

# University of California, Berkeley

## Virtual Desktop Infrastructure - VDI Is it worth it?

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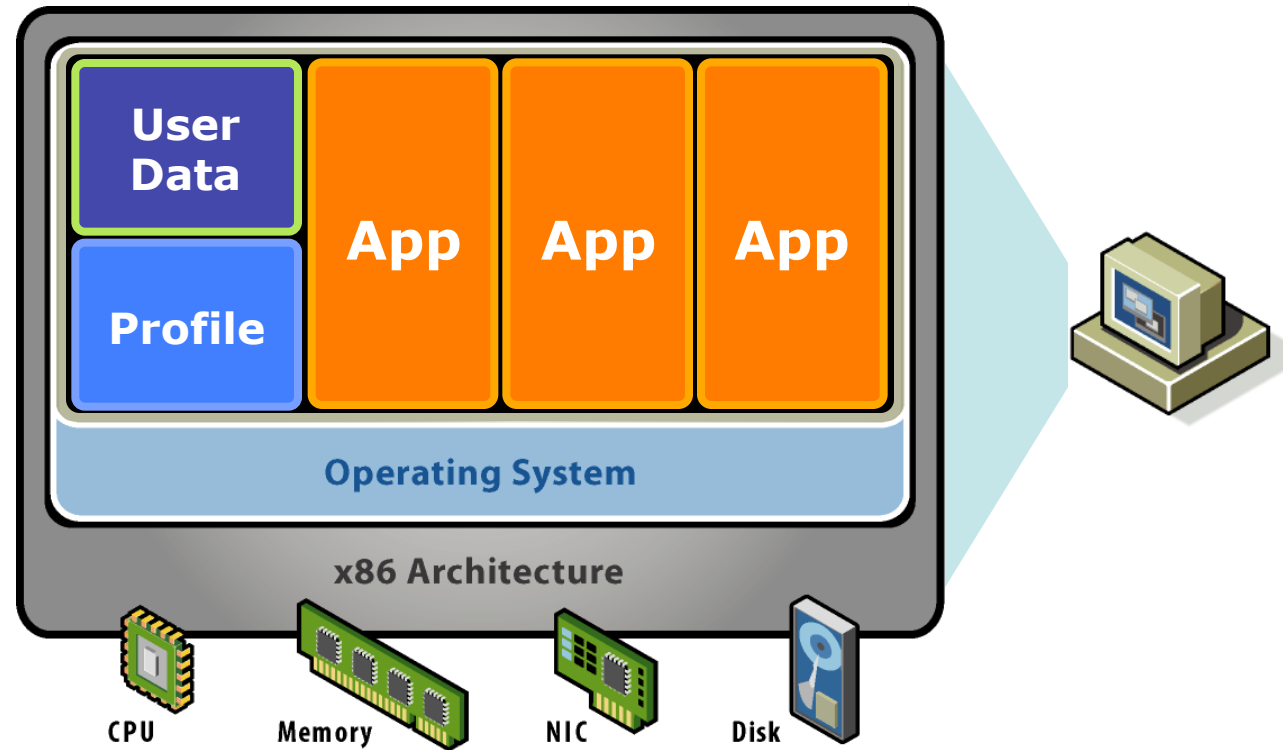


## What is VDI?

- Emerging Paradigm for providing desktop services in a virtual environment
- Different options, each with plus and minus and different use cases
- Widely discussed in 2007-2008, minimally deployed
- New real uses cases within higher ed now emerging



