Chrome OS

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Chrome OS Flex: How to Use It Without Installing

1. Introduction (Background & Motivation)

ChromeOS is an operating system developed and designed by Google. It is derived from the open-source ChromiumOS operating system and uses the Google Chrome web browser as its principal user interface.

Google announced the project in July 2009, initially describing it as an operating system where applications and user data would reside in the cloud. ChromeOS was used primarily to run web applications.

ChromeOS supports progressive web applications, Android apps from Google Play and Linux applications.

In 2006, Jeff Nelson, a Google employee, created the concept of what would become ChromeOS, initially codenamed "Google OS" as a Linux distribution focused on speed. Early Google OS versions used Firefox as Chrome has not been released, although it switched to Chrome sometime in 2007 due to internal betas being passed around Google.

To ascertain marketing requirements, developers relied on informal metrics, including monitoring the usage patterns of 200 machines used by Google employees. Developers also noted their own usage patterns.

Google requested that its hardware partners use solid-state drives "for performance and reliability reasons" as well as the lower capacity requirements inherent in an operating system that accesses applications and most user data on remote servers. In November 2009, Matthew Papakipos, engineering director for the ChromeOS, announced that ChromeOS would only support solid-state storage (i.e. not mechanical hard-disks), and noted that ChromeOS only required one- sixtieth as much drive space as Windows 7.Ten years later, in 2019, the recovery images Google provided for ChromeOS were still only between 1 and 3 GB in size.

On November 19, 2009, Google released ChromeOS's source code as the ChromiumOS project. At a November 19, 2009 news conference, Sundar Pichai–at the time Google's vice president overseeing Chrome–demonstrated an early version of the operating system. He previewed a desktop which looked very similar to the desktop Chrome browser, and in addition to the regular browser tabs also had application tabs, which take less space and

can be pinned for easier access. At the conference, the operating system booted up in seven seconds, a time Google said it would work to reduce. Additionally, Chris Kenyon, vice president of OEM services at Canonical Ltd, announced that Canonical was under contract to contribute engineering resources to the project with the intent to build on existing open-source components and tools where feasible.

Canonical was an early engineering partner on the project, and initially ChromiumOS could only be built on an Ubuntu system. In February 2010, the ChromiumOS development team switched to Gentoo Linux because Gentoo's package management system *Portage* was more flexible. The ChromiumOS build environment is no longer restricted to any distribution, but installation and quick - start guides use Debian's (and thus also Ubuntu's) *apt* syntax.

Chrome OS Flex is an operating system developed by Google as a lightweight alternative to traditional systems like Windows and macOS. It is cloud-first, designed to be fast, secure, and simple to use, with an emphasis on web applications and online services. Chrome OS Flex is specifically tailored to revive aging hardware that may no longer support modern operating systems efficiently.

The motivation behind choosing Chrome OS Flex lies in its efficiency, minimal resource usage, and the growing relevance of cloud computing. Educational institutions, businesses, and individual users are increasingly moving toward cloud-based environments. Chrome OS Flex helps reduce e-waste and supports sustainability by extending the life of older machines.

2. Objectives

- ✓ To install and evaluate Chrome OS Flex on a physical or virtual system.
- ✓ To document and analyze the installation process and user experience.
- ✓ To identify technical challenges during the process and provide practical solutions.
- ✓ To understand the file system used and its impact on performance and stability.
- ✓ To assess the benefits and drawbacks of Chrome OS Flex.

3. Requirements

3.1. Hardware Requirements

- ➢ USB Flash Drive: Minimum 8GB (Used: 32GB)

- Processor: Intel or AMD x86_64
- RAM: Minimum 4GB
- No internal storage used; Chrome OS Flex was run entirely from the USB flash drive.
- Stable internet connection for setup

