



**HOCHSCHULE
MITTWEIDA**
University of Applied Sciences



Bundeskriminalamt

Betriebssysteme

Linux Paket- und Dienstmanagement

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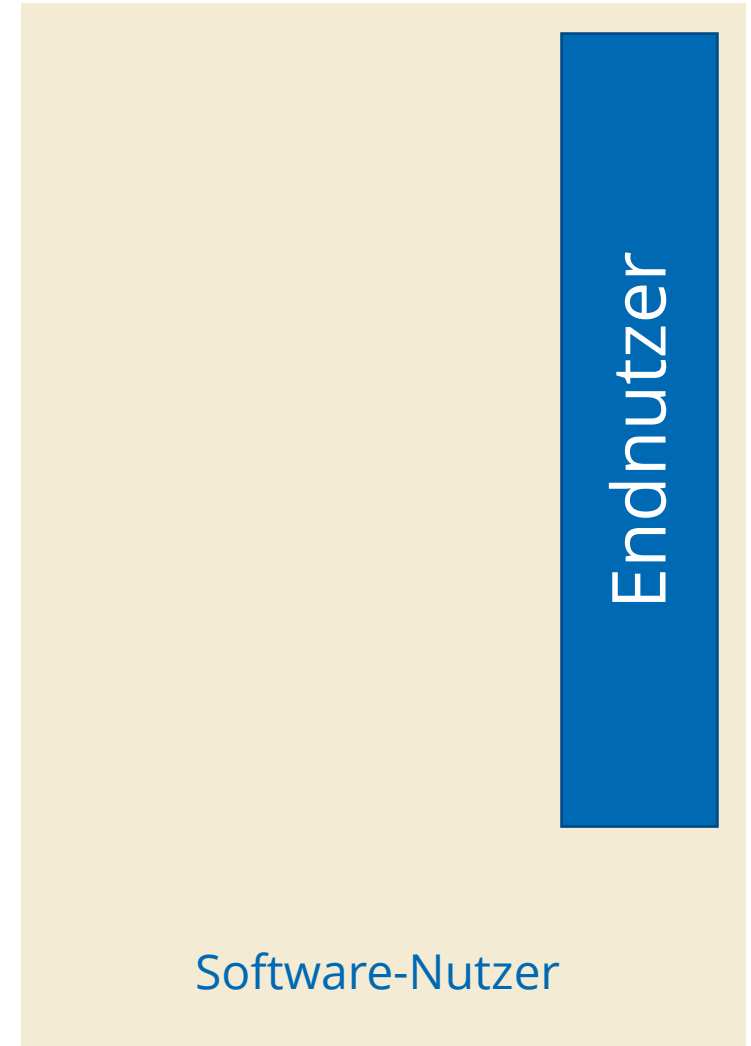
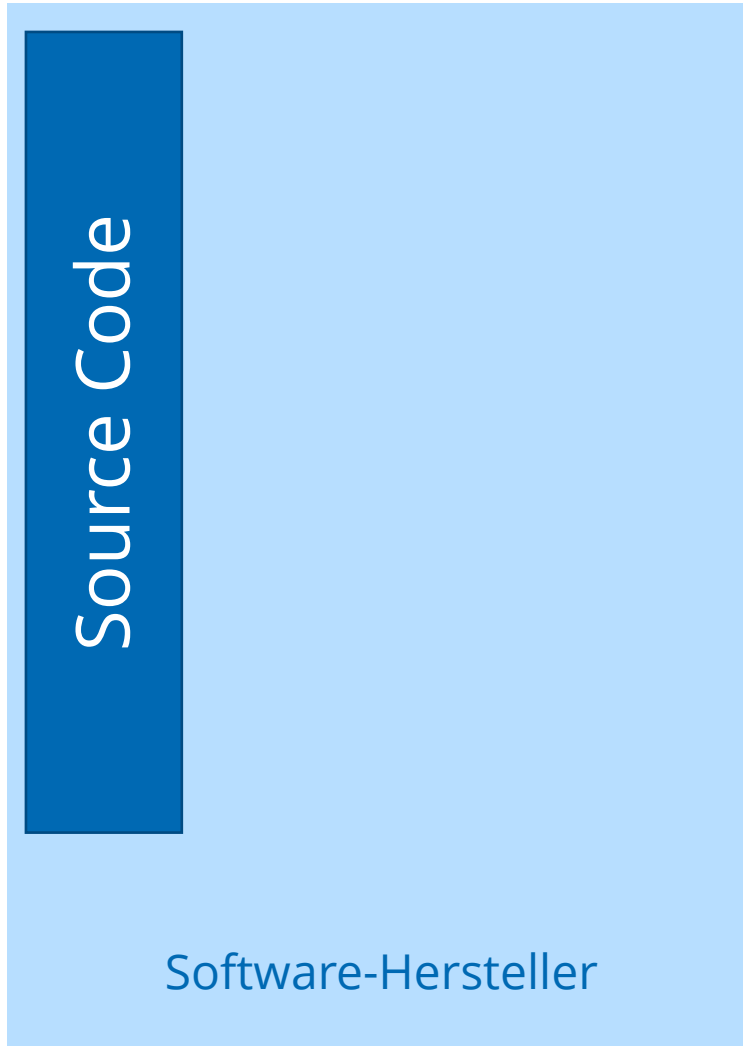
Stand: 11.05.2023

