

## Using the Chromium Open Source Browser Productively in Business

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Open source software is software for which the source code is viewable and changeable by the public or otherwise open. When the source code is not viewable and changeable by the public, it is considered closed or proprietary.

Source code is the behind-the-scenes programming part of software that users do not usually look at. Source code lays out the instructions for how the software works and how all of the different features of the software work.

Open source software allows programmers to collaborate on improving the software by finding and fixing errors in the code (bug fixes), updating the software to work with new technology and creating new features. The group collaboration approach of open source projects benefits users of the software because errors are fixed faster, new features are added and released more frequently, the software is more stable with more programmers to look for errors in the code and security updates are implemented faster than many proprietary software programs.

Most open source software uses some version or variation of the GNU General Public License (GNU GPL or GPL). The simplest way to think of a GPL similar to a photo that is in the public domain. GPL and public domain both allow anyone to modify, update, and reuse something however they need to. The GPL gives programmers and users the permission to access and change the source code whereas public domain gives users the permission to use and adapt the photo. The GNU part of GNU GPL refers to the licence created for the GNU operating system, a free/open operating system that was and continues to be a significant project in open source technology.

Another bonus for users is that open source software is generally free, however, there may be a cost for extras, such as technical support, for some software programs.

While the concept of collaborative software coding has its roots in 1950-1960s, by the 1970s and 1980s, issues such as legal disputes caused this open collaboration approach for software coding to lose steam. Proprietary software took over the software market until Richard Stallman founded the Free Software Foundation (FSF) in 1985, bringing open or free software back to the forefront. The concept of free software refers to freedom, not cost. The social movement behind free software maintains that software users should have the freedom to see, change, update, fix and add to source code to meet their needs and to be allowed to distribute it or share it freely with others.

The FSF played a formative role in the free and open source software movement with their GNU Project. GNU is a free operating system (a set of programs and tools that instruct a device or computer how to operate), typically released with a set of tools, libraries and applications that together may be referred to as a version or a distribution. GNU is paired with a program called a kernel, which manages the different resources of the computer or device, including communications back and forth between software applications and the hardware.

The most common kernel paired with GNU is the Linux kernel, originally created by Linus Torvalds. This operating system and kernel pairing is technically called the GNU/Linux operating system, though it is often referred to simply as Linux.

For a variety of reasons, including confusion in the marketplace over what the term 'free software' truly meant, the alternative term 'open source' became the preferred term for software created and maintained using the public collaboration approach. The term 'open source' was officially adopted at a special summit of technology thought-leaders in February 1998, hosted by technology publisher Tim O'Reilly. Later that month, the Open Source Initiative (OSI) was founded by Eric Raymond and Bruce Perens as a non-profit organisation dedicated to promoting open source software.

The FSF continues as an advocacy and activist group dedicated to supporting users' freedoms and rights related to the use of source code. However, much of the technology industry uses the term "open source" for projects and software programs that allow public access to source code.

Open source projects are a part of our daily lives. You might be reading this article on your cell phone or tablet, and if so, you are most probably using open source technology right now. The operating systems for both iPhone and Android were originally created using building blocks from open source software, projects and programs.

If you are reading this article on your laptop or desktop, are you using Chrome or Firefox as the web browser? Mozilla Firefox is an open source web browser. Google Chrome is a modified version of the open source browser project called Chromium - though Chromium was started by Google developers who continue to play an active role in the updating and additional development, Google has added programming and features (some of which are not open source) to this base software to develop the Google Chrome browser.

In fact, the internet as we know it would not exist without open source software. The technology pioneers that helped build the world wide web used open source technology such as the Linux operating system and Apache web servers to create our modern-day internet. Apache web servers are open source software programs that process a request for a certain webpage (for example, if you click on a link for a website you would like to visit) by finding and taking you to that webpage. Apache web servers are open source and are maintained by developer volunteers and members of the non-profit organisation called the Apache Software Foundation.

Open source is recreating and reshaping our technology and our daily lives in ways we often do not realise. The global community of programmers who contribute to open source projects continue to grow the definition of open source software and add to the value it brings to our society.

Chromium is the open source project that underpins Google's Chrome browser. Since the project is open source, both Google and others are able to build on and use the Chromium source code. In fact, anyone can download, compile and tinker with the source code for Chromium.

Chromium is an open source browser application that was initially created by Google. Chromium is the source code for what became the Chrome browser. When Google released Chrome in 2008, it also released the Chromium code. The Chromium project is now managed by The Chromium Projects and is designed for developers to create a faster, more stable and safer form for web browsing.

Chrome itself still includes some of the Chromium source code along with proprietary features, such as automatic updates. Google owns and manages the product, which is by far the most popular browser worldwide, with 62.5 percent of the market share as of February 2019.

