archlinux™

A simple, lightweight distribution

Kyle Suero
@KST123ABC

The Arch History

- Inspired by CRUX/BSD - Minimalism
  - Only officially support x86_64
- Initially released March 11, 2002 by Judd Vinet
  - Arch is an angsty teen! Almost 16. Wow.
  - Now maintained by Aaron Griffin and The Arch Community

The Arch Philosophy

- KISS - Keep It Simple, Stupid
- Be Versatile - Suits any role
- Stay Bleeding Edge - Offer latest stable package versions
- Pragmatism over Ideology - Design Decisions made on case-by-case basis
  - Developer consensus, evidence based analysis, debate

Focus on Simplicity, Minimalism, Code Correctness, Elegance

The Arch Design/Principles

Relying on complex tools to manage and build your system is going to hurt the end users. [...] "If you try to hide the complexity of the system, you'll end up with a more complex system". Layers of abstraction that serve to hide internals are never a good thing. Instead, the internals should be designed in a way such that they NEED no hiding. — Aaron Griffin (Phrakture)

- Focuses on creating an environment that is straightforward and relatively easy for the user to understand directly. No polishing point-and-click style management tools.
    - Clean configs
    - No official package manager front-end
- For "Intermediate and advanced Linux users who aren't afraid of the command line"

The Arch Difference

- Package manager
  - Pacman
- Rolling Release Model
  - Regular system updates ensure latest software. Keeps patching to a minimum(see code correctness)
- ArchWiki/Community/AUR
- Minimal installation images released by the team
  - Latest main system components

The Arch Package Manager

- **Pacman** was created for Arch
  - Antergos
  - Manjaro
- Easter Egg
  - ILoveCandy
- Signed packages is default

The Arch Package Manager

- **Pacman**
  - Core - Everything needed to set up base system
  - Extra - DEs, Programs, etc not necessary for base system
  - Community - Build/Voted on by community
    - ↑ Votes & Trusted User Adoption
  - Multilib - repo to support 32-bit apps in 64-bit env
- Testing repos
  - Testing - Core + Extra
  - Community-Testing
  - Multilib-testing

The Arch Release Model

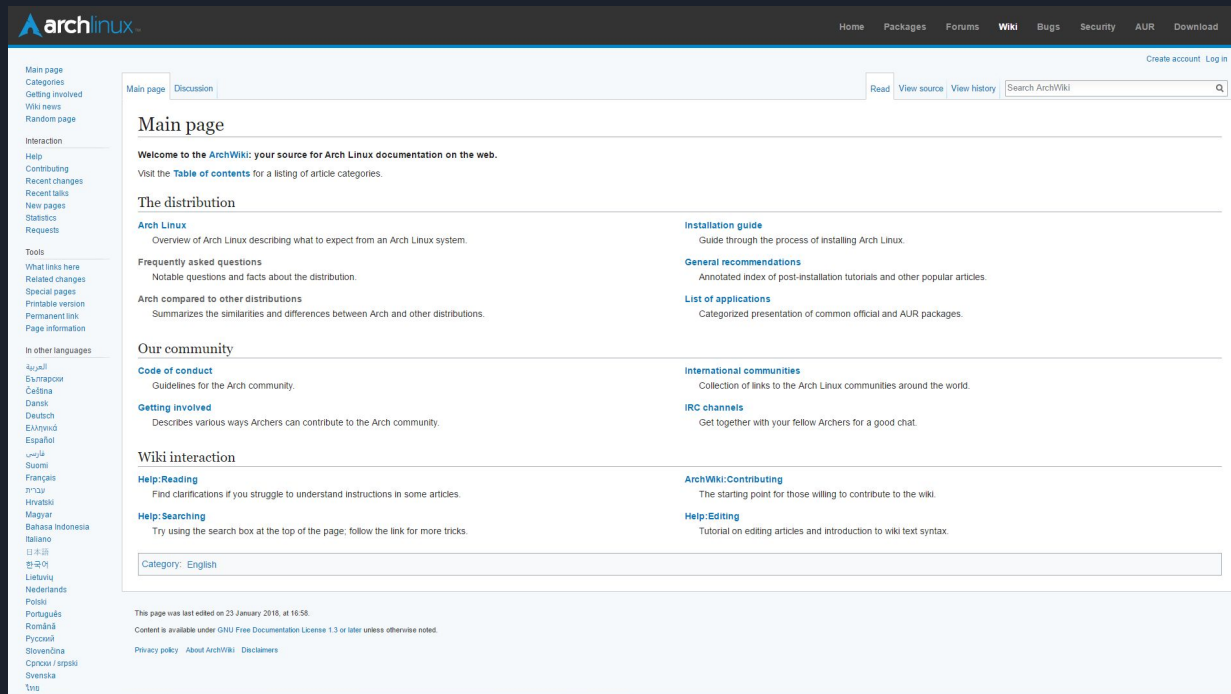- Rolling Releases
  - Gentoo, Manjaro, Sid, Solus, Void
- Release Based
  - Debian/Ubuntu, Fedora,
- Packages are available quickly after upstream releases
- Gentoo builds packages from source
  - Very customizable
- Arch builds packages using the ABS(Arch Build System)
  - Ports-like system for building packages from source
    - Src tarballs -> Binary -> pacman
  - Quicker/easier to build/update

