Lesson 1

- Reading list
  - Cloud Computing bible, B.Sosinsky, John Wiley & Sons, 2010
  - Cloud Computing: principles and paradigms, R.Buyya, 2011
  - Cloud Computing, V.K. Pachghare, 2016

Marking

Written exams

- Mid term → 5 grades
- Final exam → 10 grades

Paper

- Review at least 5 papers and Presentation of your readings → 5 grades
- Writing your own paper and published it you can achieve → 3 grades more that 20
- **** if you could publish it on an ISI journal, you can get the full mark ****

Plan

- Introduction
  - What is Cloud Computing?
- Characteristics of Cloud Computing
- Advantages of Cloud Computing
- Cloud service models
  - Software as a Service SaaS
  - Platform as a Service PaaS
  - Infrastructure as a Service IaaS
- Cloud implementation types
- Conclusion

What is Cloud Computing?

Gartner

"Cloud computing is a style of computing where massively scalable IT-related capabilities are provided as a service across the Internet to multiple external customers"

FORRESTER®

"Cloud computing: A pool of abstracted, highly scalable, and managed infrastructure capable of hosting end-customer applications and billed by consumption"

"Cloud computing is Web-based processing, whereby shared resources, software, and information are provided to computers and other devices (such as smartphones) on demand over the Internet."

Why we need Cloud?

- Alignment with the needs of the business / user / non-computer specialists / community and society
- Need to address the scalability issue: large scale data, high performance computing, automation, response time, rapid prototyping, and rapid time to production
- Transform data from diverse sources into intelligence and deliver intelligence to right people/user/systems
- What about providing all this in a cost-effective manner?

What is Cloud Computing?

