The Basic Concepts of Snapper

Snapper is a command-line tool in SUSE Linux Enterprise Server for NVIDIA that enables administrators to create and manage Btrfs file system snapshots. By leveraging copy-on-write capabilities, it captures the file system state with minimal disk space overhead, allowing users to safely undo system modifications, restore files and perform system rollbacks. This provides robust system recovery options while automated cleanup algorithms prevent the partition from running out of space.

Prerequisites

- Snapper installed on the system
- A root partition (`/`) size of at least 16 GB



Note

This article is the first installment of the series of articles about Snapper. In the subsequent articles, we cover common use cases such as undoing changes, rolling back the system, manually creating and managing snapshots, automatic snapshot cleanup, and more. Each article builds upon the knowledge gained from the previous ones, providing a progressively enhanced understanding of the Snapper tool.

Publication Date: 05 Nov 2026

Contents

1 Essential concepts of Btrfs subvolumes and snapshots 3

2 What is Snapper? 3

3 Snapper default setup 4

4 For more information 8

5 Legal Notice 8

A GNU Free Documentation License 9

1 Essential concepts of Btrfs subvolumes and snapshots

Btrfs subvolumes are separately mountable file systems within a physical partition. The Btrfs file system is set up with subvolumes by default. Snapshots in Btrfs are a type of subvolume that shares data with another subvolume. They are created using the copy-on-write capabilities of Btrfs, which allows them to be quickly created with minimal disk space usage. Snapshots can be used to capture the state of a file system at a particular point in time and to roll back to a previous state if needed.

A Btrfs subvolume has its own independent file and directory hierarchy. Unlike LVM logical volumes, which operate at the block level, Btrfs subvolumes are file extent-based. A snapshot is also considered a subvolume, carrying the initial content of the original subvolume. Subvolumes appear as directories and can be manipulated like any other directory, including being renamed or moved.

One of the primary purposes of subvolumes is to be explicitly included or excluded from snapshots. When using a snapshot to roll back the system, we need to ensure that data such as users' home directories, Web and FTP server contents or log files do not get lost or overwritten during a rollback. This is achieved by excluding certain Btrfs subvolumes from snapshots. Find more information and the list of excluded subvolumes in *Section 3.3, "Subvolumes excluded from snapshots"*.

2 What is Snapper?

Snapper is a tool that helps create and manage file system snapshots. File system snapshots allow keeping a copy of the state of a file system at a certain point of time. Snapper can create and compare snapshots, revert between snapshots, and supports automatic snapshot timelines. Snapper never modifies the content of snapshots.

The standard setup of Snapper is designed to allow rolling back system changes. However, you can also use it to create on-disk backups of user data. As the basis for this functionality, Snapper uses two types of file systems:

- Btrfs, a copy-on-write file system for Linux that natively supports file system snapshots of subvolumes.
- Thinly provisioned LVM volumes formatted with XFS and ext4.



Note

You can also boot from `Btrfs` snapshots.

2.1 What can Snapper do?

Snapper has a command-line interface that allows you to create, delete and compare snapshots, as well as undo changes made between snapshots.

Using Snapper, you can perform the following tasks:

- Undo system changes made by **`zypper`**.
- Restore files from previous snapshots.
- Do a system rollback by booting from a snapshot.
- Manually create and manage snapshots, within the running system.
- Perform automatic snapshot cleanup.

2.2 Snapshot creation

When a snapshot is created, both the snapshot and the original point to the same blocks in the file system. So, initially a snapshot does not occupy additional disk space. If data in the original file system is modified, changed data blocks are copied while the old data blocks are kept for the snapshot. Therefore, a snapshot occupies the same amount of space as the data modified. So, over time, the amount of space a snapshot allocates constantly grows. As a consequence, deleting files from a `Btrfs` file system containing snapshots may *not* free disk space!



Note: Snapshot location

Snapshots always reside on the same partition or subvolume on which the snapshot has been taken. It is not possible to store snapshots on a different file system.

As a result, partitions containing snapshots need to be larger than partitions not containing snapshots. The exact amount depends strongly on the number of snapshots you keep and the amount of data modifications. As a rule of thumb, give partitions twice as much space as you normally would. To prevent disks from running out of space, old snapshots are automatically cleaned up.