The Arch Wiki

- ## Comprehensive
- ## Most recent information on specific topics
- ## Applicable beyond arch linux
- ## Lots of examples and bug reports

The Arch Wiki

Fonts

> **Tip:** If you set the *Scaling factor* to a value above 1.00, the Accessibility menu will be automatically enabled.

Fonts can be set for Window titles, Interface (applications), Documents and Monospace. See the Fonts tab in the Tweak Tool for the relevant options.

For hinting, RGBA will likely be desired as this fits most monitors types, and if fonts appear too blocked reduce hinting to *Slight* or *None*.

Startup applications

To start certain applications on login, copy the relevant `.desktop` file from `/usr/share/applications/` to `~/.config/autostart/`.

The `gnome-tweak-tool` allows managing autostart-entries.

> **Tip:** If the plus sign button in the Tweak Tool's Startup Applications section is unresponsive, try start the Tweak Tool from the terminal using the following command: `gnome-tweak-tool`

> **Note:** The deprecated *gnome-session-properties* dialog can be added by **installing** the `gnome-session-properties`[AUR] package.

Power

When you are using a laptop you might want to alter the following settings:

```
$ gsettings set org.gnome.settings-daemon.plugins.power sleep-inactive-ac-timeout 3600
$ gsettings set org.gnome.settings-daemon.plugins.power sleep-inactive-ac-type hibernate
$ gsettings set org.gnome.settings-daemon.plugins.power sleep-inactive-battery-timeout 1800
$ gsettings set org.gnome.settings-daemon.plugins.power sleep-inactive-battery-type hibernate
$ gsettings set org.gnome.settings-daemon.plugins.power power-button-action suspend
$ gsettings set org.gnome.desktop.lockdown disable-lock-screen true
```

The Arch Wiki

- "Most Comprehensive Distribution Wiki"
  - End-user knowledge base
  - Learn new programs
  - See example configs
- Other distros - Classic definition of Wiki
  - Issue tracker
  - Corporate wiki

https://i.imgur.com/Hokk8sK.jpg

1. CORE INSTALLATION

- boot Arch ISO & be online

BIOS / MBR

- create a single partition and mark it bootable
  ```
  cfdisk /dev/sda
  ```
- build ext4 filesystem on it
  ```
  mkfs.ext4 /dev/sda1
  ```
- mount the new partition
  ```
  mount /dev/sda1 /mnt
  ```

UEFI / GPT

- create 512M partition, Type: EFI system
  create second partition for the rest
  ```
  cfdisk /dev/sda
  ```
- build FAT32 on 512MB one
  ```
  mkfs.fat -F32 /dev/sda1
  ```
- build ext4 on the other
  ```
  mkfs.ext4 /dev/sda2
  ```
- mount the large ext4 partition
  ```
  mount /dev/sda2 /mnt
  ```
- create directory boot on it
  ```
  mkdir /mnt/boot
  ```
- mount 512MB one in to boot
  ```
  mount /dev/sda1 /mnt/boot
  ```

- (optional) set geographicly close mirror top
  ```
  nano /etc/pacman.d/mirrorlist
  ```
- install the base system
  ```
  pacstrap /mnt base base-devel
  ```
- generate fstab
  ```
  genfstab -U /mnt > /mnt/etc/fstab
  ```
- chroot in to the new system
  ```
  arch-chroot /mnt
  ```

