



# Linux and Windows in industrial automation

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The first Linux distributions were introduced in 1992. Since then, there have been thousands of distributions created, and hundreds active at any given time. Linux has been made to work on everything from toasters to the International Space Station. The industrial automation space is no stranger to Linux distributions, but recently, we have seen an uptick of requests on custom and standard industrial computer products. This white paper will explore some advantages and disadvantages of using Linux on industrial computers.

## Reliability

In the industrial world, we mostly deal with devices that need to perform a single set of repeating tasks. Extended uptime and reliability without requiring a restart will increase productivity. Unlike Windows-based computers, most of the time Linux machines do not need to be restarted after installing critical security updates, peripherals, or new software. A fresh installation of Windows 10 has more programs and services doing more things behind the scenes. When an orphaned task develops, it can cause errors that eventually crash the computer. This is considered bad for stability and uptime. If a computer running Linux had similar issues, it could restart its jobs and programs without freezing the entire machine.

We cannot talk about reliability without addressing security issues. Due to the popularity of Windows, it is often the target of spyware, malware, and viruses. Microsoft Windows is a victim of its success. Although it is possible to get a virus on a Linux-based desktop environment, it is unlikely because most attacks are made to target operating systems with a larger, less savvy installation base. Linux also happens to be better at limiting the damage that a malicious application can affect because in Linux, your rights as a user are limited. Primarily, only an admin with the right skills can make system-wide changes.

Another important distinction for reliability when comparing Windows to Linux is the fact that in general, more people are helping to develop tools and programs for a longer period of time. Linux is made by the computing community and is an open source. More people are looking over the source code of widely adopted Linux distributions, and significant issues are seen and fixed by the community, rather than by a single company like Microsoft.

## Software, hardware, and support

Microsoft Windows has been around for a long time. Almost any software you might need can be purchased and downloaded with relative ease. Even complicated SCADA systems have dedicated professionals that are well versed in dealing with Windows. Linux, on the other hand, has a much smaller software library. The people supporting that software are often harder to find, especially if you want to get somebody on the phone because there is no single point of contact when it comes to running (most) Linux distribution.

When it comes to hardware support, generally speaking, the newer the platform, the better the support. According to distrowatch.com, there are currently 285 active Linux distributions. Testing hardware on all the current variations would be extremely labor-intensive and time-consuming.

## Implementation

Loading an OS, whether it's Linux or Windows, is a pretty simple process for computing professionals. There are many resources and loads of people to help you through the beginning process. Once you're sitting at your shiny new desktop, that is when the fun starts. In both Windows and Linux, you can use the internet and install a multitude of software solutions, but you will want to be familiar with using a command line interface to get tasks done in most Linux distributions. Also, offline installations can be much more difficult than in Windows.

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When you need to install software on Windows, it's a simple process. You grab the .exe you need, put it on a thumb drive, then install it on your Windows device. Even if the software is obscure or old, there's a pretty good chance that it works. Life can be much more difficult in the Linux world. The way Linux installs and uses programs is different. Because of that, offline installations can be a hassle, due to dependencies. Rather than having a single file that contains everything like in a .exe in Windows, Linux applications can sometimes require other files to install to get a program up and running. It is not an issue if you are connected to the internet because Linux can grab the files it needs automatically. When you are offline (and don't have a local repository), you may need to hunt Linux forums and download sites for all the necessary dependencies. You need to make sure versions match up and are compatible with other parts of the Linux distributions and hardware. It can get difficult quickly, especially if you are not skilled with Linux.

### Cost

Microsoft Windows 10 LTSC differs in cost depending on your processor, ranging anywhere from the price of a nice lunch to the cost of a nice dinner with wine. Linux is free, but specific

distributions like Red Hat Linux have a range of paid support packages. In the industrial automation world, we've been seeing a rise in users utilizing free distributions of Linux like Ubuntu and Fedora. This makes more financial sense as the number of devices to be deployed increases. For the actual cost of a Linux distribution, you must take into account the effort of the on-site staff who are going to be supporting the products.

### Who is the ideal Linux customer?

You can guarantee any workplace has a Windows expert nearby, but the same is not true for Linux. Although the initial investment cost of running a free version of Linux is low, challenges will occur if the engineering or IT department you are working with is not familiar with the Linux environment. Getting Linux-specific software running and communicating with all the other devices on the network takes specialty knowledge of software and communication protocols; it is not a small undertaking. A motivated customer can learn how to use this unique, stable, and highly customizable operating system, but in short, the ideal Linux customer is someone who has past and current Linux experience.