3 Snapper default setup

Learn about the default setup of Snapper and its default settings.

Snapper is set up as an undo and recovery tool for system changes. By default, the root partition (`/`) of SUSE Linux Enterprise Server for NVIDIA is formatted with `Btrfs`. Taking snapshots is automatically enabled if the root partition (`/`) is big enough (more than approximately 16 GB). By default, snapshots are disabled on partitions other than `/`.



Important

We do not recommend activating snapshots manually after the system has been installed with snapshots. Enabling Snapper after the installation results in a different setup compared to what is described here.



Tip: Checking root partition size

The size of the root partition is product-specific. To find out the disk space that the root partition occupies, run:

```
> df -h
```

3.1 Snapper default settings

Snapshots are created for the root partition only, and certain directories are excluded by means of subvolumes. For the list of excluded subvolumes, see *Section 3.3, "Subvolumes excluded from snapshots"*.

Snapper provides automatic snapshot cleanup algorithms to prevent running out of space on the root partition. These algorithms differentiate between timeline snapshots and *numbered* snapshots (administration plus installation snapshot pairs). The cleanup behavior can be configured based on the following criteria:

- Number limit: The system can be set to automatically delete old snapshots when a certain count of snapshots is reached.
- Age limit: Old snapshots can be deleted if they exceed a certain age, while still preserving a number of snapshots for each time period (hourly, daily, monthly, yearly).
- `Pre` and `post` snapshot pairs: `pre` and `post` snapshot pairs that do not differ can be automatically deleted.

For numbered snapshots, which include administration and installation snapshot pairs, the cleanup is controlled by parameters such as `NUMBER_CLEANUP`, `NUMBER_LIMIT`, `NUMBER_LIMIT_IMPORTANT`, and `NUMBER_MIN_AGE`. The default values are 2–10 for `NUMBER_LIMIT` and 4–10 for `NUMBER_LIMIT_IMPORTANT`, meaning that only the youngest snapshots are kept.

For timeline snapshots, the cleanup is based on the number of snapshots to keep for each type (hourly, daily, weekly, monthly, yearly). For example, the last 24 hourly snapshots, the first daily snapshot from the last seven days, the first snapshot made on the last day of the month for the last twelve months, and so forth. The parameters include `TIMELINE_CLEANUP`, `TIMELINE_MIN_AGE` and interval parameters such as `TIMELINE_LIMIT_DAILY`, `TIMELINE_LIMIT_HOURLY` and so on.

You can roll back to an existing snapshot at any time by booting from the respective snapshot and making it active afterwards.



Note: Disabling Snapper automatically and manually

If your root partition is smaller than 16 GB, the automatic creation of snapshots as described above is disabled by default. In this case, you can manually create snapshots. Keep an eye on the available disk space.

To disable automatic snapshots even if your root partition is sufficiently sized, disable snapshots manually during the installation in the partition setup step.

3.2 Snapper on root

When Snapper is configured to operate on root, every Btrfs subvolume is excluded by default.

The default behavior of Snapper is defined in a configuration file that is specific for each partition or Btrfs subvolume. These configuration files reside under `/etc/snapper/configs/`.

3.3 Subvolumes excluded from snapshots

The primary use case for snapshots is to roll back the system to a previous state. Therefore, there are certain subvolumes (directories) for which snapshotting is disabled.

The following list contains directories that are excluded from snapshots. Depending on your product and architecture, not all of them may be available on your system.

`/boot/grub2/i386-pc`, `/boot/grub2/x86_64-efi`, `/boot/grub2/powerpc-ieee1275`, `/boot/grub2/s390x-emu`

A rollback of the boot loader configuration is not supported. The directories listed above are architecture-specific. The first two directories are present on AMD64/Intel 64 machines, the latter two are on IBM POWER and on IBM Z, respectively.

`/home`

If `/home` does not reside on a separate partition, it is excluded to avoid the loss of user-created data on rollbacks.

`/opt`, `/usr/local`

These directories are used when manually installing third-party products. They are excluded to avoid uninstalling these installations on rollbacks.

`/srv`

Contains data for Web and FTP servers. It is excluded to avoid data loss on rollbacks.

`/tmp`

All directories containing temporary files and caches are excluded from snapshots.

