CMPE 282 Cloud Services
Introduction

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- Cloud Computing
- Reference Model
- Big Data
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- Roadmap

What is Cloud Computing?

- A survey from Citrix (http://www.businessinsider.com/people-think-stormy-weather-affects-cloud-computing-2012-8):
  - 51% think bad weather affects cloud computing
  - Another 95% don't think they ever use cloud computing, even though they're actually doing a lot in the cloud

Definition - Gartner

A style of computing where *scalable* and *elastic* IT-enabled capabilities are delivered as a *service* to customers using *Internet* technologies

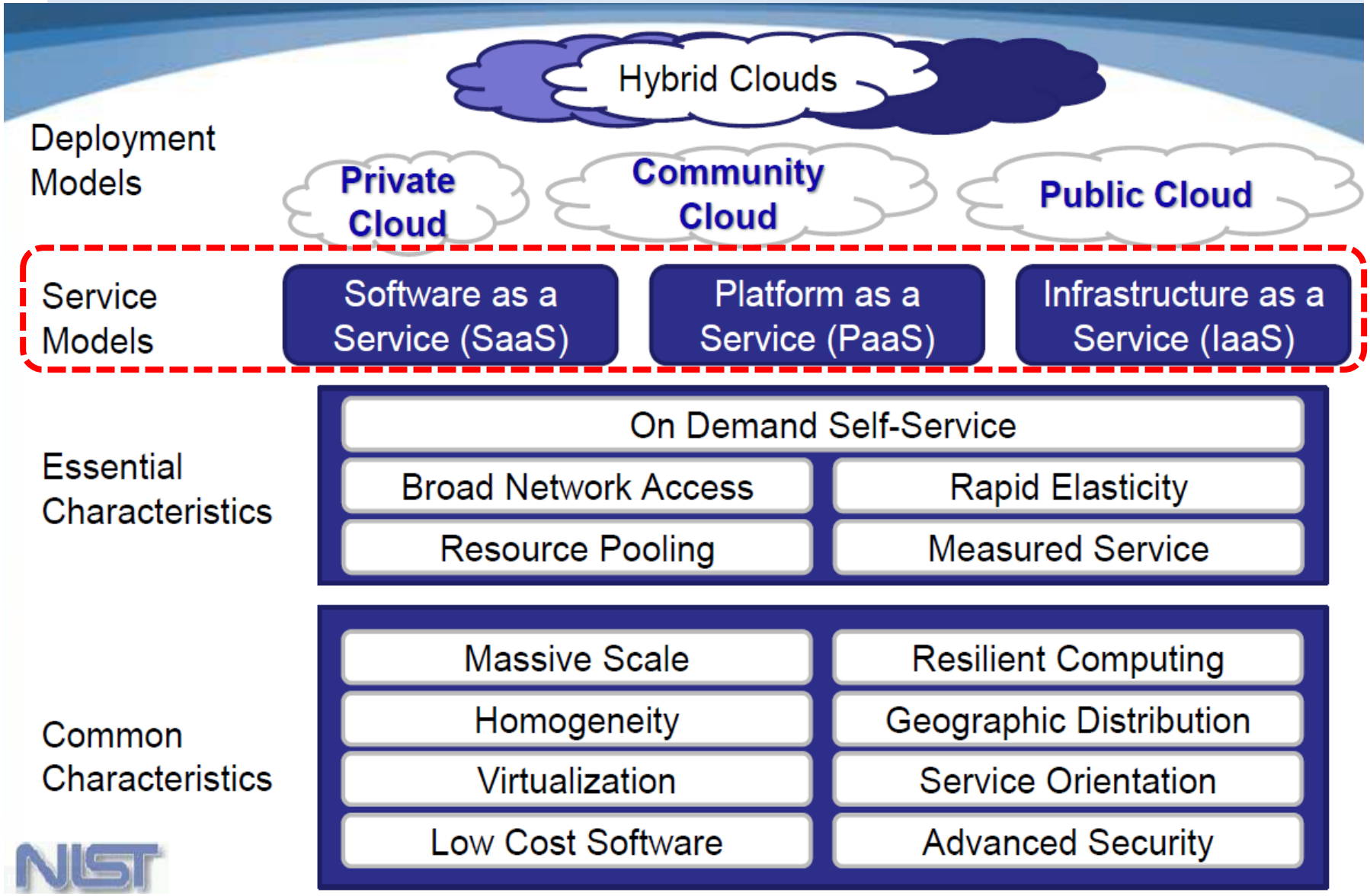
– http://www.gartner.com/newsroom/id/1035013