As a web browser, Chromium is inherently less stable than Chrome which means it crashes more often and can exhibit other types of undesirable behaviour. However, it is compatible

with Chrome browser extensions and offers a very similar user experience without submitting to any invasive information-gathering from Google.

Chromium and Chrome look and feel a lot alike because Chrome is based on Chromium. Chromium and Chrome are very closely related. In very simple terms, Chrome is based almost entirely on Chromium. When Google releases a new version of Chrome, they take stable code from the Chromium project, and they add their own proprietary code to implement features like automatic updates. In this way, Chrome is essentially Chromium with some extra features, and Chromium is the primordial soup from which Chrome emerged.

The purpose of the open source Chromium project is to provide the source code for Google's Chrome browser, which is not open source. This allows Google to receive input from outside sources and iterate on new ideas very quickly. In fact, there are several new builds of the Chromium browser released every single day.

There are few different reasons to use Chromium instead of, or in addition to, Chrome and other browsers. The first is that developers need to use it to see how it works, how it needs to be tweaked and how well updates perform. If you are not a developer, you can also use Chromium for the same purpose by reporting bugs. A major reason why non-developers use Chromium is that it provides a similar browsing experience without any overt connection to Google and this is the business case for using Chromium for specific purposes. Chromium does not collect any of your information and deliver it to Google, so some users are willing to trade stability for privacy.

In addition to working like Chrome, but without intrusion from Google, Chromium also has the benefit of working with regular Google extensions. That means you can usually transition, if you want to, from Chrome to Chromium and install all your favourite extensions.

The main web browser that relies on the Chromium source code is Chrome but there are a number of others that are built on the same platform. These browsers take the Chromium source code and add their own proprietary features and interfaces to create a different user experience.

Here are some of the more popular browsers that are built on Chromium:

Opera - This browser has been around for decades and it used to be based on its own proprietary code. Since 2013, it has relied on Blink which is based on Chromium.

Yandex - This is a Russian browser from the search engine of the same name, but it is based on the same Blink engine that powers Chrome, Opera and other Chromium-based browsers.

Vivaldi - This Chromium-based browser is also a spiritual successor to Opera as it was created by a former Opera CEO to add back features that had been removed from that browser.

**Brave** - This browser was developed by the co-founders of Mozilla but is based on Chromium. The selling point is that Brave removes intrusive advertisements and prevents sites from tracking user behaviour without requiring any plug-ins. It also includes an option to pay your favourite content creators in lieu of viewing advertisements.

**Epic** - This is another privacy-focused browser built on Chromium. It is always in privacy mode so it removes cookies and clears your cache and browsing history every time you close a browsing session.

If you are willing to risk some stability, Chromium gives a good browsing experience and it is easier to install than you may think. While advanced users do have the option of downloading and compiling the source code manually, the rest of you can download and run a fresh build of Chromium with just a few clicks.

You can download Chromium yourself with a couple of clicks.

Here's the easiest way to get your hands on the Chromium web browser:

1. In any browser, go to [download-chromium.appspot.com](https://download-chromium.appspot.com). There are other ways to download and compile Chromium builds manually, but this is the easiest way for a regular user to get their hands on the browser. Visit [chromium.org](https://chromium.org) for more detailed information about how to access source code for Chromium and Chromium OS.
2. At the bottom of the page, next to Supported Platforms, select the appropriate version of Chromium for your operating system.
3. Select download-chromium.
4. Once the download has finished, select and unzip the compressed file to open it.
5. Locate and select the appropriate file for your operating system. Windows users, for example, need to unzip the `chrome-win32.zip` file and select `Chrome.exe`. Mac users can simply select the Chromium application icon to open it.

When you launch Chromium, you will find that it looks and feels a lot like the Chrome browser. Accordingly, you may be tempted to make a permanent switch but it is important to note that raw builds of Chromium are not stable. If you use your web browser for important work, be aware that it may crash at any time.

Chromium has all of the same security strengths and weaknesses as the more stable Chrome browser. Since Chromium is updated far more frequently, it receives security patches before Chrome does.

The issue with Chromium in this regard is that it lacks any kind of automatic update feature. Browsers like Chrome, Firefox and Edge all prompt the user to update on a regular basis. In some cases, the browser may even download and update automatically after enough time has passed. Chromium relies on the user to download updates. So even though the Chromium source code receives security patches and bug fixes before Chrome, it is possible for a user to

continue running a vulnerable version of Chromium without knowing it. If you manually update your copy of Chromium on a regular basis, then it is no less secure than Chrome.

