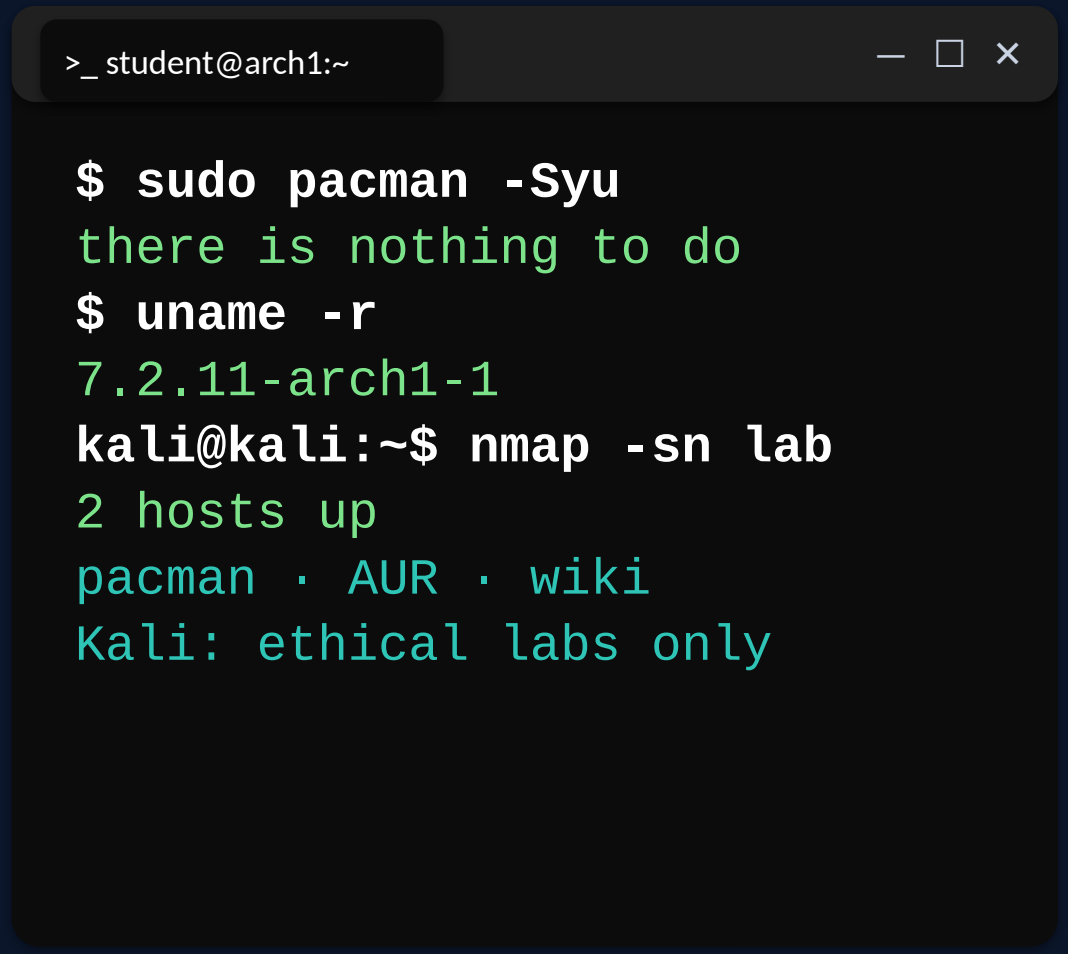


LESSON 3 OF 12

Arch & Kali Linux

Rolling · pacman · AUR · Security Lab

pacman: Packages, Repositories, Mirrors & Keys

Full Course · Arch 2026.11 · Kali 2026.3 (Nov 2026)

What You Will Learn in Lesson 3

- pacman operations: -S, -R, -Q, -F, -U and their flags
- The one rule: full upgrades only (pacman -Syu)
- Official repos: core, extra, multilib (and testing)
- Mirrors with reflector
- Package signing, archlinux-keyring and pacman-key
- .pacnew / .pacsave files and pacdiff
- The cache, downgrades and the Arch Linux Archive

pacman Operations

Command	Meaning
pacman -Syu	Sync databases (y) and upgrade everything (u) — the daily command
pacman -S nginx	Install from the repos (S = sync)
pacman -Ss / -Si nginx	Search repos / show repo package info
pacman -Rns nginx	Remove + unneeded dependencies (s) + config backups (n)
pacman -Q / -Qi / -Ql nginx	Query installed: list / info / files
pacman -Qo /usr/bin/ssh	Which package owns this file?
pacman -F bin/dig	Search files in packages not installed (after pacman -Fy)
pacman -U ./pkg.pkg.tar.zst	Install a local or downloaded package file

