

Better Living through Managed Private Virtual Machines

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27 July 2009

The home system management problem

- Individuals have proven unable or unwilling to manage their home computers well
- System management is complex and time consuming
- Lack of security leads to malware infections
- Lack of backups can lead to data loss
- Problem is growing worse as more people rely on computing for more aspects of their lives

Exploring alternatives

- What if individuals turn over management of their personal computers to service providers?
- How much flexibility would individuals retain?
- Where should these machines reside?
- Should they be virtual or physical machines?
- Who would own these machines and their data?
- How much would it cost and who would pay?

Managed private virtual machines running in the cloud are an attractive alternative

Managed private VMs in the cloud

- One virtual machine per individual
- Runs in a utility computing infrastructure
- Enjoys encapsulation and isolation benefits of VMs
- Managed by a **paid** service provider
- Individual retains rights to data in his VM
- Still need some hardware in the home, e.g., a thin client, but it should be simpler to manage than a full-featured computer system

In the cloud vs. in the home

- Virtual machines in the cloud:
 - Run on highly available infrastructure
 - Hardware failures/upgrades are transparent to individuals
 - Enjoy economies of scale
 - e.g., share memory pages of popular binary images across many VMs
- Virtual or physical machines in the home:
 - Better interactive response for some apps
 - Some apps available without a network connection
 - Stronger sense of ownership and control?

Flexibility vs. manageability

- Outsourcing system management to service providers will limit options open to individuals
e.g., what software packages are installed on VM
- How much flexibility would individuals be willing to give up?

The price question

- Managed private virtual machine services are emerging, currently aimed at enterprises
e.g., pair.com Virtual Private Server at ~\$80/month
- Would need to bring price down for a viable consumer offering
 - People are willing to pay for services they perceive as valuable, e.g., ~\$10/month for MobileMe
 - Cost and market studies are needed

Many uses of a private VM in the cloud

- Trusted proxy for mobile devices [MobiHeld09]
 - Saves battery, bandwidth, processing, storage on devices
 - Many possible applications
 - Location-based services
 - Synchronization and backup
 - Participatory sensing
 - ...
- Trusted online presence for individuals
 - Peer-to-peer online social networking [WOSN09]
 - Web server: blog, photos, etc.
 - Email server, ...
- Helps preserve owner privacy across all these uses
- Cost is amortized across all these uses