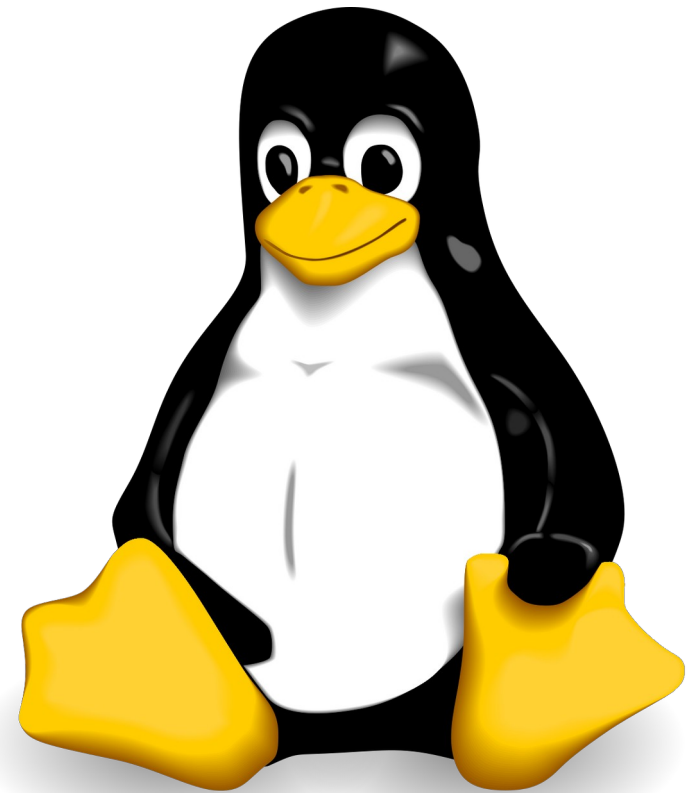


LINUX AS AN OPERATING SYSTEM

Jamison Kagey



Verse of the Day

1 Peter 3:18

18 For Christ also suffered once for sins, the just for the unjust, that He might bring us to God, being put to death in the flesh but made alive by the Spirit,



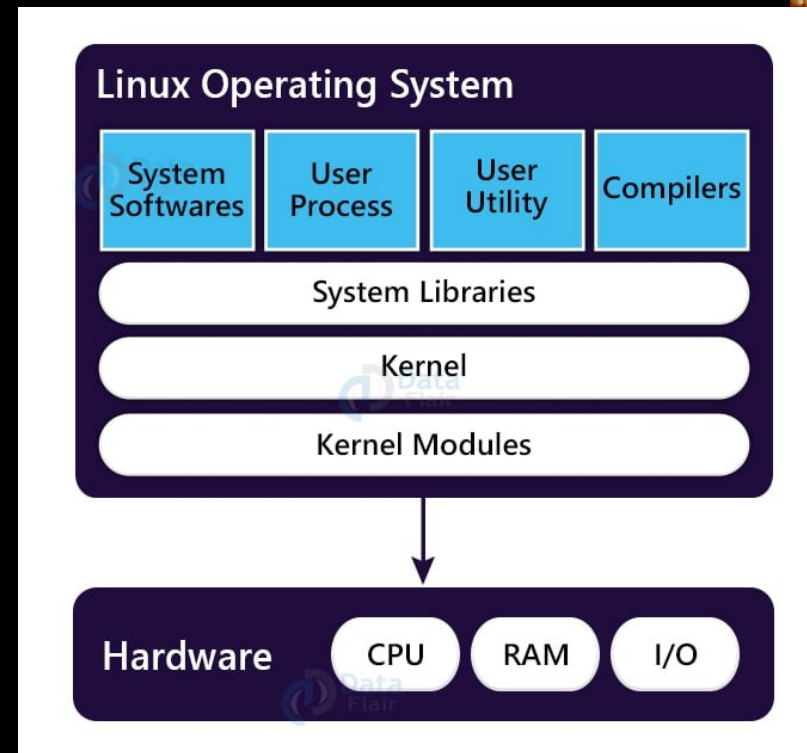
Overview

- The boot process of Linux
 - Different components of a working Linux install
 - Build an Arch ISO
 - Install an Arch ISO in VMWare Player
-

So, what is Linux anyways?

In short, Linux by itself is just a kernel

Normally when people talk about Linux, they mean GNU/Linux, the OS



GNU Linux vs. Windows

LINUX

- Linux is Free Open-Source Software (FOSS)
- Like a manual car
- Wide hardware support
- Extremely stable
- Secure/stable for servers
- Customizable to any extent

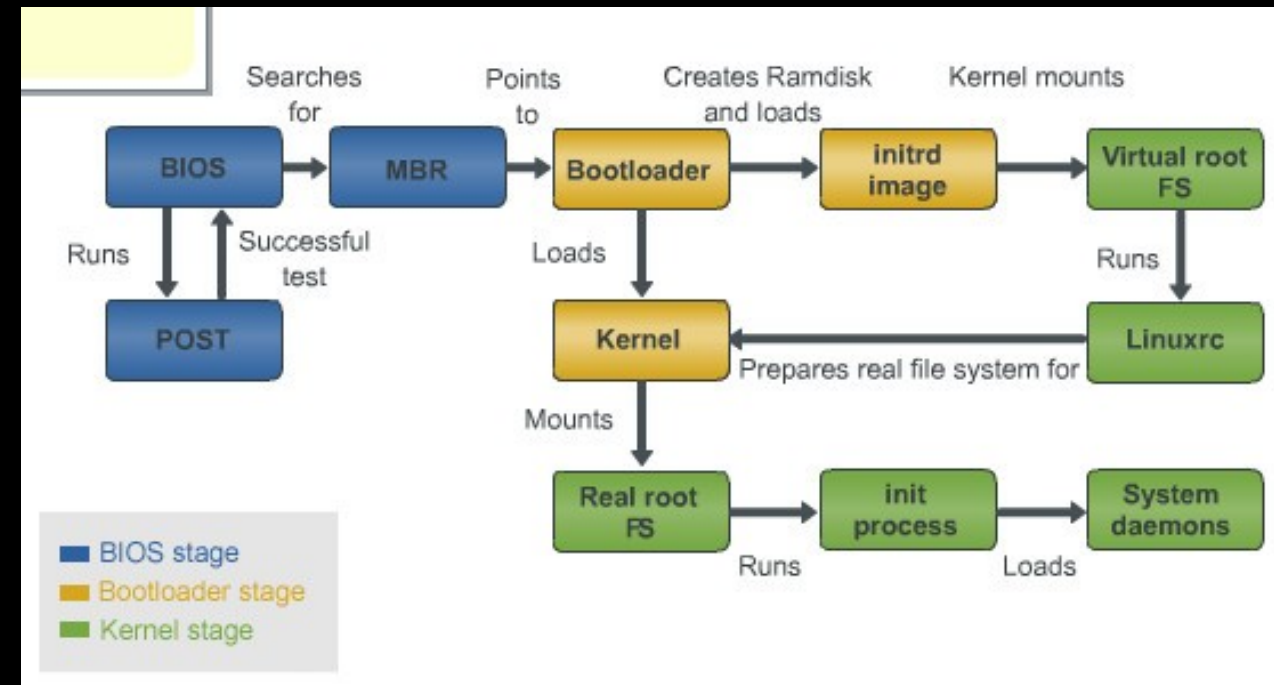


WINDOWS

- Proprietary software made by Microsoft
 - Automatic
 - Wide software support
 - Graphics support (Games, 3D Modelling, Adobe etc.)
 - Generally easy to use
-

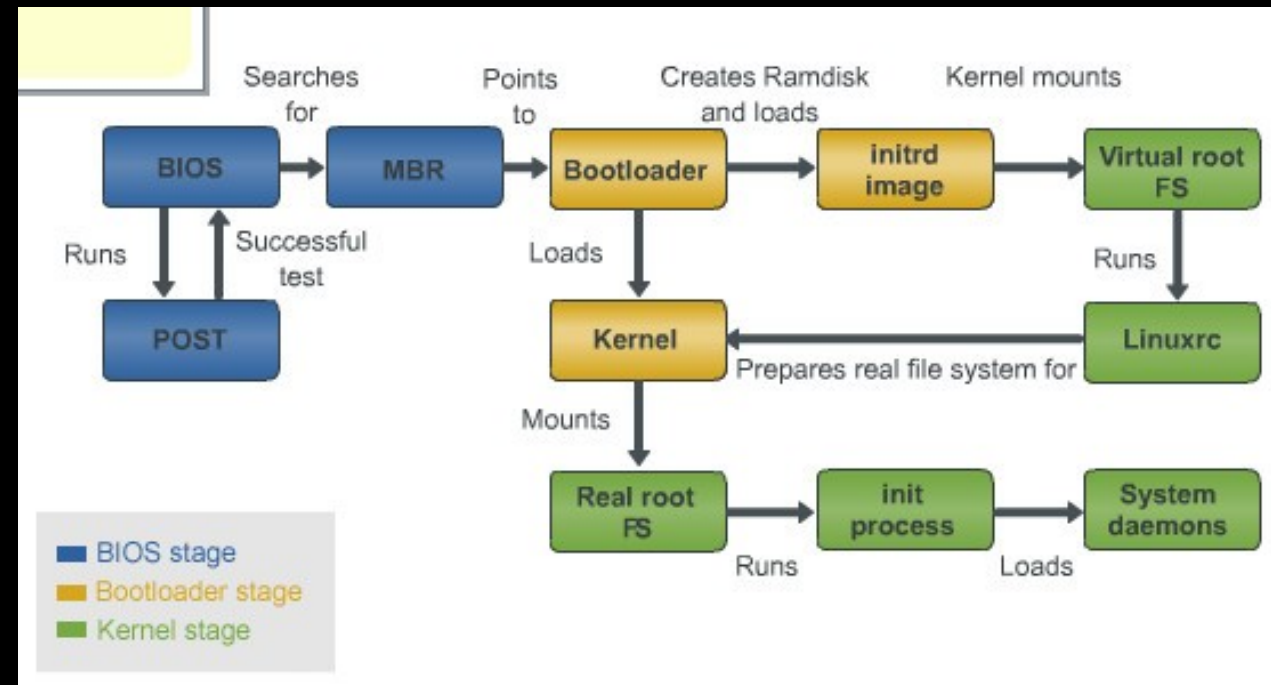
GNU Linux Boot Process (POST)

- Post aka Power On Self Test
- Tests to see what hardware is connected and if it is working properly
- Initializes firmware
- Verifies firmware



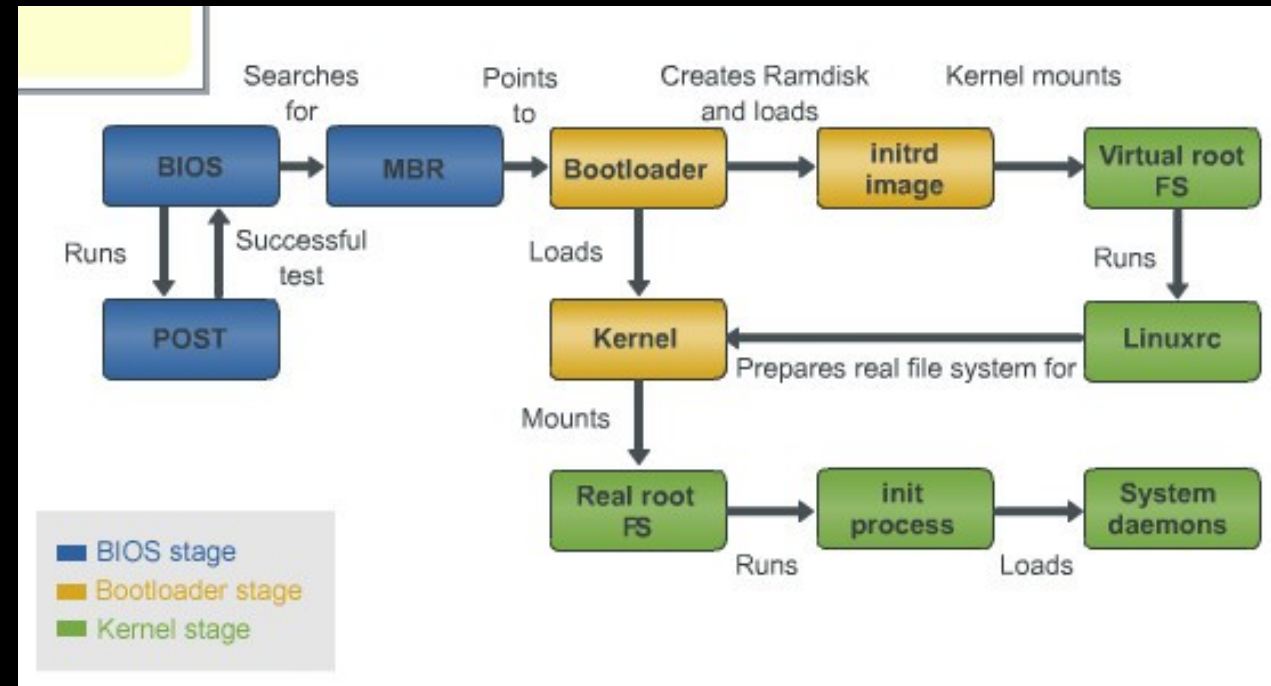
GNU Linux Boot Process (BIOS and MBR)

- Old Legacy standard (last used in 2007)
- Often still used in VMs because it is easy to implement
- Load and execute a specific part of a disk with an MBR partition
- Starts a legacy bootloader to get to an OS