Agenda

1. Softwareinstallationswege
2. Paketverwaltung
3. Binaries
4. Source Code
5. Dienstmanagement

Softwareinstallationswege

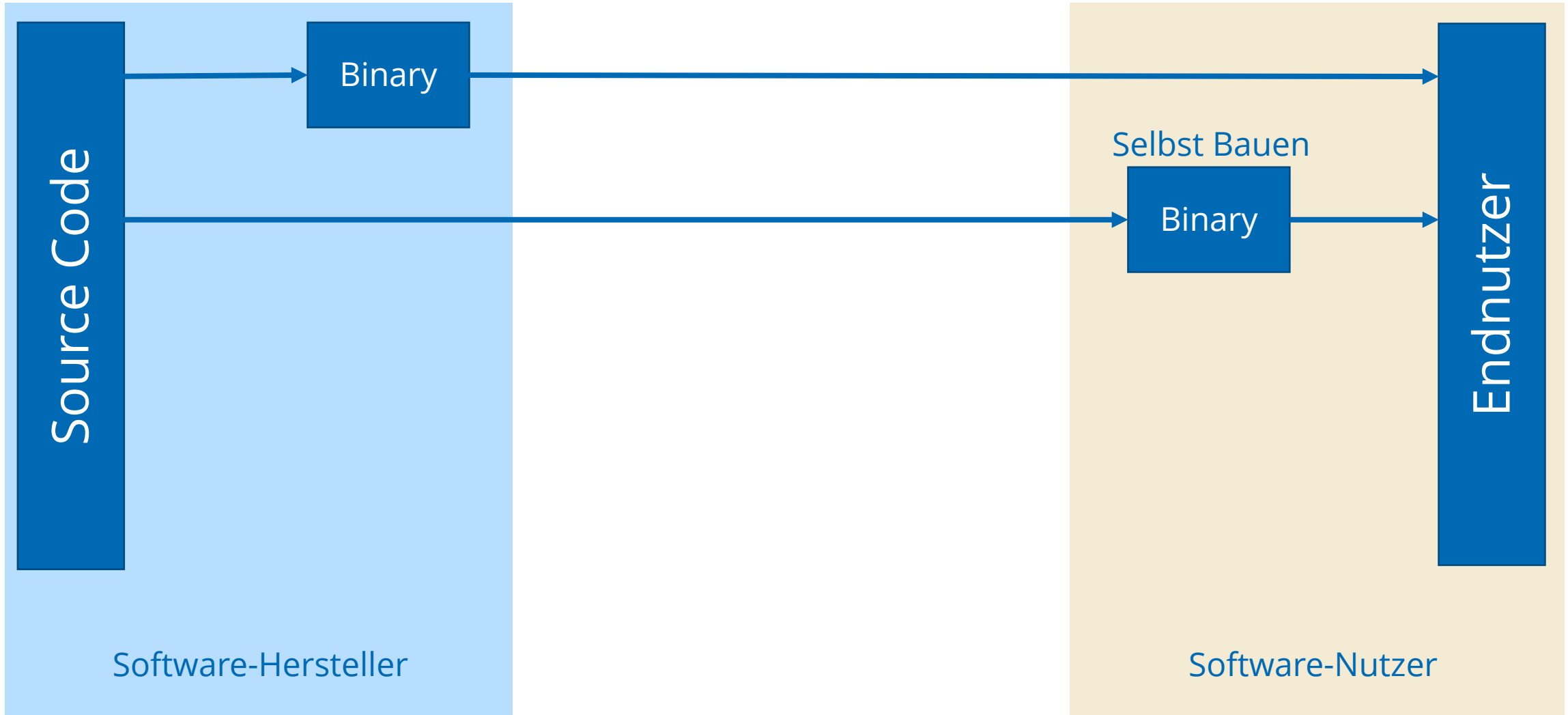
Softwareinstallationswege



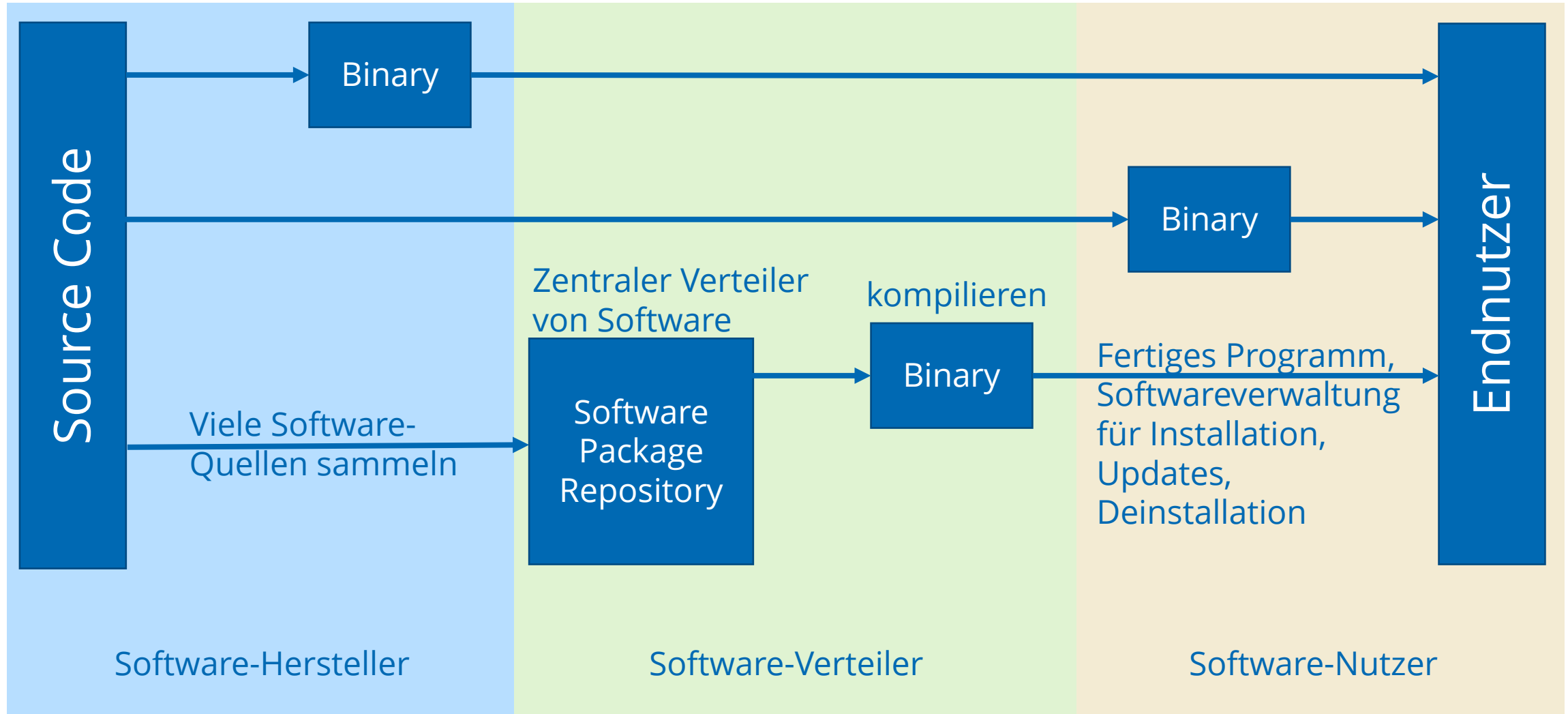
Softwareinstallationswege



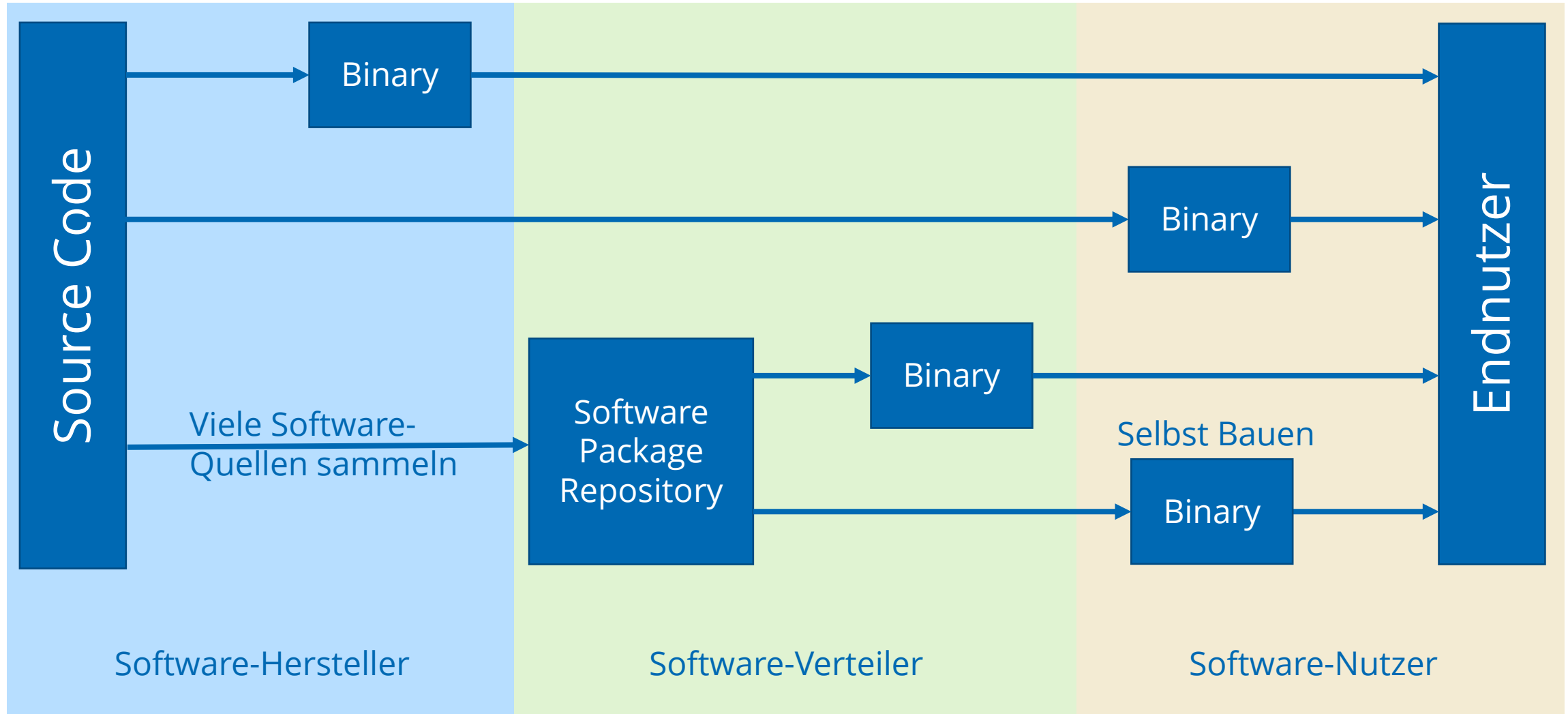
Softwareinstallationswege



Softwareinstallationswege



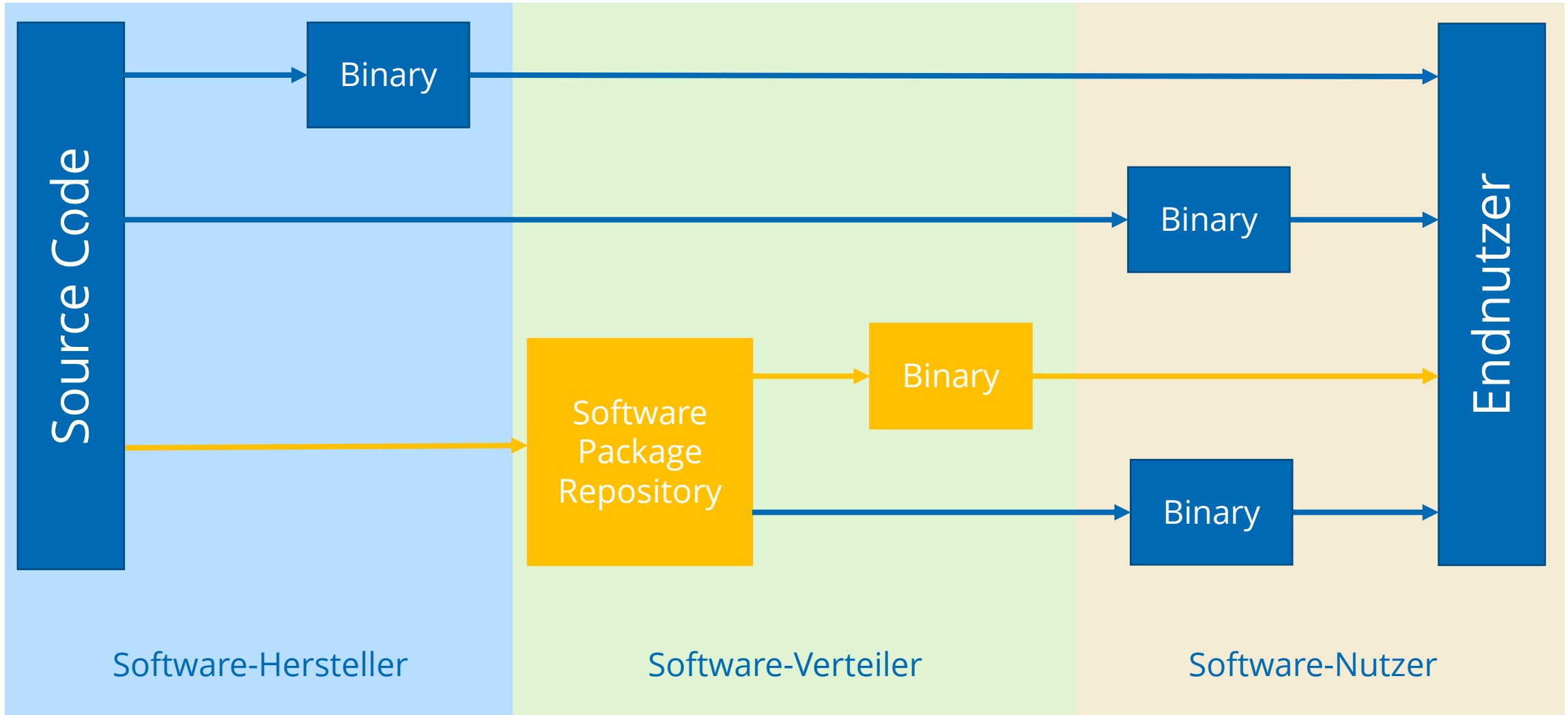
Softwareinstallationswege



Paketverwaltung

am Beispiel apt

Paketverwaltung



Aufgaben

- **Software**

- Installieren
- Aktualisieren
- Konfigurieren
- Deinstallieren

- **Metainformationen zu Software**

- Version
- Hersteller
- Abhängigkeiten
- ...

- **Sicherheit**

- Updates
- Signieren von Software (Integrität)
- Programmfunktion gewährleisten bei Deinstallation anderer Software (Ausfallssicherheit)

Softwareorganisation

- Software in Einzelkomponenten (Pakete) zerlegen
- Abhängigkeiten festlegen
- Standardkonfiguration anbieten → je nach Distribution unterschiedlich
- **Vorteil:**
 - Einmalige Installation von mehrfach genutzten Paketen
 - Weniger Speicherplatzbedarf
 - Trennung von Programm und Konfiguration