BIOS / MBR

- install and configure GRUB
  ```
  pacman -S grub os-prober
  grub-install --recheck /dev/sda
  grub-mkconfig -o /boot/grub/grub.cfg
  ```

UEFI / GPT

- install systemd bootloader
  ```
  bootctl install
  ```
- create new boot entry
  ```
  nano /boot/loader/entries/arch.conf
      title     Arch Linux
      linux     /vmlinuz-linux
      initrd    /initramfs-linux.img
      options   root=/dev/sda2 rw
  ```
- set the defaut entry
  ```
  nano /boot/loader/loader.conf
      timeout 3
      default arch
  ```

- remove the bootable media, restart PC
  ```
  exit
  reboot
  ```

2. BASIC SETTINGS

- login as root
- set password for root
  ```
  passwd
  ```
- set hostname
  ```
  echo Whatever > /etc/hostname
  ```
- add new user & set password
  ```
  useradd -m -G wheel bastard
  passwd bastard
  ```
- edit sudoers to allow new user to sudo
  ```
  EDITOR=nano visudo
      ## Uncomment to allow members of group..
      %wheel ALL=(ALL) ALL
  ```
- check the name of your network interface
  ```
  ip link
  ```
- enable aquiring dynamic IP
  ```
  systemctl enable dhcpcd@enp0s3.service
  systemctl start dhcpcd@enp0s3.service
  ```
- uncomment desired locales in locale.gen
  ```
  nano /etc/locale.gen
  ```
- generate new locales & set one system wide
  ```
  locale-gen
  localectl set-locale LANG=en_US.UTF-8
  ```
- select timezone and set it permanent
  ```
  tzselect
  timedatectl set-timezone 'Europe/Berlin'
  ```
- set hardware clock and sync using ntp
  ```
  hwclock --systohc --utc
  timedatectl set-ntp true
  ```
- setup a swap file if RAM < 2GB
  ```
  fallocate -l 2G /swapfile
  chmod 600 /swapfile
  mkswap /swapfile
  nano /etc/fstab
      /swapfile none swap defaults 0 0
  nano /etc/sysctl.d/99-sysctl.conf
      vm.swappiness=10
  ```
- enable color and x86 repo in pacman.conf
  ```
  nano /etc/pacman.conf
      # Misc options
      Color
      [multilib]
      Include = /etc/pacman.d/mirrorlist
  ```
- synchronize repositories and reboot
  ```
  pacman -Sy && reboot
  ```

3. DESKTOP ENV.

X.org

- log in as regular user and use sudo
- install the default video driver
  ```
  # pacman -S xf86-video-vesa
  ```
- install OpenGL support
  ```
  # pacman -S mesa
  ```
- install video driver specific for your hardware

Brand	Type		Driver	Multilib
AMD	Open source		xf86-video-amdgpu	lib32-mesa-libgl
			xf86-video-ati	
	Proprietary		catalyst[AUR]	lib32-catalyst-libgl[AUR]
Intel	Open source		xf86-video-intel	lib32-mesa-libgl
Nvidia	Open source		xf86-video-nouveau	lib32-mesa-libgl
	Proprietary		nvidia	lib32-nvidia-libgl
			nvidia-340xx	lib32-nvidia-340xx-libgl
			nvidia-304xx	lib32-nvidia-304xx-libgl

- install Xorg packages
  ```
  # pacman -S xorg-server xorg-utils
               xorg-xinit xterm
  ```

DE

- install desktop enviroment of your choice

DE	Packages	DL size	Inst. Size
Xfce	xfce4, xfce4-goodies	90 MB	400 MB
GNOME	gnome, gnome-extra	550 MB	2 300 MB
KDE	plasma, kde-applications	715 MB	2 760 MB
Cinnamon	cinnamon	150 MB	750 MB
MATE	mate, mate-extra	270 MB	1 120 MB
LXDE	lxde	30 MB	140 MB
LXQt	lxqt	65 MB	360 MB

- Xfce as an example
  ```
  # pacman -S xfce4 xfce4-goodies
  ```
- install & enable login manager LightDM
  ```
  # pacman -S lightdm-gtk-greeter
  # systemctl enable lightdm.service
  ```
- unmute master volume channel
  ```
  $ amixer sset Master unmute
  ```
- reboot PC
  ```
  # reboot
  ```