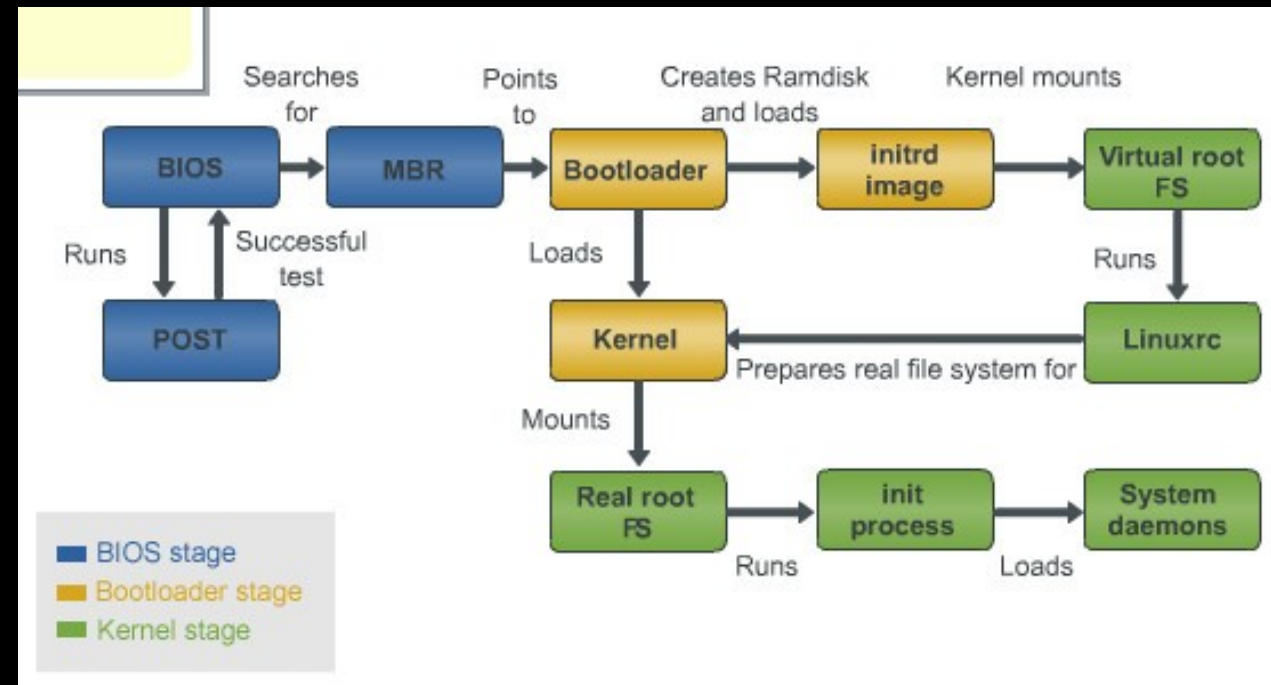
GNU Linux Boot Process (UEFI and GPT)

- Completely different from legacy booting
- Can use CSM to boot like a legacy system if needed
- Has many more components and can 'understand' the bootloaders, partition tables, and operating systems on a device



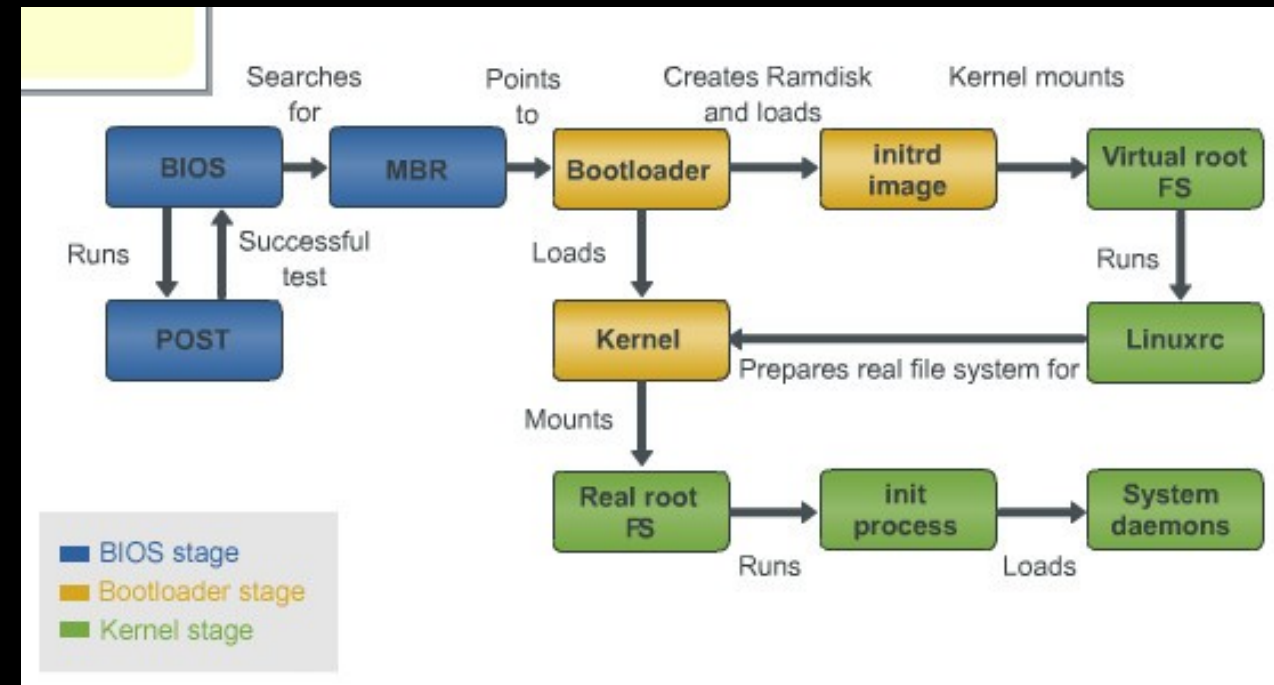
GNU Linux Boot Process (UEFI and GPT) cont..

- Executes EFI (extensible firmware interface) on a FAT partition or dedicated EFI partition
- Much easier to use because it uses standard partitions (GPT disk)
- UEFI can be accessed from the OS, in Linux the efibootmgr tool
- Lists recognized bootable devices with /EFI folder



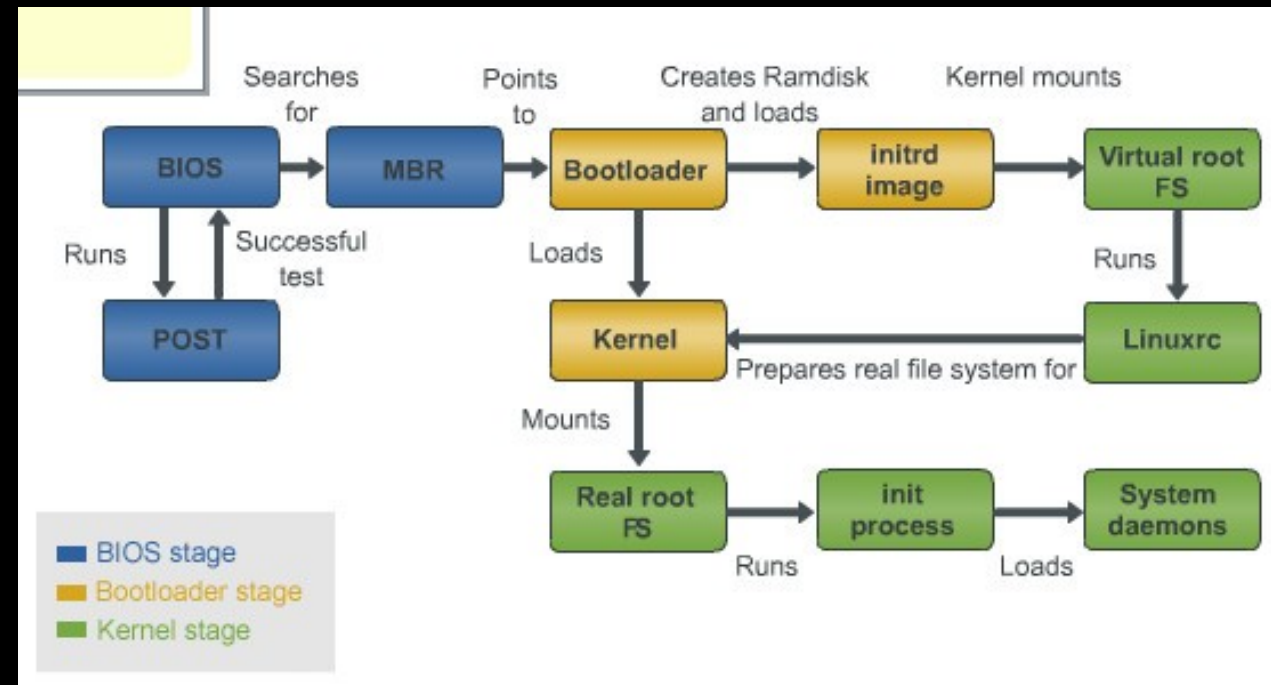
GNU Linux Boot Process (Bootloader)

- Typically GRUB 2.0 (GRand Universal Bootloader)
- Other options are Syslinux and LILO
- Can boot to the Linux kernel which loads OS
- GRUB can also boot to Windows



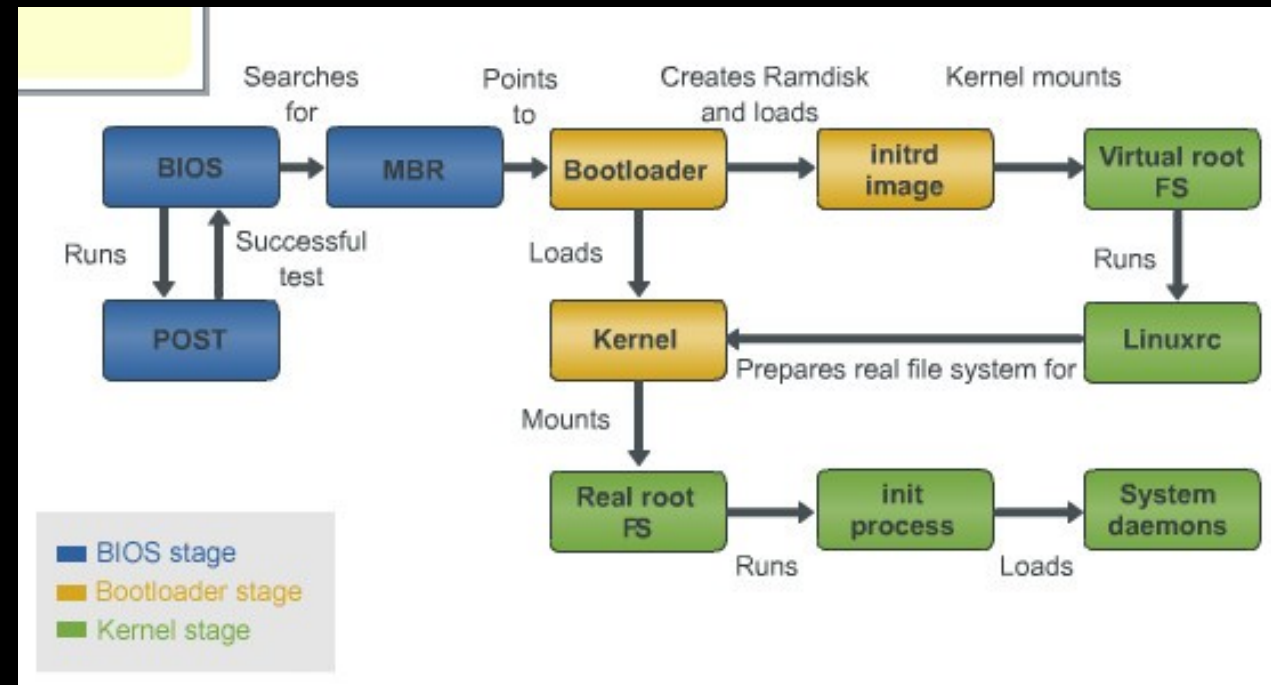
GNU Linux Boot Process (initrd filesystem)

- Initial RAM disk
- Loads RAM disk as root and mounts it
- Moves root filesystem to disk and mounts it
- Removes itself from RAM



GNU Linux Boot Process (initrd filesystem)

- Initial RAM disk
- Done in read only mode
- Loads RAM disk as root and mounts it
- Mounts root filesystem to disk and moves to it
- Loads system devices
- Kernel is initialized
- Removes itself from RAM



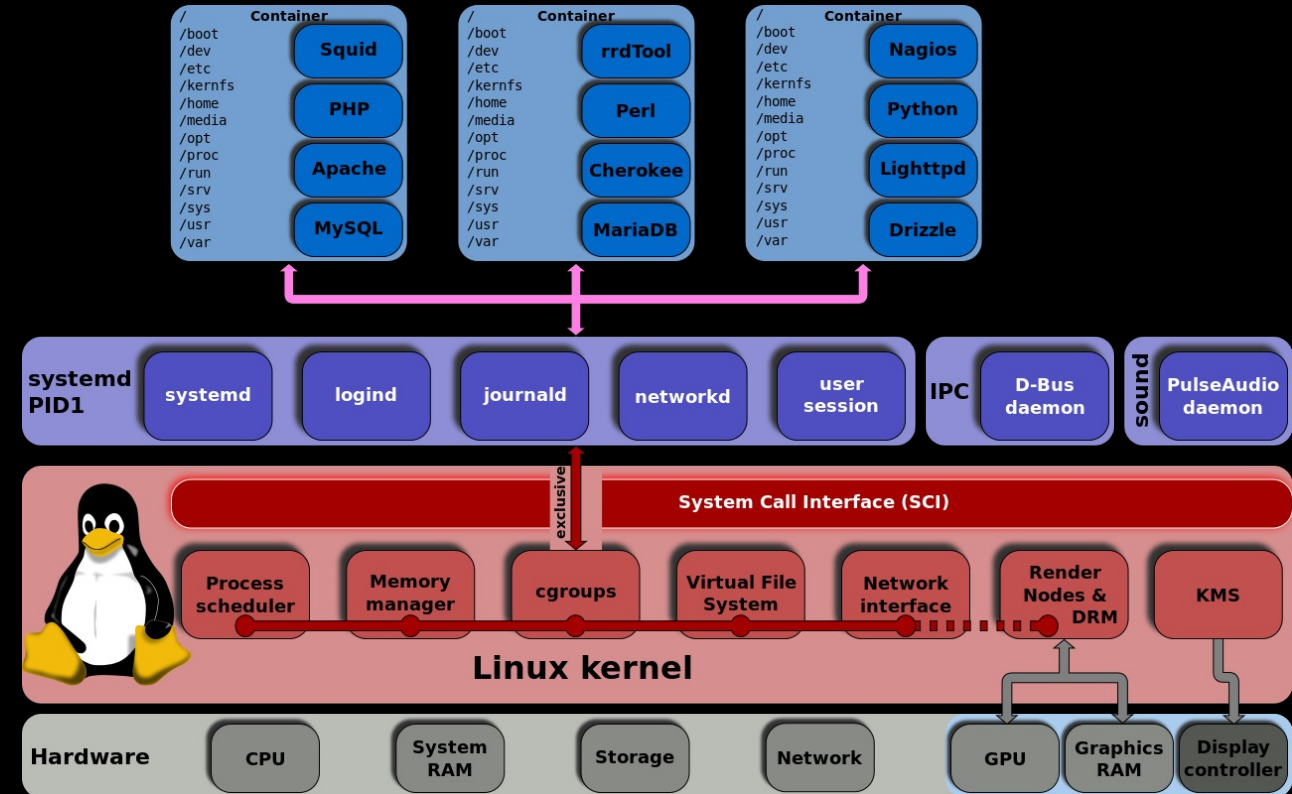
GNU Linux Boot Process (init)

