



# GOOGLE FUCHSIA: A CAPABILITY BASED OPERATING SYSTEM

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## ABSTRACT

**Fuschia** is a new capability based realtime operating system developed by Google that prioritizes security, updatability, and performance of the system.Fuchsia is based on new kernel,named as Zircon (formerly called Magenta), a medium-sized micro-kernel that is itself based on a project called LittleKernel .Google has been working on Fuchsia for a while and without giving many clues about it.The long-awaited FUCHSIA operating system from Google finally starting to roll out on real Made by Google devices, namely, the first-generation Nest Hub.

**Keywords:**kernel , Flutter, Nest-Hub

## INTRODUCTION

Fuschia is the third major operating system by Google.Its extraordinary quality is flexibility and adaptability that will be an asset in the future.Android, one of the greatest and the world's most powerful mobile platform which has fragmentation issues due to the fact that dozens of manufacturers use different, customized versions rather than the purest version.The new operating system should offer improved security and privacy, according to reports.Fuchsia is a completely new, modern, safer, platform optimised for the challenges of today. The operating system's user interface and applications are written in Flutter,.Flutter is Google's UI toolkit for building beautiful, natively compiled applications for mobile, web, and desktop from a single codebase.From a functional standpoint, the open source nature of Fuchsia invites developers from all over the community to suggest their own tested additions and updates to the operating system.

# Google Operating Systems

The operating system (OS) manages all of the software and hardware on the system, which is usually come pre-loaded on any device. Most people use the operating system that comes with their computer, but it's possible to upgrade or even change operating systems. The three most common operating systems for personal computers are Microsoft Windows, macOS, and Linux. Examples of mobile operating systems include Apple iOS and Google Android.

Fuchsia is the third major operating system from Google. The prior operating systems are Google Chromium OS and Android

## Google Chromium OS

Chromium OS is an open-source project introduced by Google LLC in 2009 aimed for people who spend most of their time on web, which provides a fast, simple and more secure computing experience. Chrome is designed for notebooks and tablets. It is a cloud-based OS, having enormous speed, very low latency, means no need to wait for the web or internet for long to connect. It also has an automatic upgrade system and do not need any manual intervention.

## Android Operating System

The Android operating system is specially designed for mobile system that was developed by Google primarily used for touchscreen devices, cell phones, and tablets. Its simple design lets users to manipulate the mobile devices intuitively, with finger movements such as pinching, swiping, and tapping. Android is, by far the most popular OS on the world, running over 50% of all computing devices. Google develops a new version of Android each year. This powers phones that range from basic "feature phones" to the most advanced. In addition to notebooks, the variants of Android run on TVs, in cars, game consoles, cameras and even watches.

## Long-awaited Google Fuchsia OS

**"Pink + Purple = Fuchsia (a new Operating System)"**. This is the real description from Google which is placed at the top of their GitHub page in August 2016, for their project. This operating system is completely new, has finally arrived on the original Google Nest Hub, which became the world's first commercial Fuchsia device as the company officially launched the OS on 25 May 2021. Google prior operating systems such as Chrome OS and Android are based on Linux kernel. Fuchsia instead relies on the self-developed micro kernel called Zircon. Google's Fuchsia, all in all, is a modular, rights-based, real-time operating system that Google team has been developing since 2016, mostly away from the public eye.

The OS was introduced on Google Nest Hub by replacing its original operating system. The Nest Hub is a smart speaker with a large 7-inch display with built-in Google Assistant and Voice Match. Launched in 2018, the Nest Hub operated on Cast OS, which is also a Linux-based operating system. But with the