3.2. Software Requirements

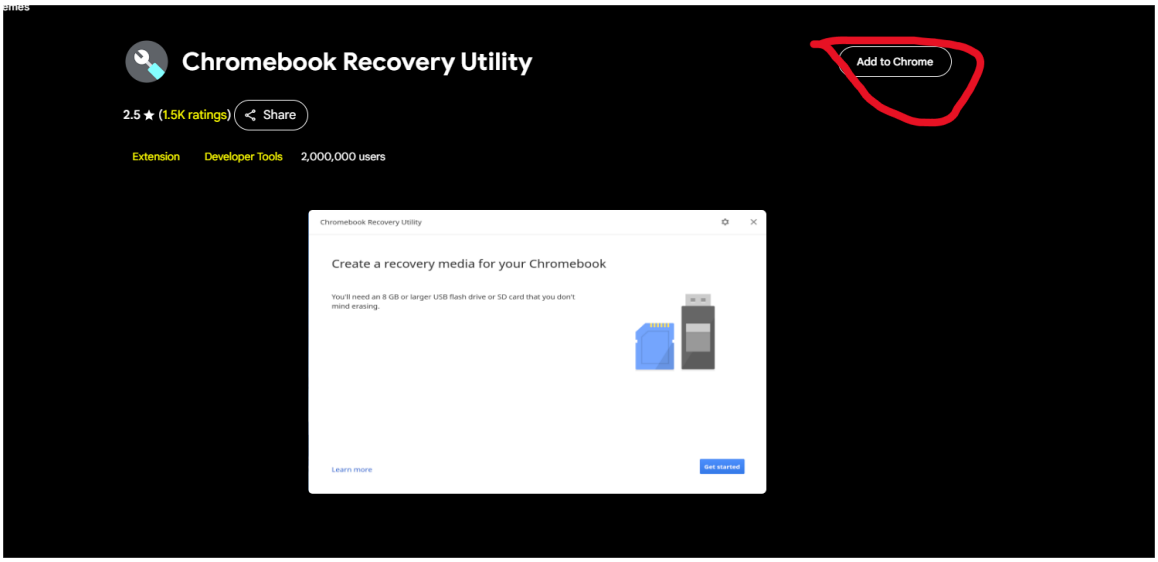
→ Google Chrome browser
→ Chromebook Recovery Utility (Chrome extension)
→ Chrome OS Flex recovery image (downloaded automatically)
→ Optional: VirtualBox or VMware Workstation for virtual installations