Cloud Computing

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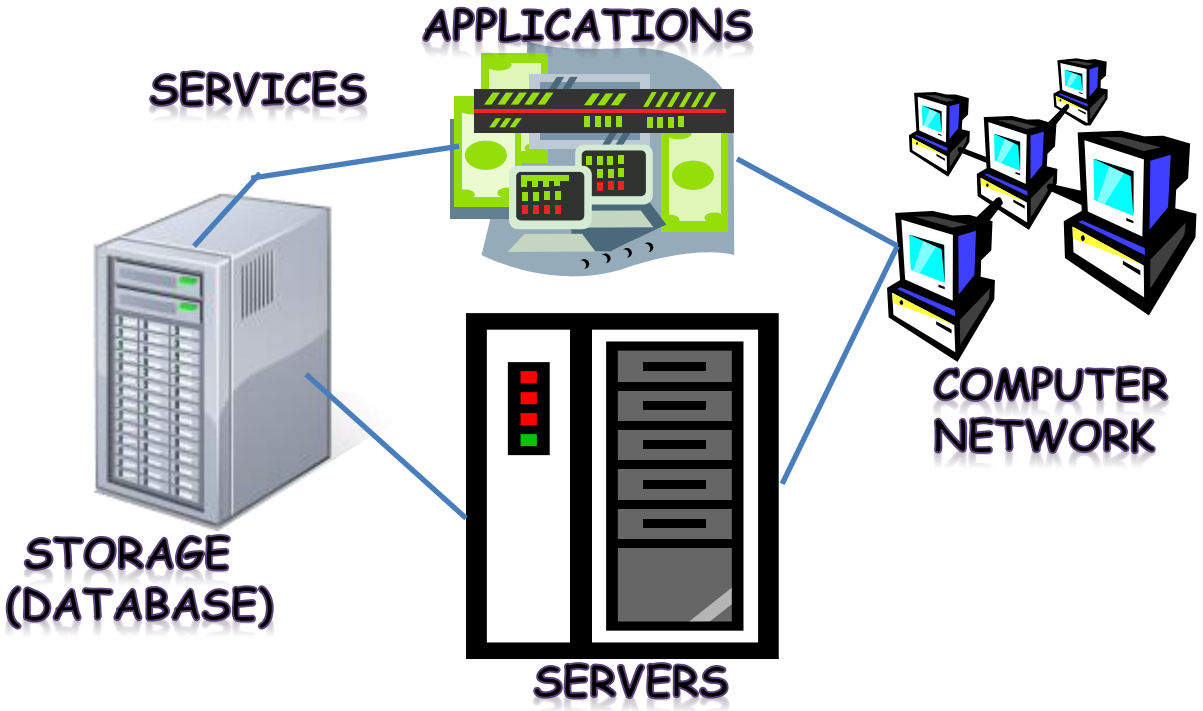
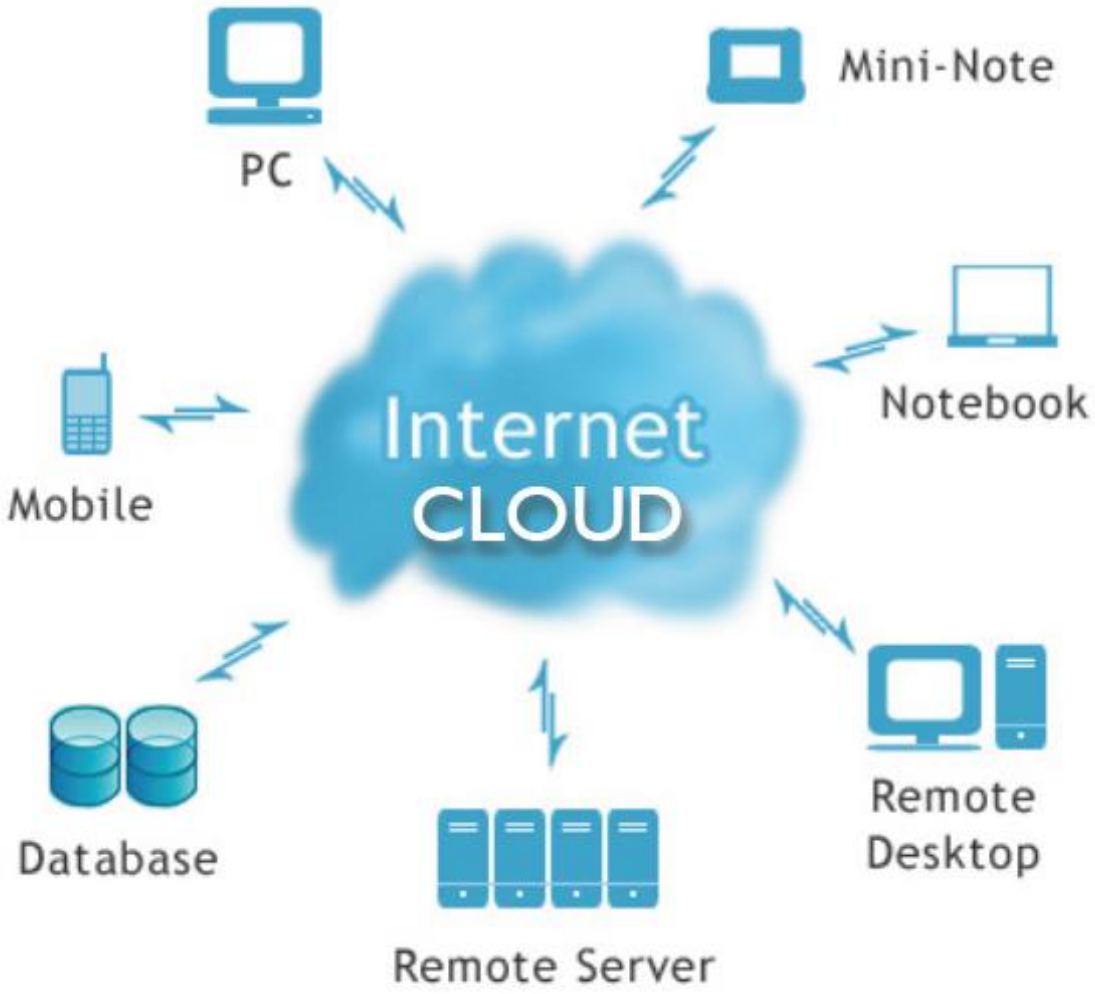
Computing and software resources that are delivered on demand, as service..

What is Cloud Computing?

