

# Easy Access to Remote Graphical UNIX Applications for Windows Users

Richard R. Repasky, University Information Technology Services, Indiana University, Bloomington, IN 47408, USA

rrepasky@indiana.edu

## ABSTRACT

A barrier deters Windows users from evaluating graphical scientific software that runs only on remote UNIX systems. Graphical UNIX applications are based on X Windows. To make use of X applications, Windows users must install an X server, install communications software for connecting to remote UNIX systems, and configure their systems to display graphics from remote systems. This barrier can be removed by making use of an X server and communications software that run live from CD-ROM. This poster presents such a CD-ROM known as XLiveCD.

XLiveCD appears to users as an application that provides a command-prompt that allows them to log in to remote computers. Windows XP/NT/ 2000 users insert the CD into a drive and click twice in response to a wizard. A terminal window appears on the screen and provides a command prompt. From the command prompt users run the secure shell (ssh) to connect to a remote computer and launch applications. X graphics windows are forwarded automatically.

XLiveCD is based entirely on open source software and is available free for download. It is a Cygwin environment (from Red Hat, Inc.), including the X.org X server and openssh installed and modified to be run from CD-ROM. The home page is <http://xlivecd.indiana.edu/>.

## Categories and Subject Descriptors

J.m [Computer Applications]: Miscellaneous

## General Terms

Documentation, Performance, Design, Economics, Human Factors

## Keywords

Microsoft Windows, X Windows, remote graphical application, X11 forwarding, open source software

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## 1. INTRODUCTION

Faculty and graduate students need easy access to graphical applications on remote UNIX systems. Scientific applications are often developed on UNIX systems, and they may be available only for UNIX or may be available sooner for UNIX than for Windows. However, Windows is more widely used than UNIX for desktop workstations. Windows users can access remote graphical UNIX applications, but the software that is needed to do so is difficult to install and configure. Briefly, graphical UNIX applications are based on X Windows. To make use of X applications, Windows users must install an X server, install communications software for connecting to remote UNIX systems, and configure their systems to display graphics from remote systems. Many users fail at the task.

Access to X applications can be improved if an X server and communications software can be run without installing them or if they can be installed and run with little or no configuration. Indeed, the ability to run software without installing it is desirable because most users are initially interested in evaluating graphical applications: no installation means no barrier to evaluation. Users who infrequently run remote graphical applications may find that they never need to install an X server and communications software. Frequent users will probably want to install an X server and communications software, and they should be able to do so with minimal configuration.

This poster describes a CD-ROM that can be used to access remote graphical UNIX applications without installing an X server or communications software. The CD-ROM is XLiveCD. It behaves as an application that provides access to remote computers and displays remote X graphics windows automatically, and it is freely available under open source licenses. The poster describes how XLiveCD appears to users, the software that runs on the CD, and licensing terms and availability.

## 2. THE USER EXPERIENCE

### 2.1 Basic

XLiveCD appears to users as an application that provides access to remote computers. On Windows XP, NT, and 2000 users can insert the CD into a drive and be presented with a wizard. Windows 98 and ME users need to click on a script in the basal folder of the CD. The wizard presents a brief statement of purpose and license information. When the user continues, the wizard presents three choices: read documentation, run X Windows from the CD, and install

software from the CD. If the user elects to read documentation, a page is presented that summarizes use of the CD and provides links to more information. If the user elects to run X Windows, a single terminal window will appear on the desktop and an X icon will appear in the system tray. The terminal window contains a command prompt that can be used to log into a remote machine using the secure shell (openssh). Forwarding of graphical applications from the remote machine happens automatically. When the user has finished, she can disconnect from remote machines and use the X icon in the system tray to terminate the X server.

## 2.2 Advanced

While the X server is running, it is possible to launch multiple terminal windows and establish multiple logins to remote machines. A shortcut for creating more terminal windows resides on the desktop from the time that the X server starts until it exits.

The command-prompt that is presented by XLiveCD can be used to run commands locally on the workstation. For example, utilities are available for converting plain text files between DOS/Windows format and UNIX format. Many standard UNIX facilities are available from the command prompt including text editors (nano, vi), text extraction (grep), compression (zip, gzip, bzip2), and scripting (bash, tcsh, sed, awk, perl).

Also, the X server on XLiveCD can be used with ssh clients other than the openssh client that is provided on the CD if the ssh clients support X11 forwarding. This may be useful to users who have already installed ssh clients on their workstations. Briefly, the X server displays windows locally, and the ssh client forwards graphics windows from the remote computer to the local X server for display. Any ssh client that can locate the X server should work.