 - Einfache Softwareverwaltung

Paketformate

- **deb** (Debian Build)
 - Debian, ubuntu, Linux Mint, ...
- **dpkg** (Debian Package, Vereinfachung für Endnutzer von deb)
 - Debian, ubuntu, Linux Mint, ...
- **rpm** (Redhat Package Manager)
 - Redhat, Fedora, CentOS, openSuse, Solaris, ...
- **ebuild, Portage**
 - Gentoo
- **PiSi** (Packages Installed Successfully as Intended)
 - Pardus, Solus
- **pub und pet**
 - Puppy
- **iPKG**
 - OpenVRT

Linux Package Manager

- **apt-get** Debian, ubuntu, Linux Mint, ...
- **apt** Debian, ubuntu, Linux Mint, ...
- **pacman** Arch Linux
- **yum** Redhat, Fedora
- **yaST** OpenSUSE
- **emerge** Gentoo
- **portage** Gentoo
- **PiSi** Pardus, Solus

Package Manager für Programmierer

- **Pip3** Python Package Manager
- **Npm** Node Package Manager, JavaScript
- **NuGet** C# und Visual Studio
- **Perl Package Manager** Perl

Paketinformationen aktualisieren

- apt update
- Quellen definiert unter:
 - /etc/apt/sources.list
 - /etc/apt/sources.list.d/*
- Welche Pakete gibt es?
- Welche Version ist aktuell?
- Metainformationen
- Unterschiede Auflösen
- Updates installieren