4. AUR & FONTS

YAOURT

- add archlinuxfr repo to pacman.conf
  ```
  # nano /etc/pacman.conf
      [archlinuxfr]
      SigLevel = Never
      Server = http://repo.archlinux.fr/$arch
  ```
- synchronize repositories databases
  ```
  # pacman -Sy
  ```
- install yaourt to access AUR packages
  ```
  # pacman -S yaourt
  ```

infinality

- initialize pacman keyring and add infinality key
  ```
  # pacman-key --init
  # dirmngr ctrl+c
  # pacman-key -r 962DDE58
  # pacman-key --lsign-key 962DDE58
  ```
- add infinality repos to pacman.conf
  ```
  # nano /etc/pacman.conf
      [infinality-bundle]
      Server = http://bohoomil.com/repo/$arch
      [infinality-bundle-multilib]
      Server = http://bohoomil.com/repo/multilib/$arch
      [infinality-bundle-fonts]
      Server = http://bohoomil.com/repo/fonts
  ```
- synchronize repositories databases
  ```
  # pacman -Sy
  ```
- install infinality fonts packages
  ```
  # pacman -S infinality-bundle
  # pacman -S infinality-bundle-multilib
  # pacman -S ibfonts-meta-base
               ibfonts-meta-extended
  ```
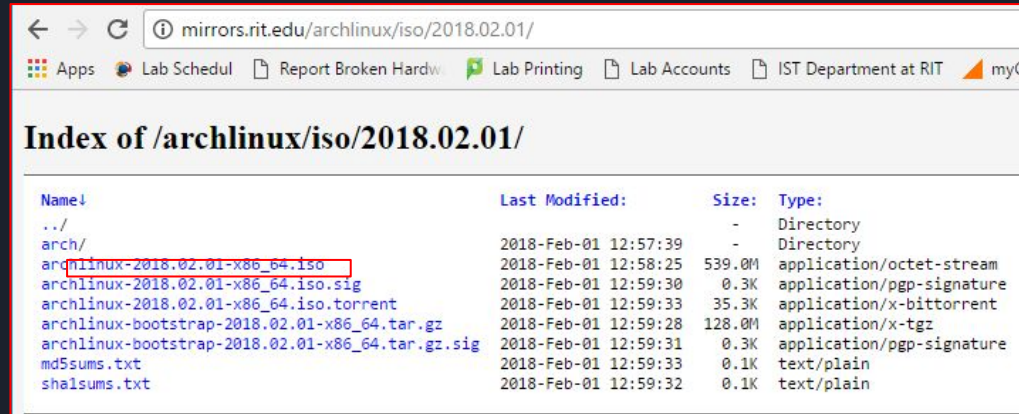
Zsh

- install Zsh package
  ```
  # pacman -S zsh
  ```
- create an empty config file
  ```
  $ touch ~/.zshrc
  ```
- install Prezto framework from AUR
  ```
  $ yaourt prezto-git
  ```
- change your shell to Z shell
  and make sure your terminal supports unicode
  ```
  $ chsh -s /bin/zsh
  ```
- log out and log back in for the effect

2015-12-26

The Arch Install Process

- https://wiki.archlinux.org/index.php/installation_guide
- USB, Server Mount & Client Boot, Chroot, VM, Dual Boot Win
- archlinux.org/download
  - University Mirrors
  - Torrents

Index of /archlinux/iso/2018.02.01/

Name↓	Last Modified:	Size:	Type:
../		-	Directory
arch/	2018-Feb-01 12:57:39	-	Directory
archlinux-2018.02.01-x86_64.iso	2018-Feb-01 12:58:25	539.0M	application/octet-stream
archlinux-2018.02.01-x86_64.iso.sig	2018-Feb-01 12:59:30	0.3K	application/pgp-signature
archlinux-2018.02.01-x86_64.iso.torrent	2018-Feb-01 12:59:33	35.3K	application/x-bittorrent
archlinux-bootstrap-2018.02.01-x86_64.tar.gz	2018-Feb-01 12:59:28	128.0M	application/x-tgz
archlinux-bootstrap-2018.02.01-x86_64.tar.gz.sig	2018-Feb-01 12:59:31	0.3K	application/pgp-signature
md5sums.txt	2018-Feb-01 12:59:33	0.1K	text/plain
sha1sums.txt	2018-Feb-01 12:59:32	0.1K	text/plain