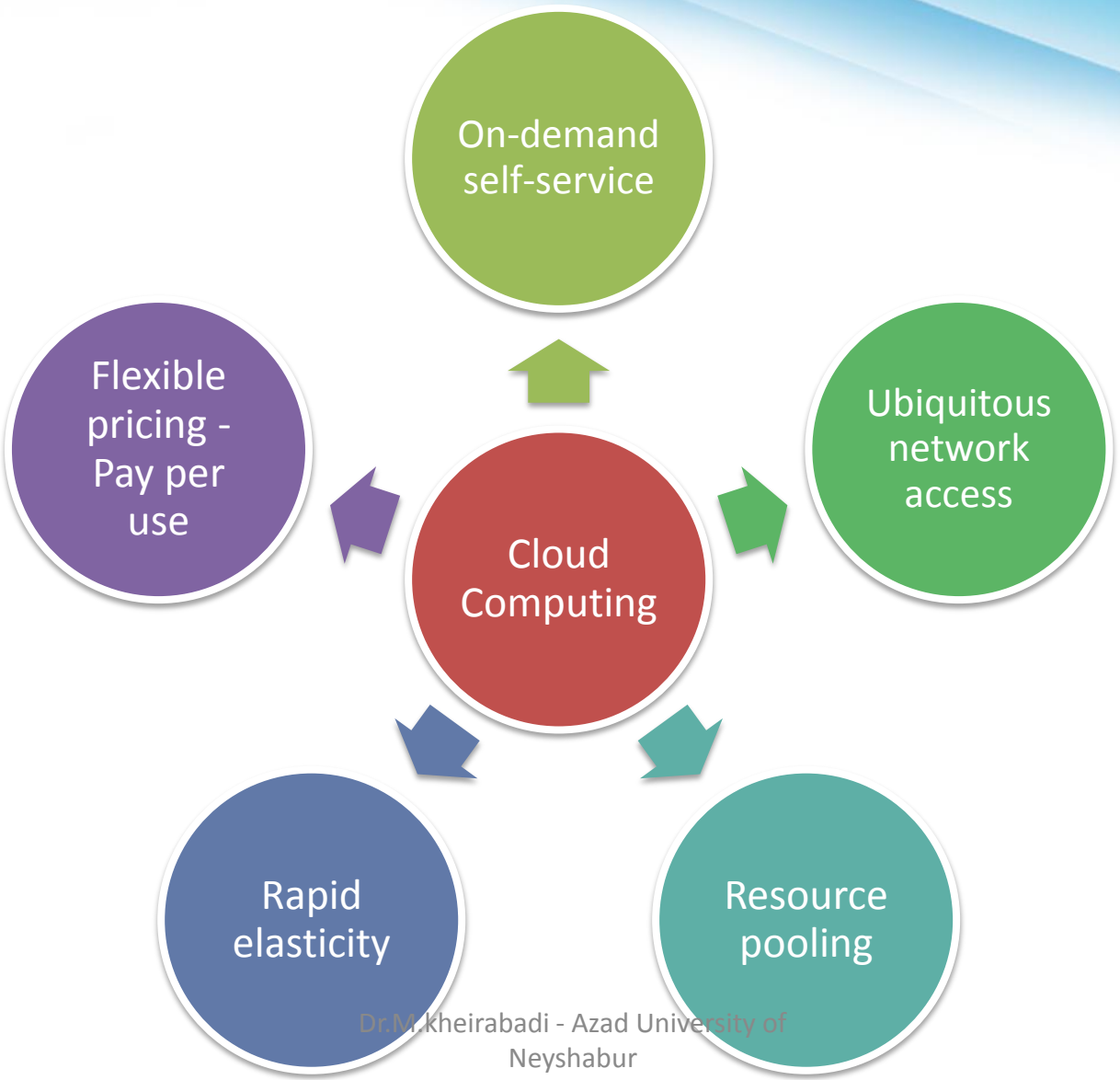


Everything on the Clouds



Characteristics of Cloud Computing

Essential characteristics of Cloud Computing



Common characteristics of Cloud Computing

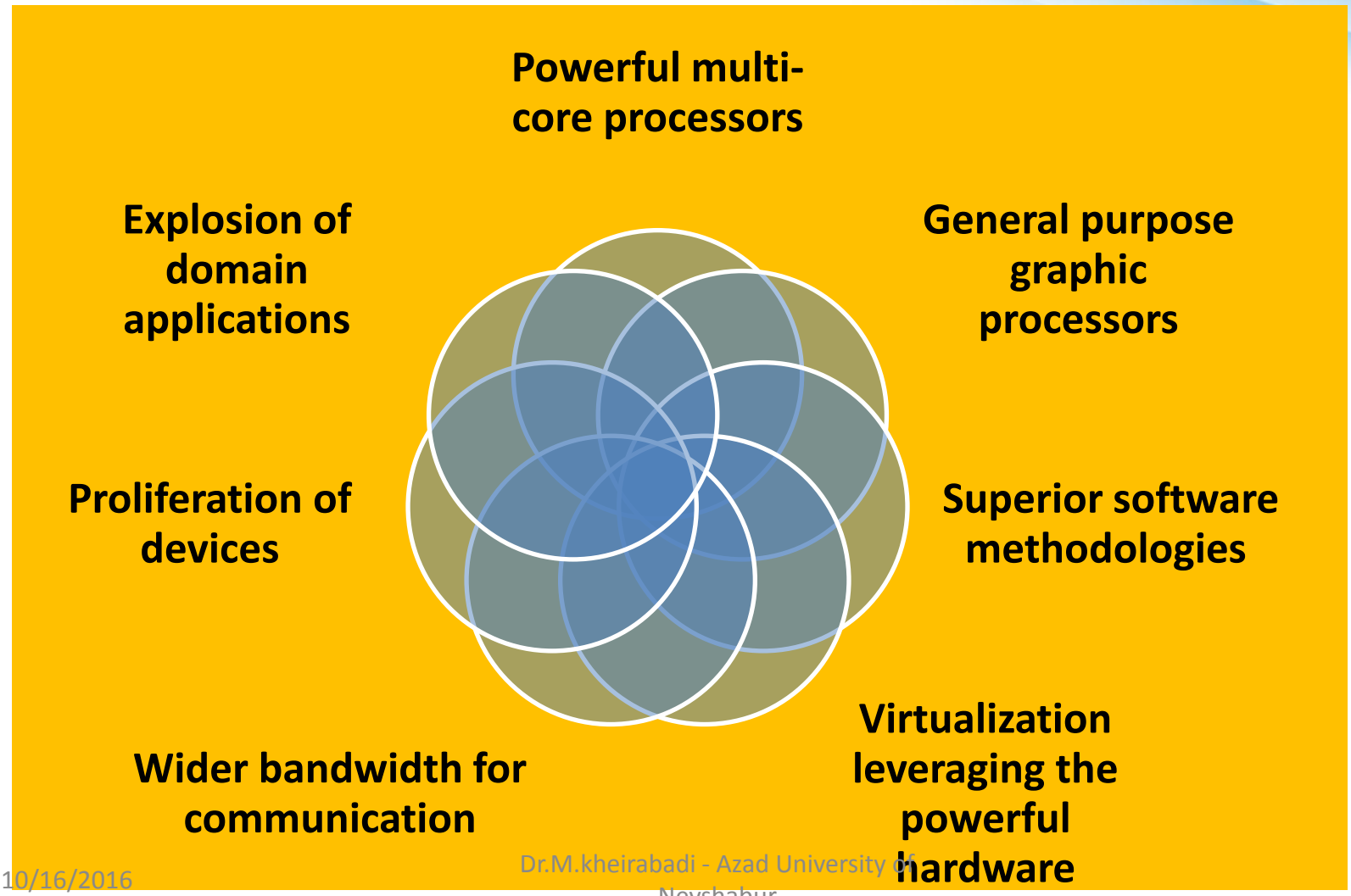
- On-demand self-service
- Ubiquitous network access (Access it anywhere/everywhere/Anytime you need)
- Resource pooling (advanced virtualization/ presentation, Application, Desktop, Storage, Network)
- Rapid elasticity (automatically request additional space)
- Flexible pricing - Pay per use

Advantages of Cloud Computing

Advantages of Cloud Computing

- Lower Computing Cost
- Improved Performance
- Reduced Software Cost
- Instant Software Updates
- Unlimited Storage Capacity
- Increased Data Reliability
- Device Independence and the “always on!, anywhere and any place”
- Free From Maintenance and the “no-need-to-know”

