INTRODUCTION TO CLOUD COMPUTING

CIT 3400

LECTURE 5

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LECTURER COMPUTER SCIENCE

PAAS

- Platform as a Service (PaaS) aka cloudware
  - Give me nice API and take care of the implementation
  - Supplies all resourced needed to build apps and services without having to download or install software
  - Provides a computing platform and solution stack
    - E.g for web application need OS, web server, DB, prog language
    - Provides support to create user interfaces (HTML, Javascript)
    - Provides automatic facilities for concurrency management, scalability, failover, and security
  - Services include:
    - app design, development, testing, deployment, hosting

PAAS

- Customer interacts with platform through API
- Runtime services – allows application to leverage infrastructure
- Platform manages and scales

- Team collaboration, web service integration, database integration, security, scalability, storage, state management, versioning

PAAS

- Supports web development interfaces
  - SOAP (simple object access protocol), REST (Representational state transfer), allow construction of multiple web services (mashups)
  - Interfaces able to access DBs, reuse services

PAAS PROVIDES

- Development teams across world to work together
- Merge web services from multiple sources
- Cost savings from using built-in security, scalability and failover
- Cost-savings from using higher-level programming abstractions

PROBLEMS WITH PAAS

- Vendors used proprietary services or languages – developer may be locked in
- Lack of portability and interoperability – if develop on one cloud, can't move to another (unless pay …) – **Lock-in**
- What if provider goes out of business?

- Examples:
  - Google App Engine
  - Heroku
  - RightScale
  - Salesforce.com

SAAS

- Software as a Service (SaaS) – web based applications
  - Just run it for me!
  - Software available on cloud for use
  - Application hosted as a service to customers who access via the internet
  - Single instance runs and services multiple end users

SAAS

- Good candidates for SaaS:
  - Simple task with little interaction with other systems
  - Customers who want high powered apps but do not want to develop
    - Customer resource management CRM
    - Video conferencing
    - IT service management
    - Accounting
    - Web analytics
    - Web content management

SAAS

- Unlike earlier distributed computing tools, SaaS specifically uses web/Internet tools
- Built with multitenant in mind
- Can access from anywhere as long as have access to Internet
- SaaS often used as a component of another application – mashup or plugin

BENEFITS TO SAAS

- Everyone knows WWW, little training needed
- Smaller IT staff needed
- Easier to customize
- Better marketing by providers, accommodate more
- Web reliability
- Security (SSL used), don't need VPNs (Virtual private networks on back-end)

SAAS

- Pros/Cons
  - Customer doesn't have to maintain or support SW
  - Out of customer's hands when hosting service changes it
  - Use software out of box
  - Instead of just paying for its once, billed
  - Don't have to pay as much up front, cheaper more reliable

OBSTACLES TO SAAS

- Specific computational need not addressed
- Lock-in – can't move to new vendor without penalty
- Open source and cheaper hardware