Definition - NIST

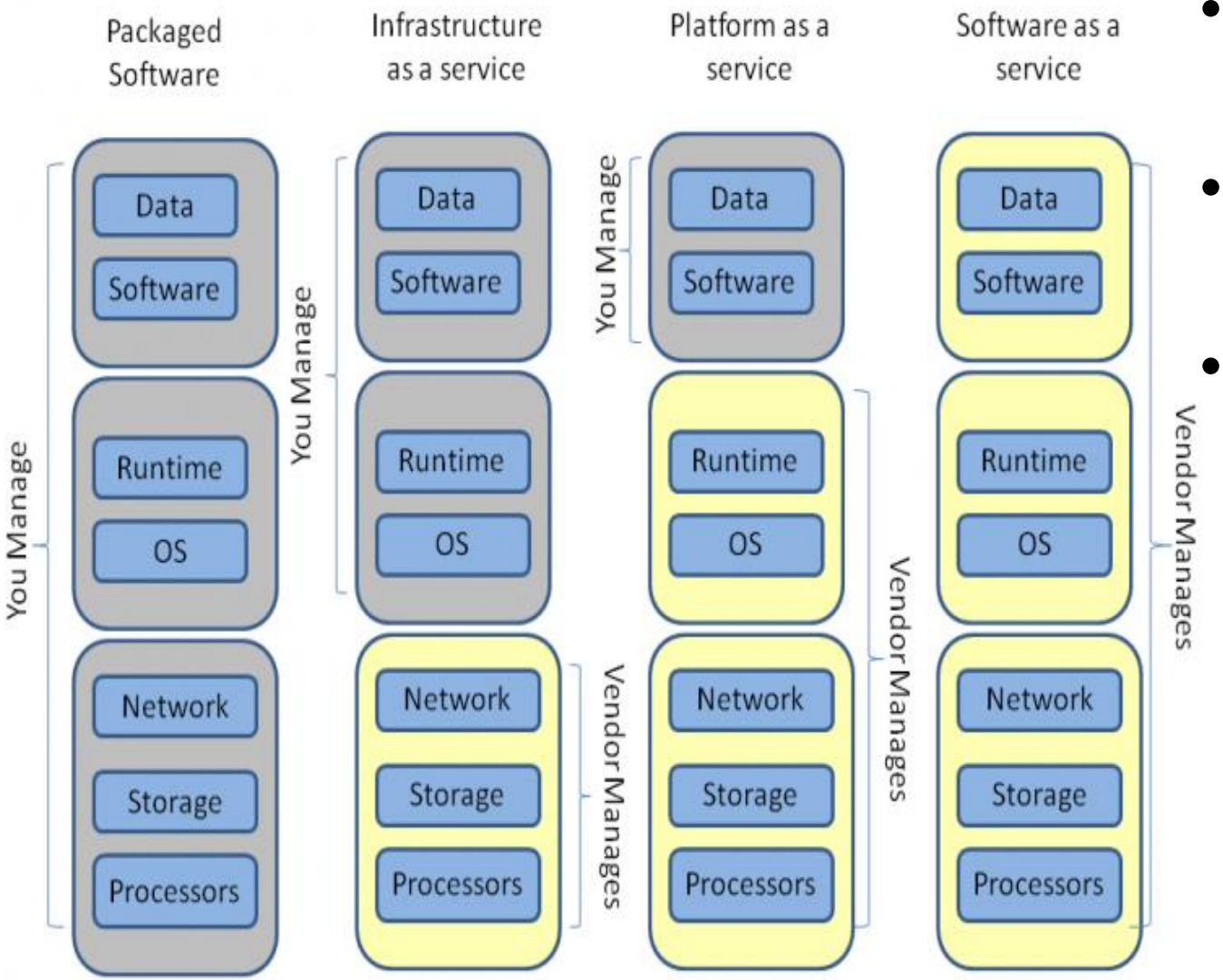
Cloud computing is a model for enabling *ubiquitous*, convenient, *on-demand* network access to a *shared pool* of configurable computing resources (e.g., networks, servers, storage, applications, and *services*) that can be *rapidly provision*ed and released with *minimal management* effort or service provider interaction.

