

PowerWorld Cloud Computing



PowerWorld Client Conference

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Outline

- History of cloud computing
- What is the cloud today?
- Common examples
- Future of PowerWorld cloud computation



History of the Cloud

- 1970s
 - Mainframes and dumb terminals (if you were lucky)
 - UNIX & VAX/VMS terminal access
 - Limited individual computation





History of the Cloud

- 1980s
 - Rise of the PC
 - Smart individual computers
 - Beginning of commoditization of computer hardware





History of the Cloud

- 1990s
 - High speed networking becomes commonplace through development of fast Ethernet
 - Development of Mosaic web browser and popularization of web by Netscape and Microsoft push Internet proliferation





History of the Cloud

- 2000s
 - Google & Amazon become popular, require lots of hardware to power sites
 - Virtual machines advance significantly and allow Google and Amazon to use commodity hardware
 - They realize for little more investment they can sell computation services





What is the cloud today?

- Commodity hardware, similar to what you have at your desk
- Connected by commodity networking like gigabit or 10Gb Ethernet
- Raw services sold: storage, database instances, virtual machines running Windows, Linux, etc.
 - Usually sold by CPU hour, DB transaction or gigabytes stored
 - Additional charges for large data transfers into or out of the data center



What is the cloud today?





Common examples

- Virtual storefronts: Amazon, eBay
- Email: Gmail, Hotmail
- Storage: Google Drive, Dropbox
- Streaming Video: Youtube, Hulu, Netflix
- Online backup: Carbonite, Crashplan
- Even some soon to be released console and computer games will offload intense computation



What PowerWorld May Use

- Distributed computation testing on Microsoft Azure virtual machines
 - Accessed just like a computer on your local network via Remote Desktop
- Investigating using cloud backup for easy offsite storage



Future of PowerWorld Cloud Computation

- Offer distributed computation services in the cloud
 - Offered as blocks of CPU hours or pay as you go?
 - May require 10-15 minutes to spin everything up
- Advantages:
 - No IT expense for purchasing and maintaining hardware and software
 - Pay only for what is used
- Potential disadvantage: NERC CIP?



Future of PowerWorld Cloud Computation





More Information

- Google Throws Open Doors to its Top-Secret Data Center, Wired:

<http://www.wired.com/2012/10/ff-inside-google-data-center/all/>

- Cloud Computing, Wikipedia:

https://en.wikipedia.org/wiki/Cloud_computing