EXAMPLE APPLICATIONS BENEFITING

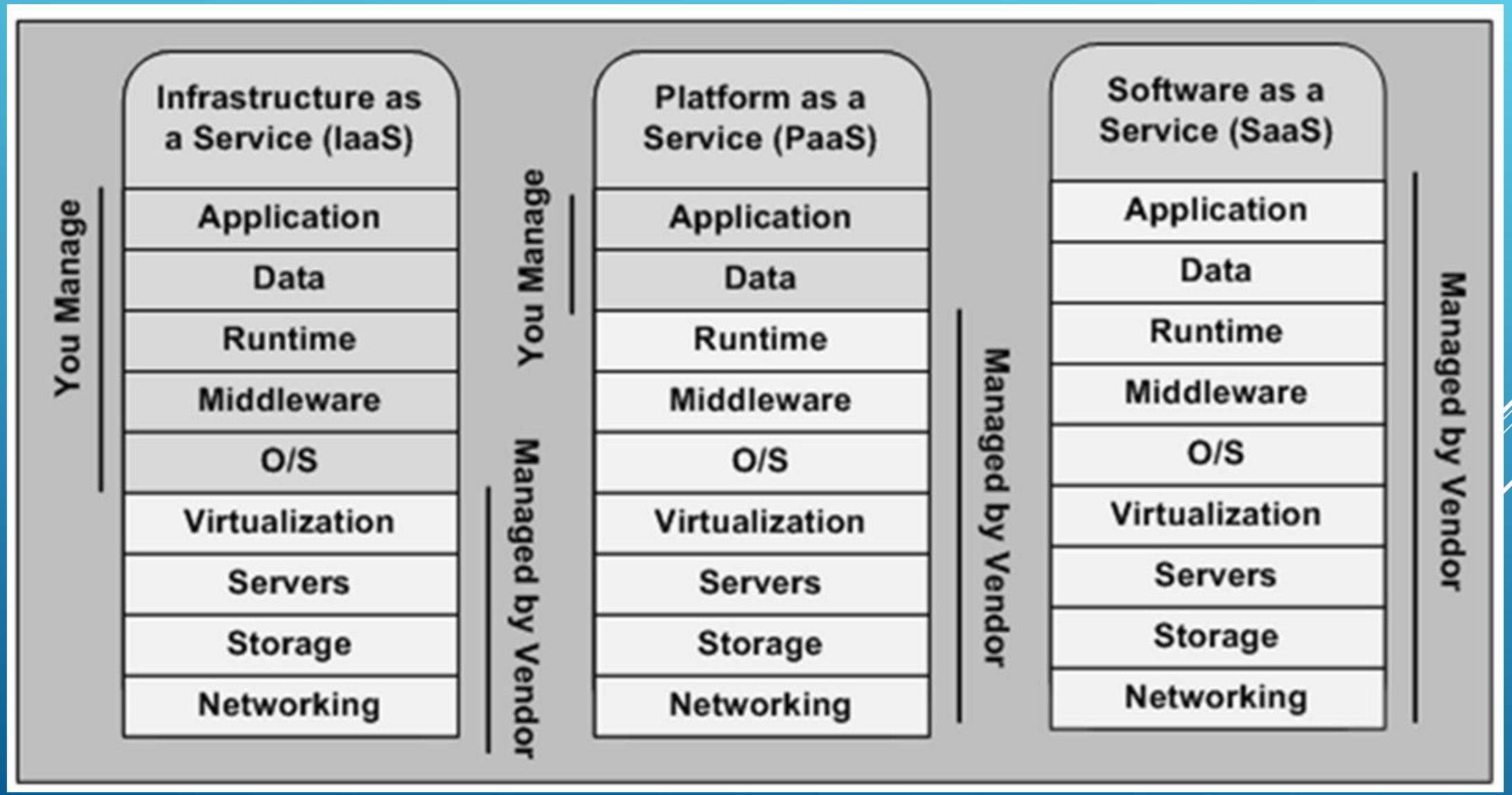
- Using Hadoop tool, open-source MapReduce
  - NY Times converted 11 M articles, images in archive to PDF
  - Instead of 7 weeks, using Hadoop took 24 hours, < $300
- Animoto's mashup tool – create videos from set of images and music
  - Scaled from 50 to 3500 servers in 3 days
  - Application built to be horizontal

- Examples:
  - Gmail
  - Dropbox
  - Microsoft Office 365

FUTURE OF SAAS

- Move all processing power to the cloud and carry ultralight input device
  - Already happening?
    - E-mail
    - Google Docs
    - OnLive
    - **Implications for Microsoft, software as purchasable local application**
      - Windows Live (Microsoft's cloud)
      - Adobe web based photoshop

IAAS, PAAS, SAAS



IN SUMMARY - IAAS, PAAS, SAAS

- With IaaS
  - Provider doesn't know what you are going to do with HW
  - Just ask for resources, including OS (VMs)
  - So you can specify how many machines, how many VMs per machine, etc.
  - Can create your own PaaS, or SaaS on IaaS

IAAS, PAAS, SAAS

- With PaaS
  - Ask for specific web services, DBs, etc.
  - Restricted to using only those, can modify only within constraints of platform
  - System decides what hardware and how many VMs you get, e.g. scaling
- With SaaS
  - Just say which software and you use it