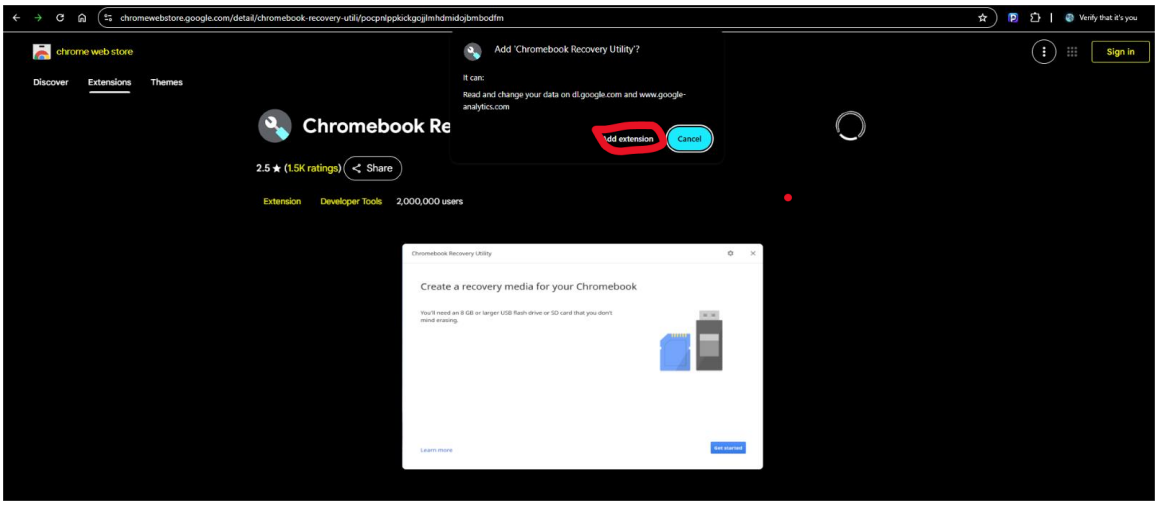
4. Installation Steps

4.1. Step-by-Step Procedure

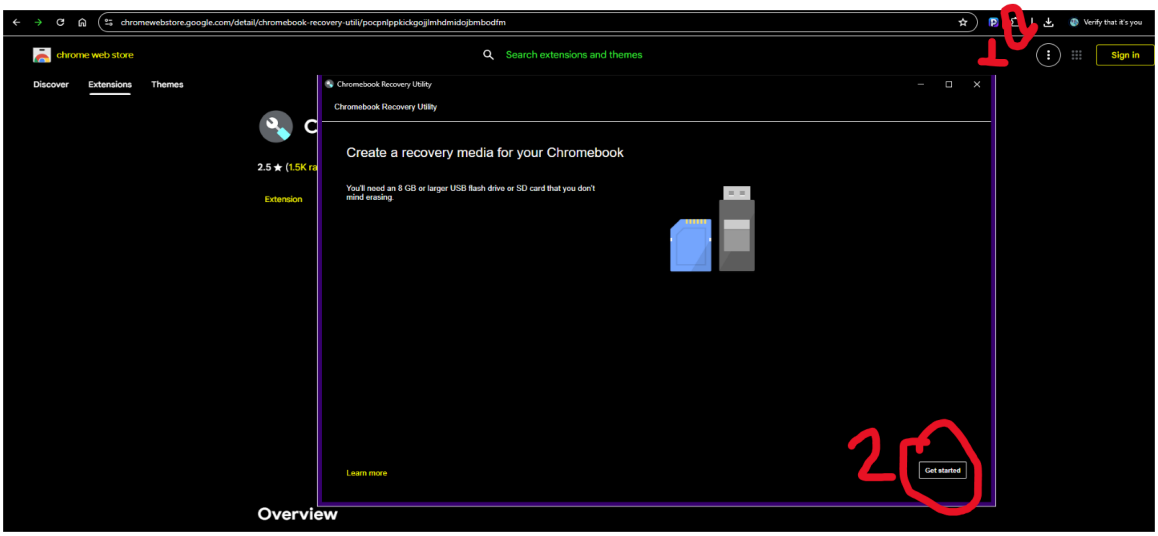
i. Open the Google Chrome browser and type 'Chromebook Recovery Utility' in the search bar.

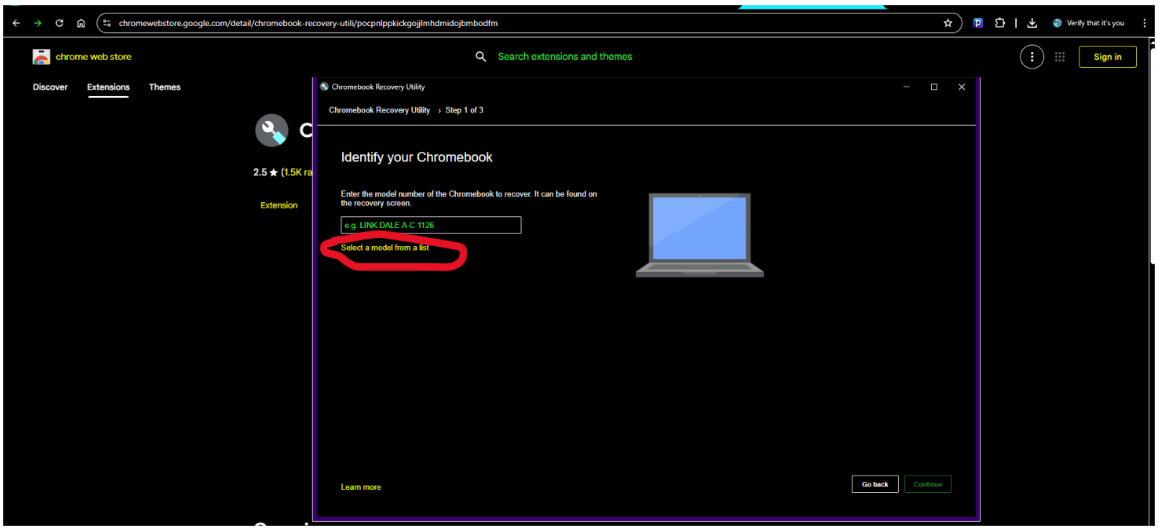
ii. Install the "Chromebook Recovery Utility" extension from the Chrome Web Store