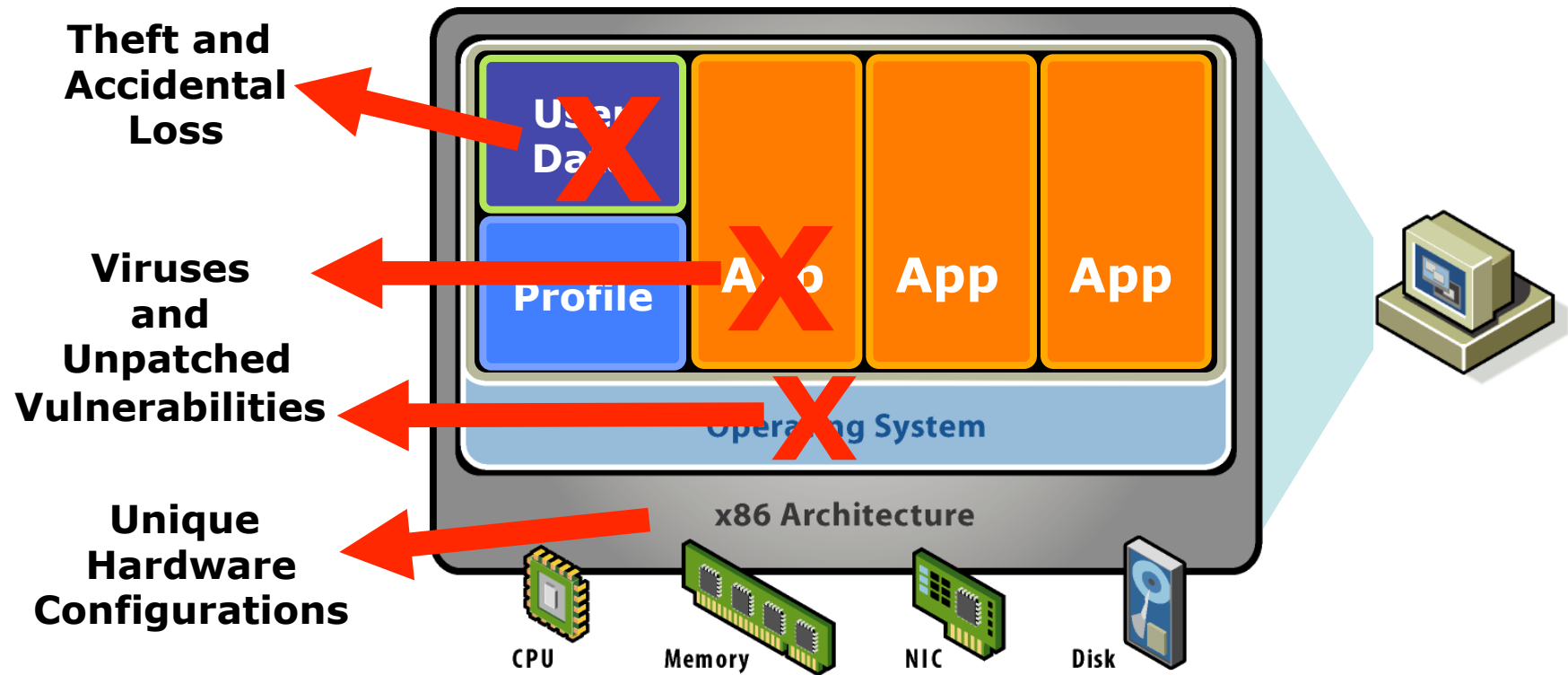
## So how does it work? A Typical Desktop Build



A typical desktop has everything bundled into a single device with a complex intertwined collection of software and data.