The Arch Install Process

- ## USB Install
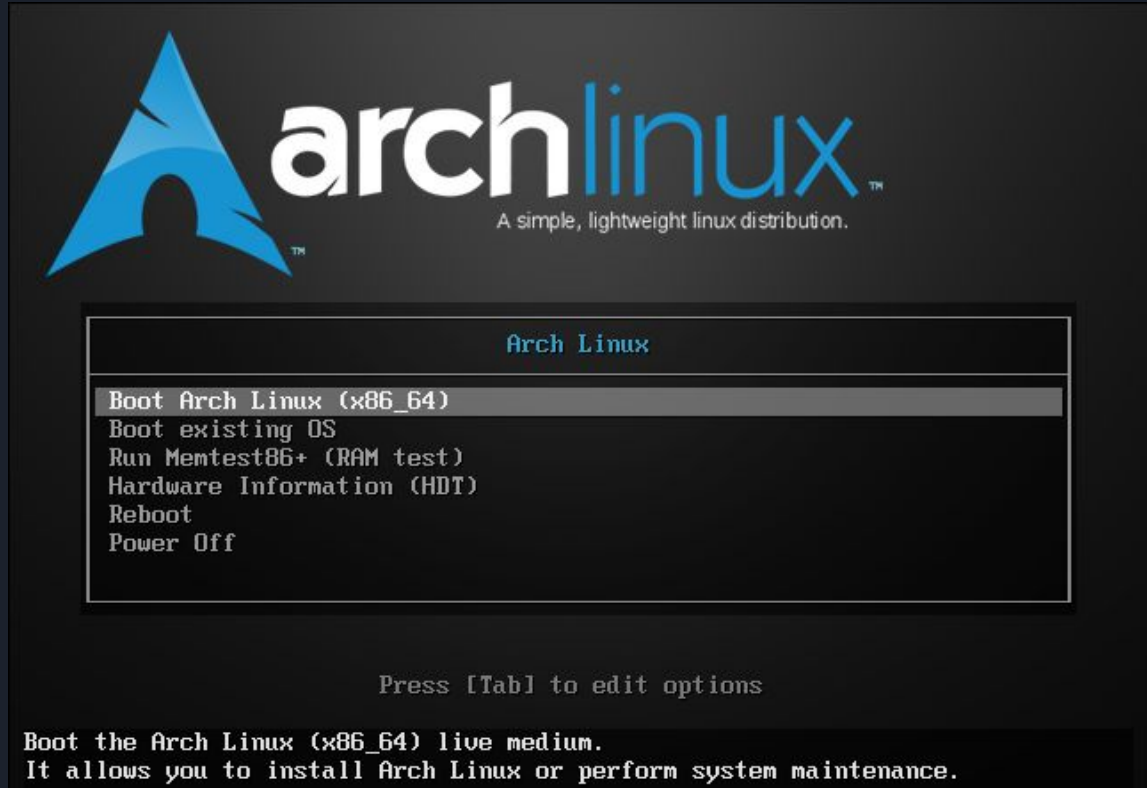 - https://wiki.archlinux.org/index.php/USB_flash_installation_media
  - $ dd bs=4M if=/path/to/archlinux.iso of=/dev/sdx status=progress oflag=sync

The Arch Install Process

Boot into Arch Linux!

The Arch Install Process

- **https://wiki.archlinux.org/index.php/Wireless_network_configuration**
- **https://wiki.archlinux.org/index.php/Network_configuration#Device_driver**
- **Nano, vi, vim**

First Boot

- Update system clock
  - # timedatectl set-ntp true
- Partition disks
  - fdisk -l, lsblk
  - fdisk /dev/sda, parted /dev/sda
- Needed partitions
  - /
  - EFI System partition
- Encrypt disks, LVM, RAID, swap, other partitions

```
Partition type
   p    primary (0 primary, 0 extended, 4 free)
   e    extended (container for logical partitions)
Select (default p): p
Partition number (1-4, default 1):
First sector (2048-209715199, default 2048):
Last sector, +sectors or +size{K,M,G,T,P} (2048-209715199, default 209715199):

Created a new partition 1 of type 'Linux' and of size 100 GiB.

Command (m for help): w
The partition table has been altered.
Calling ioctl() to re-read partition table.
Syncing disks.

root@archiso ~ #
```