A Golden Era in Computing

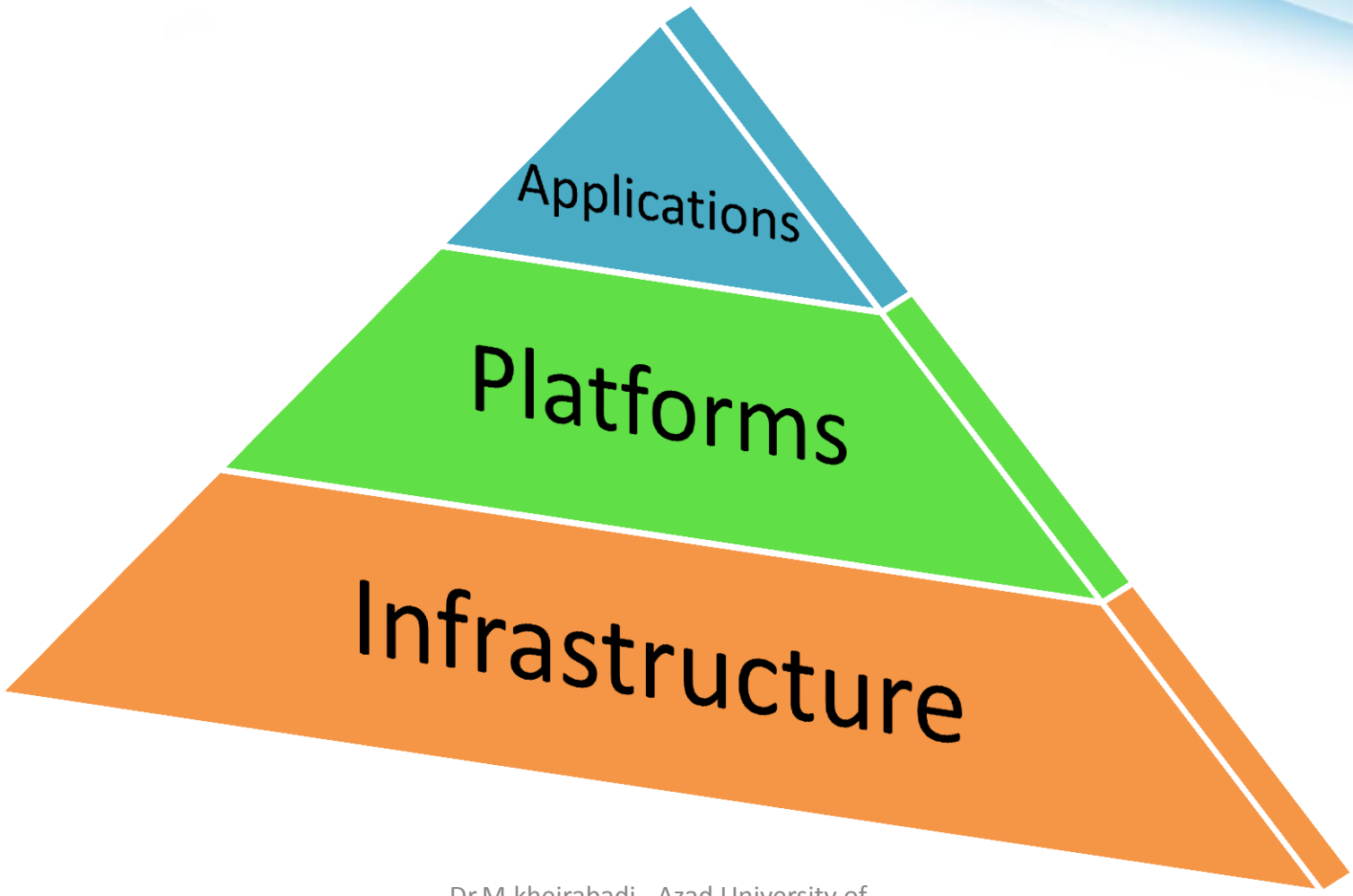


Disadvantages

- Requires a constant Internet connection
- Does not work well with low-speed connections
- Features might be limited
- Can be slow
- Stored data might not be secure
- Stored data can be lost
- Compatibility for clouds/DB/etc.