- Init (initialization) is run
- Parent of all Linux processes with PID 1
- Starts processes in /etc/inittab
- Normally runs at Runlevel 5 for GUI (display manager) and Runlevel 3 for no GUI

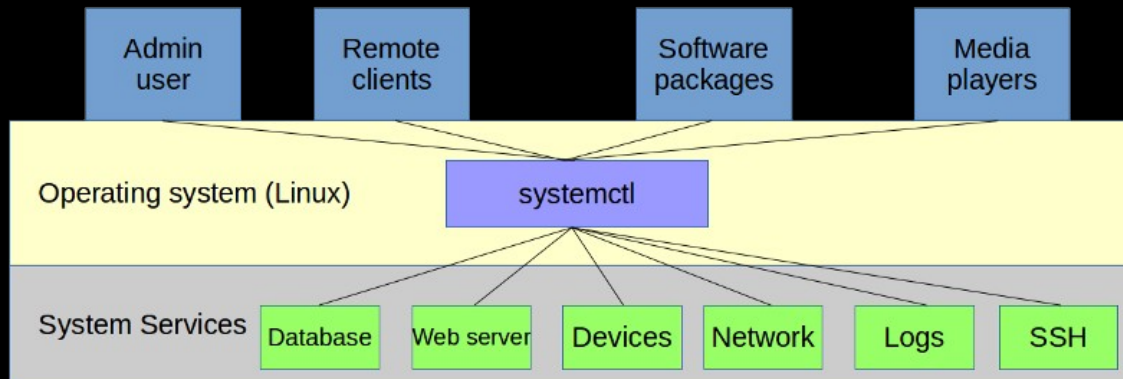
Runlevel	Mode	Action
0	Halt	Shuts down system
1	Single-User Mode	Does not configure network interfaces, start daemons, or allow non-root logins
2	Multi-User Mode	Does not configure network interfaces or start daemons.
3	Multi-User Mode with Networking	Starts the system normally.
4	Undefined	Not used/User-definable
5	X11	As runlevel 3 + display manager(X)
6	Reboot	Reboots the system

SYSTEMD

- The default init process for most Linux based Oses
- Starts all daemons (background processes necessary to run)



Systemd

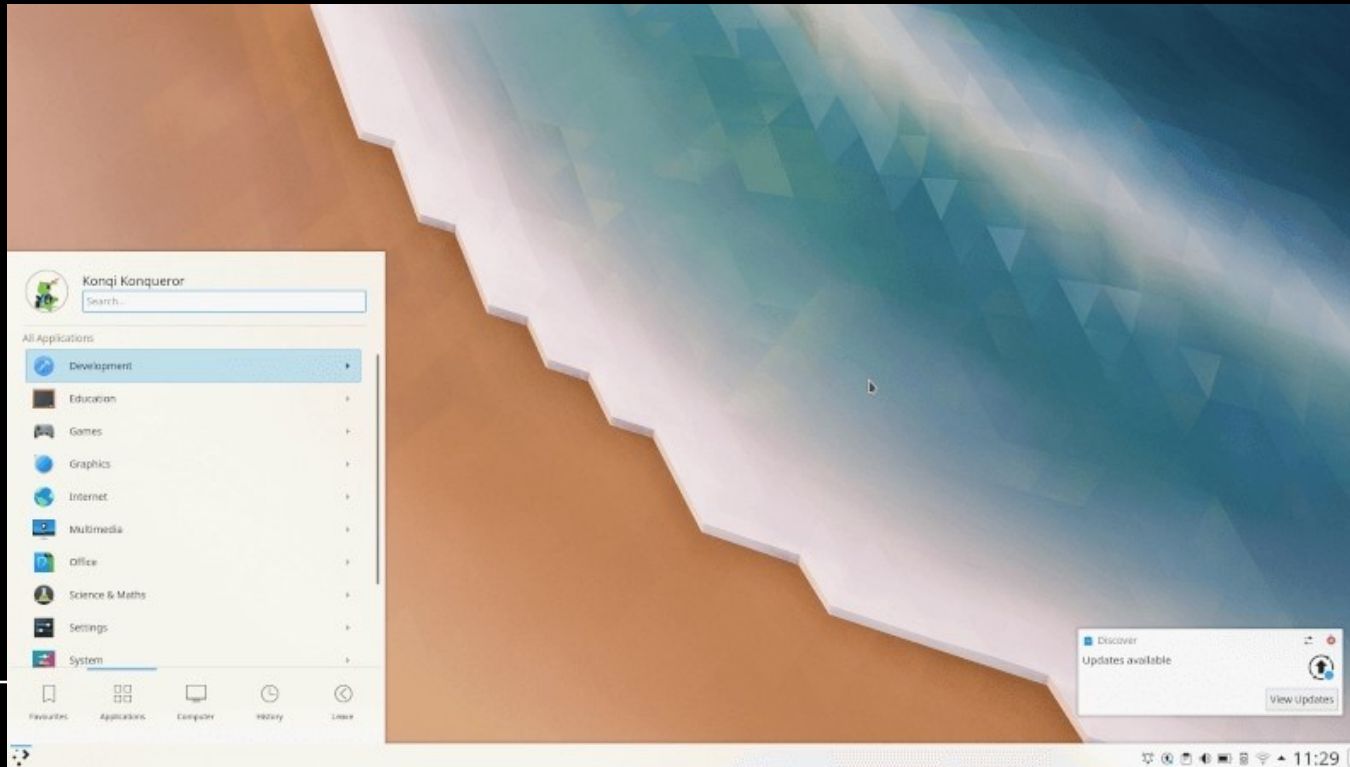


- Starts and stops system process services called units
- systemctl can manage these units and view their status
- Must be run as root user
- systemctl list-units = lists all of the currently active units

Desktop Environment

- The GUI of an OS
- Desktop Environments have their own navigation systems with their own look, feel, and performance

- Popular Desktop Environments:
 - KDE
 - LXDE
 - GNOME
 - XFCE
 - Cinnamon
 - MATE
 - LXQt

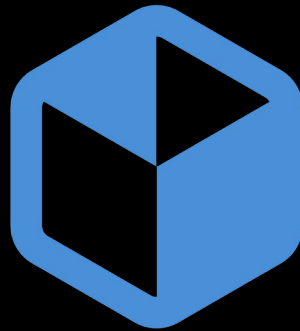


Package Managers

- The easiest way to install programs and manage them
 - Solve most dependency issues
 - Update through repositories online
- 3 Most Popular Package Managers
 1. apt – Debian based
 2. pacman – Arch based
 3. dnf – Red Hat (improved version of yum)



Other Package Types



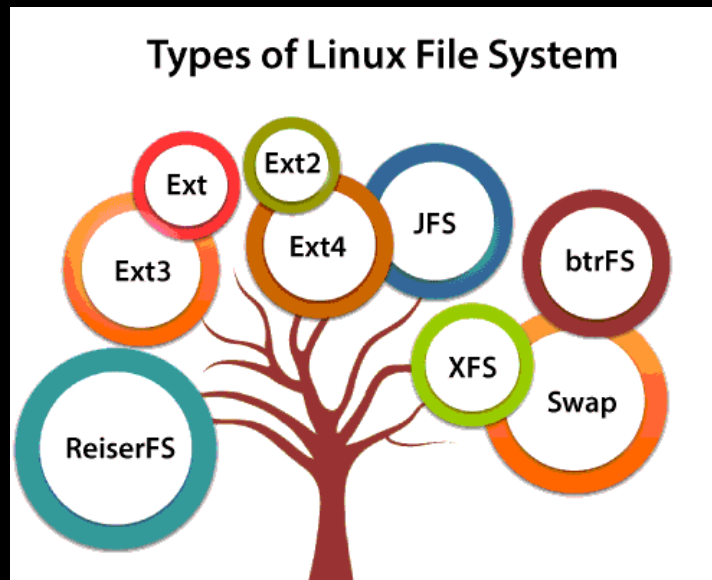
Flatpak

- Snap – made for Ubuntu, sandboxed, includes all dependencies and libraries in one package
- Flatpak – larger OS support, sandboxed, can share libraries and dependencies between packages
- AppImage – run on all major OS, not sandboxed, contain all necessary libraries to run

Filesystems

- EXT (2/3/4) – typical Linux
- FAT (12/16/32) – EFI
- exFAT – flash drives
- ZFS – used in Linux servers
- Swap – RAM overflow
- NTFS – Windows
- APFS - Mac

00 Empty	27 Hidden NTFS Win	82 Linux swap / So	c1 DRDOS/sec (FAT-
01 FAT12	39 Plan 9	83 Linux	c4 DRDOS/sec (FAT-
02 XENIX root	3c PartitionMagic	84 OS/2 hidden or	c6 DRDOS/sec (FAT-
03 XENIX usr	40 Venix 80286	85 Linux extended	c7 Syrinx
04 FAT16 <32M	41 PPC PREP Boot	86 NTFS volume set	da Non-FS data
05 Extended	42 SFS	87 NTFS volume set	db CP/M / CTOS / .
06 FAT16	4d QNX4.x	88 Linux plaintext	de Dell Utility
07 HPFS/NTFS/exFAT	4e QNX4.x 2nd part	8e Linux LVM	df BootIt
08 AIX	4f QNX4.x 3rd part	93 Amoeba	e1 DOS access
09 AIX bootable	50 OnTrack DM	94 Amoeba BBT	e3 DOS R/O
0a OS/2 Boot Manag	51 OnTrack DM6 Aux	9f BSD/OS	e4 SpeedStor
0b W95 FAT32	52 CP/M	a0 IBM Thinkpad hi	ea Linux extended
0c W95 FAT32 (LBA)	53 OnTrack DM6 Aux	a5 FreeBSD	eb BeOS fs
0e W95 FAT16 (LBA)	54 OnTrackDM6	a6 OpenBSD	ee GPT
0f W95 Ext'd (LBA)	55 EZ-Drive	a7 NeXTSTEP	ef EFI (FAT-12/16/
10 OPUS	56 Golden Bow	a8 Darwin UFS	f0 Linux/PA-RISC b
11 Hidden FAT12	5c Priam Edisk	a9 NetBSD	f1 SpeedStor
12 Compaq diagnost	61 SpeedStor	ab Darwin boot	f4 SpeedStor
14 Hidden FAT16 <3	63 GNU HURD or Sys	af HFS / HFS+	f2 DOS secondary
16 Hidden FAT16	64 Novell Netware	b7 BSDI fs	f8 EBBR protective
17 Hidden HPFS/NTF	65 Novell Netware	b8 BSDI swap	fb VMware VMFS
18 AST SmartSleep	70 DiskSecure Mult	bb Boot Wizard hid	fc VMware VMKORE
1b Hidden W95 FAT3	75 PC/IX	bc Acronis FAT32 L	fd Linux raid auto
1c Hidden W95 FAT3	80 Old Minix	be Solaris boot	fe LANstep
1e Hidden W95 FAT1	81 Minix / old Lin	bf Solaris	ff BBT
24 NEC DOS			



Common Linux Commands (Files)



- `cd /directory/to/go/to`
 - `~` = home directory
 - `/` = top directory
 - `..` = move up a directory
 - `ls` = lists contents of directory
 - `mkdir [name]` = makes a directory
 - `touch [filename]` = creates file
 - `cp /file /destination` = copy file or directory
 - `rm` = remove file
 - `mv /file /destination` = move file
 - `pwd` = displays present working directory
-

Common Linux Commands (Users)

- `sudo` = proceeding command will run as root (important and dangerous)
- `whoami` = displays which user you are currently using for shell
- `su` = changes current user to root
- `su -` = changes current user to login
- `su [user]` = changes current user
- `exit` = exits from current user
- `passwd [user]` = changes password
- `useradd [user]` = adds user
- `chmod` = changes permission of files for execute permission, reads, and writes
- `chown` = changes ownership of file or directory



Common Linux Commands (Internet)



- `wget [URL]` = downloads recursively from website
- `curl [option] [URL]` = used to transmit data between servers
- `ifconfig` = displays info and configures network (deprecated)
- `ping [hostname]` = checks connection to server