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt update  
[sudo] password for fische11:  
Hit:1 http://archive.ubuntu.com/ubuntu focal InRelease  
Get:2 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]  
Get:3 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]  
Get:4 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [1450 kB]  
Get:5 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]  
Get:6 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1790 kB]  
Get:7 http://security.ubuntu.com/ubuntu focal-security/main Translation-en [249 kB]  
Get:8 http://security.ubuntu.com/ubuntu focal-security/main amd64 c-n-f Metadata [10.2 kB]  
Get:9 http://security.ubuntu.com/ubuntu focal-security/restricted amd64 Packages [911 kB]  
Get:10 http://security.ubuntu.com/ubuntu focal-security/restricted Translation-en [130 kB]  
Get:11 http://security.ubuntu.com/ubuntu focal-security/universe amd64 Packages [702 kB]  
Get:12 http://security.ubuntu.com/ubuntu focal-security/universe Translation-en [125 kB]  
Get:13 http://security.ubuntu.com/ubuntu focal-security/universe amd64 c-n-f Metadata [14.4 kB]  
Get:14 http://archive.ubuntu.com/ubuntu focal-updates/main Translation-en [330 kB]  
Get:15 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 c-n-f Metadata [15.1 kB]  
Get:16 http://archive.ubuntu.com/ubuntu focal-updates/restricted amd64 Packages [975 kB]  
Get:17 http://archive.ubuntu.com/ubuntu focal-updates/restricted Translation-en [139 kB]  
Get:18 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [920 kB]  
Get:19 http://archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [206 kB]  
Get:20 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 c-n-f Metadata [20.6 kB]  
Get:21 http://archive.ubuntu.com/ubuntu focal-backports/main amd64 Packages [42.2 kB]  
Get:22 http://archive.ubuntu.com/ubuntu focal-backports/main Translation-en [10.1 kB]  
Get:23 http://archive.ubuntu.com/ubuntu focal-backports/main amd64 c-n-f Metadata [864 B]  
Get:24 http://archive.ubuntu.com/ubuntu focal-backports/universe amd64 Packages [22.7 kB]  
Get:25 http://archive.ubuntu.com/ubuntu focal-backports/universe amd64 c-n-f Metadata [804 B]  
Fetched 8402 kB in 10s (816 kB/s)  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
32 packages can be upgraded. Run 'apt list --upgradable' to see them.  
fische11@DESKTOP-5MHG39V:~$
```


Programme installieren

- `apt install <Programm>`
- Auflösen benötigter Pakete
- Downloadgröße bestimmen
- Installationsgröße bestimmen
- Pakete herunterladen
- Pakete installieren

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt install gdb  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following package was automatically installed and is no longer required:  
  libfwupdplugin1  
Use 'sudo apt autoremove' to remove it.  
The following additional packages will be installed:  
  gdbserver libbabeltrace1 libc6 libc6-dbg libcc1-0 libdw1  
Suggested packages:  
  gdb-doc glibc-doc  
The following NEW packages will be installed:  
  gdb gdbserver libbabeltrace1 libc6-dbg libcc1-0 libdw1  
The following packages will be upgraded:  
  libc6  
1 upgraded, 6 newly installed, 0 to remove and 31 not upgraded.  
Need to get 26.6 MB of archives.  
After this operation, 42.3 MB of additional disk space will be used.  
Do you want to continue? [Y/n]  
Get:1 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libc6 amd64 2.31-0ubuntu9.9 [2722 kB]  
Get:2 http://archive.ubuntu.com/ubuntu focal/main amd64 libdw1 amd64 0.176-1.1build1 [226 kB]  
Get:3 http://archive.ubuntu.com/ubuntu focal/main amd64 libbabeltrace1 amd64 1.5.8-1build1 [156 kB]  
Get:4 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 gdb amd64 9.2-0ubuntu1~20.04.1 [3222 kB]  
Get:5 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 gdbserver amd64 9.2-0ubuntu1~20.04.1 [22  
2 kB]  
Get:6 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libcc1-0 amd64 10.3.0-1ubuntu1~20.04 [48  
.8 kB]  
Get:7 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 libc6-dbg amd64 2.31-0ubuntu9.9 [20.0 MB  
]  
Fetched 26.6 MB in 15s (1792 kB/s)  
Preconfiguring packages ...  
(Reading database ... 53155 files and directories currently installed.)  
Preparing to unpack .../libc6_2.31-0ubuntu9.9_amd64.deb ...  
Unpacking libc6:amd64 (2.31-0ubuntu9.9) over (2.31-0ubuntu9.7) ...  
Setting up libc6:amd64 (2.31-0ubuntu9.9) ...  
Selecting previously unselected package libdw1:amd64.  
(Reading database ... 53155 files and directories currently installed.)  
Preparing to unpack .../0-libdw1_0.176-1.1build1_amd64.deb ...  
Unpacking libdw1:amd64 (0.176-1.1build1) ...  
Selecting previously unselected package libbabeltrace1:amd64.  
Preparing to unpack .../1-libbabeltrace1_1.5.8-1build1_amd64.deb ...  
Unpacking libbabeltrace1:amd64 (1.5.8-1build1) ...  
Selecting previously unselected package gdb.  
Preparing to unpack .../2-gdb_9.2-0ubuntu1~20.04.1_amd64.deb ...  
Unpacking gdb (9.2-0ubuntu1~20.04.1) ...  
Selecting previously unselected package gdbserver.  
Preparing to unpack .../3-gdbserver_9.2-0ubuntu1~20.04.1_amd64.deb ...  
Unpacking gdbserver (9.2-0ubuntu1~20.04.1) ...  
Selecting previously unselected package libcc1-0:amd64.
```

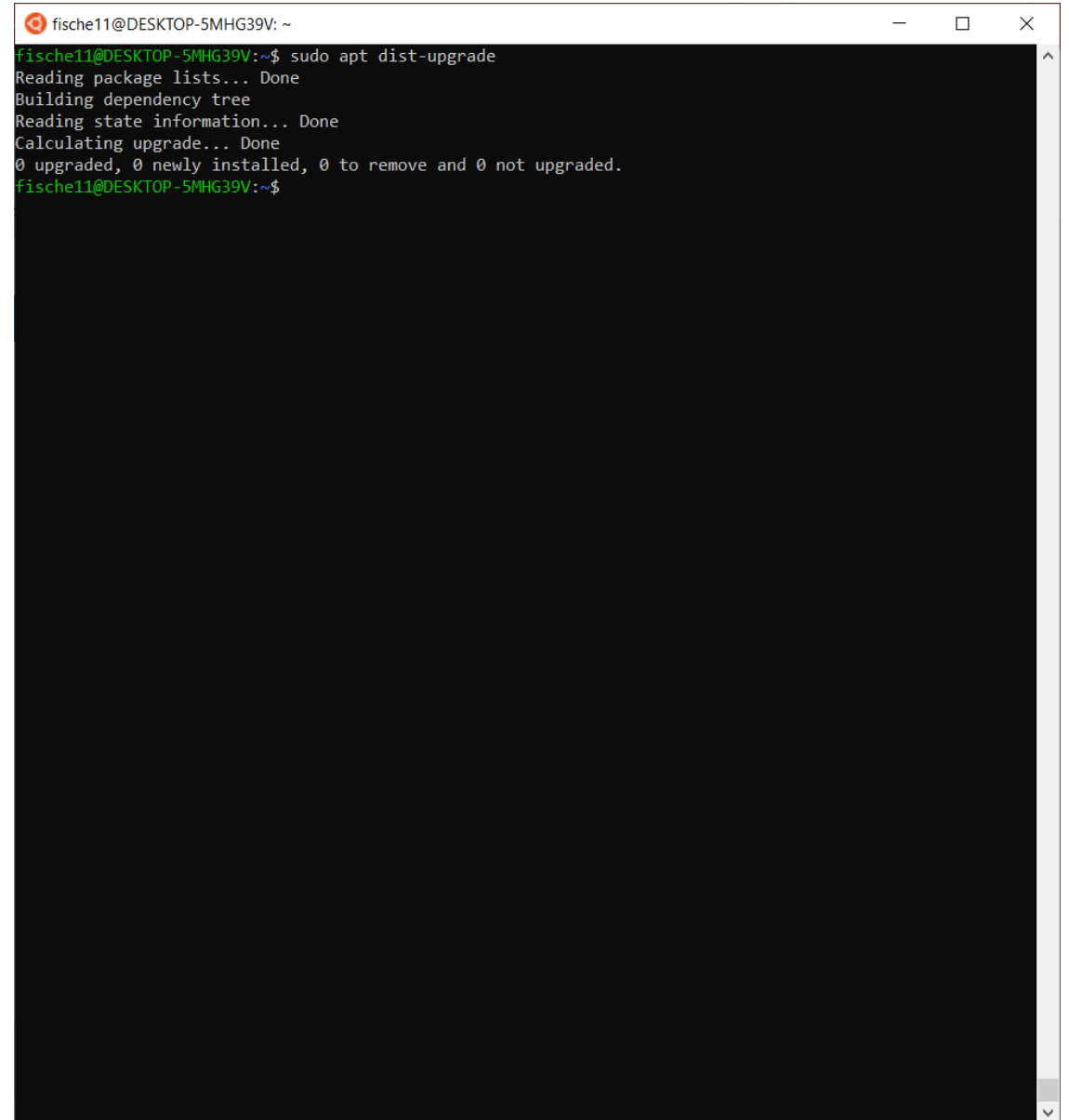
Programme aktualisieren

- apt upgrade
- Auflösen benötigter Pakete
- Downloadgröße bestimmen
- Installationsgröße bestimmen
- Pakete herunterladen
- Pakete installieren
- Meist kein Neustart notwendig

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt upgrade  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Calculating upgrade... Done  
The following package was automatically installed and is no longer required:  
  libfwupdplugin1  
Use 'sudo apt autoremove' to remove it.  
The following packages will be upgraded:  
  curl dbus dbus-user-session dbus-x11 libc-bin libcurl3-gnutls libcurl4 libdbus-1-3 libnss-systemd  
  libnss3 libpam-systemd libsensors-config libsensors5 libsqlite3-0 libssl1.1 libsystemd0 libtiff5  
  libudev1 locales networkd-dispatcher openssh-client openssh-server openssh-sftp-server openssl  
  rsyslog sbsigntool snapd systemd systemd-sysv systemd-timesyncd udev  
31 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.  
14 standard security updates  
Need to get 51.1 MB of archives.  
After this operation, 45.1 kB of additional disk space will be used.  
Do you want to continue? [Y/n]  
Get:1 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 locales all 2.31-0ubuntu9.9 [3869 kB]  
1% [1 locales 570 kB/3869 kB 15%]
```

Programme aktualisieren

- **apt dist-update**
- Wie update
- Neue Pakete werden installiert wenn abhängig
- Kernel-Update
- Aktualisierung auf neue Distributionsversion

A terminal window titled 'fische11@DESKTOP-5MHG39V: ~' showing the execution of the command 'sudo apt dist-upgrade'. The output shows the process of reading package lists, building a dependency tree, reading state information, and calculating the upgrade. The final output indicates that 0 packages were upgraded, 0 were newly installed, 0 were to be removed, and 0 were not upgraded.

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt dist-upgrade  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Calculating upgrade... Done  
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.  
fische11@DESKTOP-5MHG39V:~$
```