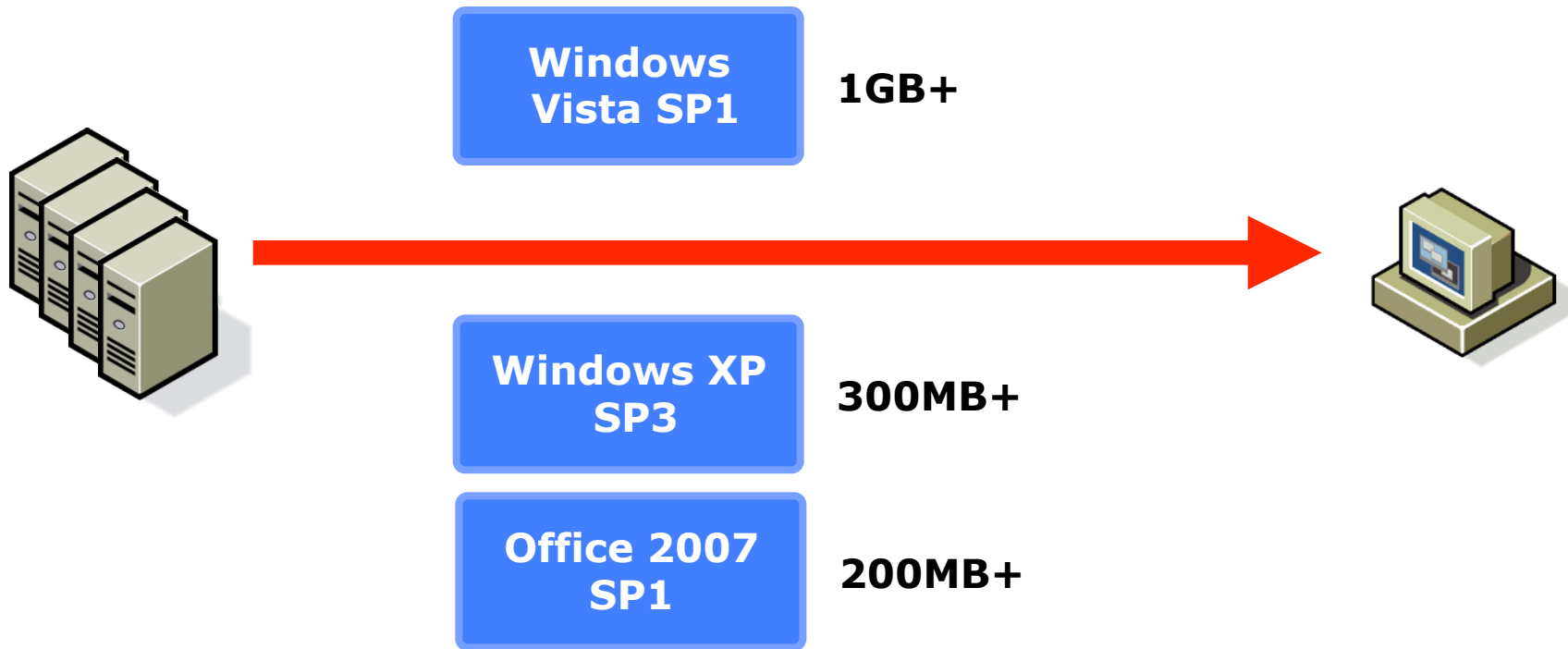
# Management is difficult on the Edge



Many individual devices must be patched, monitored, and secured – a difficult task, especially for remote users.



