

Running Windows-applications on a Linux HPC cluster using WINE

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High-Performance Computing (HPC) is an area of computer science where Linux-based operating systems have established their dominance [1]. As a consequence, applications designed purely for Microsoft (MS) Windows do not run on GNU/Linux HPC machines. This is often not an issue if the developers provide binaries for all platforms or if the source code is available, as it might be recompiled for GNU/Linux. However, there are still widely-used applications, such as WarpEM [2] or Imaris, where developers provide only a Windows version, and recompilation on Linux is not always feasible. Thus, there is a need to bridge compatibility between Windows-based applications and GNU/Linux HPC computers.

Solutions based on some kind of virtualization engine might be available but have their own drawbacks (performance penalties, increased memory requirements). In addition, these engines usually don't run in user-space, which is problematic when trying to integrate them with schedulers like SLURM. Therefore, we tested whether such MS-Windows applications could run on our HPC machines using WINE [2], a thin compatibility layer that allows Windows applications to run under GNU/Linux.

We tested whether Warp [2] can run under Wine [3] on our HPC cluster [4] with the following setups: Debian 11 (Bullseye), Wine compiled from source, Wine Staging patches (in order to enable GPU support), X-tunneling through SSH, x2go, and VGL/VNC for remote GUI-based access. So far, we have had success in running WarpEM using Wine Staging v7.17 to v7.21 (with version 7.22 the set of patches for *nvidia-cuda* has been disabled).

Imaris 9.9.1, Imaris Viewer 9.9.1 and 10.0.0 run without issue on newer versions of Wine.

Of course some Windows applications do not run on Wine. For those that we tested and failed, we submitted test reports to the WINE application database [3] (<https://appdb.winehq.org/>).

Specifically, issues have been observed with the graphics stack over remote connections to the cluster. This affects Mesa, x2go, and VirtualGL. To address some of these issues, some newer versions of Mesa have been compiled by us and are provided via the Lmod module system.

Wine and its applications run purely in user-space. This has several advantages, (i) it works well with our scheduling system, (ii) the security assessment is easy, (iii), there is very little computation overhead, (iv) addition layers in the software (hypervisor/emulator) and an additional operating system (MS Windows) can be avoided. Therefore, Wine seems to be a viable option for us to run Windows applications on a GNU Linux cluster.

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References

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