Software deinstallieren

- `apt remove <Programm>`
- Auflösen nicht benötigter Pakete
- Gelöschte Dateigröße bestimmen
- Pakete deinstallieren
- Konfiguration bleibt bestehen

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt upgrade  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
Calculating upgrade... Done  
The following package was automatically installed and is no longer required:  
  libfwupdplugin1  
Use 'sudo apt autoremove' to remove it.  
The following packages will be upgraded:  
  curl dbus dbus-user-session dbus-x11 libc-bin libcurl3-gnutls libcurl4 libdbus-1-3 libnss-systemd  
  libnss3 libpam-systemd libsensors-config libsensors5 libsqlite3-0 libssl1.1 libsystemd0 libtiff5  
  libudev1 locales networkd-dispatcher openssh-client openssh-server openssh-sftp-server openssl  
  rsyslog sbsigntool snapd systemd systemd-sysv systemd-timesyncd udev  
31 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.  
14 standard security updates  
Need to get 51.1 MB of archives.  
After this operation, 45.1 kB of additional disk space will be used.  
Do you want to continue? [Y/n]  
Get:1 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 locales all 2.31-0ubuntu9.9 [3869 kB]  
1% [1 locales 570 kB/3869 kB 15%]
```

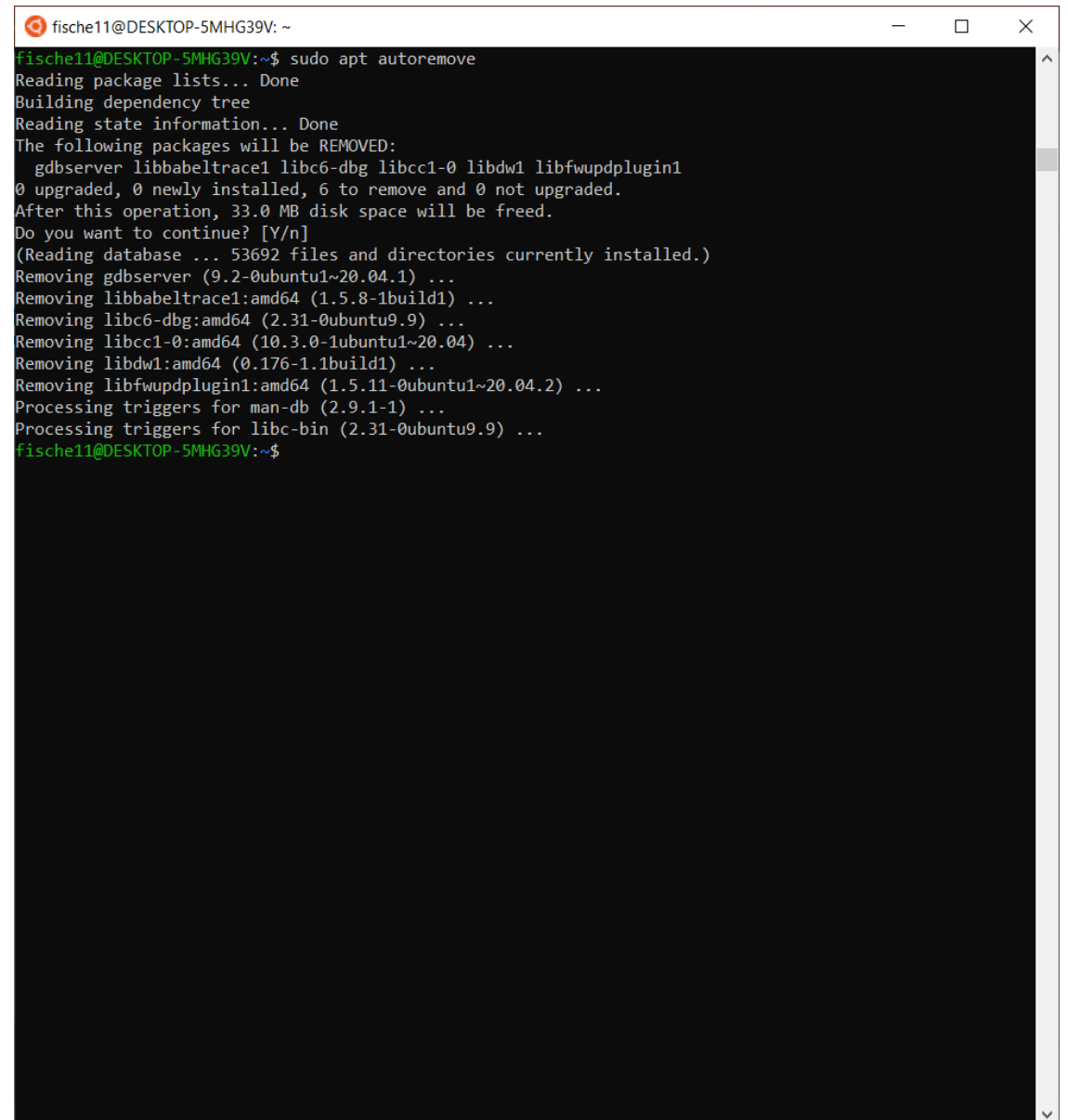
Software deinstallieren

- `apt purge <Programm>`
- Wie `remove`
- Konfiguration wird gelöscht

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt purge gdb  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
  gdbserver libbabeltrace1 libc6-dbg libcc1-0 libdw1 libfwupdplugin1  
Use 'sudo apt autoremove' to remove them.  
The following packages will be REMOVED:  
  gdb*  
0 upgraded, 0 newly installed, 1 to remove and 0 not upgraded.  
After this operation, 9761 kB disk space will be freed.  
Do you want to continue? [Y/n]  
(Reading database ... 53772 files and directories currently installed.)  
Removing gdb (9.2-0ubuntu1~20.04.1) ...  
Processing triggers for man-db (2.9.1-1) ...  
(Reading database ... 53694 files and directories currently installed.)  
Purging configuration files for gdb (9.2-0ubuntu1~20.04.1) ...  
fische11@DESKTOP-5MHG39V:~$
```