– http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf

NIST Cloud Definition Framework

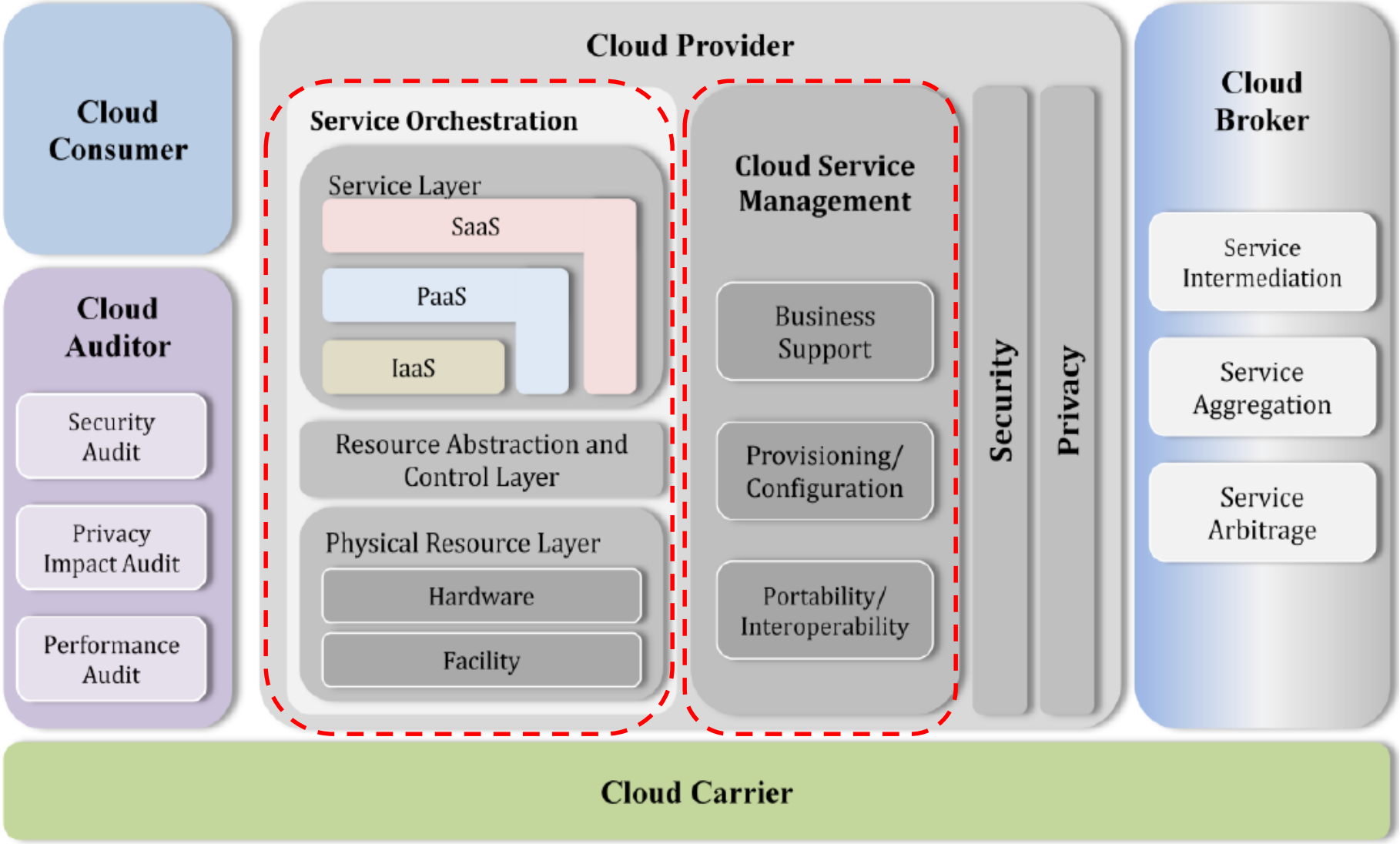


Service Models



- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

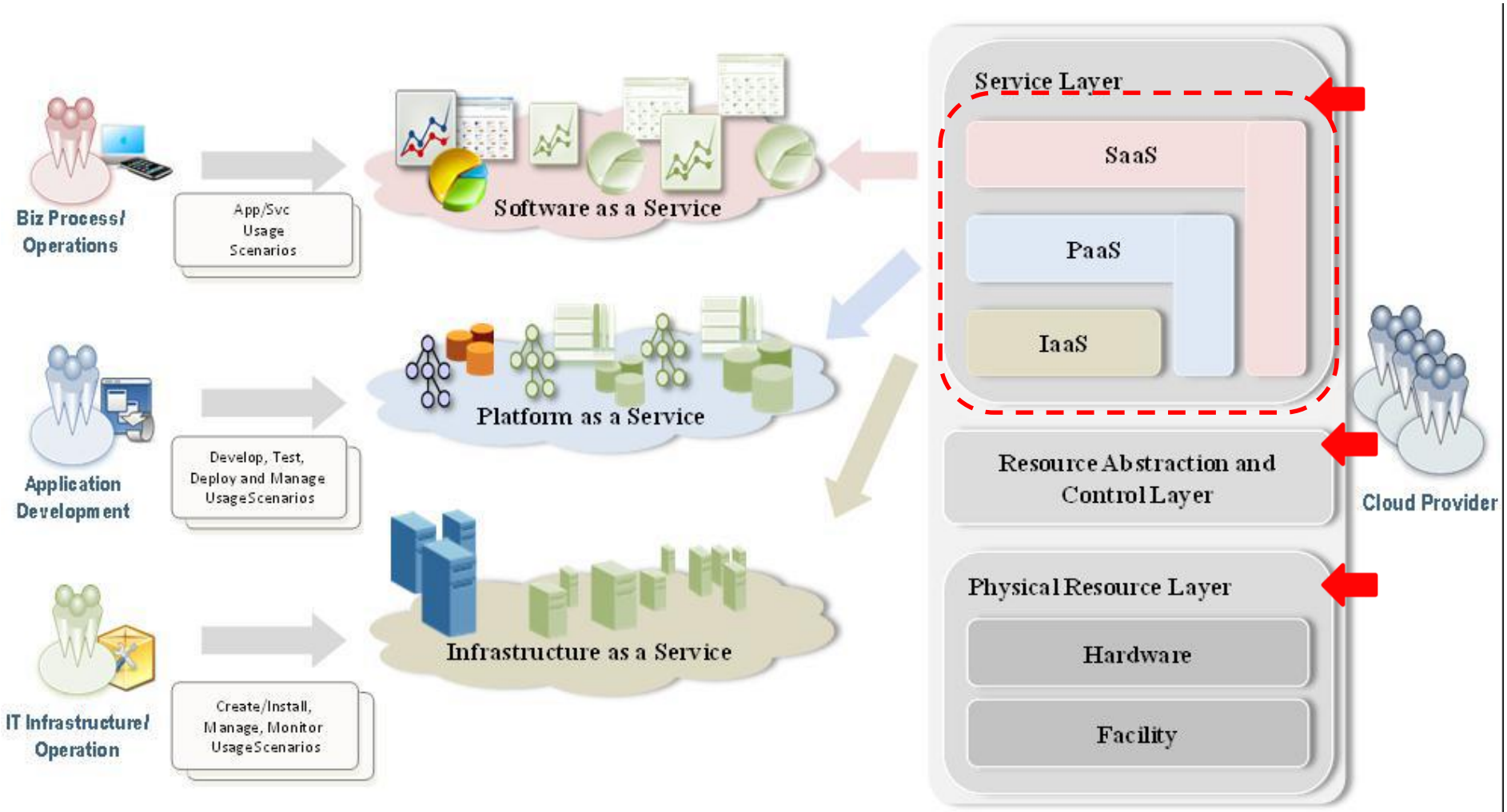
NIST Cloud Reference Model



Service Orchestration

- the arrangement, coordination, and management of cloud infrastructure to provide the optimizing capabilities of cloud services, as a cost-effective way of managing IT resources, as dictated by strategic business requirements

Service Orchestration (cont'd)