Cloud service models

Cloud Service Layers



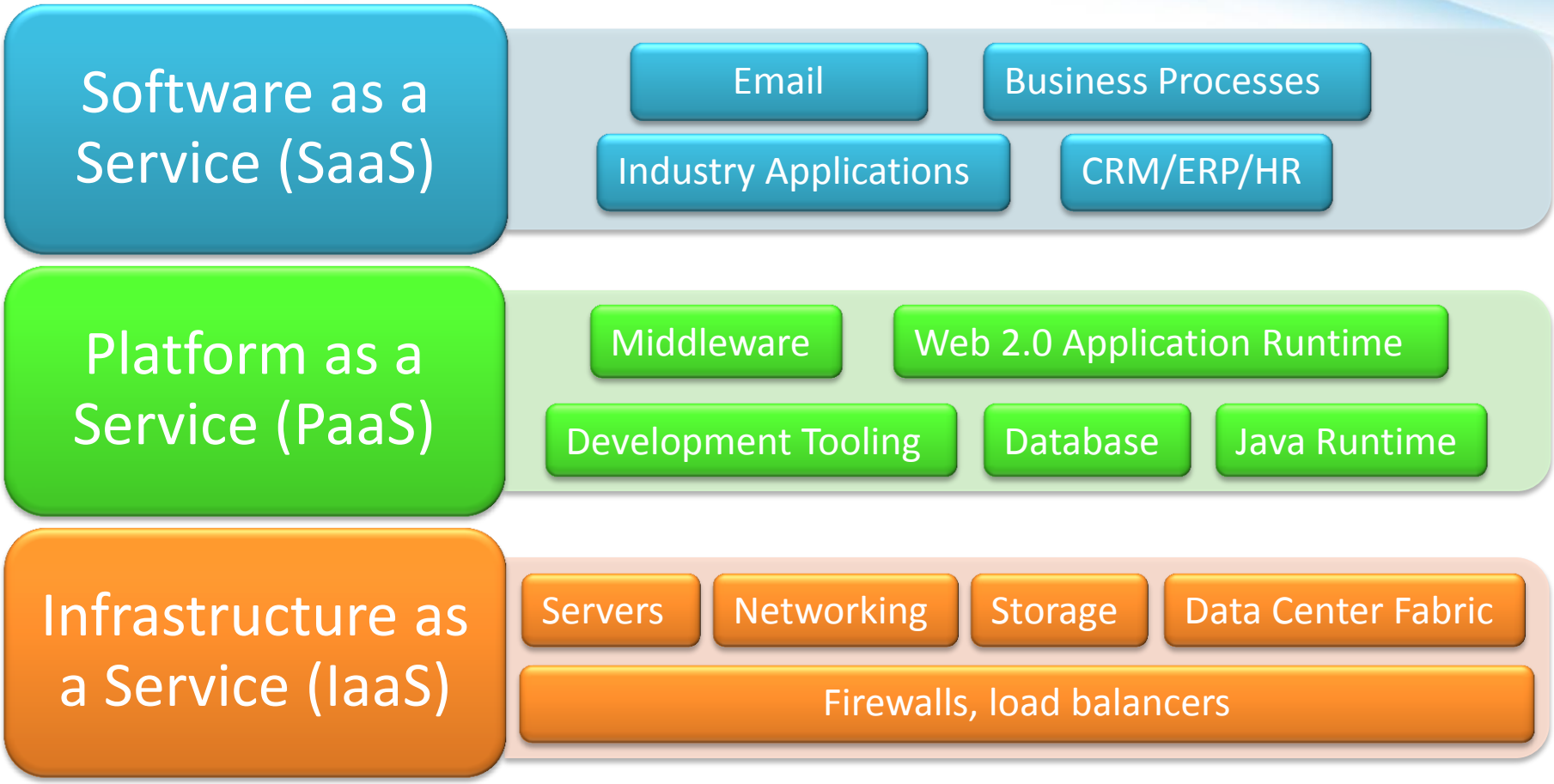
Cloud Service models - Definitions

Software as a Service (SaaS)	• SaaS is a software delivery methodology that provides licensed multi-tenant access to software and its functions remotely as a Web-based service.
Platform as a Service (PaaS)	• PaaS provides all of the facilities required to support the complete life cycle of building and delivering web applications and services entirely from the Internet.
Infrastructure as a Service (IaaS)	• IaaS is the delivery of technology infrastructure as an on demand scalable service.