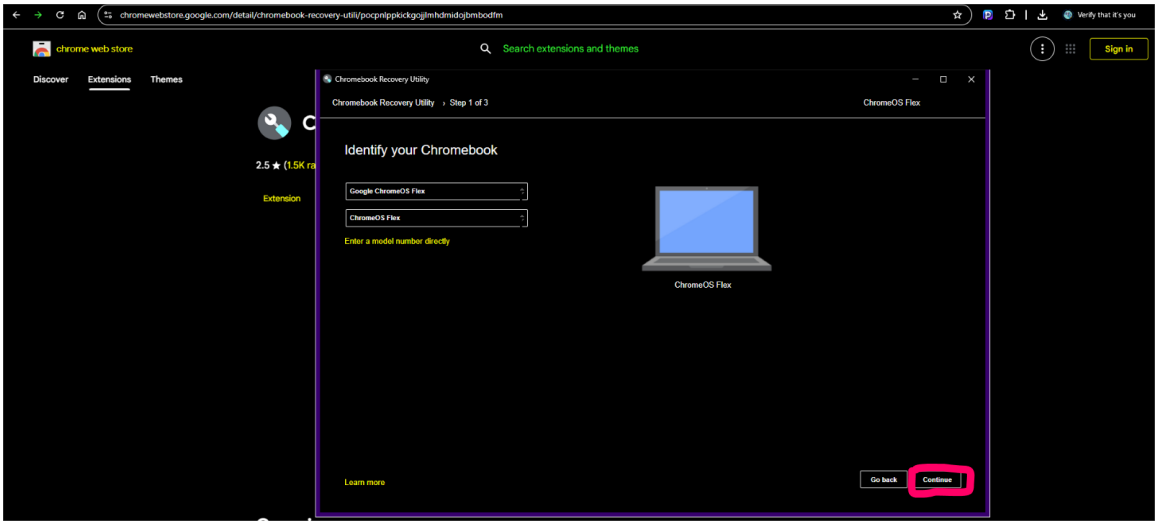


iii. Launch the utility and select "Google Chrome OS Flex" > "Chrome OS Flex (Developer-Unstable)"

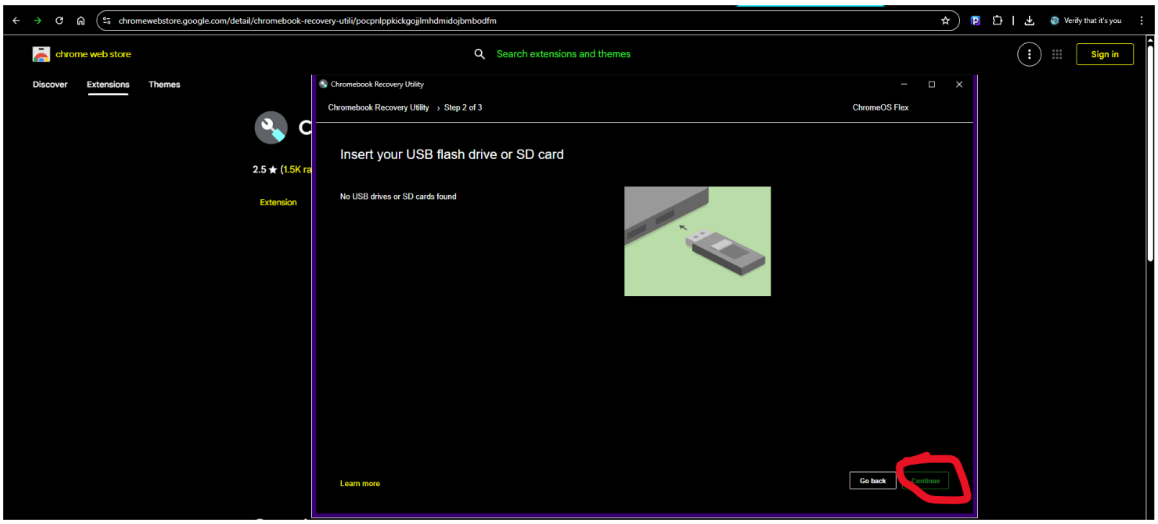




Set 'Select a manufacturer' to 'Google Chrome OS Flex' and 'Select a product' to 'Chrome OS Flex'.



iv. Insert the USB flash drive (32GB SanDisk).

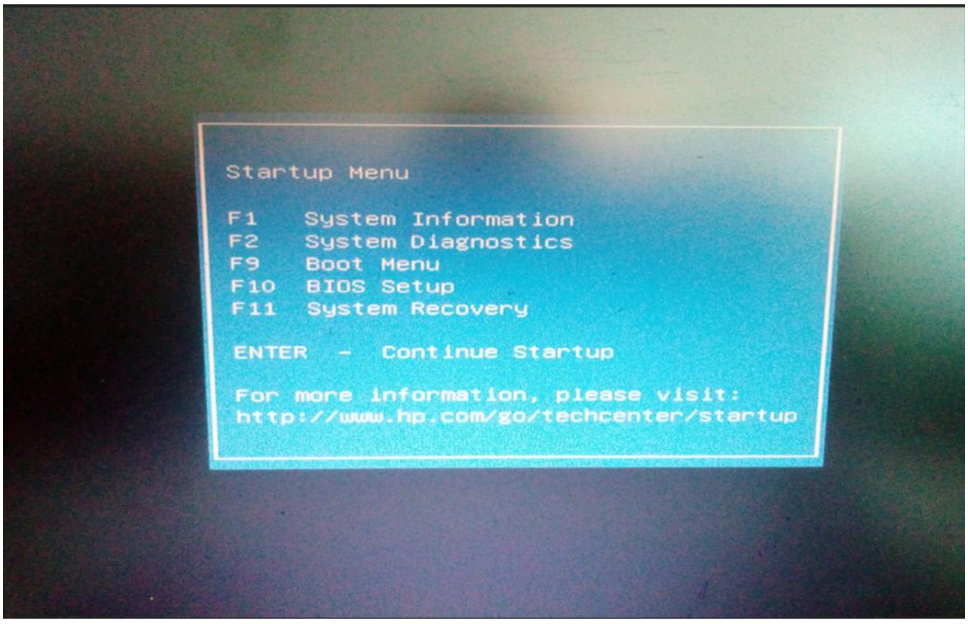


v. Follow on-screen instructions to write the image to the USB.