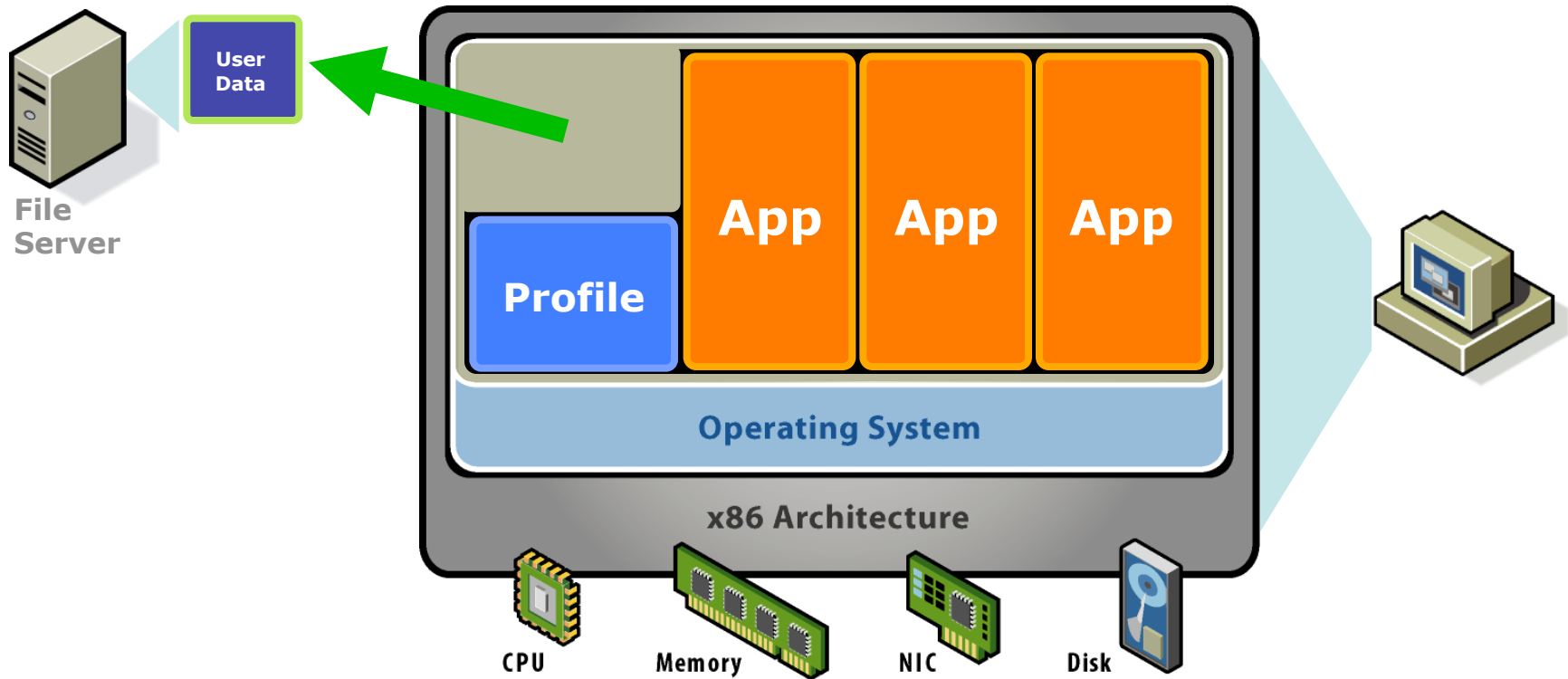
## Patching at the Edge



Trying to deliver patches over WAN links or even slower office networks becomes more and more difficult.



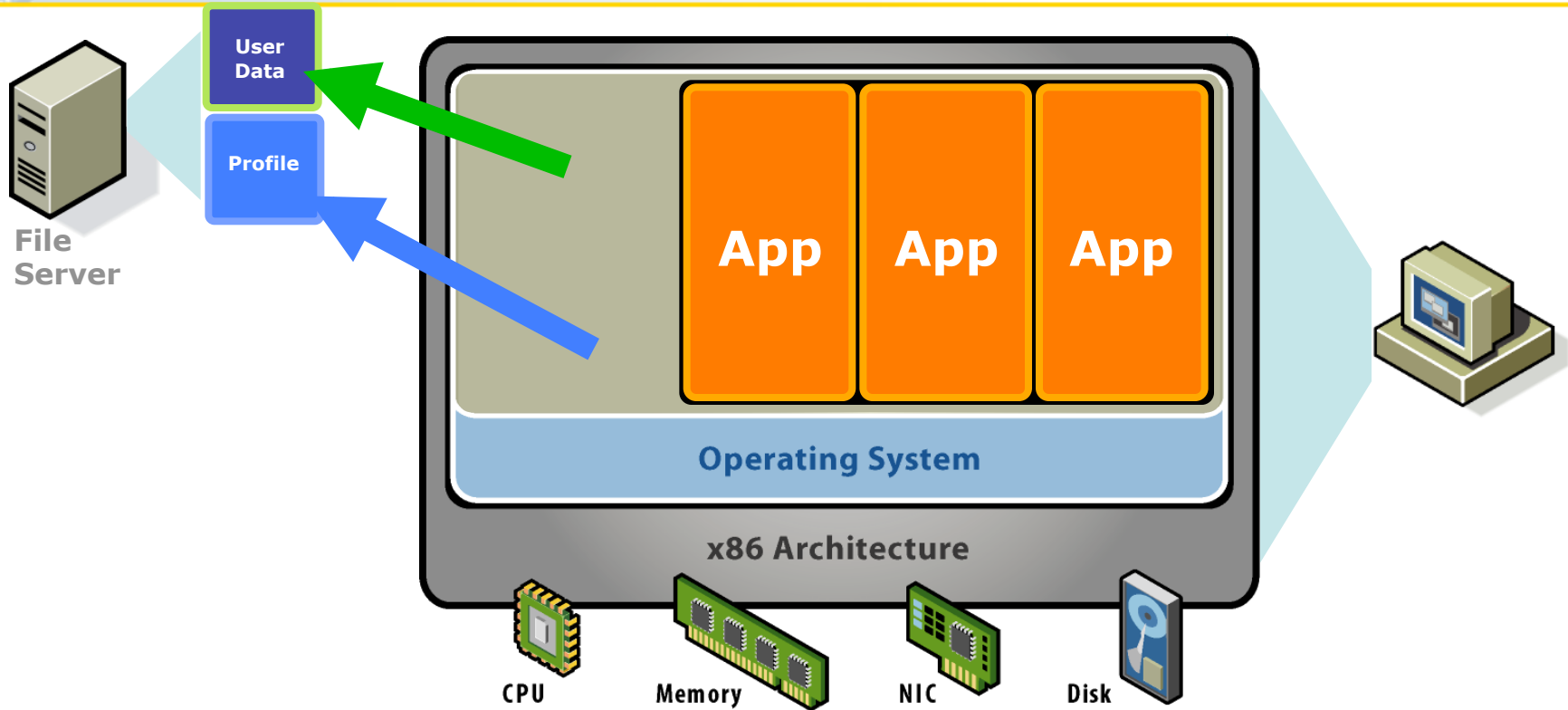
# Network File Shares for Data



User data is stored on network file shares, where it can be backed up and secured.