Cloud Service models - Characteristics

Software as a Service (SaaS)	• Scalable; Multi-tenant; Metadata driven configurability • Sometimes free; easy to use; good consumer adoption; proven business models
Platform as a Service (PaaS)	• Highly scalable; multi-tier architecture; Multi tenant environments • Developers can upload a configured applications and it "runs" within the platform's framework
Infrastructure as a Service (IaaS)	• Offers full control of a company's infrastructure; not confined to applications or restrictive instances • Sometimes comes with a price premium; can be complex to build, manage and maintain

Cloud Service models - Containing



Cloud Service models - Examples

Software as a Service (SaaS)

Gmail by Google

facebook

Platform as a Service (PaaS)

Google App Engine

force.com platform as a service

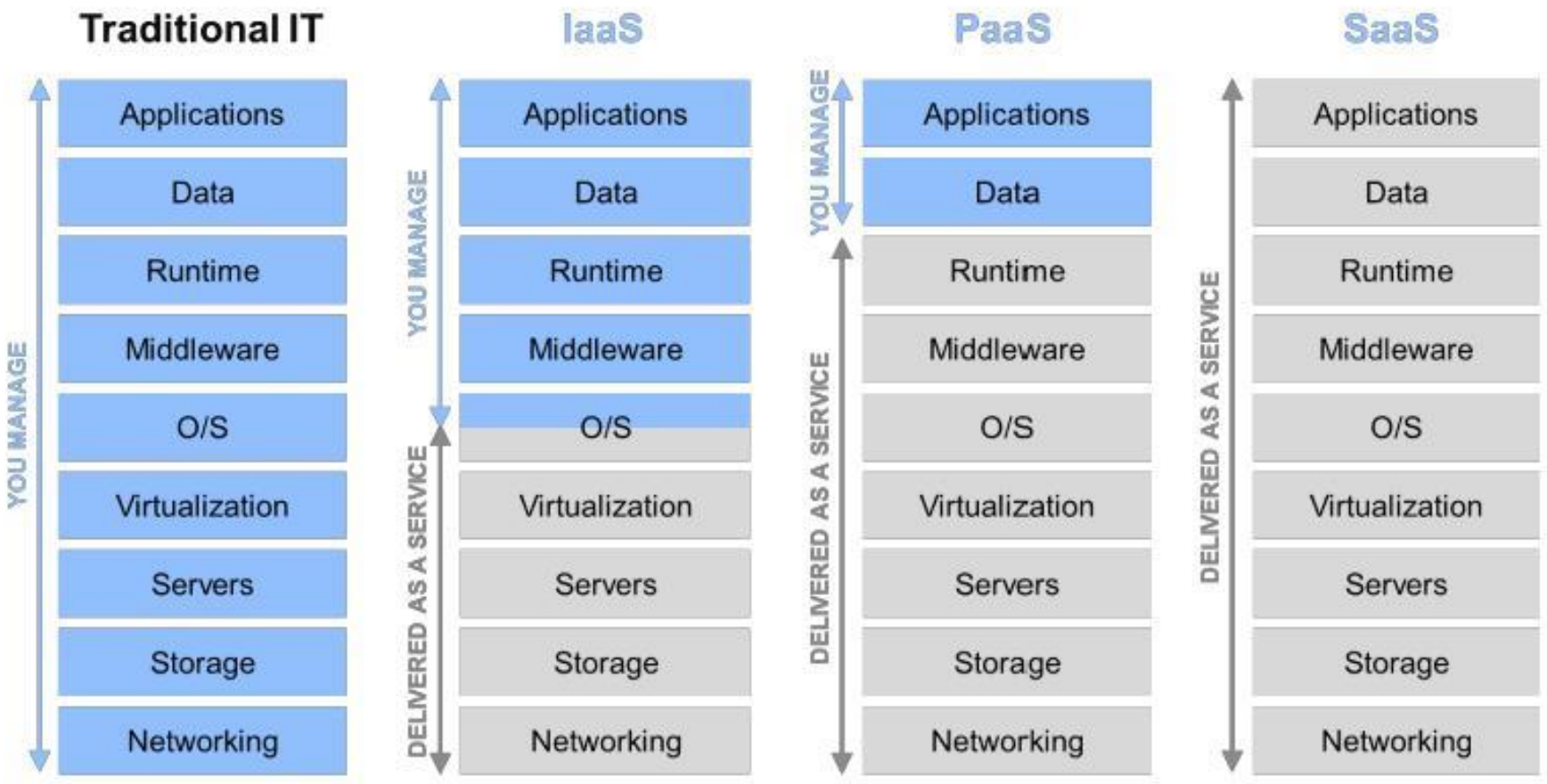
Windows Azure

Infrastructure as a Service (IaaS)