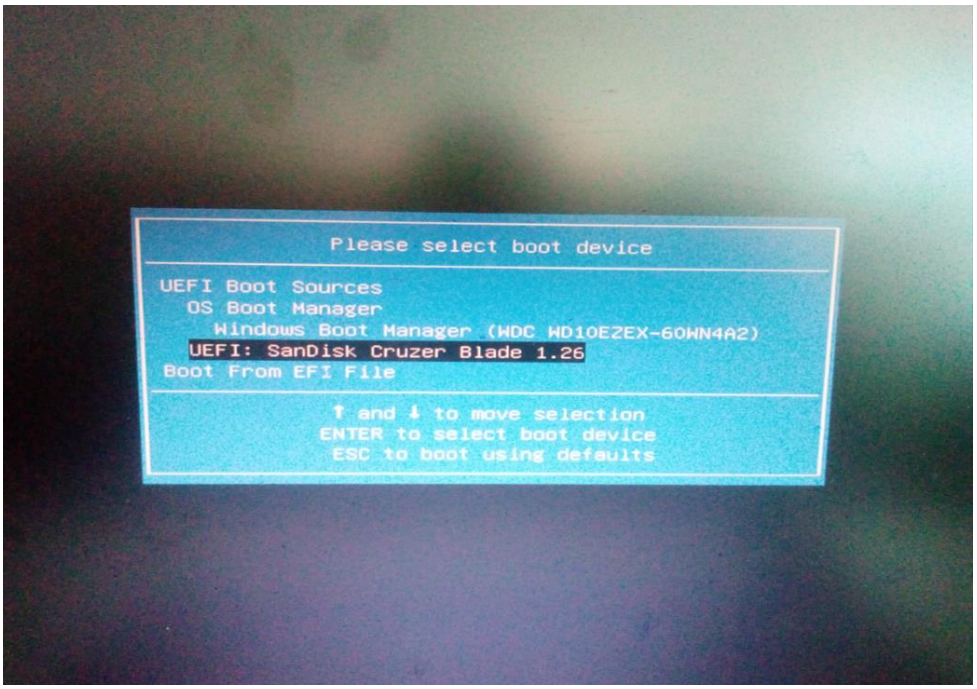
vi. After completion, eject the USB safely.

vii. Insert the USB into the target PC and power it on.

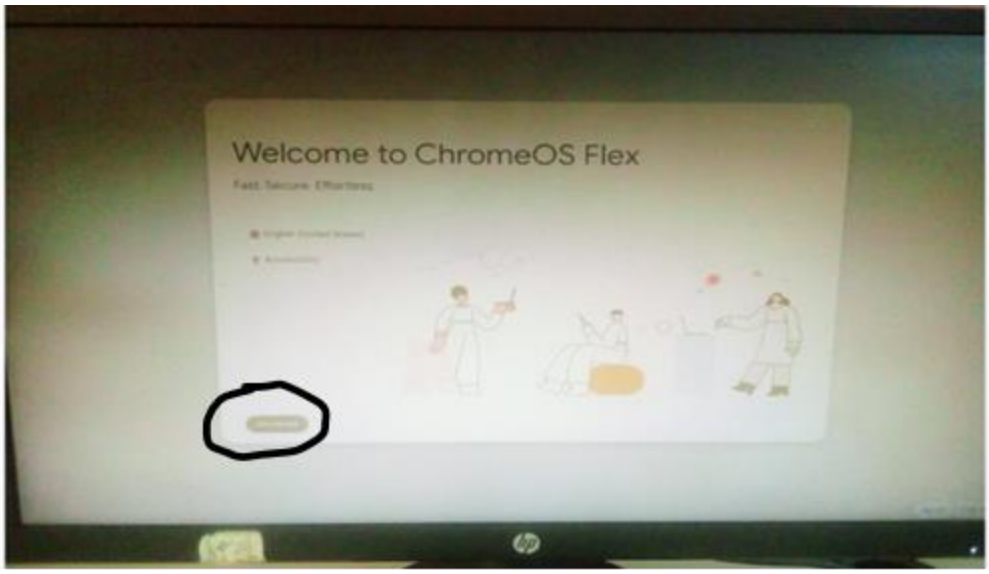
Viii. Enter the boot menu by pressing the appropriate key (e.g., F12 for Dell, Esc for HP).