Common Linux Commands (Other Stuff)

```
~/projects/htop
1  [|||||] 34.3% Aug
2  [|||||] 55.0%
3  [|||||] 43.0%
4  [|||||] 47.0%
Mem [|||||] 1.16G/7.81G
Sup [|||||] 0K/0K

Tasks: 55, 165 thr: 3 running
Load average: 0.64 0.38 0.29
Uptime: 05:19:59
Battery: 35.5% (Running on A/C)

PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
5177 hisham 20 0 35020 5000 4592 S 0.0 0.1 0:00.00 gmain
5176 hisham 20 0 2952 2080 1976 S 0.0 0.0 0:00.05 /bin/dbus-daemon --config-file=/System/Settings/at-spi2/ac
5175 hisham 20 0 35020 5000 4592 S 0.0 0.1 0:00.00 gdbus
5168 root 20 0 34456 6224 5236 S 0.0 0.1 0:02.90 /usr/lib/upower/upowerd
5170 root 20 0 34456 6224 5236 S 0.0 0.1 0:00.00 gdbus
5169 root 20 0 34456 6224 5236 S 0.0 0.1 0:00.00 gmain
5165 hisham 20 0 177M 12896 6764 S 0.0 0.2 0:47.75 /usr/bin/pulseaudio --start --log-target=syslog
5309 hisham 20 0 177M 12896 6764 S 0.0 0.2 0:00.00 alsa-source-ALC
5308 hisham 20 0 177M 12896 6764 S 0.0 0.2 0:00.00 alsa-sink-ALC36
5180 hisham 20 0 177M 12896 6764 S 0.0 0.2 0:00.01 alsa-source-ALC
5174 hisham 20 0 177M 12896 6764 S 0.0 0.2 0:45.67 alsa-sink-ALC36
5160 hisham 20 0 32288 11616 10624 S 0.7 0.1 0:00.67 xfsettingsd
5167 hisham 20 0 32288 11616 10624 S 0.0 0.1 0:00.53 gmain
5159 hisham 20 0 35076 17196 14320 S 0.0 0.2 0:01.17 xfce4-power-manager
5161 hisham 20 0 35076 17196 14320 S 0.0 0.2 0:00.00 gdbus
5150 hisham 20 0 64348 31912 22820 S 0.0 0.4 0:00.68 nm-applet
5207 hisham 20 0 64348 31912 22820 S 0.0 0.4 0:00.00 gdbus
5146 hisham 20 0 46952 22548 16712 S 0.0 0.3 0:01.52 xfdesktop
5211 hisham 20 0 46952 22548 16712 S 0.0 0.3 0:00.53 gmain
5144 hisham 20 0 33156 13072 12216 S 0.0 0.2 0:00.02 Thunar --daemon
5153 hisham 20 0 33156 13072 12216 S 0.0 0.2 0:00.00 gmain
5142 hisham 20 0 39672 21724 17008 S 0.0 0.3 0:04.26 xfce4-panel
19006 hisham 20 0 18388 8600 7012 S 0.0 0.1 0:00.14 urxvt -cr green -fn *-lode-* -fb *-lode-* -fi *-lode-* -fb
19007 hisham 20 0 8788 5088 3780 S 0.0 0.1 0:00.09 zsh

F1 Help F2 Setup F3 Search F4 Filter F5 Sorted F6 Collap F7 Nice F8 Nicer F9 Kill F10 Quit
```

- systemctl = manages system processes (system control)
- history = displays command history
- top or htop = displays current system statistics
- kill [PID] = kills running process
- nano or vim for text editing

Helpful Keyboard Shortcuts

- up arrow
- Ctrl + C = kill current command
- Ctrl + Z = suspend current command
- Ctrl + Q = resume suspended command
- Ctrl + A = move to start of command
- Ctrl + E = move to end of command

LINUX TERMINAL SHORTCUTS CHEATSHEET



Automatically complete the file, directory, or command you're typing.



Erases the complete line.



Kill the current foreground process running in terminal.



Erase the part of the line after the cursor.



Suspend the current foreground process running in terminal.



Erase the word before the cursor.



Delete the character at the cursor location.



Paste the last thing you cut from the clipboard.



Clears the screen just like clear command.



Go to the previous command in the command history.



Move the cursor to the beginning of the line.



Go to the next command in the command history.



Move the cursor to the end of the line.



Search for a command in command history.

Time to make an Arch ISO



Use Archiso to Customize your ISO

- Install on Arch
- Use releng profile for default package config
- Change to archive directory
- Edit packages.x86_64 (I added htop)
- Copy any files you want included
- Change kernel or bootloader if desired in packages.x86_64
- `pacman -S archiso`
- `cp -r /usr/share/archiso/configs/releng/archive`
- `cd archive`
- `nano packages.x86_64`



Use Archiso to Customize your ISO cont..

- Find the system service to start for X
 - Start the X display manager at boot by linking it
 - `ls -l /etc/systemd/system/display-manager.service`
 - `ln -s /usr/lib/systemd/system/lxdm.service archive/airootfs/etc/systemd/system/display-manager.service`
-

Use Archiso to Customize your ISO cont..

- Add user to live environment, in this case 'archie'
- edit archive/airootfs/etc/passwd



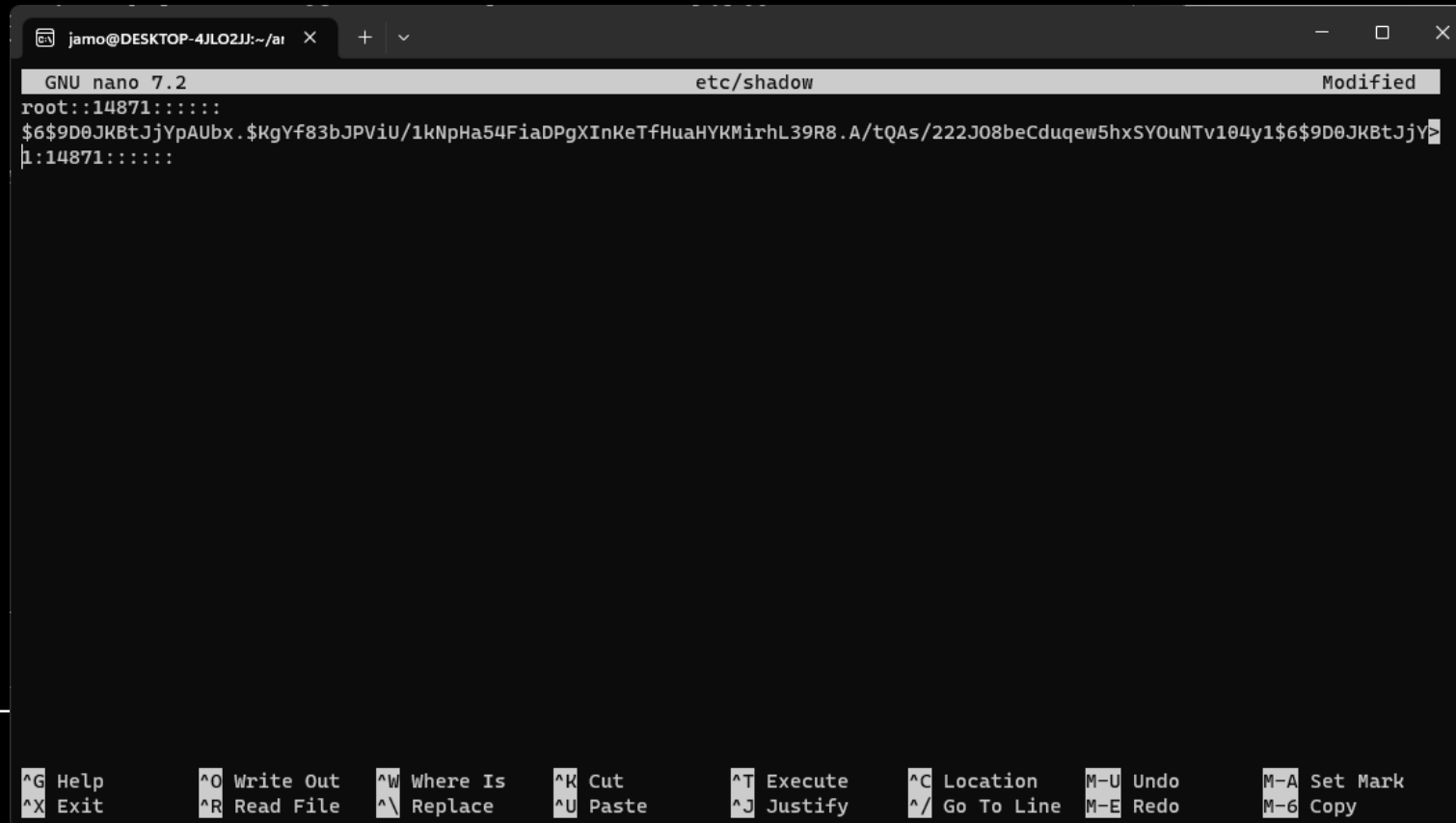
```
GNU nano 7.2 etc/passwd
root:x:0:0:root:/root:/usr/bin/zsh
archie:x:1000:1000:~/home/archie:/usr/bin/zsh
```

[Read 2 lines]

^G Help	^O Write Out	^W Where Is	^K Cut	^T Execute	^C Location	M-U Undo	M-A Set Mark
^X Exit	^R Read File	^N Replace	^U Paste	^J Justify	^_ Go To Line	M-E Redo	M-6 Copy

Use Archiso to Customize your ISO cont..

- Generate password for user
- Add generated hash to list
- openssl passwd -6
- edit archive/airootfs/etc/shadow



```
jamo@DESKTOP-4JLO2JJ: ~/ai
GNU nano 7.2 etc/shadow Modified
root::14871::::::
$6$9D0JKBtJjYpAUbx.$KgYf83bJPViU/1kNpHa54FiaDPgXInKeTfHuaHYKMirhL39R8.A/tQAs/222J08beCduqew5hxSY0uNTv104y1$6$9D0JKBtJjYp
l:14871::::::
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute    ^C Location   M-U Undo     M-A Set Mark
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify    ^/_ Go To Line M-E Redo     M-G Copy
```

Use Archiso to Customize your ISO cont..

- Add user to groups so they have permissions
- edit archive/airootfs/etc/gshadow

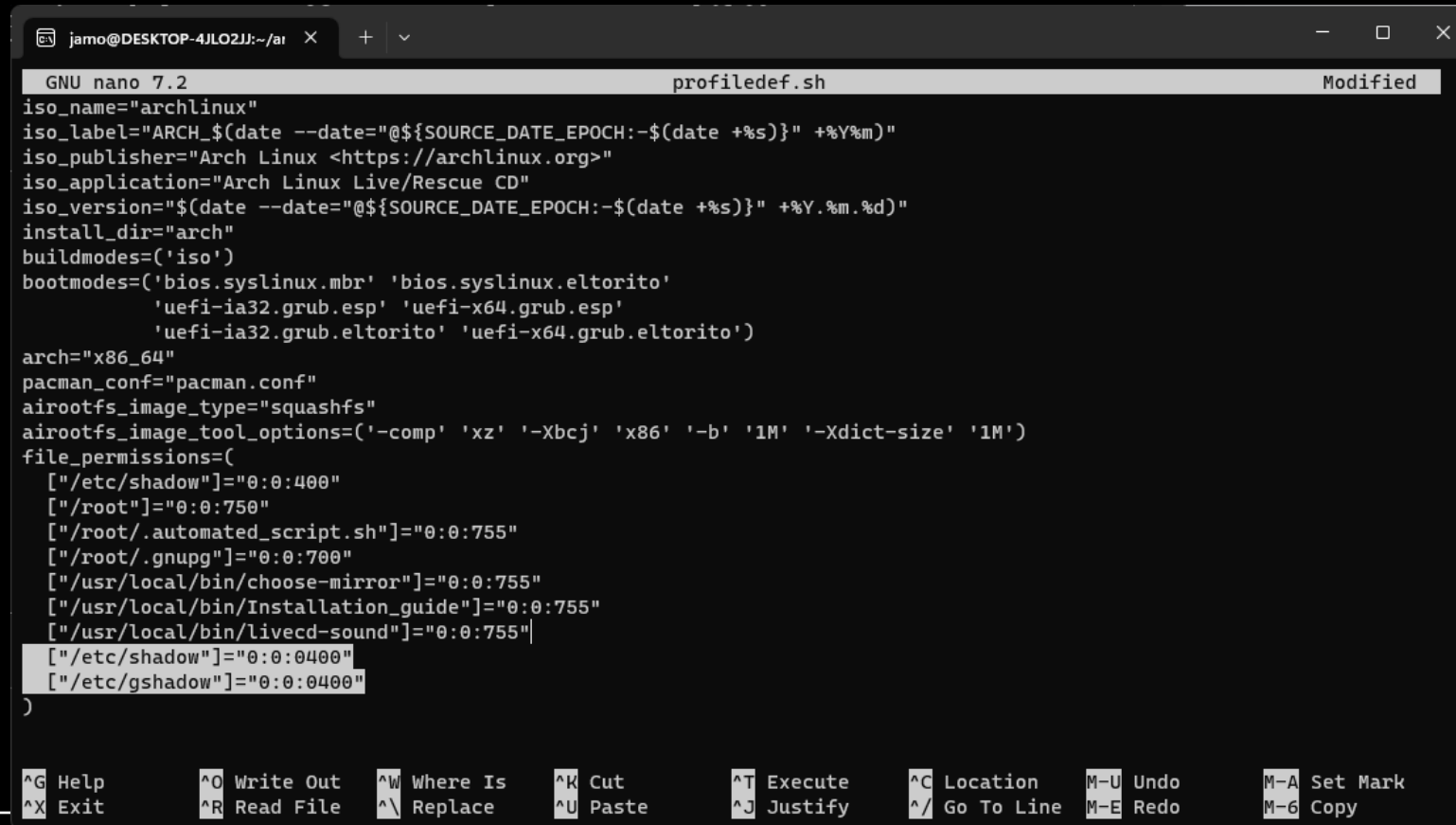


```
jamo@DESKTOP-4JLO2JJ: ~/ai
GNU nano 7.2 etc/gshadow Modified
root:!*::root
archie:!*::|
```

^G Help ^O Write Out ^W Where Is ^K Cut ^T Execute ^C Location M-U Undo M-A Set Mark
^X Exit ^R Read File ^\ Replace ^U Paste ^J Justify ^_ Go To Line M-E Redo M-6 Copy

Use Archiso to Customize your ISO cont..