Layers: Scope of Control

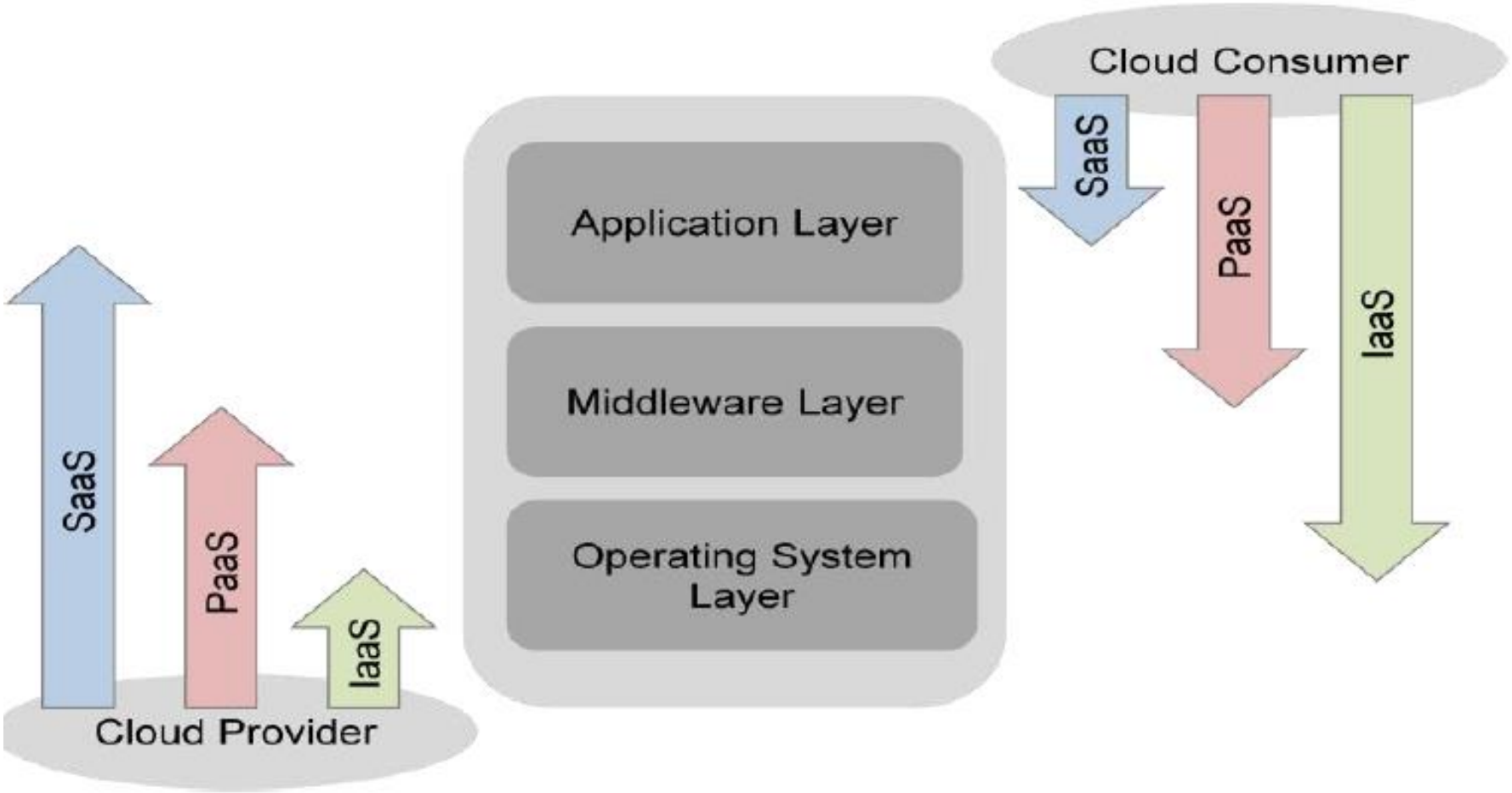