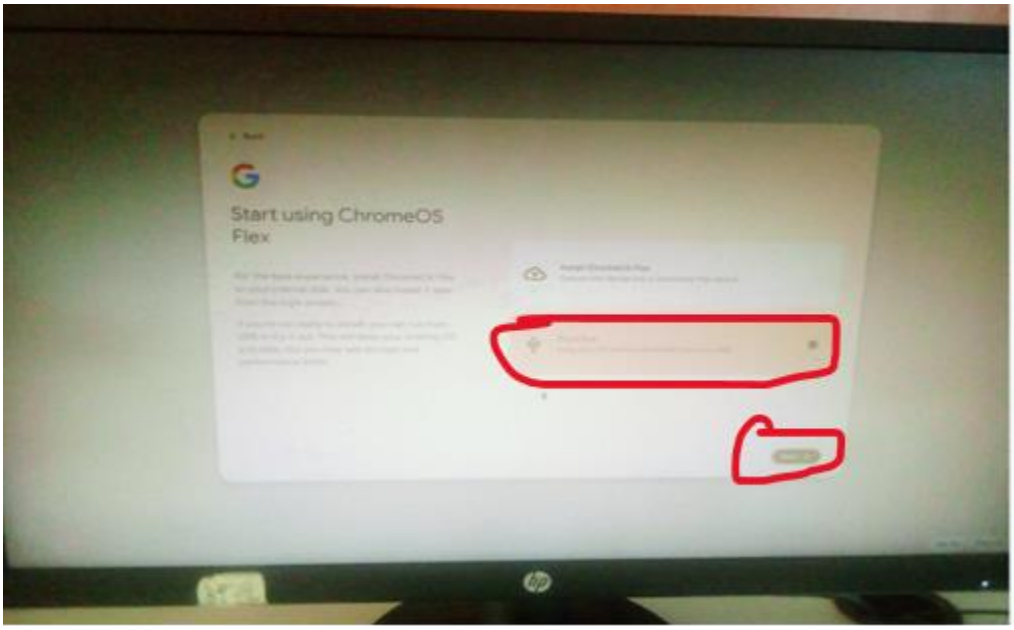


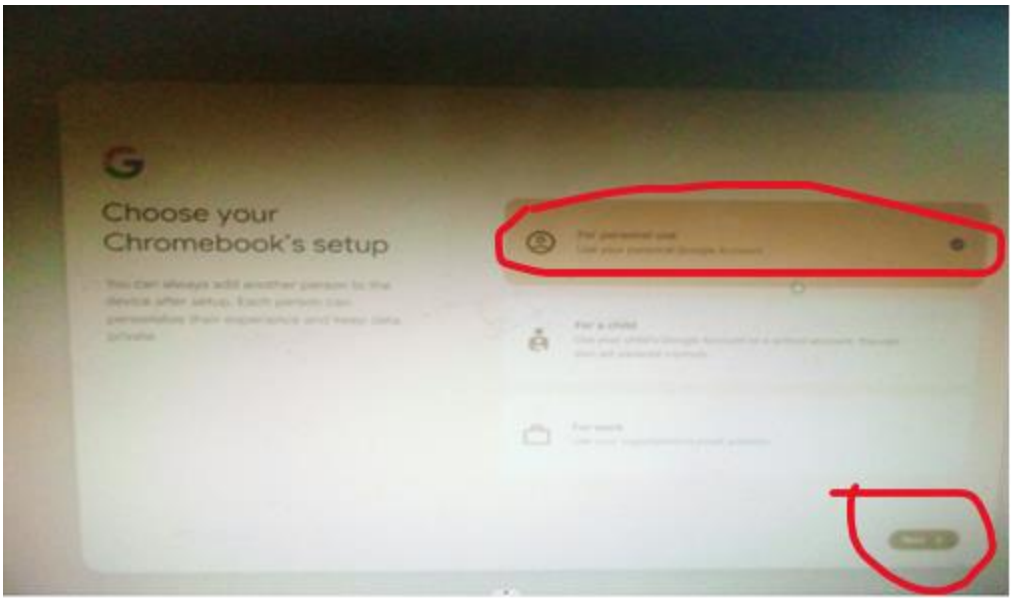
ix. Select the USB device from the list and boot into Chrome OS Flex.

