

High-resolution data visualization is useful when wanting to look at data on a larger scale while maintaining finer details. While using a projector helps show information on a larger scale, the pixels are only enlarged and detail is lost due to the inflated pixel size. By using a grid of monitors, however, one gains a higher resolution and still maintain the details, as well as being able to display more information than a single monitor. In the Innovation Center, there is a wall that is four by four grid of monitors, giving a total resolution of 5120x4096 pixels, or over 20 Mega pixels. Work began with reading up on how the wall is constructed as well as the software behind it.

The wall is constructed using three computers: a head node and two display nodes. The nodes have VNC installed on them, the head node using the server version and the display nodes the viewer version. VNC, or virtual network computing, is a "remote control software which allows you to view and fully interact with one computer desktop (the "VNC server") using a simple program (the "VNC viewer") on another computer desktop anywhere on the Internet" (Online Author unknown accessed 9 June 2008). Software does not even need to be installed, as there is a Java viewer that enables the desktop to be controlled via a browser. The head node would create a display and the display nodes would access it using the viewer. Each computer has four nVidia video cards with dual DVI output to control eight of the monitors, one the top eight and the other the bottom. Further analysis of the communication between the server and viewers will occur in the upcoming weeks when performance is analyzed.

Part of the researching involved reading through the RFB Protocol. RFB, or read frame buffer, is "a simple protocol for remote access to graphical user interfaces" and the protocol used in VNC (Richardson 2007). It is cross-compatible, therefore usable in Windows *nix window and operating systems because it works at the framebuffer level, and is designed to make very few requirements of the client machine. Also, upon disconnecting from the server, when the client machine reconnects, the state of the user interface is maintained, and the state is preserved between multiple locations. The protocol was easy to understand and interpret for when we looked at it in accordance with vncviewer code.

At the end of the week, the display node computers were brought to the IRL to have their operating systems reinstalled. Initially, both were going to be updated with Ubuntu 8.04 Server Edition, but several issues arose when attempting to install the nVidia drivers on Node 1. Because of this, we installed Xubuntu 8.04 to match the operating system of the other node. The nVidia drivers worked more easily due to a graphical option to use them upon boot and login. Both computers were set up to auto-login and returned to the Innovation Center.

Further reading on the subject is very scarce. There are many universities and companies who have constructed display walls using multiple monitors and computers, but very few have documentation as to how they set up their display. Other walls have mentioned using Xdmx and Chromium to implement their displays, which is the method being tested on the nine-monitor wall in the IRL, but very few explain how they use VNC Server, if they use it, or create their own software. Our goal is to enable VNC to increase performance and access specific regions on the server and translate these findings to a Java applet so it can be used in the MLTI program and the middle school students' laptops and so no extra software will be needed.

Sources:

Richardson, Tony, The RFB Protocol, (<http://www.realvnc.com/docs/rfbproto.pdf>), 27 June, 2007.

Author unknown, VNC - the original cross-platform remote control solution, (<http://www.vnc.com/vnc/index.html>).