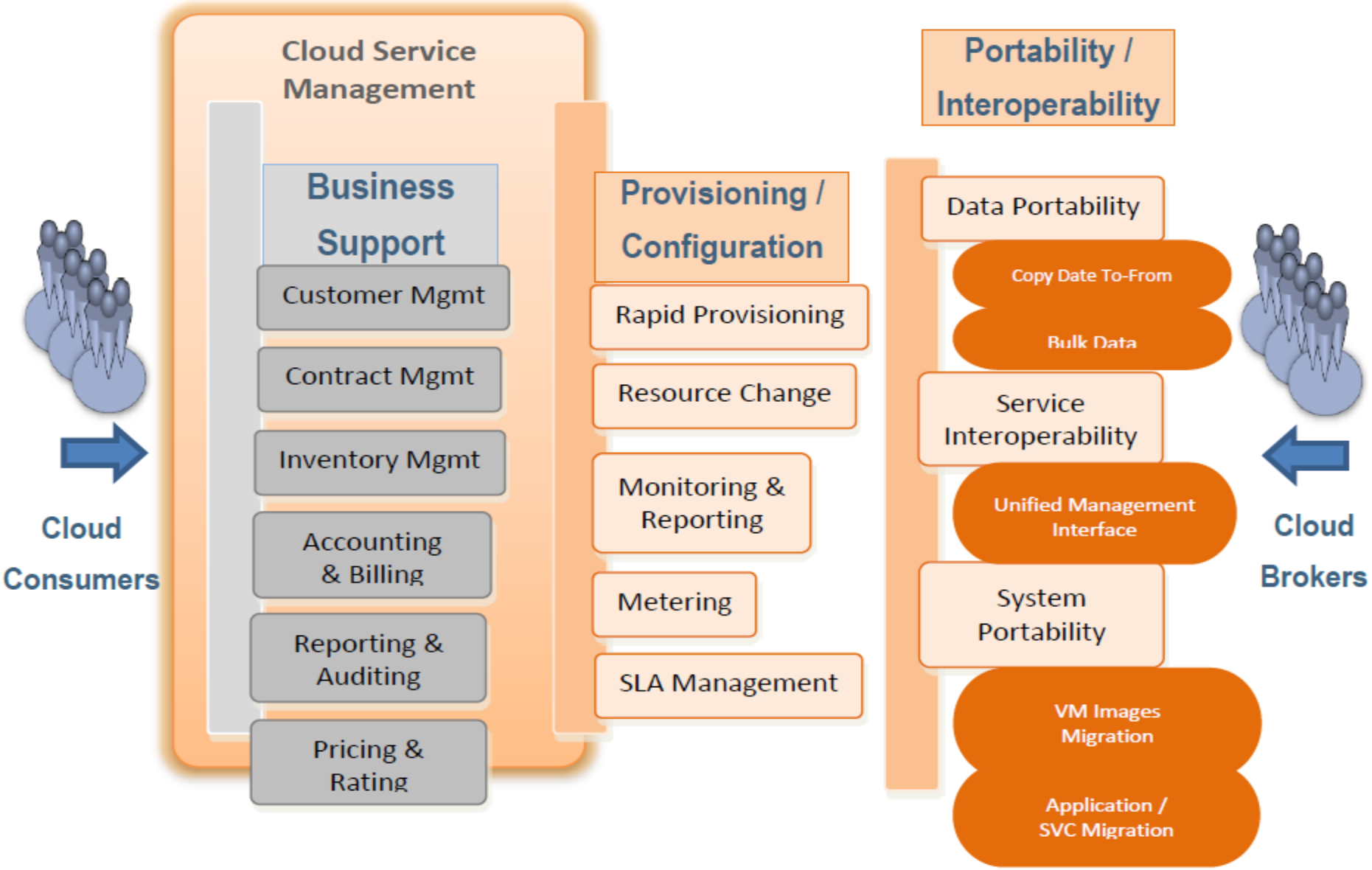