Format Partitions

\#   mkfs.ext4 /dev/sda1

\#   mkswap /dev/sda3

   \#   Swapon /dev/sda3

\#   mount /dev/sda1 /mnt

\#   mkdir /mnt/boot

   \#   mount /dev/sda2 /mnt/boot

\#   lsblk

```
root@archiso ~ # mkfs.ext4 /dev/sda1
mke2fs 1.43.8 (1-Jan-2018)
Creating filesystem with 26214144 4k blocks and 6553600 inodes
Filesystem UUID: 954bbd8f-fc00-45b4-96ed-04396c61f1cd
Superblock backups stored on blocks:
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
        4096000, 7962624, 11239424, 20480000, 23887872

Allocating group tables: done
Writing inode tables: done
Creating journal (131072 blocks): done
Writing superblocks and filesystem accounting information: done
```

Mirrors/Pacstrap

- Packages are downloaded from mirror servers

    # vim /etc/pacman.d/mirrorlist

- Sorted by sync status and speed at time of image creation

```
## United States
Server = http://mirrors.rit.edu/archlinux/$repo/os/$arch
```

- Install base package group

    # pacstrap /mnt base

        ○ base-devel

```
##
## Arch Linux repository mirrorlist
## Filtered by mirror score from mirror status page
## Generated on 2018-02-01
##

## China
Server = http://mirrors.xjtu.edu.cn/archlinux/$repo/os/$arch
## Canada
Server = http://mirror.its.dal.ca/archlinux/$repo/os/$arch
## Belgium
Server = http://archlinux.cu.be/$repo/os/$arch
## Brazil
Server = http://br.mirror.archlinux-br.org/$repo/os/$arch
## Italy
Server = http://archlinux.students.cs.unibo.it/$repo/os/$arch
## United States
Server = http://mirror.umd.edu/archlinux/$repo/os/$arch
## Singapore
Server = http://mirror.0x.sg/archlinux/$repo/os/$arch
## Serbia
Server = http://mirror.pmf.kg.ac.rs/archlinux/$repo/os/$arch
## Germany
Server = http://archlinux.thaller.ws/$repo/os/$arch
## Colombia
Server = http://mirror.venturasystems.tech/archlinux/$repo/os/$arch
## United States
Server = http://www.gtlib.gatech.edu/pub/archlinux/$repo/os/$arch
## New Caledonia
Server = http://mirror.lagoon.nc/pub/archlinux/$repo/os/$arch
## United States
Server = http://mirror.grig.io/archlinux/$repo/os/$arch
## Norway
Server = http://archlinux.uib.no/$repo/os/$arch
## Slovakia
Server = http://tux.rainside.sk/archlinux/$repo/os/$arch
                                                    1,1        Top
```

Configuration

\#   genfstab -U /mnt >> /mnt/etc/fstab

   \#   cat /mnt/etc/fstab

\#   arch-chroot /mnt

\#   ln -sf /usr/share/zoneinfo/America/New_York

\#   hwclock --systohc

   \#   cat /etc/adjtime

\#   vi /etc/locale.gen "Uncomment `en_US.UTF-8 UTF-8`"

   \#   Locale-gen

\#   echo "LANG=en_US.UTF-8" > /etc/locale.conf

Configuration

\# echo "myhostname" > /etc/hostname

\# passwd

● Read the GRUB wiki page

\# pacman -S grub

  \# grub-install --target=1386-pc /dev/sda `this is boot`

  \# Grub-mkconfig -o /boot/grub/grub.cfg

● Intel CPU?

\# pacman -S intel-ucode

  ○ Enable microcode updates

```
/etc/hosts

127.0.0.1        localhost
::1              localhost
127.0.1.1        myhostname.localdomain    myhostname
```

Configuration (GRUB)