## 2.3 Performance

The cost of running software from a CD-ROM is performance. Performance of XLiveCD is sensitive to the hardware in use. For example, the terminal window appears about 70 seconds after the user launches the X server on a Pentium 450-MHz computer that has a 40-X CD-ROM drive and runs Windows XP. Startup time is about 30 seconds on a dual 3-GHz Xeon processor computer that has a 40-X CD-ROM drive and runs Windows XP.

The ideal use of XLiveCD is for evaluating remote X applications from workstations that lack an X server and an ssh client. A startup time of 30 seconds to 70 seconds may seem like a long time to wait for a terminal window, but it is very short compared to the amount of time required to install an X server, to install an ssh client and to configure them to forward X Windows. The performance of XLiveCD may be acceptable to users who make occasional use of X applications. Users who make regular use of X applications will probably want to install an X server.

## 2.4 Installation

Software on XLiveCD can be installed. The installed software runs much faster than it does from the CD. For example, on a 450MHz Pentium machine startup time is cut from 70 seconds to 30 seconds, and on a dual 3-GHz processor machine, startup time is cut from 30 seconds to 8 seconds. In other respects, the user's experience should be similar to that after launching the X server from the CD.

# 3. THE SOFTWARE

## 3.1 Components

XLiveCD is largely a set of Cygwin software packages that have been installed and modified to run from CD with the feel of an application. Cygwin is an open source, Unix-like environment for Windows from Red Hat, Inc[3]. XLiveCD primarily uses the X.org X server package and the openssh package. Other packages are part of a default install of the Cygwin environment or are needed for XLiveCD. The installed software was modified to be run from CD using methods outlined in a post to the Cygwin mailing list[1].

To give XLiveCD the feel of an application a wizard was introduced to shape events from the time that the CD is inserted to the time that the user quits the X server. The wizard is the Wizard's Apprentice[2]. It is launched by the Windows autostart facility and presents users with the choice of running X from CD, reading documentation or installing the software. If the user chooses to run X, it launches a DOS batch script that prepares the Cygwin environment and then launches a Bourne shell script under Cygwin that runs the X server. The Bourne shell script launches an X terminal window, creates the shortcut on the desktop for launching other terminal windows, launches the copy/paste facility and then runs the X server. It also waits until the X server exits and cleans up by removing the shortcut and shutting down the copy/paste facility. After the Bourne shell script exits, the DOS batch script that launched it, disables the Cygwin environment before exiting.

If software is installed from XLiveCD, the installed software is currently compatible with software that is installed directly from Cygwin[3]. Packages can be upgraded using the Cygwin installer. However, the environment that is installed from CD differs somewhat from an environment that would be installed directly from Cygwin, and there is no guarantee that upgrading packages from Cygwin will always be compatible the installed software. The degree to which software installed from the CD differs from a pure Cygwin environment is documented on the CD.

## 3.2 License

XLiveCD is open source software that is derived primarily from Cygwin[3]. The CD contains many Cygwin packages that are under many different open source licenses. The GNU General Public License is the most common license, and it covers the Cygwin libraries that make XLiveCD possible. The X.org X server is distributable under the X11 license. Scripts that were written specifically for XLiveCD are copyright by the Trustees of Indiana University under the GNU General Public License.

## 3.3 Availability

XLiveCD is available for download as an ISO-9660 CD-ROM image[4].

# 4. DISCUSSION

Easy access to remote graphical UNIX applications for Windows users increases the accessibility of research UNIX systems. XLiveCD allows Windows users to run remote graphical X applications without installing software. For us at Indiana University XLiveCD solves the chronic problem of introducing Windows users to central research systems on campus. We believe that XLiveCD will be useful at any

institution at which X applications on UNIX systems are to be used by people working at Windows workstations.

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## 6. REFERENCES

- [1] Fergus. How to make your own portable Cygwin on CD. <http://www.cygwin.com/ml/cygwin/2003-07/msg01117.html> (visited April 2004).
- [2] D. Nicolaas. The Wizard's Apprentice. <http://wizapp.sourceforge.net/> (visited April 2004).
- [3] Red Hat, Inc. Cygwin. <http://www.cygwin.com/> (visited April 2004).
- [4] Trustees of Indiana University. Xlivecd. <http://xlivecd.indiana.edu/> (visited April 2004).