Everyday pacman

```
[student@arch1 ~]$ sudo pacman -Syu
:: Synchronizing package databases...
 core / extra / multilib is up to date
:: Starting full system upgrade...
Packages (14) linux-7.2.11.arch1-1 mesa-1:26.2.6-1 systemd-262.1-1 ...
:: Proceed with installation? [Y/n] y
[student@arch1 ~]$ sudo pacman -S --needed htop btop fastfetch
[student@arch1 ~]$ pacman -Qe | wc -l           # explicitly installed
[student@arch1 ~]$ pacman -Qdtq                 # orphans (unneeded deps)
[student@arch1 ~]$ sudo pacman -Rns $(pacman -Qdtq)
[student@arch1 ~]$ pacman -Qkk openssh 2>&1 | tail -1   # verify files
```

The One Rule: No Partial Upgrades

Do	Don't
sudo pacman -Syu (every few days)	sudo pacman -Sy then pacman -S somepkg
sudo pacman -Syu somepkg (upgrade + install)	Hold back core libraries for months
Read archlinux.org/news before big updates	Upgrade blindly during an important deadline
Reboot after kernel/systemd/glibc updates	Mix packages from different snapshots
Why	Arch supports only fully updated systems — partial upgrades break library links

Repositories and pacman.conf

```
[student@arch1 ~]$ grep -v '^#' /etc/pacman.conf | grep -v '^$'
[options]
HoldPkg     = pacman glibc
Architecture = auto
Color
ParallelDownloads = 5
SigLevel    = Required DatabaseOptional
[core]
Include = /etc/pacman.d/mirrorlist
[extra]
Include = /etc/pacman.d/mirrorlist
[multilib]                    # 32-bit libs: Steam, Wine (uncomment to enable)
Include = /etc/pacman.d/mirrorlist
# core-testing / extra-testing: for testers only
```

Fast Mirrors with reflector

```
[student@arch1 ~]$ sudo pacman -S reflector
[student@arch1 ~]$ sudo cp /etc/pacman.d/mirrorlist /etc/pacman.d/mirrorlist.bak
[student@arch1 ~]$ sudo reflector --country 'United States' --protocol https \
      --latest 20 --sort rate --save /etc/pacman.d/mirrorlist
[student@arch1 ~]$ head -5 /etc/pacman.d/mirrorlist
Server = https://mirror.example.edu/archlinux/$repo/os/$arch
[student@arch1 ~]$ sudo vim /etc/xdg/reflector/reflector.conf
[student@arch1 ~]$ sudo systemctl enable --now reflector.timer   # weekly refresh
[student@arch1 ~]$ sudo pacman -Syyu    # force-refresh databases after changing mirrors
```

Package Signing and Keys

```
[student@arch1 ~]$ pacman -Qi archlinux-keyring | grep Version
[student@arch1 ~]$ sudo pacman-key --list-keys | grep -c pub
# Error: 'signature from ... is unknown trust' / 'invalid or corrupted package'
[student@arch1 ~]$ sudo pacman -Sy archlinux-keyring && sudo pacman -Su
# Long-offline machine? Update the keyring first, then the rest.
[student@arch1 ~]$ systemctl list-timers | grep archlinux-keyring   # automatic refresh
# Last resort — reinitialize:
[student@arch1 ~]$ sudo rm -r /etc/pacman.d/gnupg && sudo pacman-key --init \
      && sudo pacman-key --populate archlinux
```

.pacnew Files, Cache and Downgrades

```
warning: /etc/pacman.conf installed as /etc/pacman.conf.pacnew
[student@arch1 ~]$ sudo DIFFPROG='vim -d' pacdiff        # merge new defaults

[student@arch1 ~]$ du -sh /var/cache/pacman/pkg
[student@arch1 ~]$ sudo paccache -rk2                    # keep 2 versions per package

# Downgrade a package that broke something
[student@arch1 ~]$ ls /var/cache/pacman/pkg/ | grep mesa
[student@arch1 ~]$ sudo pacman -U /var/cache/pacman/pkg/mesa-1:26.2.5-1-x86_64.pkg.tar.zst
# Not in cache? archive.archlinux.org/packages/m/mesa/
# Then report the bug and upgrade again when it is fixed
```

Summary and Homework

- -S install, -R remove, -Q query, -F files, -U local file
- Always full upgrades: pacman -Syu (never -Sy + -S)
- core, extra, multilib; pacman.conf: ParallelDownloads, Color
- reflector + reflector.timer for fast mirrors
- Keyring errors: pacman -Sy archlinux-keyring first
- Homework: enable multilib, run reflector, find orphans, merge a .pacnew with pacdiff

Thank You! 🙏

Free videos & PDFs: www.MyWebUniversity.com

Slides for this lesson: MyWebUniversity.com/presentations

YouTube: @MyWebUniversity · @MyWebUniversity-Dari

Wahidullah Lutfy — Founder and Director of IT of MyWebUniversity, and CS teacher

Book: The Direct Path to Linux Ubuntu (Amazon · Barnes & Noble)

Learn it, then pass it on.