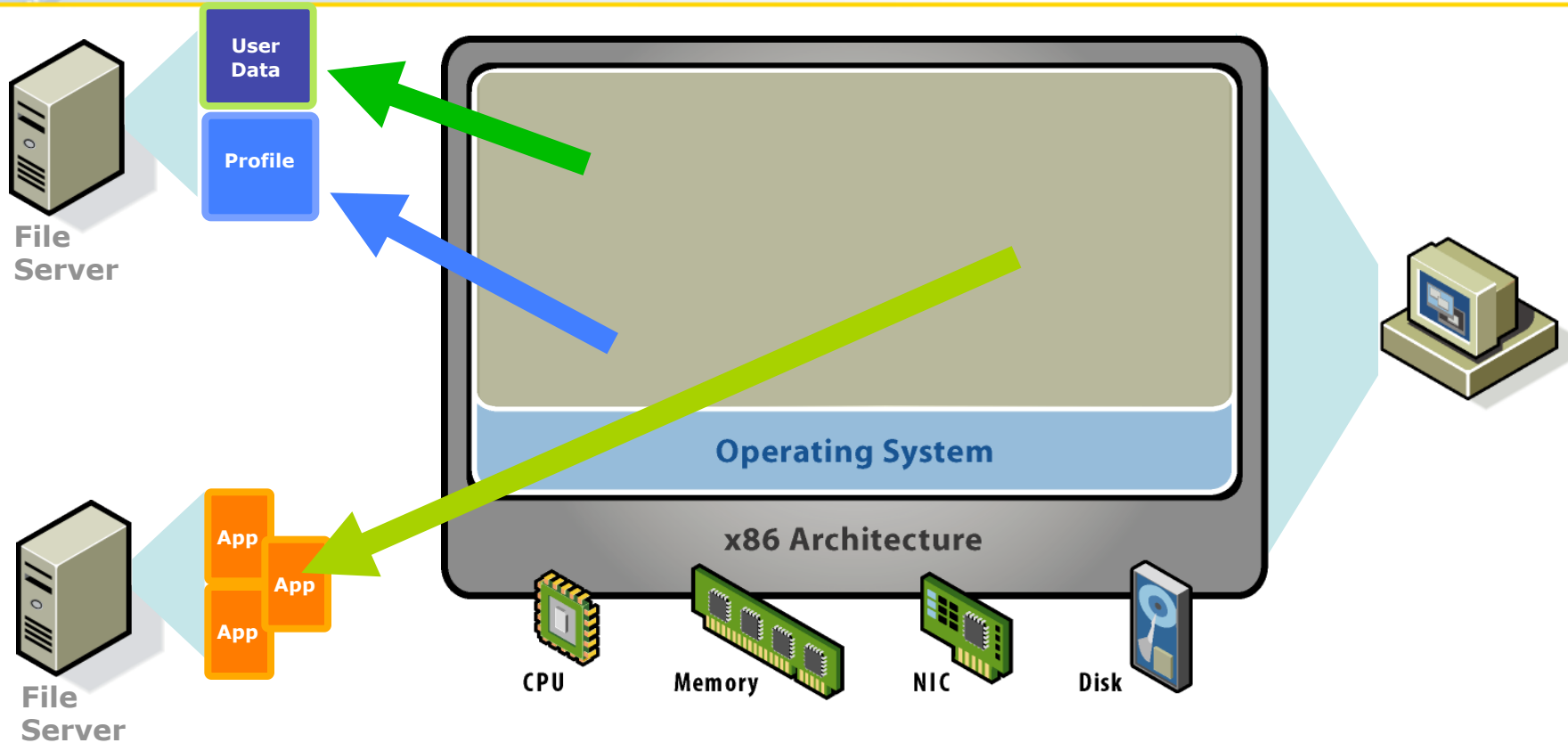
# Roaming Profiles



Using roaming profiles, a user's settings are moved to a server for backup and to allow their personality to follow them.