- Give correct permissions to group
- edit archive/profiledef.sh



```
GNU nano 7.2 profiledef.sh Modified
iso_name="archlinux"
iso_label="ARCH_$(date --date="@${SOURCE_DATE_EPOCH:-$(date +%s)}" +%Y%m)"
iso_publisher="Arch Linux <https://archlinux.org>"
iso_application="Arch Linux Live/Rescue CD"
iso_version="$(date --date="@${SOURCE_DATE_EPOCH:-$(date +%s)}" +%Y.%m.%d)"
install_dir="arch"
buildmodes=('iso')
bootmodes=('bios.syslinux.mbr' 'bios.syslinux.eltorito'
            'uefi-ia32.grub.esp' 'uefi-x64.grub.esp'
            'uefi-ia32.grub.eltorito' 'uefi-x64.grub.eltorito')
arch="x86_64"
pacman_conf="pacman.conf"
airootfs_image_type="squashfs"
airootfs_image_tool_options=('-comp' 'xz' '-Xbcj' 'x86' '-b' '1M' '-Xdict-size' '1M')
file_permissions=(
  ["/etc/shadow"]="0:0:400"
  ["/root"]="0:0:750"
  ["/root/.automated_script.sh"]="0:0:755"
  ["/root/.gnupg"]="0:0:700"
  ["/usr/local/bin/choose-mirror"]="0:0:755"
  ["/usr/local/bin/Installation_guide"]="0:0:755"
  ["/usr/local/bin/livecd-sound"]="0:0:755"
  ["/etc/shadow"]="0:0:0400"
  ["/etc/gshadow"]="0:0:0400"
)

^G Help      ^O Write Out ^W Where Is  ^K Cut       ^T Execute  ^C Location  M-U Undo     M-A Set Mark
^X Exit      ^R Read File ^N Replace   ^U Paste     ^J Justify  ^_/ Go To Line M-E Redo     M-6 Copy
```

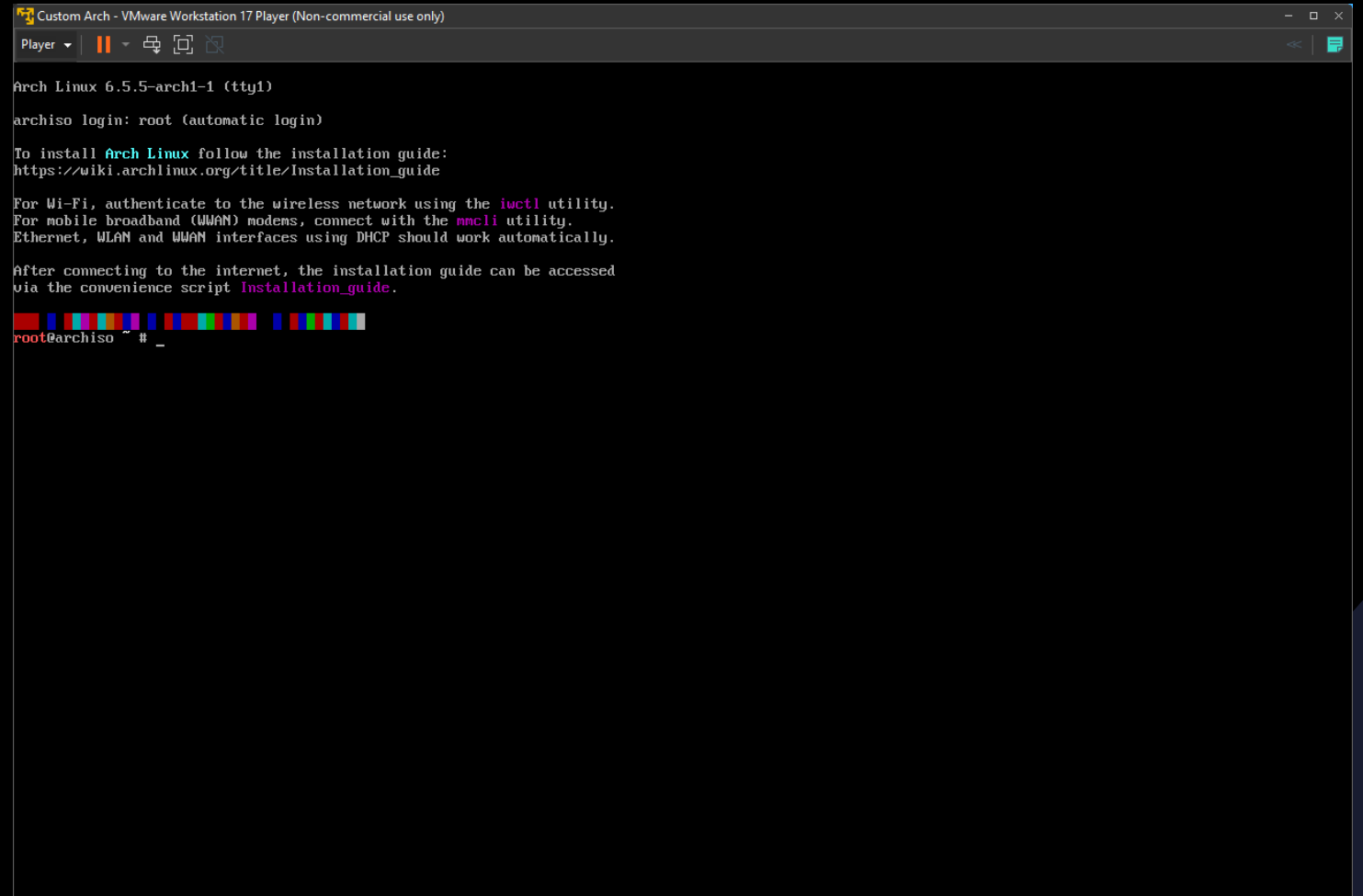
Use Archiso to Customize your ISO cont..

- Build ISO!
- `mkarchiso -v -w /path/to/work_dir -o /path/to/out_dir /path/to/profile/`

```
jamo@DESKTOP-4JLO2JJ:~  
games (50)  
systemd-journal-upload (974)  
unknown (34)  
unknown (32)  
systemd-timesync (976)  
systemd-network (980)  
video (985)  
[mkarchiso] INFO: Creating checksum file for self-test...  
[mkarchiso] INFO: Done!  
[mkarchiso] INFO: Creating ISO image...  
xorriso 1.5.6 : RockRidge filesystem manipulator, libburnia project.  
  
xorriso : NOTE : Environment variable SOURCE_DATE_EPOCH encountered with value 1696210782  
Drive current: -outdev 'stdio:/home/jamo/archlive/out/archlinux-2023.10.01-x86_64.iso'  
Media current: stdio file, overwriteable  
Media status : is blank  
Media summary: 0 sessions, 0 data blocks, 0 data, 948g free  
Added to ISO image: directory '/'='/home/jamo/archlive/iso'  
xorriso : UPDATE : 110 files added in 1 seconds  
xorriso : UPDATE : 110 files added in 1 seconds  
xorriso : NOTE : Copying to System Area: 432 bytes from file '/home/jamo/archlive/iso/boot/syslinux/isohdpx.bin'  
libisofs: NOTE : Aligned image size to cylinder size by 355 blocks  
xorriso : UPDATE : 21.39% done  
ISO image produced: 413862 sectors  
Written to medium : 413862 sectors at LBA 0  
Writing to 'stdio:/home/jamo/archlive/out/archlinux-2023.10.01-x86_64.iso' completed successfully.  
  
[mkarchiso] INFO: Done!  
809M /home/jamo/archlive/out/archlinux-2023.10.01-x86_64.iso  
[jamo@DESKTOP-4JLO2JJ ~]$
```


Use Archiso to Customize your ISO cont..

- Boot Arch Linux setup!



```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player
Arch Linux 6.5.5-arch1-1 (tty1)
archiso login: root (automatic login)

To install Arch Linux follow the installation guide:
https://wiki.archlinux.org/title/Installation_guide

For Wi-Fi, authenticate to the wireless network using the iwctl utility.
For mobile broadband (WWAN) modems, connect with the mmcli utility.
Ethernet, WLAN and WWAN interfaces using DHCP should work automatically.

After connecting to the internet, the installation guide can be accessed
via the convenience script Installation_guide.

root@archiso ~ #
```

- htop is installed

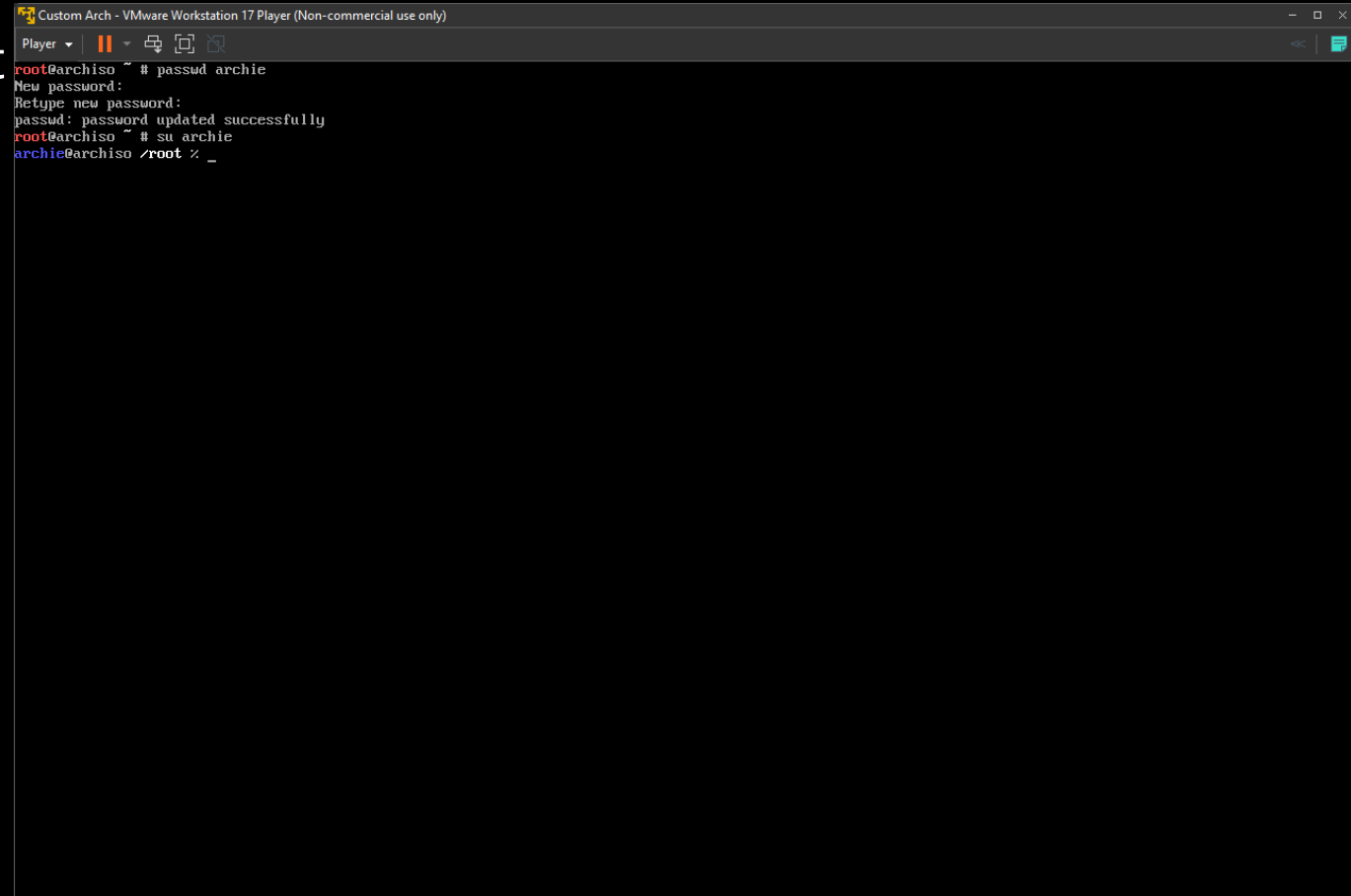
```
VMware Workstation 17 Player (Non-commercial use only)
Player ▾ || 📄 🖨️ 🔍 Saved to this PC ⏪ ⏩

0t 0.0%] 3t 0.0%]
1t 0.7%] 4t|||| 5.3%]
2t 0.0%] 5t 0.0%]
Mem| | Tasks: 26, 12 thr, 157 kthr; 2 running
Sup| Load average: 2.03 3.00 1.84
Uptime: 00:08:28

Main | /?
PID USER PRI NI VIRT RES SHR S CPU% MEM% TIME+ Command
1169 root 20 0 8684 4736 3456 R 0.7 0.1 0:00.03 httpd
1 root 20 0 22652 14108 10052 S 0.0 0.2 0:04.09 /sbin/init
284 root 20 0 25276 10112 9344 S 0.0 0.1 0:00.23 /usr/lib/systemd/systemd-journald
319 root 20 0 16740 6656 5888 S 0.0 0.1 0:00.04 /usr/lib/systemd/systemd-userdbd
334 root 20 0 36580 12544 8064 S 0.0 0.2 0:00.62 /usr/lib/systemd/systemd-udev
353 systemd-ti 20 0 91204 8320 7552 S 0.0 0.1 0:00.30 /usr/lib/systemd/systemd-timesyncd
386 systemd-ti 20 0 91204 8320 7552 S 0.0 0.1 0:00.16 /usr/lib/systemd/systemd-timesyncd
426 root 20 0 17436 7168 6400 S 0.0 0.1 0:00.00 systemd-userwork: waiting...
431 dbus 20 0 8980 4736 4224 S 0.0 0.1 0:00.26 /usr/bin/dbus-daemon --system --address=systemd: --nofork --nopidfile --systemd-activation --
433 polkitd 20 0 301M 7424 6784 S 0.0 0.1 0:00.13 /usr/lib/polkit-1/polkitd --no-debug
435 root 20 0 17256 8064 7296 S 0.0 0.1 0:00.12 /usr/lib/systemd/systemd-logind
436 root 20 0 226M 8196 5376 S 0.0 0.1 0:00.37 /usr/bin/vmtoolsd
437 root 20 0 148M 3712 1536 S 0.0 0.0 0:00.00 /usr/bin/vmware-umblock-fuse -d -f -o subtype=vmware-umblock,default_permissions,allow_other
438 root 20 0 17436 7168 6272 S 0.0 0.1 0:00.01 systemd-userwork: waiting...
440 root 20 0 148M 3712 1536 S 0.0 0.0 0:00.00 /usr/bin/vmware-umblock-fuse -d -f -o subtype=vmware-umblock,default_permissions,allow_other
441 root 20 0 148M 3712 1536 S 0.0 0.0 0:00.00 /usr/bin/vmware-umblock-fuse -d -f -o subtype=vmware-umblock,default_permissions,allow_other
447 polkitd 20 0 301M 7424 6784 S 0.0 0.1 0:00.00 /usr/lib/polkit-1/polkitd --no-debug
449 polkitd 20 0 301M 7424 6784 S 0.0 0.1 0:00.00 /usr/lib/polkit-1/polkitd --no-debug
463 polkitd 20 0 301M 7424 6784 S 0.0 0.1 0:00.00 /usr/lib/polkit-1/polkitd --no-debug
464 root 20 0 17088 7680 6912 S 0.0 0.1 0:00.08 /usr/lib/systemd/systemd-homed
486 root 20 0 381M 14160 10240 S 0.0 0.2 0:00.31 /usr/bin/ModemManager
490 root 20 0 226M 8196 5376 S 0.0 0.1 0:00.00 /usr/bin/vmtoolsd
492 root 20 0 381M 14160 10240 S 0.0 0.2 0:00.00 /usr/bin/ModemManager
497 root 20 0 381M 14160 10240 S 0.0 0.2 0:00.00 /usr/bin/ModemManager
500 root 20 0 381M 14160 10240 S 0.0 0.2 0:00.00 /usr/bin/ModemManager
502 root 20 0 226M 8196 5376 S 0.0 0.1 0:00.00 /usr/bin/vmtoolsd
503 root 20 0 226M 8196 5376 S 0.0 0.1 0:00.01 /usr/bin/vmtoolsd
611 root 20 0 15820 2944 2816 S 0.0 0.0 0:00.03 /usr/lib/iud/iud
705 root 20 0 148M 3032 2560 S 0.0 0.0 0:00.92 gpg-agent --homedir /etc/pacman.d/gnupg --use-standard-socket --daemon
797 root 20 0 17436 7040 6144 S 0.0 0.1 0:00.00 systemd-userwork: waiting...
991 systemd-ne 20 0 18592 9600 8448 S 0.0 0.1 0:00.02 /usr/lib/systemd/systemd-networkd
992 systemd-re 20 0 21260 13312 11136 S 0.0 0.2 0:00.05 /usr/lib/systemd/systemd-resolved
1008 root 20 0 40180 34676 12416 S 0.0 0.4 0:00.78 /usr/bin/python /usr/bin/reflector @etc/xdg/reflector/reflector.conf
1009 root 20 0 10884 7168 6144 S 0.0 0.1 0:00.04 sshd: /usr/bin/sshd -D [listener] 0 of 10-100 startups
1078 root 20 0 7904 4992 4352 S 0.0 0.1 0:00.13 login -- root
1100 root 20 0 20132 11520 9856 S 0.0 0.1 0:00.13 /usr/lib/systemd/systemd --user
1101 root 20 0 25820 6420 1792 S 0.0 0.1 0:00.00 (sd-pan)
1109 root 20 0 10164 6168 4224 S 0.0 0.1 0:01.09 -zsh
```

