate-usr-is-broken>

To run systemd under valgrind, compile with meson option -Dvalgrind=true and have valgrind development headers installed (i.e. valgrind-devel or equivalent). Otherwise, false positives will be triggered by code which violates some rules but is actually safe. Note that valgrind generates nice output only on exit(), hence on shutdown we don't execve() systemd-shutdown.

STABLE BRANCHES AND BACKPORTS:

Stable branches with backported patches are available in the systemd-stable repo at <https://github.com/systemd/systemd-stable>.

Stable branches are started for certain releases of systemd and named after them, e.g. v238-stable. Stable branches are managed by distribution maintainers on an as needed basis. See <https://www.freedesktop.org/wiki/Software/systemd/Backports/> for some more information and examples.

ENGINEERING AND CONSULTING SERVICES:

Kinvolk (<https://kinvolk.io>) offers professional engineering and consulting services for systemd. Please contact Chris Kühl <chris@kinvolk.io> for more information.

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Vim license

README.txt for version 8.1 of Vim: Vi IMproved.

WHAT IS VIM?

Vim is a greatly improved version of the good old UNIX editor Vi. Many new features have been added: multi-level undo, syntax highlighting, command line history, on-line help, spell checking, filename completion, block operations, script language, etc. There is also a Graphical User Interface (GUI) available. Still, Vi compatibility is maintained, those who have Vi "in the fingers" will feel at home. See "runtime/doc/vi_diff.txt" for differences with Vi.

This editor is very useful for editing programs and other plain text files. All commands are given with normal keyboard characters, so those who can type with ten fingers can work very fast. Additionally, function keys can be mapped to commands by the user, and the mouse can be used.

Vim runs under MS-Windows (NT, 2000, XP, Vista, 7, 8, 10), Macintosh, VMS and almost all flavours of UNIX. Porting to other systems should not be very difficult. Older versions of Vim run on MS-DOS, MS-Windows 95/98/Me, Amiga DOS, Atari MiNT, BeOS, RISC OS and OS/2. These are no longer maintained.

DISTRIBUTION

You can often use your favorite package manager to install Vim. On Mac and Linux a small version of Vim is pre-installed, you still need to install Vim if you want more features.

There are separate distributions for Unix, PC, Amiga and some other systems. This README.txt file comes with the runtime archive. It includes the documentation, syntax files and other files that are used at runtime. To run Vim you must get either one of the binary archives or a source archive. Which one you need depends on the system you want to run it on and whether you want or must compile it yourself. Check "<http://www.vim.org/download.php>" for an overview of currently available distributions.

Some popular places to get the latest Vim:

- * Check out the git repository from github: <https://github.com/vim/vim>.
- * Get the source code as an archive: <https://github.com/vim/vim/releases>.
- * Get a Windows executable from the vim-win32-installer repository: <https://github.com/vim/vim-win32-installer/releases>.

COMPILING

If you obtained a binary distribution you don't need to compile Vim. If you obtained a source distribution, all the stuff for compiling Vim is in the "src" directory. See src/INSTALL for instructions.

INSTALLATION

See one of these files for system-specific instructions. Either in the READMEdir directory (in the repository) or the top directory (if you unpack an archive):

README_ami.txt	Amiga
README_unix.txt	Unix
README_dos.txt	MS-DOS and MS-Windows
README_mac.txt	Macintosh
README_vms.txt	VMS

There are more README_*.txt files, depending on the distribution you used.

DOCUMENTATION

The Vim tutor is a one hour training course for beginners. Often it can be started as "vimtutor". See ":help tutor" for more information.

The best is to use ":help" in Vim. If you don't have an executable yet, read "runtime/doc/help.txt". It contains pointers to the other documentation files. The User Manual reads like a book and is recommended to learn to use Vim. See ":help user-manual".

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Vim is Charityware. You can use and copy it as much as you like, but you are encouraged to make a donation to help orphans in Uganda. Please read the file "runtime/doc/uganda.txt" for details (do ":help uganda" inside Vim).

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Since Bram is back to a paid job the money will now be used to help children in Uganda. See `runtime/doc/uganda.txt`. But at the same time donations increase Bram's motivation to keep working on Vim!

For the most recent information about sponsoring look on the Vim web site:

<http://www.vim.org/sponsor/>

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If you would like to help making Vim better, see the `CONTRIBUTING.md` file.

INFORMATION

The latest news about Vim can be found on the Vim home page:

<http://www.vim.org/>

If you have problems, have a look at the Vim documentation or tips:

<http://www.vim.org/docs.php>

http://vim.wikia.com/wiki/Vim_Tips_Wiki

If you still have problems or any other questions, use one of the mailing lists to discuss them with Vim users and developers:

<http://www.vim.org/maillist.php>

If nothing else works, report bugs directly:

Bram Moolenaar <Bram@vim.org>

MAIN AUTHOR

Send any other comments, patches, flowers and suggestions to:

Bram Moolenaar E-mail: Bram@vim.org

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Version 3, 29 June 2007

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