`/var`

This directory contains many variable files, including logs, temporary caches, third-party products in `/var/opt`, and is the default location for virtual machine images and databases. Therefore, this subvolume is created to exclude all of this variable data from snapshots and has copy-on-write disabled.

`/run`

This directory contains application runtime data and is excluded from snapshots to reduce the size of the snapshot and to avoid including potentially sensitive information.



Tip

The list of subvolumes is product-specific. To see what subvolumes are created under `/` and therefore see which directories are excluded from the default snapshots behavior, run:

```
> sudo btrfs subvolume list /
```

Note: Why is there a space limit?

When creating a snapshot, no physical data copies are created. A snapshot only consists of pointers to the respective data blocks. As long as the snapshot remains consistent with the current system, it occupies almost no additional disk space (apart from the metadata it contains). However, if a file is modified on the system, the original data is recorded in the snapshot. Over time, as more changes accumulate and the snapshot diverges from the live system, the snapshot's size increases accordingly.

To prevent disks from running full (and the system becoming inoperable as a result), we recommend having a minimal root file system size. The required size depends on system usage:

- The frequency of snapshot creation
- The duration for which snapshots are retained
- The rate of changes to the system

In general, the more snapshots you have, the longer they are kept, and the more frequently the system changes, the larger the root partition needs to be.

4 For more information

For more information on the Btrfs file system, refer to https://documentation.suse.com/sles/15-SP5/html/SLES-all/cha-filesystems.html#sec-filesystems-major-btrfs and https://wiki.archlinux.org/title/btrfs.

For more information on LVM volumes, refer to https://documentation.suse.com/sles/15-SP5/html/SLES-all/part-lvm.html.

5 Legal Notice

Copyright© 2006– 2026 SUSE LLC and contributors. All rights reserved.

Permission is granted to copy, distribute and/or modify this document under the terms of the GNU Free Documentation License, Version 1.2 or (at your option) version 1.3; with the Invariant Section being this copyright notice and license. A copy of the license version 1.2 is included in the section entitled “GNU Free Documentation License”.

For SUSE trademarks, see https://www.suse.com/company/legal/. All other third-party trademarks are the property of their respective owners. Trademark symbols (®, ™ etc.) denote trademarks of SUSE and its affiliates. Asterisks (*) denote third-party trademarks.

All information found in this book has been compiled with utmost attention to detail. However, this does not guarantee complete accuracy. Neither SUSE LLC, its affiliates, the authors, nor the translators shall be held liable for possible errors or the consequences thereof.

A GNU Free Documentation License

Copyright (C) 2000, 2001, 2002 Free Software Foundation, Inc. 51 Franklin St, Fifth Floor, Boston, MA 02110-1301 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

0. PREAMBLE

The purpose of this License is to make a manual, textbook, or other functional and useful document "free" in the sense of freedom: to assure everyone the effective freedom to copy and redistribute it, with or without modifying it, either commercially or non-commercially. Secondarily, this License preserves for the author and publisher a way to get credit for their work, while not being considered responsible for modifications made by others.

This License is a kind of "copyleft", which means that derivative works of the document must themselves be free in the same sense. It complements the GNU General Public License, which is a copyleft license designed for free software.

We have designed this License to use it for manuals for free software, because free software needs free documentation: a free program should come with manuals providing the same freedoms that the software does. But this License is not limited to software manuals; it can be used for any textual work, regardless of subject matter or whether it is published as a printed book. We recommend this License principally for works whose purpose is instruction or reference.

1. APPLICABILITY AND DEFINITIONS

This License applies to any manual or other work, in any medium, that contains a notice placed by the copyright holder saying it can be distributed under the terms of this License. Such a notice grants a world-wide, royalty-free license, unlimited in duration, to use that work under the conditions stated herein. The

"Document", below, refers to any such manual or work. Any member of the public is a licensee, and is addressed as "you". You accept the license if you copy, modify or distribute the work in a way requiring permission under copyright law.

A "Modified Version" of the Document means any work containing the Document or a portion of it, either copied verbatim, or with modifications and/or translated into another language.