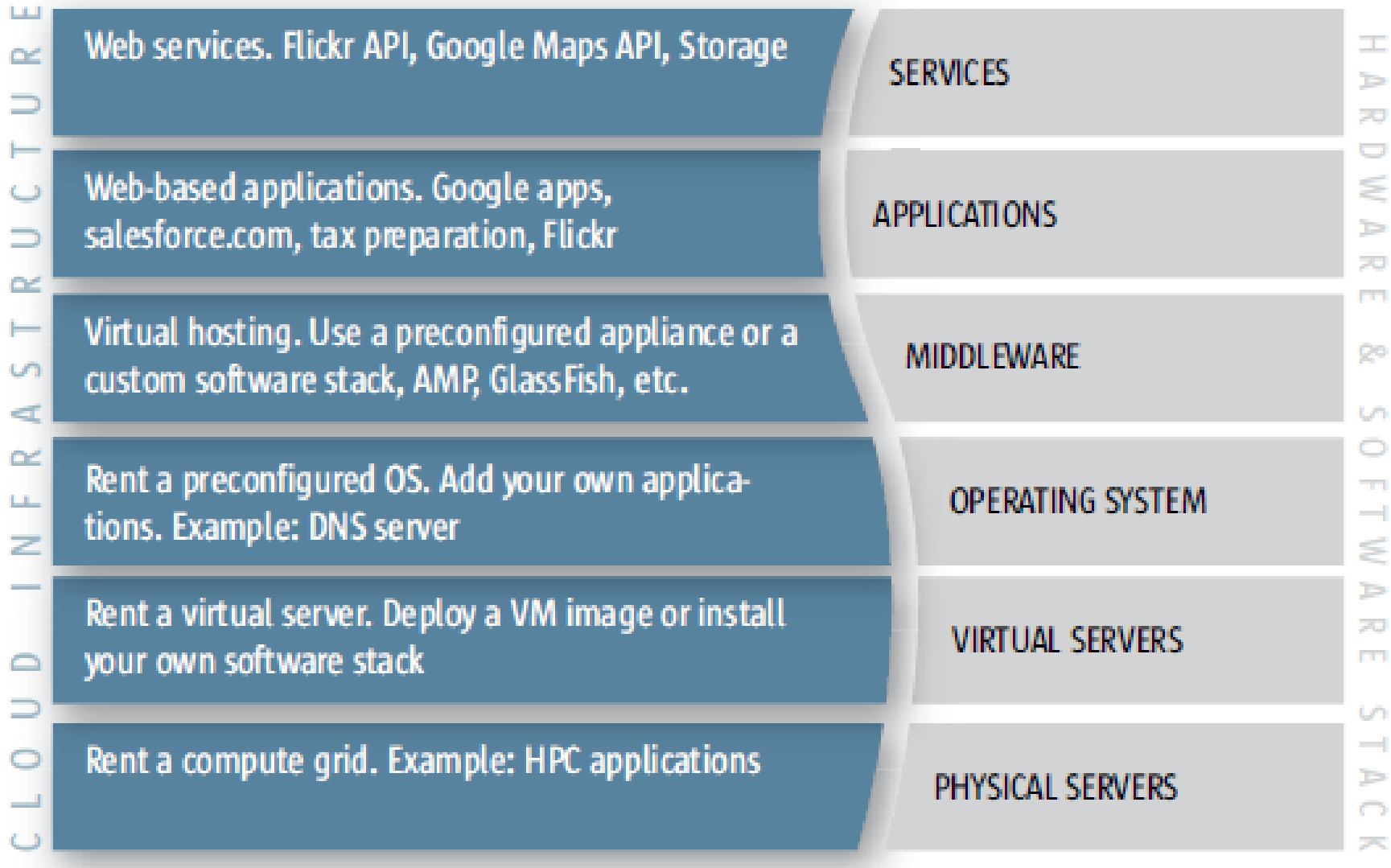


Figure 6. Cloud computing means using IT infrastructure as a service — and that service may be anything from renting raw hardware to using third-party APIs.

PAPER TO READ

- A Survey of Cloud Computing Architectures