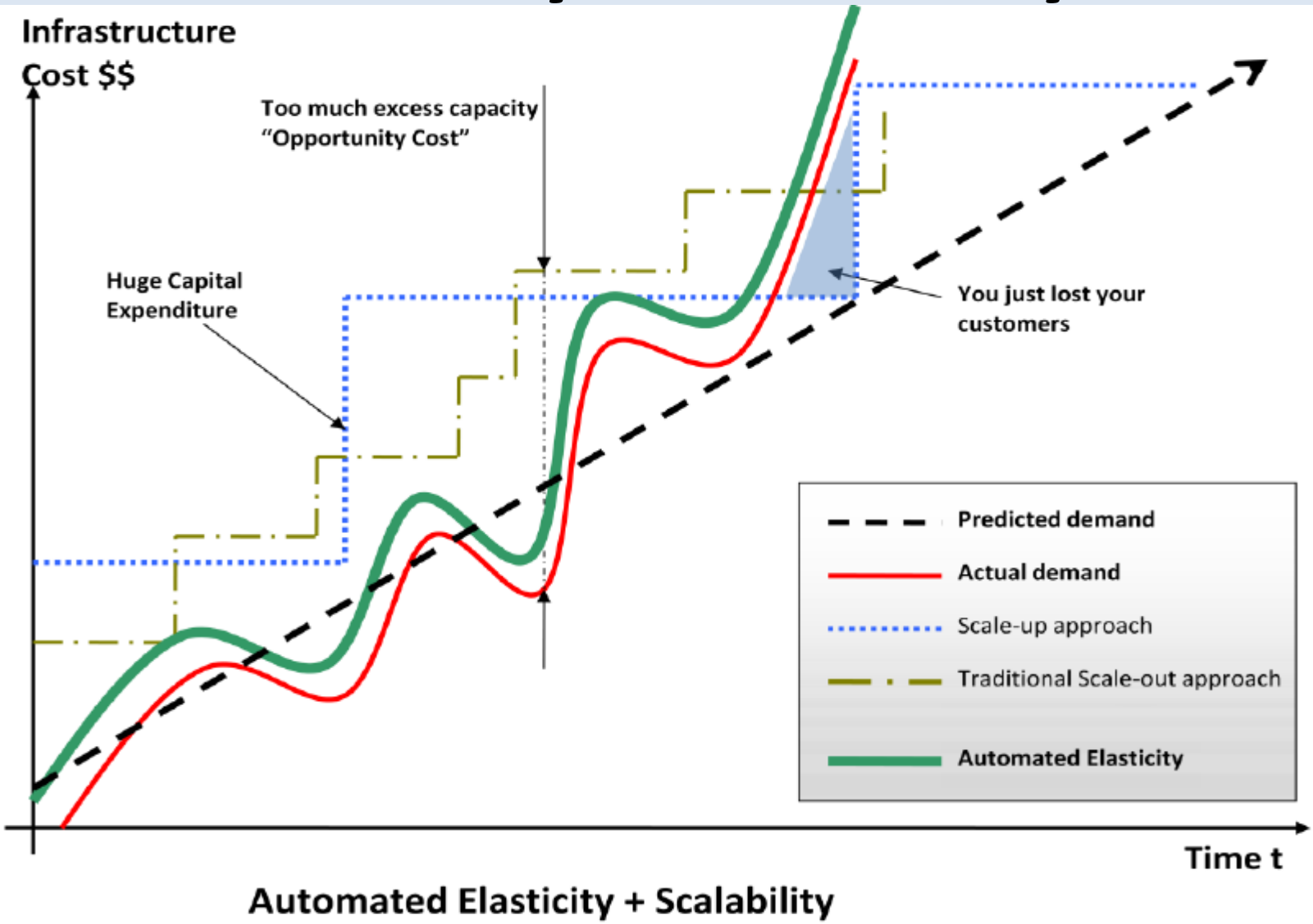