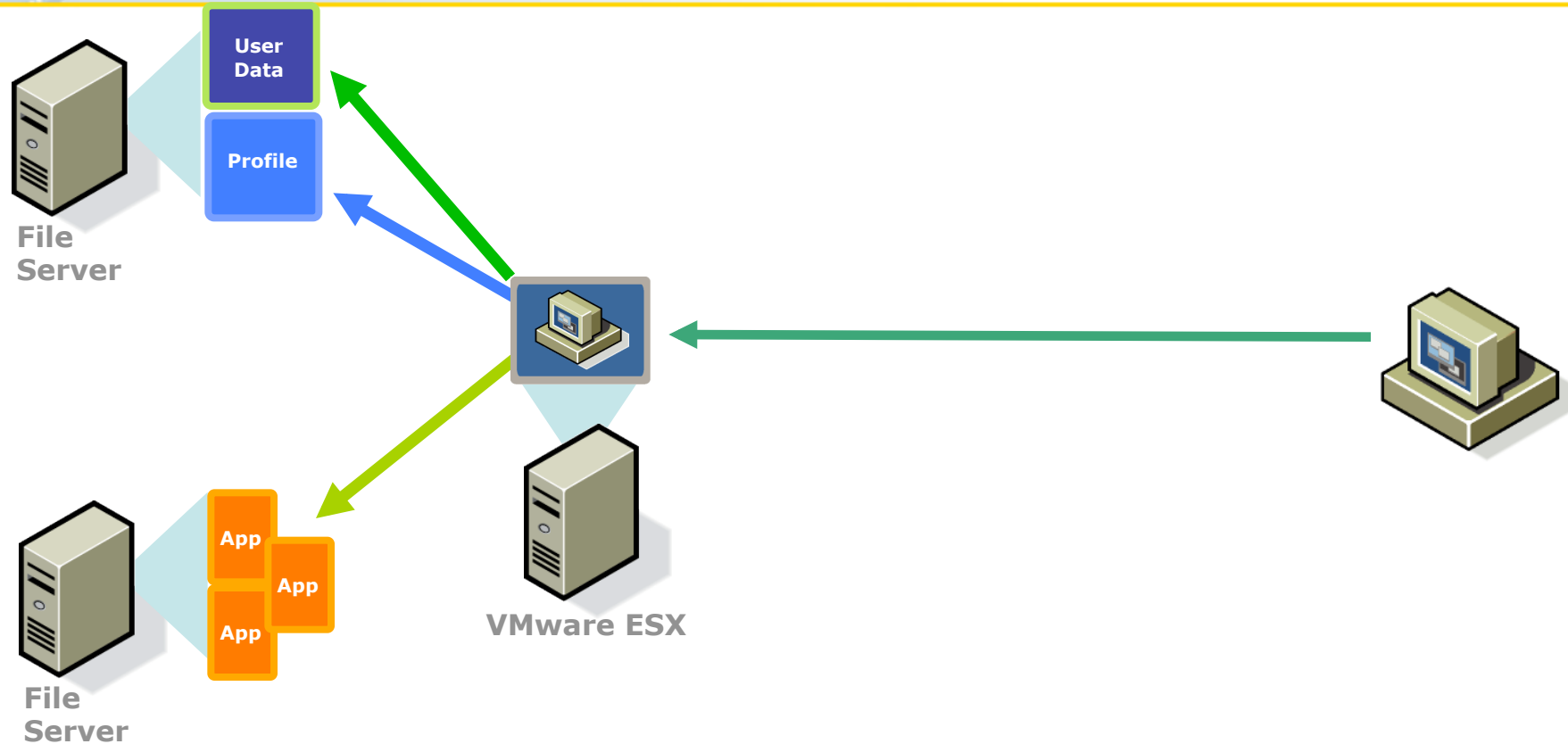
# Application Virtualization



Using Application Virtualization such as Thinstall, applications can be moved to a file share and launched without being installed locally.



# Operating System Virtualization



The now minimized OS can be virtualized on servers in the data center, and viewed with a remote protocol.