Software deinstallieren

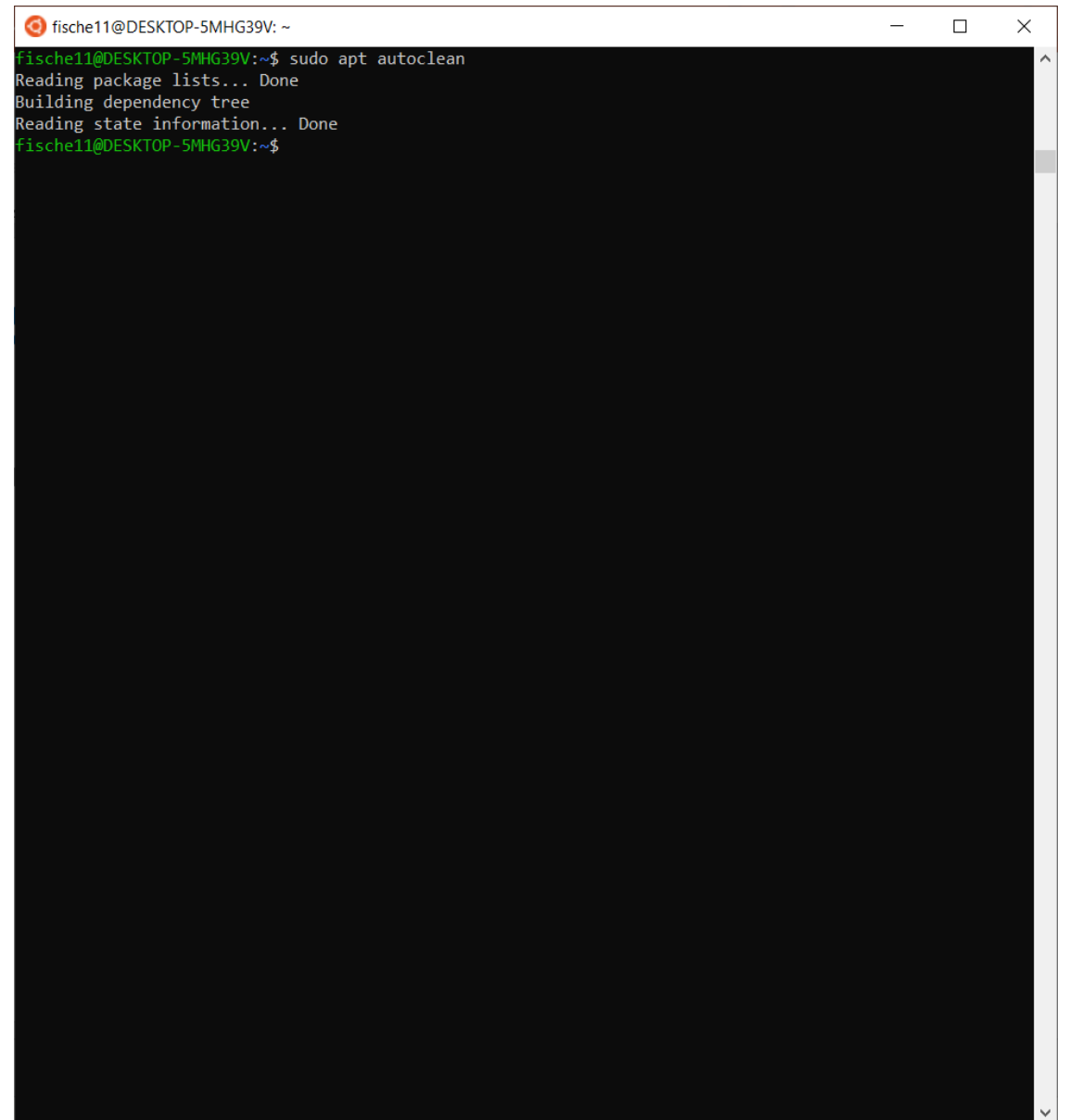
- **apt autoremove**
- Löschen automatisch installierter Pakete
- Auflistung von Paketen ohne lokale Abhängigkeit (Pakete ohne Verwendung)
- Gelöschte Dateigröße bestimmen
- Pakete deinstallieren
- Konfiguration bleibt bestehen



```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt autoremove  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages will be REMOVED:  
  gdbserver libbabeltrace1 libc6-dbg libcc1-0 libdw1 libfwupdplugin1  
0 upgraded, 0 newly installed, 6 to remove and 0 not upgraded.  
After this operation, 33.0 MB disk space will be freed.  
Do you want to continue? [Y/n]  
(Reading database ... 53692 files and directories currently installed.)  
Removing gdbserver (9.2-0ubuntu1~20.04.1) ...  
Removing libbabeltrace1:amd64 (1.5.8-1build1) ...  
Removing libc6-dbg:amd64 (2.31-0ubuntu9.9) ...  
Removing libcc1-0:amd64 (10.3.0-1ubuntu1~20.04) ...  
Removing libdw1:amd64 (0.176-1.1build1) ...  
Removing libfwupdplugin1:amd64 (1.5.11-0ubuntu1~20.04.2) ...  
Processing triggers for man-db (2.9.1-1) ...  
Processing triggers for libc-bin (2.31-0ubuntu9.9) ...  
fische11@DESKTOP-5MHG39V:~$
```

Software deinstallieren

- **apt autoclean**
- Auflösen von nicht gelisteten Paketen
- Pakete deinstallieren
- Meist benutzt zum entfernen alter Linux-Kernel

A terminal window titled 'fische11@DESKTOP-5MHG39V: ~' with standard window controls. The terminal output shows the command 'sudo apt autoclean' being executed. The output consists of four lines: 'Reading package lists... Done', 'Building dependency tree', 'Reading state information... Done', and a final prompt 'fische11@DESKTOP-5MHG39V:~\$'.

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt autoclean  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
fische11@DESKTOP-5MHG39V:~$
```

Software auflisten

- `apt list`
- `apt list <Programm>`
- Bekannte Pakete
- Lokaler Speicher
- Liste aktualisieren mit:
 - `apt update`

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt list gdb -a  
Listing... Done  
gdb/focal-updates 9.2-0ubuntu1~20.04.1 amd64  
gdb/focal 9.1-0ubuntu1 amd64  
  
fische11@DESKTOP-5MHG39V:~$ sudo apt list | nl -b a -n ln | tail -n 1 | cut -d \ -f 1  
  
WARNING: apt does not have a stable CLI interface. Use with caution in scripts.  
  
72090  
fische11@DESKTOP-5MHG39V:~$ sudo apt list  
Display all 72089 possibilities? (y or n)  
fische11@DESKTOP-5MHG39V:~$ sudo apt list sha*  
Listing... Done  
shade-inventory/focal 1.31.0-0ubuntu1 all  
shadowsocks-libev/focal 3.3.4+ds-2 amd64  
shairport-sync/focal 3.3.5-1build1 amd64  
shake/focal 1.0.2-1 all  
shanty/focal 3-4 all  
shapeit4-example/focal 4.1+dfsg-1build1 all  
shapeit4/focal 4.1+dfsg-1build1 amd64  
shapelib/focal 1.5.0-1build1 amd64  
shapetools-tutorial/focal 1.3-5 all  
shapetools/focal 1.4p16-14 amd64  
shared-mime-info/focal,now 1.15-1 amd64 [installed,automatic]  
sharness/focal 1.0.0-1 all  
sharutils-doc/focal 1:4.15.2-4build1 all  
sharutils/focal 1:4.15.2-4build1 amd64  
shatag/focal 0.5.0-3 all  
fische11@DESKTOP-5MHG39V:~$
```


Softwaredetails anzeigen

- `apt show <Programm>`
- Metadaten anzeigen
 - Programmierer
 - Webseite
 - Version
 - Größe
 - Abhängigkeiten
 - Beschreibung
 - Paketspeicherort (Quelle)
- `-a` alle Versionen anzeigen

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt show gdb -a  
Package: gdb  
Version: 9.2-0ubuntu1~20.04.1  
Priority: optional  
Section: devel  
Origin: Ubuntu  
Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>  
Original-Maintainer: Héctor Orón Martínez <zumbi@debian.org>  
Bugs: https://bugs.launchpad.net/ubuntu/+filebug  
Installed-Size: 9761 kB  
Provides: gdb-minimal (= 9.2-0ubuntu1~20.04.1)  
Depends: libbabeltrace1 (>= 1.5.4), libc6 (>= 2.29), libexpat1 (>= 2.0.1), libgcc-s1 (>= 3.0), liblzma5 (>= 5.1.1alpha+20110809), libmpfr6 (>= 3.1.3), libncursesw6 (>= 6), libpython3.8 (>= 3.8.2), libreadline8 (>= 8), libstdc++6 (>= 7), libtinfo6 (>= 6), zlib1g (>= 1:1.2.0)  
Recommends: libc-dbg, libcc1-0, gdbserver  
Suggests: gdb-doc  
Conflicts: gdb  
Replaces: gdb, gdb-doc (<< 7.8-1~)  
Homepage: http://www.gnu.org/s/gdb/  
Task: ubuntu-desktop-minimal, ubuntu-desktop, kubuntu-desktop, xubuntu-desktop, ubuntu-studio-desktop, ubuntu-kylin-desktop, ubuntu-mate-core, ubuntu-mate-desktop, ubuntu-budgie-desktop  
Download-Size: 3222 kB  
APT-Sources: http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages  
Description: GNU Debugger  
GDB is a source-level debugger, capable of breaking programs at any specific line, displaying variable values, and determining where errors occurred. Currently, gdb supports C, C++, D, Objective-C, Fortran, Java, OpenCL C, Pascal, assembly, Modula-2, Go, and Ada. A must-have for any serious programmer.  
  