When you download Chromium from a reputable source, then it is in no way a virus or malware. Even though the Chromium project is open source, only trusted developers are allowed to submit changes to the source code. The issue that many users run into is that bad actors take the Chromium source code and combine it with malware or other malicious code. If you accidentally install a fake version of Chromium, a relatively benign result may provide you with a browser that looks like Chrome on the surface but injects obnoxious pop-up advertisements. More serious issues include keylogging, data theft or including your computer in a malicious botnet.

If you downloaded Chromium from a reputable source and you have a legitimate copy, then uninstalling it is a straightforward process. The general procedure is exactly the same as it is for uninstalling other programs on your computer.

To uninstall Chromium on Windows 10, follow these steps:

1. Press the Windows key + S.
2. Type uninstall.
3. Select Add or remove programs.
4. Locate Chromium and select Uninstall. Uninstalling Chromium is easy, unless you have a fake version.
5. The program will be completely removed from your system. Remember that you may need to restart your computer once the uninstall is complete. If you do not see Chromium in the add or remove programs list and you downloaded Chromium from [download-chromium.appspot.com](http://download-chromium.appspot.com), deleting the files you downloaded will remove Chromium. If you obtained Chromium from another source or you do not remember having installed it at all, you may have a malware-infested version.

To uninstall Chromium on a Mac, follow these steps:

1. Select Finder on your dock.
2. Locate and right-click Chromium. (In most systems it will be found in the Applications folder.)
3. Select Move to Trash. In cases where you are unable to delete or install Chromium, you may have malware disguised as Chromium or a version of Chromium that has been modified with malicious code.

We looked closely at the pros and cons of both Google Chrome and Chromium to help you make an informed decision as to which one is best for you.

## Overall Findings

### Chrome

Proprietary. It is free to download and use but you cannot decompile, reverse engineer or use the source code to build another program.

Unlike Chromium, Chrome has automatic updates, tracks browsing data and has native support for Flash.

### Chromium

Free and open source. Anyone can modify the source code in whatever way they please.

Supplies most of the source code for Chrome.

No auto updates, browsing data or Flash support.

Regular users can download a frequently updated version of Chromium, compiled and ready to use, from [download-chromium.appspot.com](http://download-chromium.appspot.com).

### Chrome Pros and Cons

#### Advantages

Updates automatically.

Native support for Adobe Flash and media codes.

Stabler and easier to use.

#### Disadvantages

No support for extensions not found at the Chrome Web Store.

Tracks browsing history and data.

For regular web users, Chrome is the better choice. It offers a safe and stable browsing experience due to the automatic updates and error reports. Unlike its open source alternative, Chrome offers native support for Adobe Flash as well as closed-source media codecs like aac, H.264 and mp3.

Moreover, Chrome's few drawbacks are probably not noticeable if you are not a super user. For example, unlike Chromium, Chrome tracks browsing habits, cookies, history and other data. But you can always use the Chrome Incognito Mode.

By default, Chrome on Windows and Mac only lets you install extensions that are downloaded from the Chrome Web Store. This contrasts with other browsers that allow outside extensions. However, an open platform demands greater scrutiny from the user as outside extensions are sometimes untested or malicious. If you want the freedom to install outside extensions in Chrome, enable developer mode.

If you prefer the safety of automatic updates and an official Google download, then Chrome Canary is almost as cutting edge as Chromium without giving up on those automatic security features.

Chrome Canary sees frequent updates and so it gets new features, new bugs and new security patches more quickly than regular Chrome. Since it is still Chrome, it gets those updates automatically and so you do not need to worry about performing manual updates on a regular basis. You can download the Canary version of Chrome directly from Google. However, Chrome Canary is not updated as regularly as Chromium. Moreover, like Chromium, Chrome Canary is unstable. Do not use Chromium or Chrome Canary for important tasks as your work or progress may be lost at any time due to an unexpected crash.

## Chromium Pros and Cons

### Advantages

- More frequent updates.
- Does not track browsing data.
- Open source.

### Disadvantages

- Updates must be manually downloaded and installed.
- No native support for Flash or media codecs.

Chromium does not offer native support for Adobe Flash. While Flash is not as widespread as it once was, some sites do not work well without it. Because Flash is not open source, Chromium does not natively support it. If you want to use Flash in Chromium, you will need to write or add the necessary code to support it.

Chromium does not support licensed media codecs like aac, H.264, and mp3. Without these codecs, you would not be able to play media in Chromium. If you want to stream video from sites like YouTube, either use Chrome or install these codecs manually.

Also, Chromium does not always have the security sandbox enabled by default. Both Chrome and Chromium have a security sandbox mode but Chromium has it turned off by default in some cases.

While Chromium is a legitimate product, hackers have been using it to deliver adware and potentially unwanted programs, redirect browsers to different websites and track Internet activity. The results of such unwanted software can range from minor irritation to serious privacy concerns, including identity theft.