Use Archiso to Customize your ISO cont..

- The user archie is present



```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player
root@archiso ~ # passud archie
New password:
Retype new password:
passud: password updated successfully
root@archiso ~ # su archie
archie@archiso /root % _
```

Onto Installing Linux

Super basic, nothing extra, not even a user besides root



Install Arch

- `fdisk -l`
 - List available disks
- `fdisk /dev/sda`
 - Select disk to install to
- We are legacy not UEFI so we do not need an EFI partition
- `n`
 - Create new partition
 - Accept all defaults

```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player
For Wi-Fi, authenticate to the wireless network using the iwctl utility.
For mobile broadband (WWAN) modems, connect with the nmcli utility.
Ethernet, WLAN and WWAN interfaces using DHCP should work automatically.

After connecting to the internet, the installation guide can be accessed
via the convenience script Installation_guide.

Last login: Mon Oct  2 02:32:28 on tty1
root@archiso ~ # fdisk -l
Disk /dev/sda: 20 GiB, 21474836480 bytes, 41943040 sectors
Disk model: VMware Virtual S
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk /dev/loop0: 685.48 MiB, 718774272 bytes, 1403856 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
root@archiso ~ # fdisk /dev/sda

Welcome to fdisk (util-linux 2.39.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS (MBR) disklabel with disk identifier 0x34ad1fe5.

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p):

Using default response p.
Partition number (1-4, default 1):
First sector (2048-41943039, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-41943039, default 41943039):

Created a new partition 1 of type 'Linux' and of size 20 GiB.

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

root@archiso ~ #
```

Install Arch cont..

- `mkfs.ext4 /dev/sda1`
 - Create an ext4 filesystem
- `ping google.com`
 - Check connection to internet

```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player
Welcome to fdisk (util-linux 2.39.2).
Changes will remain in memory only, until you decide to write them.
Be careful before using the write command.

Device does not contain a recognized partition table.
Created a new DOS (MBR) disklabel with disk identifier 0x34ad1fe5.

Command (m for help): n
Partition type
   p   primary (0 primary, 0 extended, 4 free)
   e   extended (container for logical partitions)
Select (default p):

Using default response p.
Partition number (1-4, default 1):
First sector (2048-41943039, default 2048):
Last sector, +/-sectors or +/-size{K,M,G,T,P} (2048-41943039, default 41943039):

Created a new partition 1 of type 'Linux' and of size 20 GiB.

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

root@archiso ~ # mkfs.ext4 /dev/sda1
mke2fs 1.47.0 (5-Feb-2023)
Creating filesystem with 5242624 4k blocks and 1310720 inodes
Filesystem UUID: e486970d-55c4-446b-ae63-56b5615ded1d
Superblock backups stored on blocks:
    32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
    4096000

Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

root@archiso ~ # ping google.com
PING google.com (172.253.63.100) 56(84) bytes of data:
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=1 ttl=128 time=11.6 ms
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=2 ttl=128 time=11.2 ms
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=3 ttl=128 time=11.8 ms
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=4 ttl=128 time=11.9 ms
^C
--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 11.241/11.621/11.887/0.247 ms
root@archiso ~ #
```

Install Arch cont..

- pacman -Sy
- Sync package repository
- pacman -S reflector
- Update mirrorlist for close server
- mount /dev/sda1
- Mount the root partition

```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player | || |
Allocating group tables: done
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done

root@archiso ~ # ping google.com
PING google.com (172.253.63.100) 56(84) bytes of data:
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=1 ttl=128 time=11.6 ms
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=2 ttl=128 time=11.2 ms
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=3 ttl=128 time=11.8 ms
64 bytes from bi-in-f100.1e100.net (172.253.63.100): icmp_seq=4 ttl=128 time=11.9 ms
^C
--- google.com ping statistics ---
4 packets transmitted, 4 received, 0% packet loss, time 3006ms
rtt min/avg/max/mdev = 11.241/11.621/11.887/0.247 ms
root@archiso ~ # pacman -Sy
:: Synchronizing package databases...
core                               127.0 KiB   717 KiB/s  00:00 [#####] 100%
extra                             8.2 MiB   3.82 MiB/s  00:02 [#####] 100%
root@archiso ~ # pacman -S reflector
warning: reflector-2023-1 is up to date -- reinstalling
resolving dependencies...
looking for conflicting packages...

Packages (1) reflector-2023-1

Total Download Size:   0.04 MiB
Total Installed Size:  0.16 MiB
Net Upgrade Size:      0.00 MiB

:: Proceed with installation? [Y/n] y
:: Retrieving packages...
 reflector-2023-1-any           39.6 KiB   220 KiB/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... [#####] 100%
(1/1) reinstalling reflector
:: Running post-transaction hooks...
(1/2) Reloading system manager configuration...
(2/2) Arming ConditionNeedsUpdate...
root@archiso ~ # cp /etc/pacman.d/mirrorlist /etc/pacman.d/mirrorlist.bak
root@archiso ~ # reflector -c "US" -f 12 -l 10 -n 12 --save /etc/pacman.d/mirrorlist
[2023-10-02 03:37:00] WARNING: failed to rate http(s) download (https://america.mirror.pkgbuild.com/extra/os/x86_64/extra.db): Download timed out after 5 second(s).
[2023-10-02 03:37:09] WARNING: failed to rate http(s) download (https://m.lqy.me/arch/extra/os/x86_64/extra.db): HTTP Error 403: Forbidden
root@archiso ~ # mount /dev/sda1 /mnt
root@archiso ~ # S_
```

Install Arch cont..

- `pacstrap /mnt base linux linux-firmware vim nano`
 - Install necessary packages for linux
 - `install`

[illegible]

Install Arch cont..

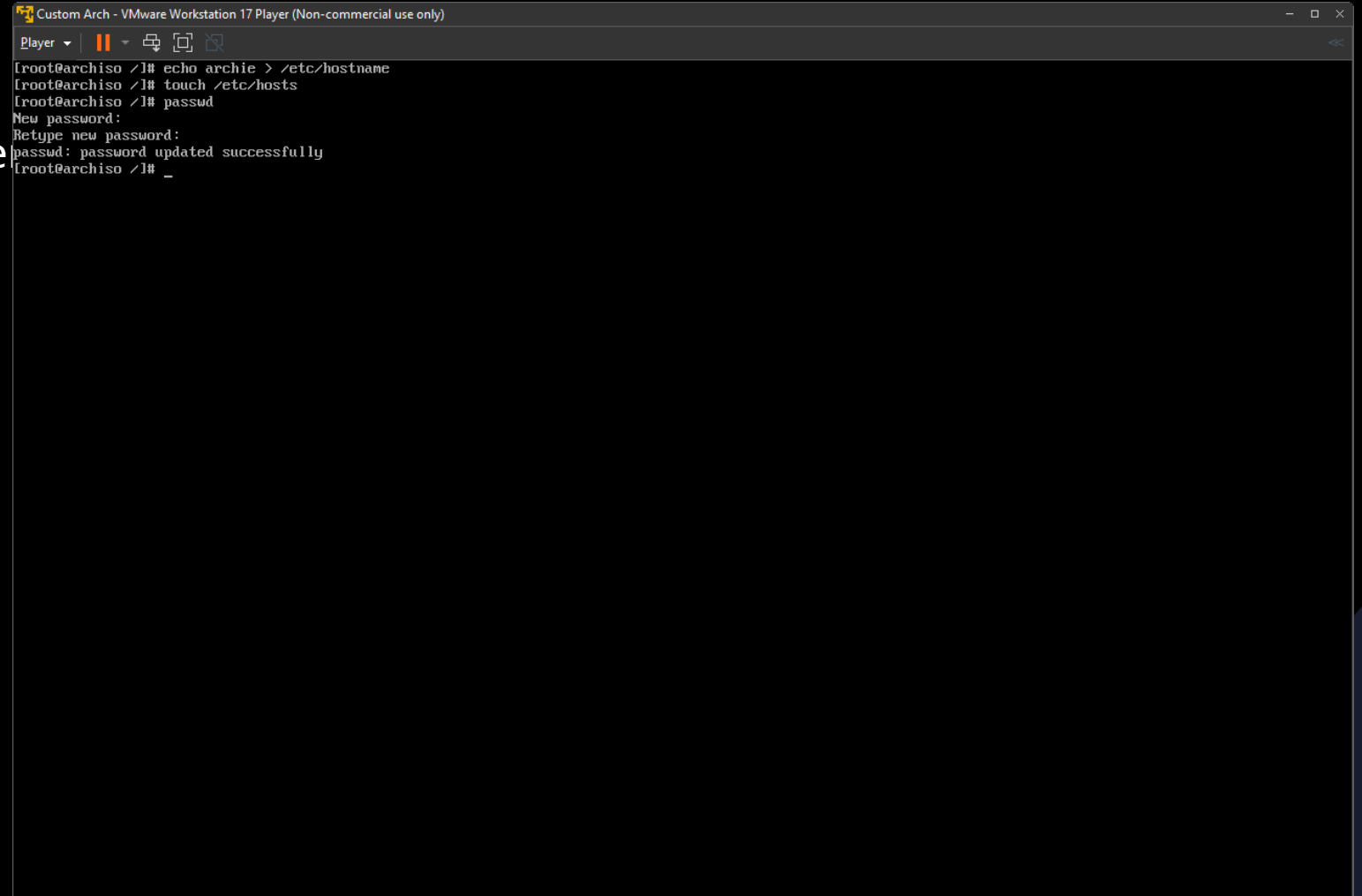
- echo archie > /etc/hostname
 - Add archie to the network
- touch /etc/hosts
 - Create the hosts file and edit it to contain itself and archie

```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player ▾ | || ▾ | 📄 🖼️ 🔍
[root@archiso /]# echo archie > /etc/hostname
[root@archiso /]# touch /etc/hosts
[root@archiso /]# _
```

```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player ▾ | || ▾ | 📄 🖼️ 🔍
GNU nano 7.2 /etc/hosts
# Static table lookup for hostnames.
# See hosts(5) for details.
127.0.0.1 localhost
::1 localhost
127.0.1.1 archie_
```

Install Arch cont..