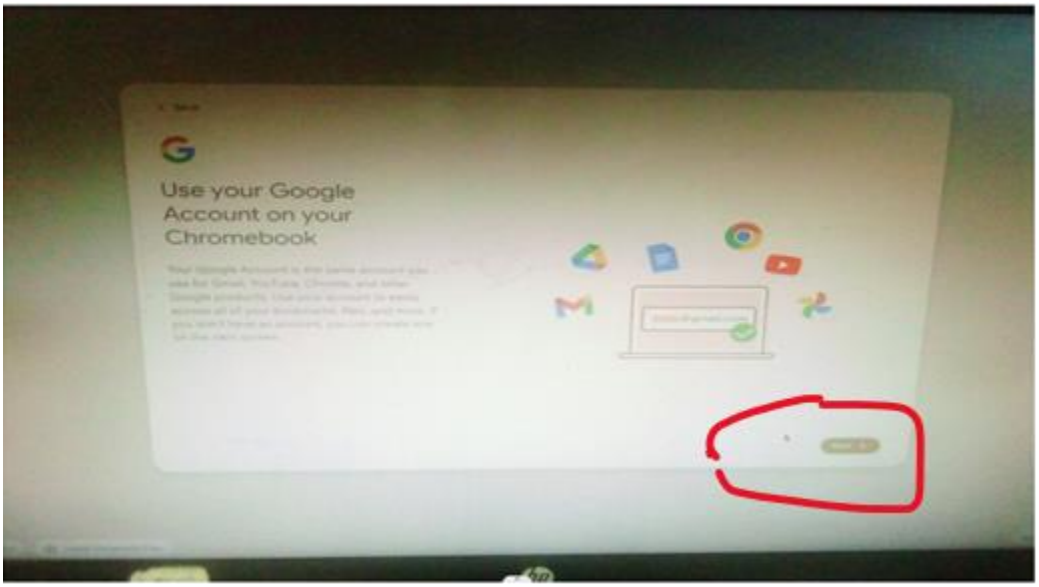


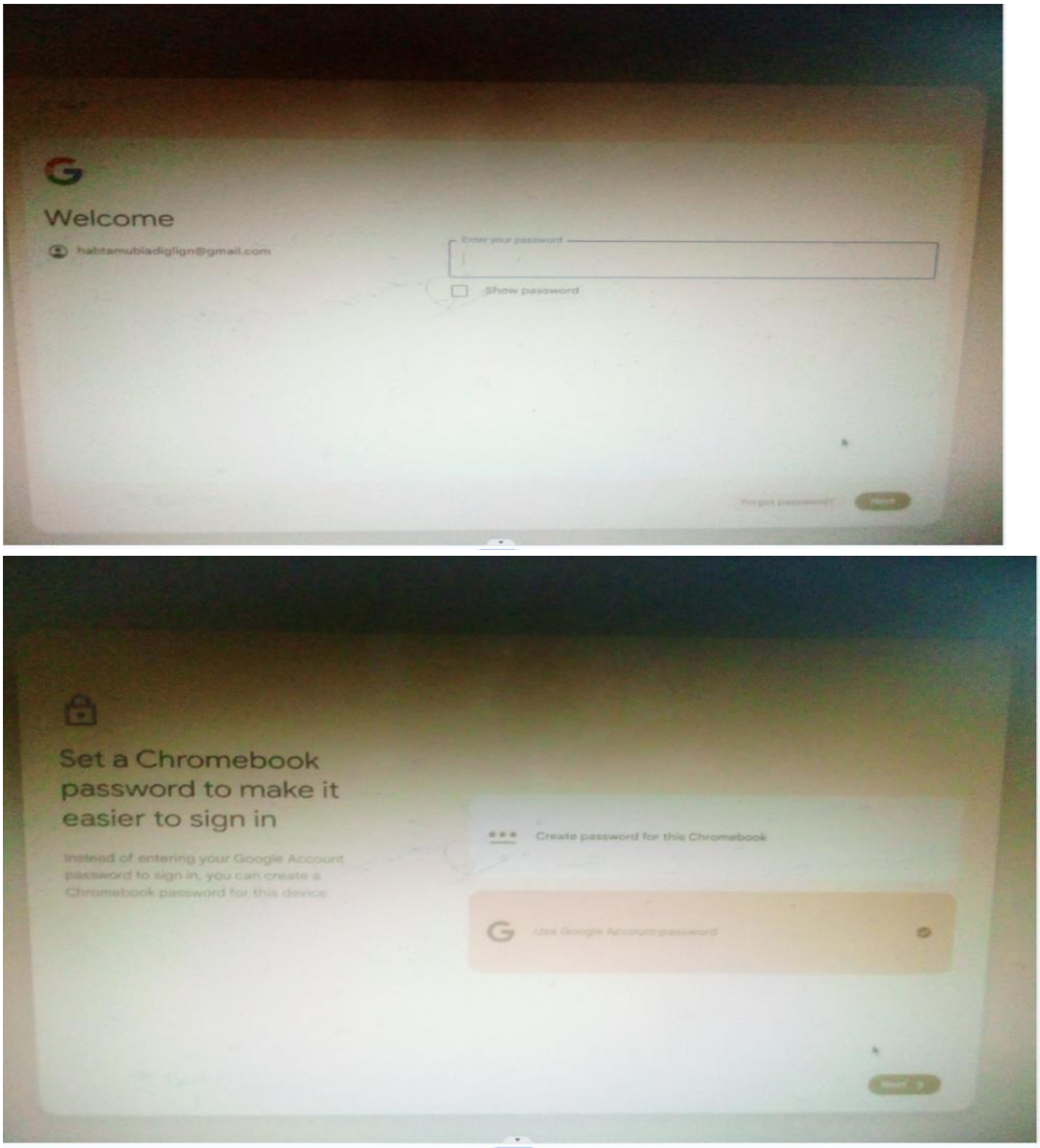
x. Choose to try or install Chrome OS Flex. For this project, the OS was run live from the USB without installing it to internal storage.