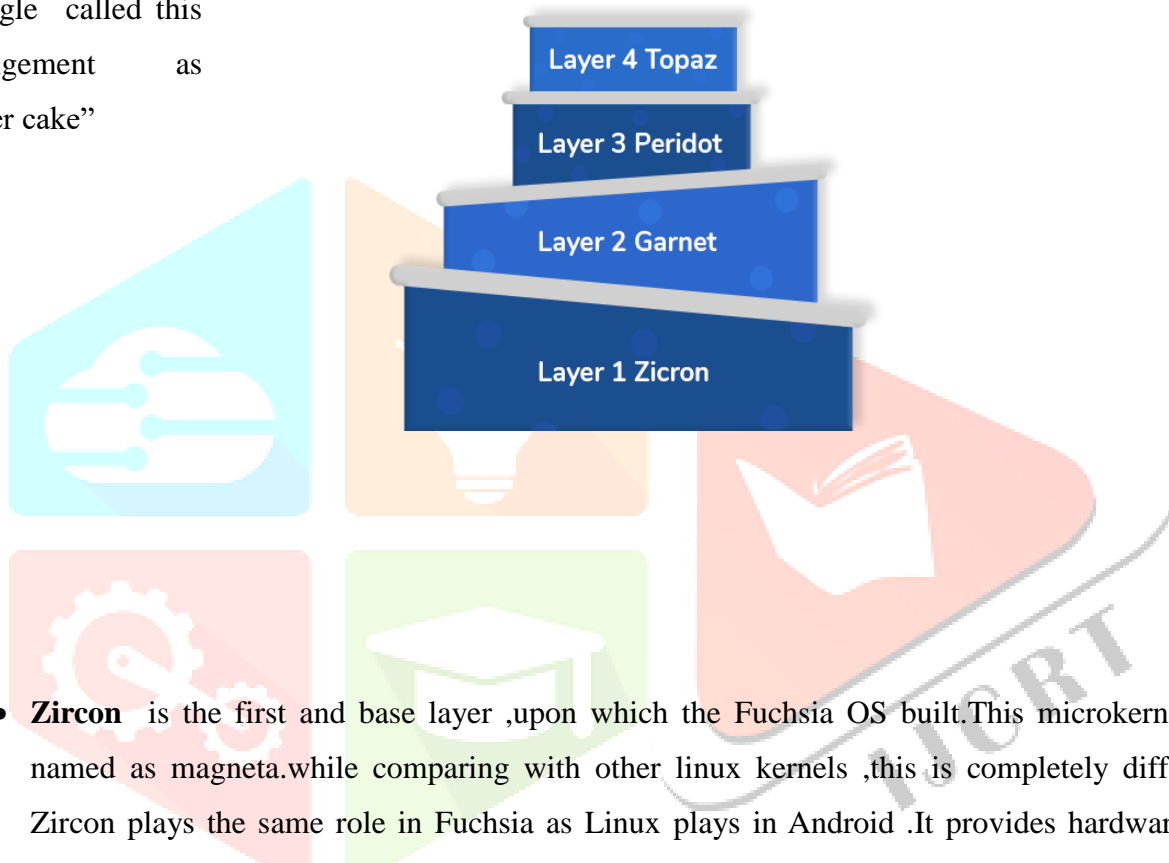
introduction of Fuchsia OS, all user-facing design elements and overall functionality and feature of the Nest Hub will remain the same as before, according to 9to5 Google.

## Fuchsia “layer cake”

Fuchsia is based on a new kernel called zircon, derived from little kernel, a small OS intended for embedded systems.

The Fuchsia is made with four independent modules that have been assigned individual tasks. They are Zircon, Garnet, Peridot, and Topaz.

Google called this arrangement as “layer cake”



- **Zircon** is the first and base layer upon which the Fuchsia OS is built. This microkernel formerly named as magneta. While comparing with other Linux kernels, this is completely different, even Zircon plays the same role in Fuchsia as Linux plays in Android. It provides hardware access at different levels and creates software abstractions over shared hardware resources. It also serves as a platform for small-level software development. The Zircon kernel has also proven to be easy to use, so there is a good chance that more operating systems will adopt this new kernel.
- **Garnet** is a specific layer that contains a variety of device level system services including software installation, administration, communication with remote systems, package management and update system, which includes the different types of drivers like network driver, Wi-Fi driver, graphics driver, etc.
- **Peridot** is a refresher in the operating system and responsible for handling the Fuchsia modular app design which means that everything in Fuchsia either it is the software or the system files are contained in different packages. Further, these packages can be broken into smaller components.

The component is a piece of code designed to do a single job. By combining all these components, you can do anything.

Two major components of peridot are **Maxwell and Ledger**.

Maxwell is a more complicated and works with the operating system as an operating system's artificial intelligence that makes Fuchsia magic. It analyzes the information of the user and makes suggestions based on that. Ledger saves your data around in devices/apps for each component of the OS. For example your location in the app/module across devices and sync to your Google account. It can also be synced across different devices which makes universal access of data.

#### • **Topaz**

Topaz, is the top layer of this Layer Cake, and is the one that directly affects developers and users. Topaz contains four major categories of software: **modules, agents, shells, and runners**. modules include the email, calendar, and terminal modules, shells include the base shell and the user shell, agents include the email and chat content providers, and runners include the Web, Dart, and Flutter runners.

## Conclusion

Fuchsia is a new operating system that is being developed by Google. Google has already developed and improved two operating systems: Chrome OS and Android. As we can see, both operating systems are stable and doing their jobs pretty decently. But all existing operating systems have several pain points. There are no perfect operating systems. We can expect that a new operating system and platform would solve all the issues that are present on modern operating systems. In fact, Google has all these learnings. These reasons bring a higher chance for Fuchsia to become the most successful operating system ever built.

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