

# The Use Of Virtual Desktop Infrastructures In A Graduate Computer Science Curriculum\*

## Faculty Poster

*David Pitts, Vladimir V. Riabov*  
*Department of Mathematics and Computer Science*  
*Rivier University*  
*Nashua, NH 03060-5086*  
*{dpitts, vriabov}@rivier.edu*

This poster will present the use of and experience with virtual desktop infrastructure (VDI) [2] in the Masters in Computer Science program at Rivier University. Many of the advantages of VDI in a university setting have been described in [3]. This poster will focus on our experience with VDI for Rivier's Computer Science graduate program. In addition to reducing hardware costs and system administration loads, VDIs also provide convenient means for both students and faculty to access software tools and applications from both home and the university. For the Computer Science program at Rivier University, the combination of VDIs and open source software gives us a good way to provide the students with the necessary tools, both in and out of class, and to perform the work that instructors expect. VDIs provide a convenient way to create the specialized Computer Science desktops (CSDs) only for the computer science students (students in other programs use the standard, "vanilla" desktops).

Rivier University started using VDI about six years ago with an in-house IT department and has continued the VDI utilization after adopting an outsourced IT model. The use of VDI became particularly important during an explosion of the graduate program due to a large influx of international students: the program went from around 40 students to almost 600 full-time students at its peak. The accommodation of VDI allowed us to meet the demands of this growth gracefully, quickly adding the necessary computer-based classrooms needed for this larger population of students.

Rivier University's VDI consists of thin-clients (we use Dell Wyse thin-clients) that connect to the Rivier's VDI server. There is a separate server

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for on-campus use versus remote use. The connection to the VDI is managed through the normal Rivier University credentials. Once connected to the VDI, the user is offered a set of virtual desktop pools. For example, Rivier provides University Desktops, Computer Science Desktops, and Faculty/Staff Desktop pools. Selecting of the appropriate pool creates a new virtual desktop for the user.

The Computer Science and University desktops are not persistent [1]. Each time a student logs into one of the computer science desktops, the desktop is created a new VDI. This feature provides some protection against student's misadventures and numerous malware dangers (e.g., viruses and worms) that are ever present. However, at Rivier, faculty are provided with persistent desktop, allowing the replacement of desktop computers in faculty offices with a small Dell Wyse thin client.

Another important benefit of VDI is that, through the use of VMWare's Horizon View client [4], the Computer Science desktops are available not only through the Dell Wyse thin clients, but also through the personal devices (e.g., laptops, desktops, and even iPhones), allowing access to the computer science applications at home as well as on campus. Faculty can work on demonstrations and in-class activities at home on exactly the same environment that students will use during class. Online students, after installing the Horizon View client, have complete access to the Computer Science desktops. Further, for faculty, their persistent desktops replace the VPN that was in use at Rivier University, since the faculty member can connect to her/his persistent desktop from home and immediately have access to the Rivier network environment (e.g., file folders, printers, etc.).

Another benefit of VDI that we have not yet pursued is the support of virtual desktops with different operating systems installed, such as Linux or FreeBSD. Rather than devoting additional hardware resources or formatting existing systems as dual-boot systems, a new pool of virtual desktops may be created.

While there are many benefits to VDI, deployment of a VDI and set of desktops requires some planning. Applications for a virtual desktop are configured as layers [5], which allow the VDI administrators to install application with the necessary dependencies and add them to the OS layer for a specific virtual desktop pool. In the case of Rivier, the "vanilla" University Desktop pool uses a small number of application layers, while the number of layers required for the Computer Science Desktops is about 30 layers. The more layers required by a virtual desktop, the longer it takes to create. When classes of 20-plus students attempted to connect to the Computer Science Desktops simultaneously for a class, the demand on the VDI system can be quite significant. Further, instructors and IT administrators must carefully plan for licenses required to

simultaneously run the large number of virtual desktops.

In conclusion, VDI has been of great benefit to Rivier University, particularly in support of the sudden spike of the number of students in the computer science programs.

## References

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