Package: gdb  
Version: 9.1-0ubuntu1  
Priority: optional  
Section: devel  
Origin: Ubuntu  
Maintainer: Ubuntu Developers <ubuntu-devel-discuss@lists.ubuntu.com>  
Original-Maintainer: Héctor Orón Martínez <zumbi@debian.org>  
Bugs: https://bugs.launchpad.net/ubuntu/+filebug  
Installed-Size: 9759 kB  
Provides: gdb-minimal (= 9.1-0ubuntu1)  
Depends: libbabeltrace1 (>= 1.5.4), libc6 (>= 2.29), libexpat1 (>= 2.0.1), libgcc-s1 (>= 3.0), liblzma5 (>= 5.1.1alpha+20110809), libmpfr6 (>= 3.1.3), libncursesw6 (>= 6), libpython3.8 (>= 3.8.0~a1), libreadline8 (>= 8), libstdc++6 (>= 7), libtinfo6 (>= 6), zlib1g (>= 1:1.2.0)  
Recommends: libc-dbg, libcc1-0, gdbserver  
Suggests: gdb-doc  
Conflicts: gdb  
Replaces: gdb, gdb-doc (<< 7.8-1~)  
Homepage: http://www.gnu.org/s/gdb/  
Task: ubuntu-desktop-minimal, ubuntu-desktop, kubuntu-desktop, xubuntu-desktop, ubuntu-studio-desktop, ub
```

Weitere Repositories hinzufügen

- Repositories aufgelistet in
 - `/etc/apt/sources.list`
 - `/etc/apt/sources.list.d/*`
- manuell einschreiben
- `add-apt-repository <Repository>`
- Infos von Softwarehersteller
- **Wichtig!**
 - Importierung des öffentlichen Schlüssels (public key) zur Integritätsprüfung.
 - `apt-key`

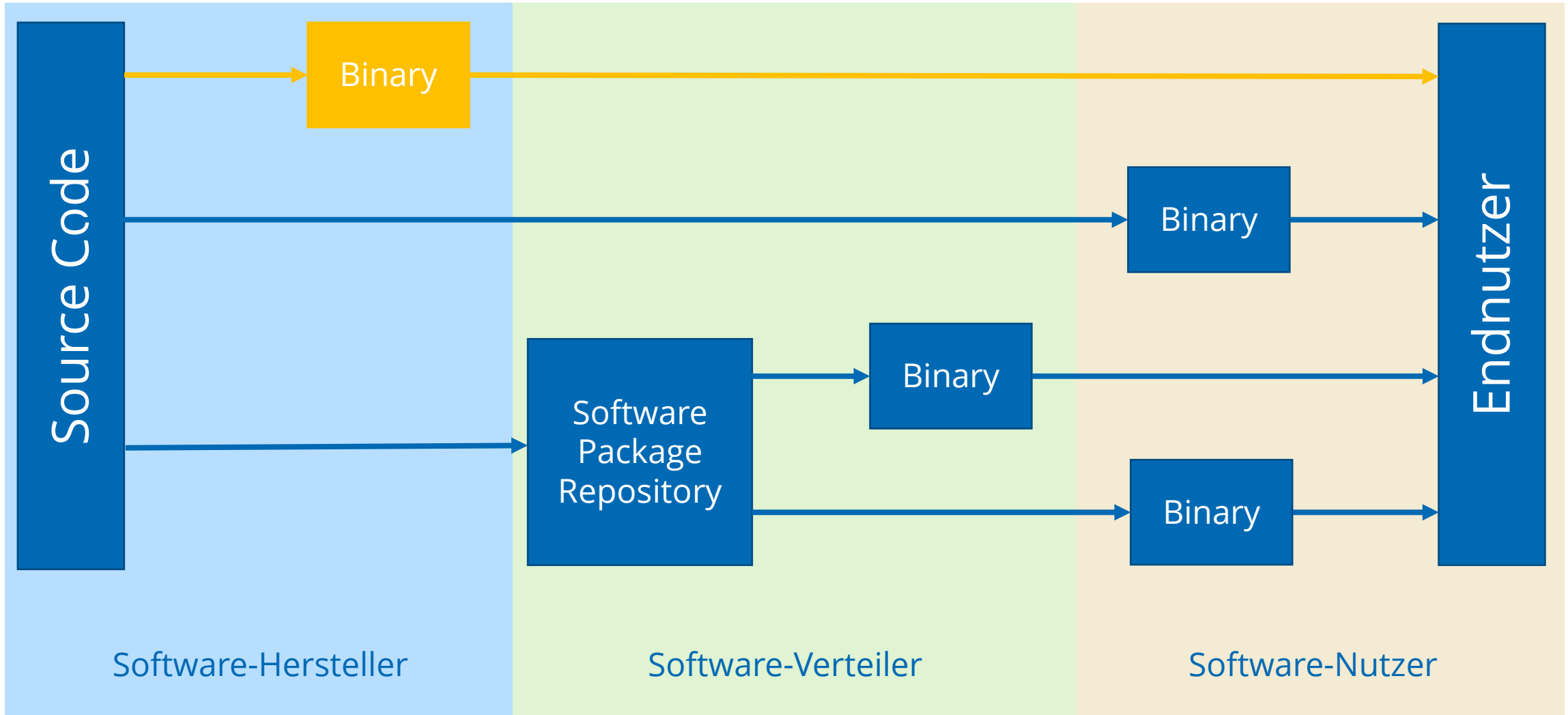
```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ sudo apt-key adv --keyserver hkp://keyserver.ubuntu.com:80 --recv 9DA3162033  
4BD75D9DCB49F368818C72E52529D4  
Executing: /tmp/apt-key-gpghome.YFUc9JFM36/gpg.1.sh --keyserver hkp://keyserver.ubuntu.com:80 --recv 9DA  
31620334BD75D9DCB49F368818C72E52529D4  
gpg: key 68818C72E52529D4: public key "MongoDB 4.0 Release Signing Key <packaging@mongodb.com>" imported  
gpg: Total number processed: 1  
gpg:          imported: 1  
fische11@DESKTOP-5MHG39V:~$ sudo add-apt-repository 'deb [arch=amd64] https://repo.mongodb.org/apt/ubuntu  
bionic/mongodb-org/4.0 multiverse'  
Ign:1 https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0 InRelease  
Get:2 https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0 Release [2989 B]  
Get:3 https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0 Release.gpg [801 B]  
Hit:4 http://archive.ubuntu.com/ubuntu focal InRelease  
Get:5 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]  
Get:6 http://archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]  
Get:7 https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0/multiverse amd64 Packages [18.4 kB]  
Get:8 http://security.ubuntu.com/ubuntu focal-security/main amd64 Packages [1451 kB]  
Get:9 http://archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]  
Get:10 http://archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1790 kB]  
Get:11 http://archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [921 kB]  
Fetched 4519 kB in 2s (2736 kB/s)  
Reading package lists... Done  
fische11@DESKTOP-5MHG39V:~$ cat /etc/apt/sources.list | head -n 20  
# See http://help.ubuntu.com/community/UpgradeNotes for how to upgrade to  
# newer versions of the distribution.  
deb http://archive.ubuntu.com/ubuntu/ focal main restricted  
# deb-src http://archive.ubuntu.com/ubuntu/ focal main restricted  
  
## Major bug fix updates produced after the final release of the  
## distribution.  
deb http://archive.ubuntu.com/ubuntu/ focal-updates main restricted  
# deb-src http://archive.ubuntu.com/ubuntu/ focal-updates main restricted  
  
## N.B. software from this repository is ENTIRELY UNSUPPORTED by the Ubuntu  
## team. Also, please note that software in universe WILL NOT receive any  
## review or updates from the Ubuntu security team.  
deb http://archive.ubuntu.com/ubuntu/ focal universe  
# deb-src http://archive.ubuntu.com/ubuntu/ focal universe  
deb http://archive.ubuntu.com/ubuntu/ focal-updates universe  
# deb-src http://archive.ubuntu.com/ubuntu/ focal-updates universe  
  