However, because it is open source, Chromium is vulnerable to misuse. Browser hijackers are a type of malware that makes changes to a user's browser settings without his knowledge or consent. Most users unintentionally download hijacking malware when clicking through online advertisements or when downloading or purchasing other software.

The malware Chromium app uses a virtual layer to push advertisements or redirect browsers to e-commerce websites. Other types can direct users to dangerous, malicious websites that can themselves contain infectious viruses and programs.

What is worse is that the bad Chromium browsers track your browser activity and can grab browsing data including personally identifying information, passwords and financial data such as credit card numbers and bank account numbers. The hackers then sell this information to third parties who often use it illegally. This activity can mean privacy breaches, unwanted use of cards and accounts and identity theft.

There are many different Chromium-based browser applications that are dubious, despite appearing to be legitimate. Usually, these apps claim to improve browsing speed and security and boast of having new features that other browsers lack. These claims lure users into a false sense of security and invite downloads that cause trouble. These questionable app names include BeagleBrowser, BrowserAir, Chedot, eFast, Fusion, MyBrowser, Olcinium, Qword, Torch and Tortuga, among others.

Often, these rogue programs are part of the Custom or Advanced settings of an app. The most common victims of these unwanted applications are users who hastily download software and install it quickly without reviewing each step. To avoid these inadvertent downloads, it is important to pay attention during the download and installation steps. Be wary of any software that is bundled with other programs and never accept offers to install third-party programs.

There is no such thing as a non-harmful malware because they all could potentially damage your system and/or access your most special files and data that you keep on the PC. It is very

important that you learn how to remove Chromium-based malware virus and do it as soon as you realise that something is not working right. Being aware of the existence of various types of malware, how they infect your computer and what they do can help prevent you or your employees from the frustration, time and irritation of Chromium-based malware.

Some signs that your computer has been infected with Chromium-based malware are given below:

Websites whose URLs were never typed appear;

Random advertisements show in the middle or in the corners of your screen in the form of banners, boxes or flashing images.

You can test Chrome builds or Chromium builds. Chrome builds have the most infrastructure for analysing crashes and reporting bugs. They also auto-update as new releases occur which makes them a good choice for most uses. Chrome Canary is available for Windows and Mac and auto-updates daily. Other channels (dev and beta) are available.

Chromium builds do not auto-update and do not have symbols. This makes them most useful for checking whether a claimed fix actually works. Use the following instructions to find builds:

**Easy Point and Click for latest build:**

Open up <https://download-chromium.appspot.com>

**Easy Script to download and run latest Linux build:**

<https://github.com/scheib/chromium-latest-linux>

**Not-as-easy steps:**

Head to <https://commondatastorage.googleapis.com/chromium-browser-snapshots/>

Choose your platform: Mac, Windows, Linux or ChromiumOS.

Pick the Chromium build number you would like to use.

The latest one is mentioned in the LAST\_CHANGE file.

Download the zip file containing Chromium.

There is a binary executable within to run.

File bugs as appropriate.

Now, let us say that you want a build of Chrome 44 for debugging purposes. Google does not offer old builds as they do not have up-to-date security fixes.

However, you can get a build of Chromium 44.x which should mostly match the stable release. Here is how you find it:

Look in <https://googlechromereleases.blogspot.com/search/label/Stable%20updates> for the last time "44." was mentioned.

Look up that version history ("44.0.2403.157") in the Position Lookup. In this case it returns a base position of "330231". This is the commit of where the 44 release was branched, back in May 2015.

Open the continuous builds archive.

Click through on your platform (Linux/Mac/Windows).

Paste "330231" into the filter field at the top and wait for all the results to XHR in.

Eventually, you will get a perfect hit: <https://commondatastorage.googleapis.com/chromium-browser-snapshots/index.html?prefix=Mac/330231/>

Sometimes you may have to decrement the commit number until you find one.

Download and run.

Typically, the above is all right, but if you need a true build of "44.0.2403.x" then you will need to build Chromium from the 2403 branch.

One of my companies, MultiSpectra Technologies, which is a subsidiary of MultiSpectra Consultants, works with the Chromium browser. While we use the Google Chrome browser for business-critical applications because we want a stable browser that will not crash, we use the Chromium browser for development purposes and also for looking at websites, including the website of MultiSpectra Consultants, from a neutral perspective. We have also successfully built a beta version of a forked version of Chromium that we call Chromium from MultiSpectra Technologies by modifying the source code of the Chromium browser. The home page of this fork defaults to <https://multispectraconsultants.com> which is the website of MultiSpectra Consultants. We have parallel installations of Google Chrome and Chromium on our computers including the one I am writing this paper right now.

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