Welcome to ChromeOS Flex


Start using ChromeOS Flex


Choose your Chromebook's setup


Use your Google Account on your Chromebook



4.2. Account Naming

During account setup, a user profile was created using the full name as required.

5. Issues (Problems Faced)

- The USB was not detected during boot due to legacy BIOS settings.
- Bootable USB created improperly when using third-party tools.
- Slow performance in virtual machines.
- Requirement for internet connection during setup.

- ➢ Limited peripheral support on some older laptops (e.g., sound or Wi-Fi not working).

6. Solutions

→ Enabled "Legacy USB Support" and "UEFI Boot" in BIOS.
→ Re-created the bootable USB using the official Chromebook Recovery Utility.
→ Used USB 3.0 ports to improve booting speed.
→ Connected via Ethernet when Wi-Fi was unsupported.
→ Selected compatible hardware to avoid driver issues.

7. Filesystem Support

Chrome OS Flex uses **ext4** as its primary filesystem, which is known for its reliability and performance. When preparing the USB installer, **FAT32** or **exFAT** is typically used to maintain compatibility across different platforms.

Common Filesystems:

- **ext4**: Main filesystem for Linux-based systems; stable and efficient. The EXT4 filesystem primarily improves performance, reliability, and capacity. To improve reliability, metadata and journal checksums were added. To meet various mission-critical requirements, the filesystem timestamps were improved with the addition of intervals down to nanoseconds. The addition of two high-order bits in the timestamp field defers the Year 2038 problem until 2446—for EXT4 filesystems, at least.
- **FAT32/exFAT**: Used for USB drives; compatible with most OS. FAT32, part of the File Allocation Table family of file systems having been originally created for floppy disk storage. It was introduced in Windows 95 but remains the most common file system today thanks to its usage in memory cards and flash drives.
- **NTFS**: Mostly supported read-only; not ideal for Chrome OS.

Why ext4?

- Journaling features for crash recovery.
- Widely adopted in the Linux ecosystem.
- Offers excellent performance for solid-state drives.

8. Advantages and Disadvantages

Advantages:

- Lightweight and fast booting OS
- Cloud-first with Google integration
- Extended life for old hardware
- Frequent updates and strong security
- Minimal system requirements

Disadvantages:

- No support for Android or Windows apps
- Internet dependency for full functionality
- Limited customization options
- Some drivers/hardware not supported

9. Conclusion

Chrome OS Flex is an ideal operating system for users looking for simplicity, speed, and efficiency. It offers a second life to outdated computers, especially in educational and enterprise settings. The installation process is straightforward, and issues encountered can typically be resolved with minor troubleshooting. While not a full replacement for general-purpose OSes like Windows or Linux, Chrome OS Flex is excellent for web-based workflows.

10. Future Outlook / Recommendations

- Google may consider supporting Android apps in future releases.
- Improve driver compatibility with legacy hardware.
- Enhance offline usability features.
- Provide native dual-boot options for advanced users.
- Expand support for enterprise-level tools.

11. Virtualization in Modern Operating Systems

What: Virtualization allows multiple operating systems to run simultaneously on a single physical machine through virtual machines (VMs).

Why:

- Resource efficiency
- Testing and development
- Improved security through isolation
- Cost savings in enterprise environments

How:

- Hypervisors like VMware, VirtualBox, and KVM manage VMs.
- Each VM operates with virtualized hardware.
- Hosts and guests interact via software emulation layers.

References:

https://en.wikipedia.org/wiki/ChromeOS#History

https://opensource.com/article/17/5/introduction-ext4-filesystem