## N.B. software from this repository is ENTIRELY UNSUPPORTED by the Ubuntu  
## team, and may not be under a free licence. Please satisfy yourself as to  
fische11@DESKTOP-5MHG39V:~$ cat /etc/apt/sources.list | tail -n 2  
deb [arch=amd64] https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0 multiverse  
# deb-src [arch=amd64] https://repo.mongodb.org/apt/ubuntu bionic/mongodb-org/4.0 multiverse  
fische11@DESKTOP-5MHG39V:~$
```

Softwareverwaltung mit Skripts

- Vorbereiten eines Arbeitsplatzes
 - `apt update -y`
 - `apt install -y <Programm1> <Programm2> <Programm3> ...`
- Installation von Software automatisieren
- Erweiterbar mit hauseigenen Repositories
- Automatisierte Aktualisierung
- Skript in Cron-Dienst hinterlegt
 - `apt update -y`
 - `apt upgrade -y`
 - `apt dist-upgrade -y`
 - `apt autoremove -y`
 - `apt autoclean -y`
- Automatisierte Softwareupdates
- unattended-upgrades
 - Automatisierte Updates über apt

Binaries

Binaries



Binary

- Binary, da nicht menschenlesbar
- Ausführbares Programm
- Funktionsweise nicht überprüfbar
- Vollständiges Vertrauen in den Hersteller
- Updateprozess für jedes Programm einzeln
- Format: AppImage (frühere Namen: klik, Portable Linux Apps)

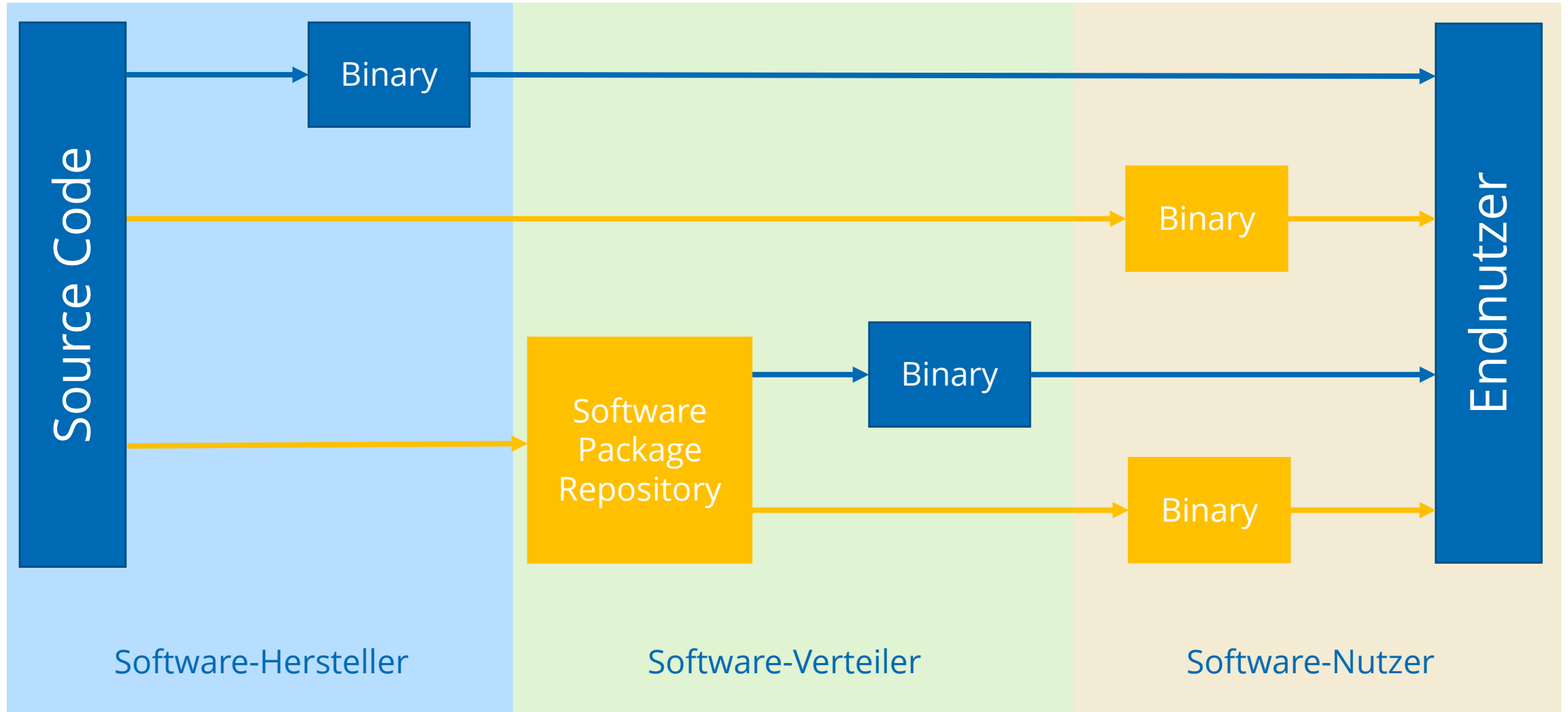
AppImage

- **Ziel:** ähnliche Handhabung wie .exe in Windows
- Programm herunterladen
- Gegebenenfalls ausführbar machen (**chmod a+x <Programm>**)
- Starten über
 - Konsole mit **./<Programm>**
 - Dateimanager mit Doppelklick

→ Alle Abhängigkeiten integriert

Source Code

Source Code



Source Code

- **Source Code = Quelltext** (menschenslesbare Programmanweisungen)
- Übersetzung in maschinenlesbare Anweisungen notwendig
 - Kompilieren (einmalig)
 - Interpretieren (während Ausführung)
- Download
 - Webseite: github, gitlab, Herstellerwebseite, ...
 - git: `git clone <repository>`
 - apt: `apt source <Programm>`
- Installationsanleitung in
 - README.MD
 - INSTALL.MD

Aktualisierung mit Source Code

- Alte Version manuell entfernen
- Source Code erneut herunterladen
- Wenn Code über git-repository geclont:
 - **git pull**
- Erneutes Kompilieren notwendig (Übersetzen in Maschinencode)
- Viel Arbeit
- Wenn möglich Paketmanager verwenden

Diensteverwaltung

Hintergrunddienste (Deamons)

- Verwaltung mit Befehl: **service**
 - status – aktuellen Status auslesen
 - start – Service starten
 - stop – Service anhalten
 - reload – Service zum Auslesen der Konfiguration auffordern
 - restart – Service Neustarten

- Bekannte Dienste:
 - Cron
 - Apache2
 - docker

```
fische11@DESKTOP-5MHG39V: ~  
fische11@DESKTOP-5MHG39V:~$ service cron status  
* cron is not running  
fische11@DESKTOP-5MHG39V:~$ service cron reload  
* Reloading configuration files for periodic command scheduler cron [ OK ]  
fische11@DESKTOP-5MHG39V:~$ service cron restart  
* Restarting periodic command scheduler cron  
* Stopping periodic command scheduler cron [ OK ]  
* Starting periodic command scheduler cron  
cron: can't open or create /var/run/crond.pid: Permission denied [ fail ]  
fische11@DESKTOP-5MHG39V:~$ sudo service cron restart  
[sudo] password for fische11:  
* Restarting periodic command scheduler cron  
* Stopping periodic command scheduler cron [ OK ]  
* Starting periodic command scheduler cron [ OK ]  
fische11@DESKTOP-5MHG39V:~$ sudo service --status-all  
[ - ] apparmor  
[ ? ] apport  
[ - ] atd  
[ - ] console-setup.sh  
[ + ] cron  
[ ? ] cryptdisks  
[ ? ] cryptdisks-early  
[ - ] dbus  
[ ? ] hwclock.sh  
[ + ] irqbalance  
[ - ] iscsid  
[ - ] keyboard-setup.sh  
[ ? ] kmod  
[ - ] lvm2  
[ - ] lvm2-lvmpolld  
[ - ] multipath-tools  
[ + ] open-iscsi  
[ - ] open-vm-tools  
[ ? ] plymouth  
[ ? ] plymouth-log  
[ - ] procps  
[ - ] pulseaudio-enable-autospawn  
[ - ] rsync  
[ - ] rsyslog  
[ - ] screen-cleanup  
[ ? ] speech-dispatcher  
[ - ] ssh  
[ ? ] ubuntu-fan  
[ - ] udev  
[ - ] ufw  
[ - ] unattended-upgrades  
[ - ] uuid  
[ - ] x11-common
```

Zusammenfassung

Zusammenfassung

Sie kennen nun verschiedene Möglichkeiten **Software unter Linux zu installieren**. Insbesondere wurde ein besonderes Augenmerk auf die Verwendung von **Paketmanagern** gerichtet.

Hier wurde am Beispiel des Paketmanagers **apt** die Installation, Aktualisierung und Deinstallation von Programmen erläutert.

Als Alternativen zum Paketmanager wurden **Binaries** über das **AppImage**-Format und selbstkomprimierte Programme aus Source Code.

Am Ende lernten Sie, wie laufende **Hintergrunddienste** unter Linux mit dem service-Befehl verwaltet werden.



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