

# Pano Case Study

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University of Maryland

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In the fast-paced IT industry, marketing professionals coin new terminology every day. The Department of Agricultural and Resource Economics (AREC) at the University of Maryland is a world-class academic unit specializing in the broad issues of the economics of agricultural, environmental and natural resources. The Department is comprised of approximately 25 faculty, 60 graduate students and 60 undergraduate students.

Faculty expertise and research interest cover a broad spectrum from theoretical investigations of preferences over uncertain events to extension publications on land use and water quality. A unique feature of the Department is the close collaboration between extension and research. This collaboration challenges researchers to provide meaningful analysis and provides extension faculty rigorous intellectual frameworks for the extension of research to public and private sectors. Specialty areas include:

- Agricultural Policy
- Coastal and Marine Resources
- Commodity Marketing
- Farm and Financial Management
- International Extension
- Land Use and Farmland Preservation
- Linking Agriculture, Natural Resources, and the Environment
- Sustainable Agriculture
- Water Quality

### **System Configuration**

AREC has a recently renovated 25 seat computer lab designated for experimental economics.

The lab is configured with 25 Panologic zero client devices, which connect to virtual desktops.



AREC Lab #1

The infrastructure for this virtual desktop environment is as follows<sup>1</sup>:

- 2 SunFire x4600M2 servers, each with 4 dual core processors and 64GB of memory operating VMware ESX 3.5 Enterprise



- A Sun StorageTek 2501 iSCSI SAN with 3.5 TB of disk space.



AREC also has a second lab for graduate students with 18 stations, configured as above, which utilizes the same back end infrastructure.

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<sup>1</sup> Please note that University of Maryland backend infrastructure is larger and more powerful than that recommended to deploy the Pano. This decision was made, primarily because Sun offered “Very attractive pricing” on discontinued and overstock hardware. Hardware sizing recommendations are available upon request.



AREC Lab #2

Currently another 15 Panos are in use by faculty and staff members.

All of the virtual desktop images are configured as follows:

- Microsoft Windows XP (with 1GB of memory)
- Windows XP Images include the following applications:
  - Microsoft's Office 2007
  - MathWork's Matlab
  - Wolfram Research's Mathematica
  - SAS Statistics
  - Maplesoft Math Software
  - ARCInfo Geographic Information System
  - Z-Tree File Manager.

### Pano Benefits Experienced

- **No End User Training Required:**
  - There were no complaints from students about the PCs being replaced by Panos as the user experience was virtually the same. In fact, as a test of the Pano usability, the deployment of first Panos was done overnight. Surprised and confused students quickly figured out that these silver cubes were PC replacements and began using them without training.
- **Enhanced Application Performance:**
  - Since many of the applications utilized by the student body are number crunching intensive, many students have found that applications run significantly faster utilizing the power of the back end servers.
- **Energy Savings:**
  - **Approximately 75% reduction in power** requirements compared to a desktop PC based on measurements taken with Kill-A-Watt meters for 5 Dell GX270 Optiplex PCs vs. 5 Panos in the lab with

similar usage; all powered on 24x7. After 172 hours: 5 PCs used 77.09 KWh; the 5 Panos used 16.00 KWh. Both PCs and Panos were connected to LCD monitors, which were also attached to the power meters. Panos draw 1 – 3 watts of power.

- **No More Space Heaters** - The graduate student lab is located on the top floor of an old building. Previously the air conditioning was constantly running to maintain a temperature of 72° F all year long to offset the heat produced by the traditional PCs. Now, with a lab full of Pano devices, the thermostat has been adjusted to run at 74° during the day and 78° at night. This change was made based upon student requests as there were no longer PCs acting as space heaters under the desks.
- **More Comfortable Work Environment**
  - **Less Noise** – During hot summer days, the air conditioning would typically be running constantly, creating a continuous stream of significant white noise. In the past the PCs fans would only add to this background noise. Now with the Pano's fanless design, not only is the PC fan noise eliminated, the lab's air conditioning cycles on and off; creating a more comfortable, near silent work environment.
  - **More Desk space or Leg Room** - Due to the small foot print of the Pano, desktop space is freed up for other purposes in one lab where the PCs were placed on the desktop. In the second lab, where PCs were positioned underneath the desk, more leg room was created - no more inadvertently kicking the PC.

### About the Pano Virtual Desktop Solution

The Pano Virtual Desktop Solution includes the hardware clients and software components required to turn standard virtual infrastructure into a purpose-built virtual desktop solution. The key components of the solution are the:

- **Pano Device** - Designed by an award-winning industrial design firm, the Pano device is a zero client - no memory, no operating system, no drivers, no software and no moving parts. The Pano device connects keyboard, mouse, display, audio and USB peripherals over an existing IP network to an instance of Windows XP or Vista running on a virtualized server. Pano is power friendly, consuming only 3% of the energy consumed by a traditional desktop computer.
- **Pano Management Server** - A centralized service and web-based management interface which enables administrators to manage the entire virtual desktop installation by integrating with existing directory services and virtual infrastructure managers.
- **Pano Desktop Service** - A lightweight service residing within each desktop virtual machine links peripherals attached to the Pano to the

unmodified Windows drivers residing in the virtual machine. This design guarantees that all existing Windows drivers will work without modification.

### **Next Steps**

If you would like some more information or assistance in evaluating if the Pano fits your organization, please contact ProSync Technologies at [sales@prosync.com](mailto:sales@prosync.com)

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