- Extra options:
  - LVM
  - Dual Boot
  - Tips/Tricks
  - RAID
  - Encryption
- GRUB ArchWiki

```
:: Proceed with installation? [Y/n] Y
:: Retrieving packages...
 grub-2:2.02-4-x86_64                     6.0 MiB  54.8M/s 00:00 [########################] 100%
(1/1) checking keys in keyring                                   [########################] 100%
(1/1) checking package integrity                                 [########################] 100%
(1/1) loading package files                                      [########################] 100%
(1/1) checking for file conflicts                                [########################] 100%
(1/1) checking available disk space                             [########################] 100%
:: Processing package changes...
(1/1) installing grub                                            [########################] 100%
Generating grub.cfg.example config file...
This may fail on some machines running a custom kernel.
done.
Optional dependencies for grub
    freetype2: For grub-mkfont usage
    fuse2: For grub-mount usage
    dosfstools: For grub-mkrescue FAT FS and EFI support
    efibootmgr: For grub-install EFI support
    libisoburn: Provides xorriso for generating grub rescue iso using grub-mkrescue
    os-prober: To detect other OSes when generating grub.cfg in BIOS systems
    mtools: For grub-mkrescue FAT FS support
:: Running post-transaction hooks...
(1/2) Arming ConditionNeedsUpdate...
(2/2) Updating the info directory file...
[root@archiso /]# grub-install --target=i386-pc /dev/sda
Installing for i386-pc platform.
Installation finished. No error reported.
[root@archiso /]# grub-mkconfig -o /boot/grub/grub.cfg
Generating grub configuration file ...
Found linux image: /boot/vmlinuz-linux
Found initrd image(s) in /boot: initramfs-linux.img
Found fallback initrd image(s) in /boot: initramfs-linux-fallback.img
done
```

Exit chroot, restart

exit

reboot

```
                  GNU GRUB  version 2.02

┌──────────────────────────────────────────────────────────┐
│*Arch Linux                                               │
│ Advanced options for Arch Linux                          │
│                                                          │
│                                                          │
│                                                          │
│                                                          │
│                                                          │
│                                                          │
│                                                          │
│                                                          │
│                                                          │
└──────────────────────────────────────────────────────────┘

    Use the ↑ and ↓ keys to select which entry is highlighted.
    Press enter to boot the selected OS, `e' to edit the commands
    before booting or `c' for a command-line.
```

WOOOOOOOOOOOOOOOO!!!!!

```
Arch Linux 4.15.4-1-ARCH (tty1)

archlinux login: root
Last login: Fri Feb 23 17:45:16 on tty1
[root@archlinux ~]#
```

What's next?

Unlimited Possibilities

- General Recommendations
  - Desktop Environments
    - Look up your fave on the arch wiki
- List of Applications
  - VPN Clients, Browsers, File Explorers, Torrent Clients, Email Clients, Terminal Emulators, IRC Clients, Remote Desktop Clients, Video Players, Music Players, Image Viewers/Editors, Collection Managers, Partition Managers, Disk Cleaning, Document/Text Editors, Readers/Viewers, Security, Science, Amateur Radio, etc

Pacman Mirrorlist Gen

- archlinux.org/mirrorlist

/etc/pacman.d/mirrorlist

Install Gnome

```
Arch Linux 4.15.4-1-ARCH (tty1)

archlinux login: root
Last login: Fri Feb 23 17:45:16 on tty1
[root@archlinux ~]# pacman -S gnome
:: There are 51 members in group gnome:
:: Repository extra
   1) adwaita-icon-theme  2) baobab  3) eog  4) epiphany  5) evince  6) gdm  7) gnome-backgrounds
   8) gnome-calculator  9) gnome-calendar  10) gnome-color-manager  11) gnome-contacts
   12) gnome-control-center  13) gnome-dictionary  14) gnome-disk-utility  15) gnome-font-viewer
   16) gnome-keyring  17) gnome-logs  18) gnome-screenshot  19) gnome-session
   20) gnome-settings-daemon  21) gnome-shell  22) gnome-shell-extensions  23) gnome-system-monitor
   24) gnome-terminal  25) gnome-themes-standard  26) gnome-user-docs  27) gnome-user-share
   28) grilo-plugins  29) gucharmap  30) gvfs  31) gvfs-afc  32) gvfs-goa  33) gvfs-google
   34) gvfs-gphoto2  35) gvfs-mtp  36) gvfs-nfs  37) gvfs-smb  38) mousetweaks  39) mutter
   40) nautilus  41) networkmanager  42) rygel  43) sushi  44) totem  45) tracker
   46) tracker-miners  47) vino  48) xdg-user-dirs-gtk  49) yelp
:: Repository community
   50) gnome-software  51) simple-scan

Enter a selection (default=all): _
```