A "Secondary Section" is a named appendix or a front-matter section of the Document that deals exclusively with the relationship of the publishers or authors of the Document to the Document's overall subject (or to related matters) and contains nothing that could fall directly within that overall subject. (Thus, if the Document is in part a textbook of mathematics, a Secondary Section may not explain any mathematics.) The relationship could be a matter of historical connection with the subject or with related matters, or of legal, commercial, philosophical, ethical or political position regarding them.

The "Invariant Sections" are certain Secondary Sections whose titles are designated, as being those of Invariant Sections, in the notice that says that the Document is released under this License. If a section does not fit the above definition of Secondary then it is not allowed to be designated as Invariant. The Document may contain zero Invariant Sections. If the Document does not identify any Invariant Sections then there are none.

The "Cover Texts" are certain short passages of text that are listed, as Front-Cover Texts or Back-Cover Texts, in the notice that says that the Document is released under this License. A Front-Cover Text may be at most 5 words, and a Back-Cover Text may be at most 25 words.

A "Transparent" copy of the Document means a machine-readable copy, represented in a format whose specification is available to the general public, that is suitable for revising the document straightforwardly with generic text editors or (for images composed of pixels) generic paint programs or (for drawings) some widely available drawing editor, and that is suitable for input to text formatters or for automatic translation to a variety of formats suitable for input to text formatters. A copy made in an otherwise Transparent file format whose markup, or absence of markup, has been arranged to thwart or discourage subsequent modification by readers is not Transparent. An image format is not Transparent if used for any substantial amount of text. A copy that is not "Transparent" is called "Opaque".

Examples of suitable formats for Transparent copies include plain ASCII without markup, Texinfo input format, LaTeX input format, SGML or XML using a publicly available DTD, and standard-conforming simple HTML, PostScript or PDF designed for human modification. Examples of transparent image formats include PNG, XCF and JPG. Opaque formats include proprietary formats that can be read and edited only by proprietary word processors, SGML or XML for which the DTD and/or processing tools are not generally available, and the machine-generated HTML, PostScript or PDF produced by some word processors for output purposes only.

The "Title Page" means, for a printed book, the title page itself, plus such following pages as are needed to hold, legibly, the material this License requires to appear in the title page. For works in formats which do not have any title page as such, "Title Page" means the text near the most prominent appearance of the work's title, preceding the beginning of the body of the text.

A section "Entitled XYZ" means a named subunit of the Document whose title either is precisely XYZ or contains XYZ in parentheses following text that translates XYZ in another language. (Here XYZ stands for a specific section name mentioned below, such as "Acknowledgements", "Dedications", "Endorsements", or "History".) To "Preserve the Title" of such a section when you modify the Document means that it remains a section "Entitled XYZ" according to this definition.

The Document may include Warranty Disclaimers next to the notice which states that this License applies to the Document. These Warranty Disclaimers are considered to be included by reference in this License, but only as regards disclaiming warranties: any other implication that these Warranty Disclaimers may have is void and has no effect on the meaning of this License.

2. VERBATIM COPYING

You may copy and distribute the Document in any medium, either commercially or non-commercially, provided that this License, the copyright notices, and the license notice saying this License applies to the Document are reproduced in all copies, and that you add no other conditions whatsoever to those of this License. You may not use technical measures to obstruct or control the reading or further copying of the copies you make or distribute. However, you may accept compensation in exchange for copies. If you distribute a large enough number of copies you must also follow the conditions in section 3.

You may also lend copies, under the same conditions stated above, and you may publicly display copies.

3. COPYING IN QUANTITY

If you publish printed copies (or copies in media that commonly have printed covers) of the Document, numbering more than 100, and the Document's license notice requires Cover Texts, you must enclose the copies in covers that carry, clearly and legibly, all these Cover Texts: Front-Cover Texts on the front cover, and Back-Cover Texts on the back cover. Both covers must also clearly and legibly identify you as the publisher of these copies. The front cover must present the full title with all words of the title equally prominent and visible. You may add other material on the covers in addition. Copying with changes limited to the covers, as long as they preserve the title of the Document and satisfy these conditions, can be treated as verbatim copying in other respects.

If the required texts for either cover are too voluminous to fit legibly, you should put the first ones listed (as many as fit reasonably) on the actual cover, and continue the rest onto adjacent pages.

