CS 755 – System and Network Architectures and Implementation

Module 9 – Cloud Services

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Consolidation

- multitude of services on same hardware
  - different services, different users

→ multi-user, multi-tasking operating system!
  - virtual processor, memory, devices
  - isolation
  - resource management

→ virtualization!
Virtual Machines

• diversity of OS ecosystems
  • software/applications tied to specific OS
  • consolidation?

→ virtualization of hardware interface
  • virtual processor(s), memory, devices
  • isolation
  • resource management
Client / Server Computing

- availability of high-speed networking
- distributed system with asymmetric roles

- server role used for
  - consolidation
  - centralized management
  - special-purpose hardware

- vs. “thin” client (ease of deployment)
Service Computing

- Software as a Service (SaaS)
  - Email, Office, CRM, etc.

- Platform as a Service (PaaS)
  - Database, Web Service, Runtime, etc.

- Infrastructure as a Service (IaaS)
  - Virtual Machine, Storage, Networking, etc.
Cloud Computing

• service computing as commodity / utility
  • pay-as-go (elastic) or longer-term contracts
  • public vs. private cloud

• large-scale consolidation

• fundamental value propositions
  • efficiency (power)
  • economies of scale
  • statistical multiplexing
Challenges

• resource management
  • contract: service-level agreement (SLA)
    – covering various performance dimensions
    → multi-dimensional optimization

• isolation
  • performance, security, control
  • virtual private network
Example: OpenStack

- open platform for cloud computing
- www.openstack.org