- passwd
 - Set a password for the root user



```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player
root@archiso /]# echo archie > /etc/hostname
root@archiso /]# touch /etc/hosts
root@archiso /]# passwd
New password:
Retype new password:
passwd: password updated successfully
root@archiso /]# _
```

Install Arch cont..

- `pacman -S grub`
 - Install GRUB bootloader package
- `grub-install /dev/sda`
 - Install the bootloader
- `grub-mkconfig -o /boot/grub/grub.cfg`
 - Generate GRUB configuration

```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player | [ ] | [ ] | [ ] | [ ]
New password:
Retype new password:
passwd: password updated successfully
[root@archiso /]# pacman -S grub
resolving dependencies...
looking for conflicting packages...

Packages (1) grub-2:2.12rc1-1

Total Download Size: 6.71 MiB
Total Installed Size: 32.91 MiB

:: Proceed with installation? [Y/n] y
:: Retrieving packages...
grub-2:2.12rc1-1-x86_64 6.7 MiB 4.70 MiB/s 00:01 [#####] 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%
:: Install your bootloader and generate configuration with:
$ grub-install ...
$ grub-mkconfig -o /boot/grub/grub.cfg
Optional dependencies for grub
freetype2: For grub-mkfont usage
fuse3: For grub-mount usage
dosfstools: For grub-mkrescue FAT FS and EFI support
lzop: For grub-mkrescue LZO 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...
(1/1) Arming ConditionNeedsUpdate...
[root@archiso /]# grub-install /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: /boot/initramfs-linux.img
Found fallback initrd image(s) in /boot: initramfs-linux-fallback.img
Warning: os-prober will not be executed to detect other bootable partitions.
Systems on them will not be added to the GRUB boot configuration.
Check GRUB_DISABLE_OS_PROBER documentation entry.
Adding boot menu entry for UEFI Firmware Settings ...
done
[root@archiso /]#
```

Install Arch cont..

- pacman -S xorg networkmanager gnome
 - Install GNOME desktop environment, display manager, and network manager

```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player ▾ || 🖨 📄 🗑
libxfixes-6.0.1-1 libxfont2-2.0.6-2 libxft-2.3.8-1 libxi-1.8.1-1 libxinerama-1.1.5-1 libxkbcommon-1.5.0-1 libxkbcommon-x11-1.5.0-1
libxkbfile-1.1.2-1 libxklavier-5.4.5 libxmb-0.3.14-1 libxmu-1.1.4-1 libxpm-3.5.16-1 libxrandr-1.5.3-1 libxrender-0.9.11-1
libxres-1.2.2-1 libxshmfence-1.3.2-1 libxslt-1.1.38-1 libxt-1.3.0-1 libxtst-1.2.4-1 libxv-1.0.12-1 libxxf86vm-1.1.5-1 libyaml-0.2.5-2
libyuv-r2322+3aebf69d-1 lilv-0.24.20-2 llum-libs-16.0.6-1 lm_sensors-1:3.6.0.r41.g31d1ff125-2 lmdb-0.9.30-3 lua-5.4.6-2
lua-jit-2.1.1694285958-1 lu2-1.18.10-1 lum2-2.03.22-2 lzo-2.10-5 man-db-2.12.0-1 mdadm-4.2-2 mesa-1:23.2.1-1 mjpegtools-2.2.1-2
mobile-broadband-provider-info-20230416-1 mod_dnssd-0.6-9 mpg123-1.32.2-1 mtdev-1.1.6-2 mutter-44.5-1 neon-0.32.5-2 net-snmp-5.9.1-8
noto-fonts-emoji-20220920-1 nspr-4.35-1 nss-3.93-1 ocl-icd-2.3.2-1 oneupl-2023.3.1-1 openal-1.23.1-1 opencore-amr-0.1.6-1 openexr-3.2.1-1
openjpeg2-2.5.0-3 openmpi-4.1.5-5 openpmix-4.2.6-1 openssh-9.4p1-4 opus-1.4-1 orc-0.4.34-1 osinfo-db-20230518-1 ostree-2023.6-3
pango-1:1.50.14-1 pangomm-2.46.3-1 parted-3.6-1 pcre-8.45-4 pcsclite-2.0.0-1 perl-5.38.0-1 pipewire-1:0.3.80-1 pixman-0.42.2-1
polkit-123-1 poppler-23.08.0-1 poppler-data-0.4.12-1 poppler-glib-23.08.0-1 portaudio-1:19.7.0-2 protobuf-24.3-1 pulseaudio-16.1-6
pulseaudio-alsa-1:1.2.7.1-2 pulseaudio-bluetooth-16.1-6 python-3.11.5-2 python-atspi-2.46.0-2 python-cairo-1.24.0-1 python-gobject-3.46.0-1
python-pyxdg-0.28-2 python-setproctitle-1.3.2-2 grencode-4.1.1-2 raptor-2.0.16-3 rawle-0.6.6-1 rtkit-0.13-2 rtmpdump-1:2.4.r99.f1b83c1-2
sane-1.2.1-5 sbc-2.0-1 sdl2-2.28.3-1 serd-0.30.16-1 shared-mime-info-2.2+13+ga2ffb28-1 slang-2.3.3-2 smlclient-4.19.0-1 sord-0.16.14-1
sound-theme-freedesktop-0.8-5 soundtouch-2.3.2-1 spandsp-0.0.6-5 speech-dispatcher-0.11.5-1 speex-1.2.1-1 speexdsp-1.2.1-1 sratom-0.6.14-1
srt-1.5.3-1 startup-notification-0.12-8 suitesparse-7.2.0-3 sut-avl-1.7.0-1 sut-hevc-1.5.1-2 taglib-1.13.1-1 tallo-2.4.1-1 tdb-1.4.9-1
tevent-1:0.15.0-1 thin-provisioning-tools-1.0.6-1 totem-pl-parser-3.26.6-2 tracker3-3.6.0-1 twolame-0.4.0-3 udisks2-2.10.1-2 unzip-6.0-19
upower-1.90.2-1 usbmuxd-1.1.1-3 v4l-utils-1.24.1-2 vid.stab-1.1.1-1 vmaf-2.3.1-1 volume_key-0.3.12-8 vte-common-0.74.0-1 vte4-0.74.0-1
vulkan-icd-loader-1.3.263-1 waupack-5.6.0-1 wayland-1.22.0-1 wayland-protocols-1.32-1 webkit2gtk-4.1-2.42.1-1 webkitgtk-6.0-2.42.1-1
webp-pixbuf-loader-0.2.5-1 webrtc-audio-processing-0.3.1-4 wildmidi-0.4.5-2 woff2-1.0.2-4 wpa-suplicant-2:2.10-8 wpebackend-fdo-1.14.2-1
x264-3:0.164.r3095.baec400-4 x265-3.5-3 xcb-protocol-1.16.0-1 xcb-util-0.4.1-1 xcb-util-image-0.4.1-2 xcb-util-keysyms-0.4.1-4
xcb-util-renderutil-0.3.10-1 xcb-util-wm-0.4.2-1 xdg-dbus-proxy-0.1.5-1 xdg-desktop-portal-1.16.0-3 xdg-desktop-portal-gtk-1.14.1-1
xdg-user-dirs-0.18-1 xf86-input-libinput-1.4.0-1 xkeyboard-config-2.39-1 xorg-fonts-alias-100dpi-1.0.5-1 xorg-fonts-alias-75dpi-1.0.5-1
xorg-util-macros-1.20.0-2 xorgproto-2023.2-1 xvidcore-1.3.7-2 yelp-xsl-42.1-1 zbar-0.23.90-3 zeromq-4.3.4-4 zimg-3.0.5-1 zubi-0.2.42-1
zxing-cpp-2.1.0-1 baobab-44.0-1 cheese-44.1-1 eog-44.3-1 epiphany-44.7-1 evince-44.3-1 gdm-44.1-1 gnome-backgrounds-44.0-1
gnome-calculator-44.0-1 gnome-calendar-44.1-1 gnome-characters-44.0-1 gnome-clocks-44.0-1 gnome-color-manager-3.36.0+r42.g90481514-1
gnome-connections-44.1-2 gnome-console-44.4-1 gnome-contacts-44.0-1 gnome-control-center-44.4-1 gnome-disk-utility-45.0-1
gnome-font-viewer-44.0-1 gnome-keyring-1:42.1-3 gnome-logs-43.0-1 gnome-maps-44.4-1 gnome-menus-3.36.0-2 gnome-music-1:44.0-2
gnome-photos-1:44.0-3 gnome-remote-desktop-44.2-1 gnome-session-44.0-2 gnome-settings-daemon-44.1-1 gnome-shell-1:44.5-1
gnome-shell-extensions-44.0-1 gnome-software-44.5-1 gnome-system-monitor-44.0-1 gnome-text-editor-44.0-2 gnome-tour-44.0-2
gnome-user-docs-44.5-1 gnome-user-share-43.0-1 gnome-weather-44.0-1 grilo-plugins-1:0.3.16-1 gufs-1.52.0-1 gufs-afc-1.52.0-1
gufs-goa-1.52.0-1 gufs-google-1.52.0-1 gufs-gphoto2-1.52.0-1 gufs-mtp-1.52.0-1 gufs-nfs-1.52.0-1 gufs-smb-1.52.0-1 malcontent-0.11.1-2
nautilus-44.2.1-1 networkmanager-1.44.0-1 orca-44.1-1 rygel-1:0.42.4-1 simple-scan-44.0-2 sushi-44.2-1 totem-43.0-2
tracker3-miners-3.6.1-1 xdg-desktop-portal-gnome-44.2-1 xdg-user-dirs-gtk-0.11-2 xf86-video-vesa-2.6.0-1 xorg-bdftopcf-1.1.1-1
xorg-docs-1.7.2-2 xorg-font-util-1.4.1-1 xorg-fonts-100dpi-1.0.4-2 xorg-fonts-75dpi-1.0.4-1 xorg-fonts-encodings-1.0.7-1
xorg-iceauth-1.0.9-1 xorg-mkfontscale-1.2.2-1 xorg-server-21.1.8-2 xorg-server-common-21.1.8-2 xorg-server-devel-21.1.8-2
xorg-server-xephyr-21.1.8-2 xorg-server-xnest-21.1.8-2 xorg-server-xvfb-21.1.8-2 xorg-sessreg-1.1.3-1 xorg-setxkbmap-1.3.4-1
xorg-smproxy-1.0.7-1 xorg-x11perf-1.6.2-1 xorg-xauth-1.1.2-1 xorg-xbacklight-1.2.3-3 xorg-xcmsdb-1.0.6-1 xorg-xcursorgen-1.0.8-1
xorg-xdpyinfo-1.3.4-1 xorg-xdriinfo-1.0.7-1 xorg-xev-1.2.5-1 xorg-xgamma-1.0.7-1 xorg-xhost-1.0.9-1 xorg-xinput-1.6.4-1
xorg-xkbcomp-1.4.6-1 xorg-xkbvud-1.1.5-1 xorg-xkbutils-1.0.5-1 xorg-xkill-1.0.6-1 xorg-xlsatoms-1.1.4-1 xorg-xlsclients-1.1.5-1
xorg-xmodmap-1.0.11-1 xorg-xpr-1.1.0-1 xorg-xprop-1.2.6-1 xorg-xrandr-1.5.2-1 xorg-xrefresh-1.0.7-1 xorg-xset-1.2.5-1
xorg-xsetroot-1.1.3-1 xorg-xvinfo-1.1.5-1 xorg-xwayland-23.2.1-1 xorg-xwd-1.0.9-1 xorg-xwininfo-1.1.6-1 xorg-xwud-1.0.6-1 yelp-42.2-2

Total Download Size: 588.97 MiB
Total Installed Size: 2574.01 MiB

:: Proceed with installation? [Y/n] y
:: Retrieving packages...
gnome-backgrounds-44.0-1-any 19.7 MiB 4.10 MiB/s 00:06 [#####] 42%
Total ( 0/594) 19.7 MiB 4.10 MiB/s 02:18 [#####] 3%
```

Install Arch cont..