Figure 8: Scope of Controls between Provider and Consumer

Cloud Service Management



Elasticity + Scalability



- http://jineshvaria.s3.amazonaws.com/public/cloudbestpractices-jvaria.pdf

Big Data

- Characteristics
  - Volume: MB, GB, TB, PB, etc
  - Variety: different forms or types
  - Velocity: batch, near realtime, realtime
- Search for actionable insights
  - Regardless of structured, semi-structured, or unstructured data
  - Q: How to analyze structured, semi-structured, and unstructured data?
- Evolution: Batch ➔ real time ➔ prediction
- Tools
  - Generic: NoSQL, SQL, search
  - Batch: MapReduce, Hive, Pig, etc.
  - Real time / streaming: Spark (streaming), Storm, etc
  - Machine learning: Mahout, Spark ML, etc
- Q: how to use the right tool for the job?
  - http://www.slideshare.net/AmazonWebServices/aws-november-webinar-series-architectural-patterns-best-practices-for-big-data-on-aws

Questions

- How does cloud computing change the architecture of applications using it efficiently?
  - How to design apps to leverage existing cloud services?
- How can I use cloud infrastructure and platform offerings to efficiently and rapidly design, build, and manage applications to support the changing needs of my business?

Cloud Services/App Architecture

- Objectives
  - Scalability: scale up/down, scale out/in, load balance
  - Availability: 24x7
  - Reliability: do not fail, do not lose data
  - Security: authentication, authorization
  - Flexibility & agility: time to market
  - Serviceability: update component w/o disruption
  - Other manageability
- Leverage from the cloud
  - What, which, when, how, etc
- Focus: Application architecture for the cloud
- Application design patterns!

Roadmap

- Concepts - CAP, Paxos
- NoSQL
- RESTful web service
- Containers
- Microservices
- Cloud-native Application Design Patterns
- Hadoop
- MapReduce
- Spark
- MapReduce design patterns
- If time allows, Cloud Computing Design Patterns

Study Marinescu Chapter 2 for next session!

References

- The NIST Cloud Definition Framework
  - http://scap.nist.gov/events/2010/itsac/presentations/day2/Security_Automation_for_Cloud_Computing-Cloud_Computing_Intro.pdf
- NIST Cloud Reference Model
  - http://www.nist.gov/customcf/get_pdf.cfm?pub_id=909505
- NIST Cloud Computing Standards Roadmap
  - http://www.nist.gov/itl/cloud/upload/NIST_SP-500-291_Version-2_2013_June18_FINAL.pdf
- Architecting for the Cloud: Best Practices
  - http://jineshvaria.s3.amazonaws.com/public/cloudbestpractices-jvaria.pdf
- Eri Chapters 3 & 4