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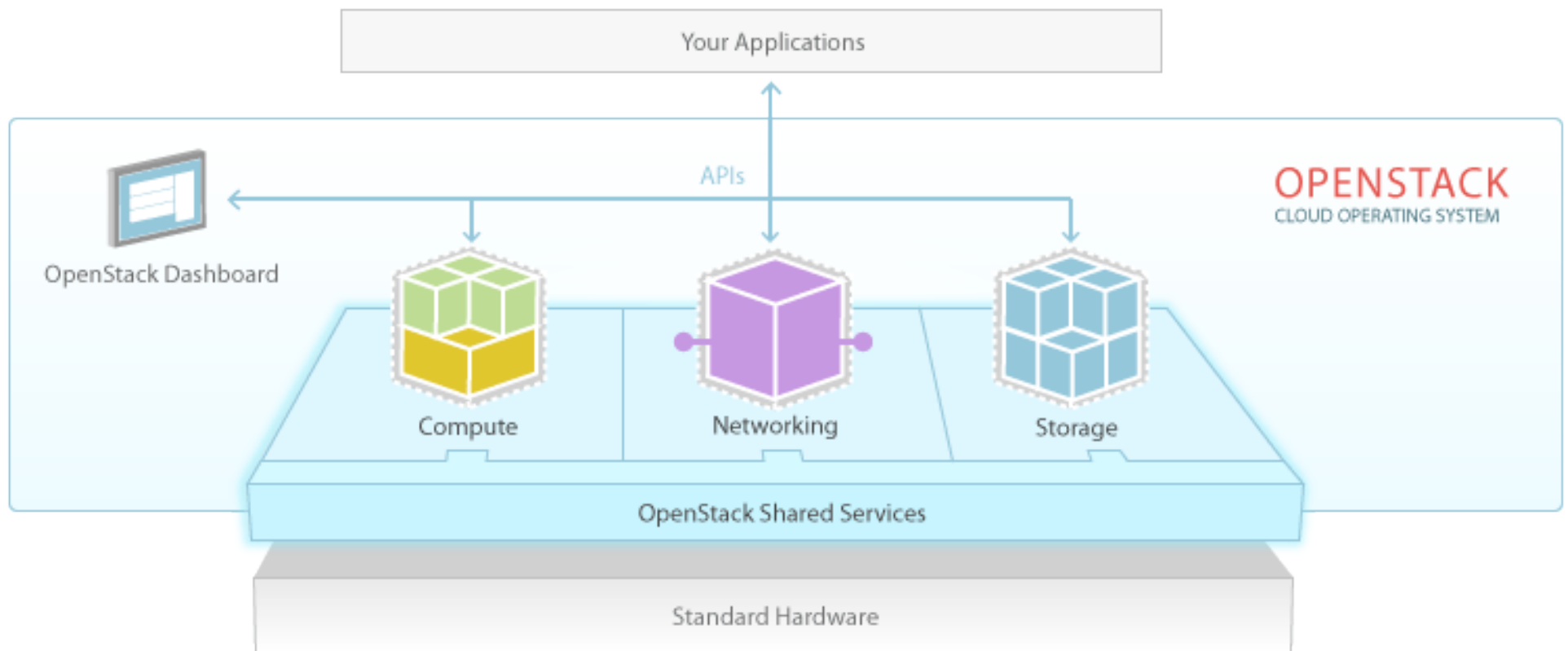
- open platform for cloud computing
- www.openstack.org