If you publish or distribute Opaque copies of the Document numbering more than 100, you must either include a machine-readable Transparent copy along with each Opaque copy, or state in or with each Opaque copy a computer-network location from which the general network-using public has access to download using public-standard network protocols a complete Transparent copy of the Document, free of added material. If you use the latter option, you must take reasonably prudent steps, when you begin distribution of Opaque copies in quantity, to ensure that this Transparent copy will remain thus accessible at the stated location until at least one year after the last time you distribute an Opaque copy (directly or through your agents or retailers) of that edition to the public.

It is requested, but not required, that you contact the authors of the Document well before redistributing any large number of copies, to give them a chance to provide you with an updated version of the Document.

4. MODIFICATIONS

You may copy and distribute a Modified Version of the Document under the conditions of sections 2 and 3 above, provided that you release the Modified Version under precisely this License, with the Modified Version filling the role of the Document, thus licensing distribution and modification of the Modified Version to whoever possesses a copy of it. In addition, you must do these things in the Modified Version:

A. Use in the Title Page (and on the covers, if any) a title distinct from that of the Document, and from those of previous versions (which should, if there were any, be listed in the History section of the Document). You may use the same title as a previous version if the original publisher of that version gives permission.

B. List on the Title Page, as authors, one or more persons or entities responsible for authorship of the modifications in the Modified Version, together with at least five of the principal authors of the Document (all of its principal authors, if it has fewer than five), unless they release you from this requirement.

C. State on the Title page the name of the publisher of the Modified Version, as the publisher.

D. Preserve all the copyright notices of the Document.

E. Add an appropriate copyright notice for your modifications adjacent to the other copyright notices.

F. Include, immediately after the copyright notices, a license notice giving the public permission to use the Modified Version under the terms of this License, in the form shown in the Addendum below.

G. Preserve in that license notice the full lists of Invariant Sections and required Cover Texts given in the Document's license notice.

H. Include an unaltered copy of this License.

I. Preserve the section Entitled "History", Preserve its Title, and add to it an item stating at least the title, year, new authors, and publisher of the Modified Version as given on the Title Page. If there is no section Entitled "History" in the Document, create one stating the title, year, authors, and publisher of the Document as given on its Title Page, then add an item describing the Modified Version as stated in the previous sentence.

J. Preserve the network location, if any, given in the Document for public access to a Transparent copy of the Document, and likewise the network locations given in the Document for previous versions it was based on. These may be placed in the "History" section. You may omit a network location for a work that was published at least four years before the Document itself, or if the original publisher of the version it refers to gives permission.

K. For any section Entitled "Acknowledgements" or "Dedications", Preserve the Title of the section, and preserve in the section all the substance and tone of each of the contributor acknowledgements and/or dedications given therein.

L. Preserve all the Invariant Sections of the Document, unaltered in their text and in their titles. Section numbers or the equivalent are not considered part of the section titles.

M. Delete any section Entitled "Endorsements". Such a section may not be included in the Modified Version.

N. Do not retitle any existing section to be Entitled "Endorsements" or to conflict in title with any Invariant Section.

O. Preserve any Warranty Disclaimers.

If the Modified Version includes new front-matter sections or appendices that qualify as Secondary Sections and contain no material copied from the Document, you may at your option designate some or all of these sections as invariant. To do this, add their titles to the list of Invariant Sections in the Modified Version's license notice. These titles must be distinct from any other section titles.

You may add a section Entitled "Endorsements", provided it contains nothing but endorsements of your Modified Version by various parties--for example, statements of peer review or that the text has been approved by an organization as the authoritative definition of a standard.

You may add a passage of up to five words as a Front-Cover Text, and a passage of up to 25 words as a Back-Cover Text, to the end of the list of Cover Texts in the Modified Version. Only one passage of Front-Cover Text and one of Back-Cover Text may be added by (or through arrangements made by) any one entity. If the Document already includes a cover text for the same cover, previously added by you or by arrangement made by the same entity you are acting on behalf of, you may not add another; but you may replace the old one, on explicit permission from the previous publisher that added the old one.

The author(s) and publisher(s) of the Document do not by this License give permission to use their names for publicity for or to assert or imply endorsement of any Modified Version.

5. COMBINING DOCUMENTS

You may combine the Document with other documents released under this License, under the terms defined in section 4 above for modified versions, provided that you include in the combination all of the Invariant Sections of all of the original documents, unmodified, and list them all as Invariant Sections of your combined work in its license notice, and that you preserve all their Warranty Disclaimers.