## Berkeley's Approach Why Try VDI

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- Many campus units don't have the resources to do technology refresh on appropriate life cycles
- Faculty in non grant funded disciplines don't have resources or necessarily local departmental IT to keep older machines running
- Multiple departments are interested in having improved remote desktop support
- Lab Management
- Energy Savings
- Sustainability: reduced hardware turns



## Berkeley's Approach: What we hope to achieve

- ***SUPPORT FOR TEACHING AND RESEARCH:*** VDI has potential to provide modern, stable platforms for faculty and staff in units with limited resources. A virtual desktop would provide enhanced performance, current software, and long-term maintainability, giving these users a better environment for teaching, research, and the administrative business of the University.
- ***SECURITY AND RELIABILITY:*** VDI serves desktops out of the data center and, correctly implemented, provides much greater security and reliability than individual desktops. User's data is stored in the secure storage area network (SAN), significantly reducing the risk of theft. In addition, the virtual desktops are hosted on highly-available, redundant servers in the data center, limiting the downtime for individual users due to workstation hardware failure.



## Berkeley's Approach: What we hope to achieve

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- **UBIQUITY:** Hosted virtual machines *may* cost less to deploy and maintain than traditional individual workstations, especially if the solution includes thin-client hardware. This lower cost would give units the ability to provide better technology to more users and advance to the stated goal of “basic standards of support for all departments and classrooms”.



## Berkeley's Pilot Project Five Use Cases

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1. Administrative / Office Worker -evaluates the case of typical office worker using a standardized desktop image and productivity software. Focuses on easy, standardized deployment and maintenance, good security, and reasonable multimedia performance.
2. Student Computing Lab - evaluates the case of a computing lab with several dozen devices and a large, transient user population. Focuses on ease of maintenance and excellent multimedia performance for instructional videos and audio.



## Berkeley's Pilot Project Five Use Cases

3. Lecturer / Visiting Faculty - evaluates the case of “kiosk”-style machines that are a hybrid of office worker lab environments and used by lecturers and visiting faculty.
4. Secure Desktop - evaluates the case of users who regularly work with restricted data. Focuses on high security (e.g. limiting access to removable media, encryption) while providing a full-featured working environment.
5. Telecommute / Work-at-home - evaluates the case of users who need a portable environment that can be used equally well in the office and over a home / remote broadband connection.



## Berkeley's Pilot

- Pilot started in Fall 2008
- Evaluated: VMWare, Citrix, and MokaFive. In November, selected VMWare.
- Provisioning ESX servers that will house the VDI environment.
- We have established metrics that will be collected in both pilot and control environments. Examples include:
  - hardware - CPU, memory, and network usage;
  - end-user experience - gathered with satisfaction surveys and multimedia benchmarking tools; and
  - support - set-up and tear-down times, overall support hours used, and ease of maintenance



## Berkeley's Pilot

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- Use case teams have developed virtual machine parent environments. On schedule to begin deploying about 35 instances in mid-January with final pilot deployment of 150 instances.
- Metrics for each use case will be evaluated in May 2009
- If meet success thresholds will develop proposal for full production service for specific use cases
- Cost of pilot expected to be \$100k over 18 months for five use groups and 150 Virtual Desktops



## What are the design points we are considering

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- Tethered high bandwidth connections - not good for buildings running on poor infrastructure or wireless (yet)
- Test beds where you need to run simulations against many desktop configurations
- Electronic Evidence Requirements - Snapshots?
- Short term spikes with high desktop demand
- Lab environments
- Environments where resources for support are limited



## What we are expecting from user focus groups

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- Demand personal settings and familiar look-and-feel
- Accustomed to local PC performance
- Work from different locations
- Want to use different devices
- Access a broad range of content



## Other VDI Considerations

- VDI Can INCREASE the hardware cost
  - Thin clients are not much cheaper than PCs
  - Requires a server for every 4-10 users
  - Running a data center is expensive
  - Cost per GB: PC vs. enterprise network storage
    - 50 unique user images can easily consume 1TB immediately
- Virtual desktop sprawl
  - Still have many unique images to manage
- Desktop workloads on servers
  - Unpredictability of user and application behavior



## Other VDI Considerations

- VDI doesn't automatically lower the management costs either...
  - Every user has his/her own VM (unlike multi-user Solaris, Windows server)
  - Virtual machines need to be managed like physical machines except for sneaker net issue
- Centralized execution often translates to poor user experience
  - Requires constant network connection - no disconnected operation
  - Overhead of VDI: VM, multiplexed VMs, remote display
  - No 3D graphics



## Other VDI Considerations

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- **Increases data center utilization**
  - Data center costs are higher than desktop
  - Increases can offset local energy savings.
  - Data center teams conflict with desktop teams
  - No gains unless done at scale