- systemctl enable gdm.service
 - Enable display manager service
- systemctl enable NetworkManager.service
 - Enable network manager service

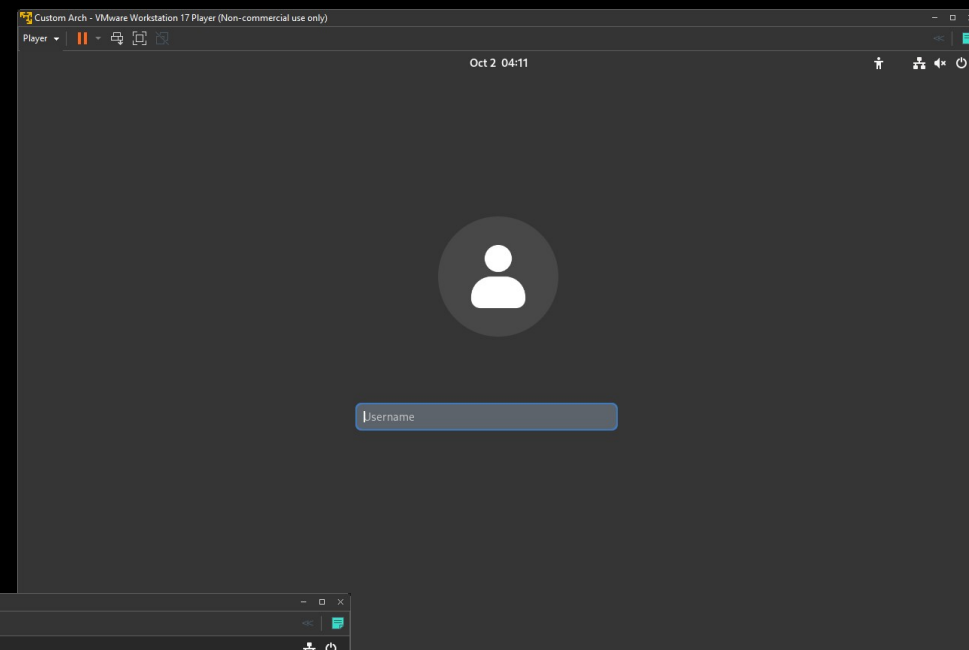
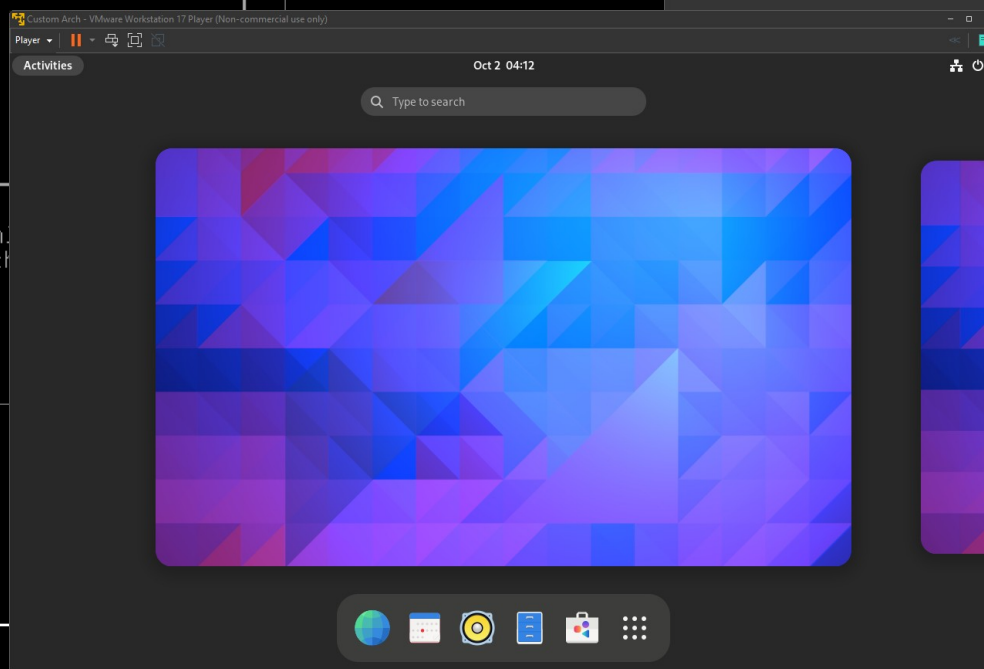
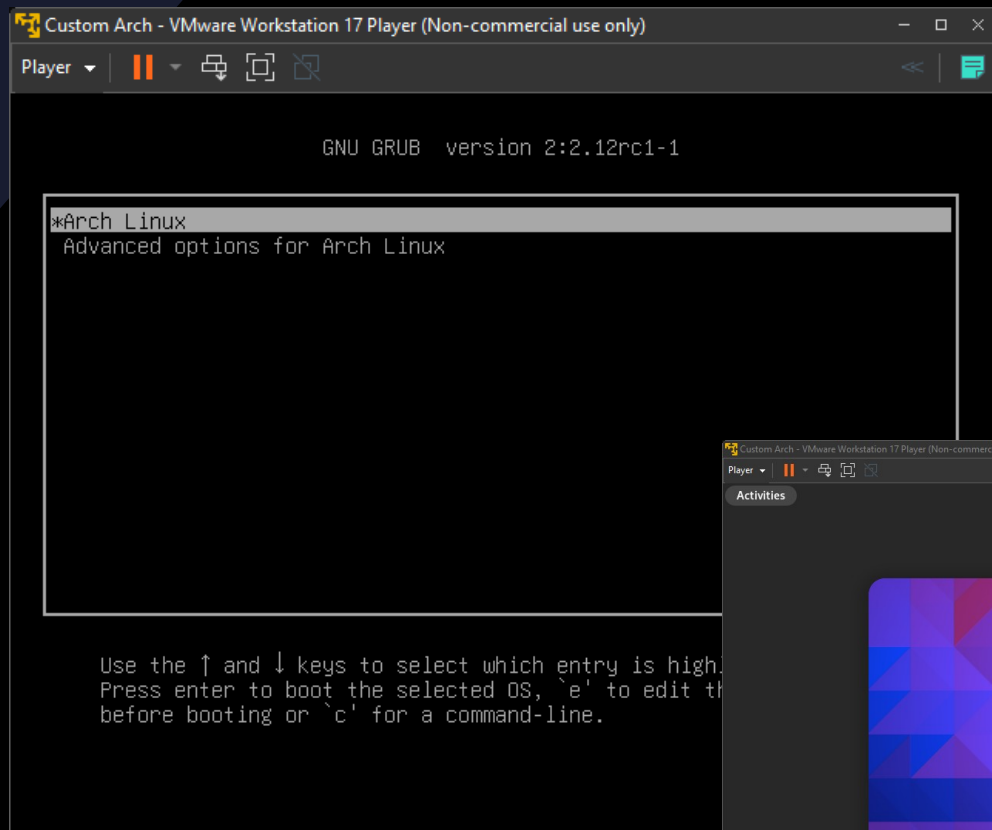
```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player | || |
--> Running build hook: [kms]
==> WARNING: Possibly missing firmware for module: 'ast'
--> Running build hook: [keyboard]
==> WARNING: Possibly missing firmware for module: 'xhci_pci'
--> Running build hook: [keymap]
--> Running build hook: [consolefont]
==> WARNING: consolefont: no font found in configuration
--> Running build hook: [block]
==> WARNING: Possibly missing firmware for module: 'qed'
==> WARNING: Possibly missing firmware for module: 'qla2xxx'
==> WARNING: Possibly missing firmware for module: 'aic94xx'
==> WARNING: Possibly missing firmware for module: 'bfa'
==> WARNING: Possibly missing firmware for module: 'qla1280'
==> WARNING: Possibly missing firmware for module: 'wd719x'
--> Running build hook: [filesystems]
--> Running build hook: [fsck]
==> Generating module dependencies
==> Creating zstd-compressed initcpio image: '/boot/initramfs-linux-fallback.img'
==> Image generation successful
(10/22) Updating the appstream cache...
? Metadata cache was updated successfully.
(11/22) Reloading system bus configuration...
  Skipped: Running in chroot.
(12/22) Warn about old perl modules
perl: warning: Setting locale failed.
perl: warning: Please check that your locale settings:
    LANGUAGE = (unset),
    LC_ALL = (unset),
    LC_MESSAGES = "",
    LANG = "en_US.UTF-8"
  are supported and installed on your system.
perl: warning: Falling back to the standard locale ("C").
(13/22) Updating fontconfig cache...
(14/22) Probing GDK-Pixbuf loader modules...
(15/22) Updating GIO module cache...
(16/22) Compiling GSettings XML schema files...
(17/22) Probing GTK3 input method modules...
(18/22) Updating icon theme caches...
(19/22) Updating GTK4 module cache...
(20/22) Reloading GVFS config...
killall: /proc lacks process entries (not mounted ?)
(21/22) Updating the desktop file MIME type cache...
(22/22) Updating X fontdir indices...
[root@archiso /]# systemctl enable gdm.service
Created symlink /etc/systemd/system/display-manager.service → /usr/lib/systemd/system/gdm.service.
[root@archiso /]# systemctl enable NetworkManager.service
Created symlink /etc/systemd/system/multi-user.target.wants/NetworkManager.service → /usr/lib/systemd/system/NetworkManager.service.
Created symlink /etc/systemd/system/dbus-org.freedesktop.mn-dispatcher.service → /usr/lib/systemd/system/NetworkManager-dispatcher.service.
Created symlink /etc/systemd/system/network-online.target.wants/NetworkManager-wait-online.service → /usr/lib/systemd/system/NetworkManager-wait-online.service.
[root@archiso /]# _
```

Install Arch cont..

- exit
 - Leave chroot
- umount -R /mnt
 - Unmount root partition
- shutdown now
 - Shutdown immediately

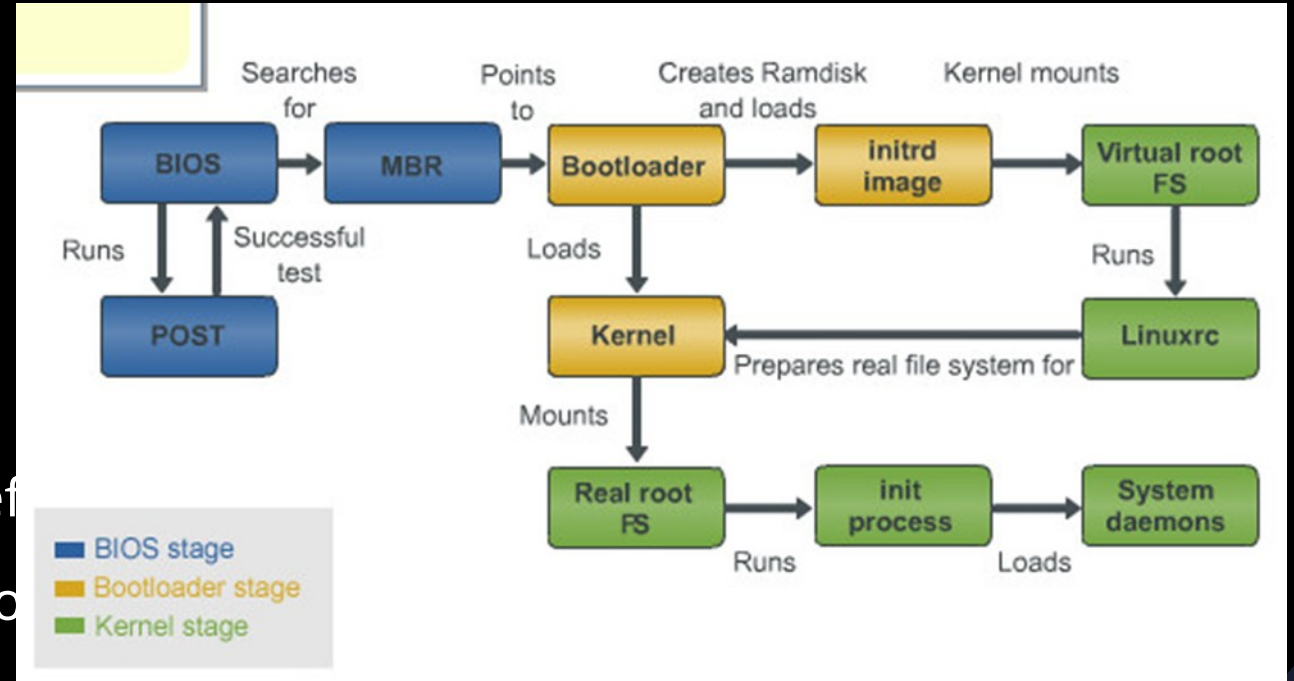
```
Custom Arch - VMware Workstation 17 Player (Non-commercial use only)
Player | || | |
--> Running build hook: [keymap]
--> Running build hook: [consolefont]
==> WARNING: consolefont: no font found in configuration
--> Running build hook: [block]
==> WARNING: Possibly missing firmware for module: 'qed'
==> WARNING: Possibly missing firmware for module: 'qla2xxx'
==> WARNING: Possibly missing firmware for module: 'aic94xx'
==> WARNING: Possibly missing firmware for module: 'bfa'
==> WARNING: Possibly missing firmware for module: 'qla1280'
==> WARNING: Possibly missing firmware for module: 'wd719x'
--> Running build hook: [filesystems]
--> Running build hook: [fsck]
==> Generating module dependencies
==> Creating zstd-compressed initramfs image: '/boot/initramfs-linux-fallback.img'
==> Image generation successful
(10/22) Updating the appstream cache...
? Metadata cache was updated successfully.
(11/22) Reloading system bus configuration...
Skipped: Running in chroot.
(12/22) Warn about old perl modules
perl: warning: Setting locale failed.
perl: warning: Please check that your locale settings:
    LANGUAGE = (unset),
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    LC_MESSAGES = "",
    LANG = "en_US.UTF-8"
are supported and installed on your system.
perl: warning: Falling back to the standard locale ("C").
(13/22) Updating fontconfig cache...
(14/22) Probing GDK-Pixbuf loader modules...
(15/22) Updating GIO module cache...
(16/22) Compiling GSettings XML schema files...
(17/22) Probing GTK3 input method modules...
(18/22) Updating icon theme caches...
(19/22) Updating GTK4 module cache...
(20/22) Reloading GVFS config...
killall: /proc lacks process entries (not mounted ?)
(21/22) Updating the desktop file MIME type cache...
(22/22) Updating X fontdir indices...
[root@archiso /]# systemctl enable gdm.service
Created symlink /etc/systemd/system/display-manager.service → /usr/lib/systemd/system/gdm.service.
[root@archiso /]# systemctl enable NetworkManager.service
Created symlink /etc/systemd/system/multi-user.target.wants/NetworkManager.service → /usr/lib/systemd/system/NetworkManager.service.
Created symlink /etc/systemd/system/dbus-org.freedesktop.nm-dispatcher.service → /usr/lib/systemd/system/NetworkManager-dispatcher.service.
Created symlink /etc/systemd/system/network-online.target.wants/NetworkManager-wait-online.service → /usr/lib/systemd/system/NetworkManager-wait-online.service.
[root@archiso /]# exit
exit
arch-chroot /mnt 26.07s user 37.27s system 4% cpu 25:02.96 total
root@archiso ~ # umount -l /mnt
root@archiso ~ # shutdown now_
```

Install Complete



Review

- Linux is just a kernel
- Systemd – the default init process
- Linux filesystems – ext4, swap, zfs, ef
- Build your own Arch ISO with archiso
- Install it in a VM



Questions???