The combined work need only contain one copy of this License, and multiple identical Invariant Sections may be replaced with a single copy. If there are multiple Invariant Sections with the same name but different contents, make the title of each such section unique by adding at the end of it, in parentheses, the name of the original author or publisher of that section if known, or else a unique number. Make the same adjustment to the section titles in the list of Invariant Sections in the license notice of the combined work.

In the combination, you must combine any sections Entitled "History" in the various original documents, forming one section Entitled "History"; likewise combine any sections Entitled "Acknowledgements", and any sections Entitled "Dedications". You must delete all sections Entitled "Endorsements".

6. COLLECTIONS OF DOCUMENTS

You may make a collection consisting of the Document and other documents released under this License, and replace the individual copies of this License in the various documents with a single copy that is included in the collection, provided that you follow the rules of this License for verbatim copying of each of the documents in all other respects.

You may extract a single document from such a collection, and distribute it individually under this License, provided you insert a copy of this License into the extracted document, and follow this License in all other respects regarding verbatim copying of that document.

7. AGGREGATION WITH INDEPENDENT WORKS

A compilation of the Document or its derivatives with other separate and independent documents or works, in or on a volume of a storage or distribution medium, is called an "aggregate" if the copyright resulting from the compilation is not used to limit the legal rights of the compilation's users beyond what the individual works permit. When the Document is included in an aggregate, this License does not apply to the other works in the aggregate which are not themselves derivative works of the Document.

If the Cover Text requirement of section 3 is applicable to these copies of the Document, then if the Document is less than one half of the entire aggregate, the Document's Cover Texts may be placed on covers that bracket the Document within the aggregate, or the electronic equivalent of covers if the Document is in electronic form. Otherwise they must appear on printed covers that bracket the whole aggregate.

8. TRANSLATION

Translation is considered a kind of modification, so you may distribute translations of the Document under the terms of section 4. Replacing Invariant Sections with translations requires special permission from their copyright holders, but you may include translations of some or all Invariant Sections in addition to the original versions of these Invariant Sections. You may include a translation of this License, and all the license notices in the Document, and any Warranty Disclaimers, provided that you also include the original English version of this License and the original versions of those notices and disclaimers. In case of a disagreement between the translation and the original version of this License or a notice or disclaimer, the original version will prevail.

If a section in the Document is Entitled "Acknowledgements", "Dedications", or "History", the requirement (section 4) to Preserve its Title (section 1) will typically require changing the actual title.

9. TERMINATION

You may not copy, modify, sublicense, or distribute the Document except as expressly provided for under this License. Any other attempt to copy, modify, sublicense or distribute the Document is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

10. FUTURE REVISIONS OF THIS LICENSE

The Free Software Foundation may publish new, revised versions of the GNU Free Documentation License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns. See https://www.gnu.org/copyleft/.

Each version of the License is given a distinguishing version number. If the Document specifies that a particular numbered version of this License "or any later version" applies to it, you have the option of following the terms and conditions either of that specified version or of any later version that has been published (not as a draft) by the Free Software Foundation. If the Document does not specify a version number of this License, you may choose any version ever published (not as a draft) by the Free Software Foundation.

ADDENDUM: How to use this License for your documents

```
Copyright (c) YEAR YOUR NAME.
Permission is granted to copy, distribute and/or modify this document
under the terms of the GNU Free Documentation License, Version 1.2
or any later version published by the Free Software Foundation;
with no Invariant Sections, no Front-Cover Texts, and no Back-Cover Texts.
A copy of the license is included in the section entitled “GNU
Free Documentation License”.
```

If you have Invariant Sections, Front-Cover Texts and Back-Cover Texts, replace the “with...Texts.” line with this:

```
with the Invariant Sections being LIST THEIR TITLES, with the
Front-Cover Texts being LIST, and with the Back-Cover Texts being LIST.
```

If you have Invariant Sections without Cover Texts, or some other combination of the three, merge those two alternatives to suit the situation.

If your document contains nontrivial examples of program code, we recommend releasing these examples in parallel under your choice of free software license, such as the GNU General Public License, to permit their use in free software.