amazon web services

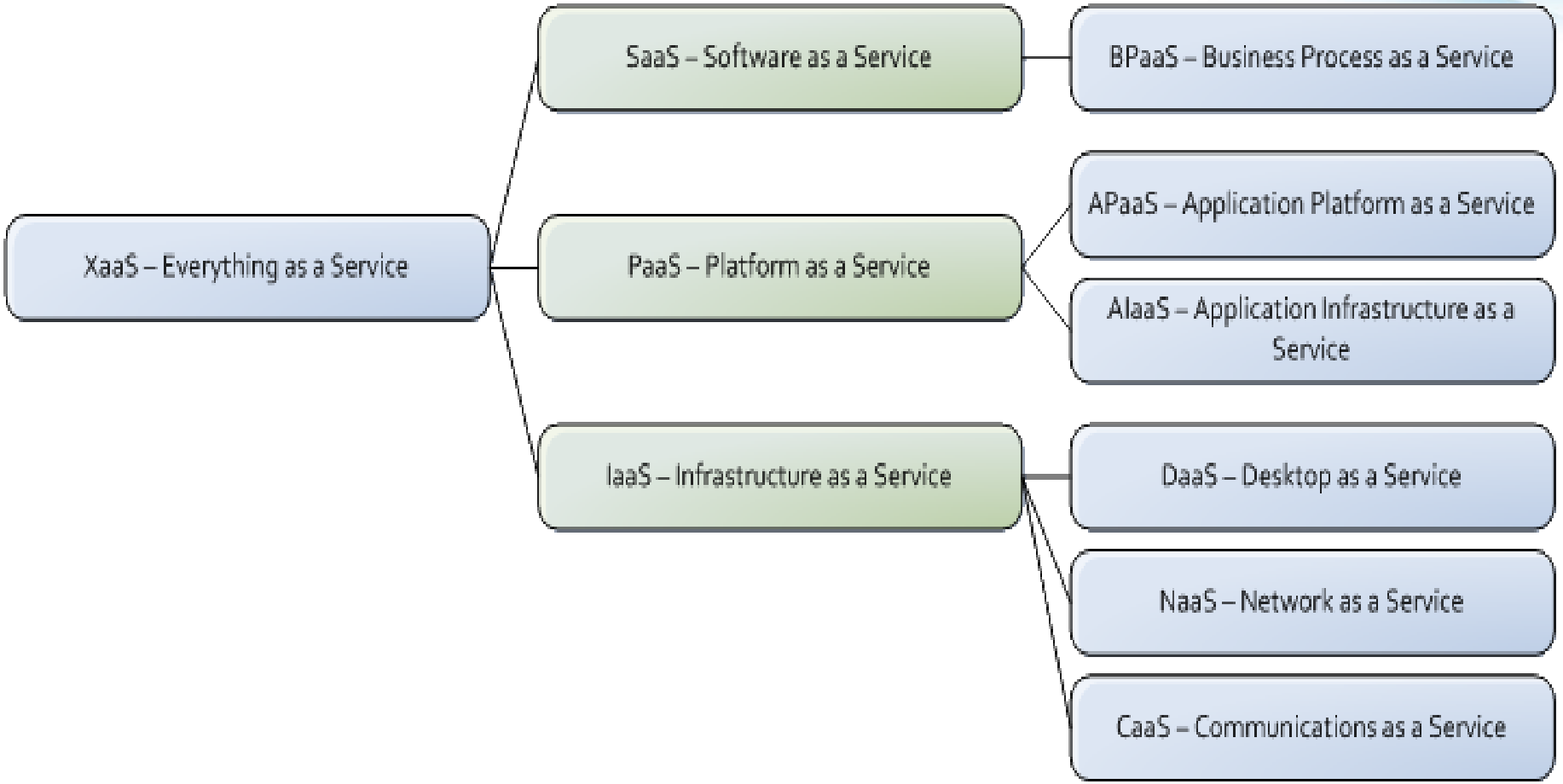
the rackspace cloud

Cloud Service models - Comparison



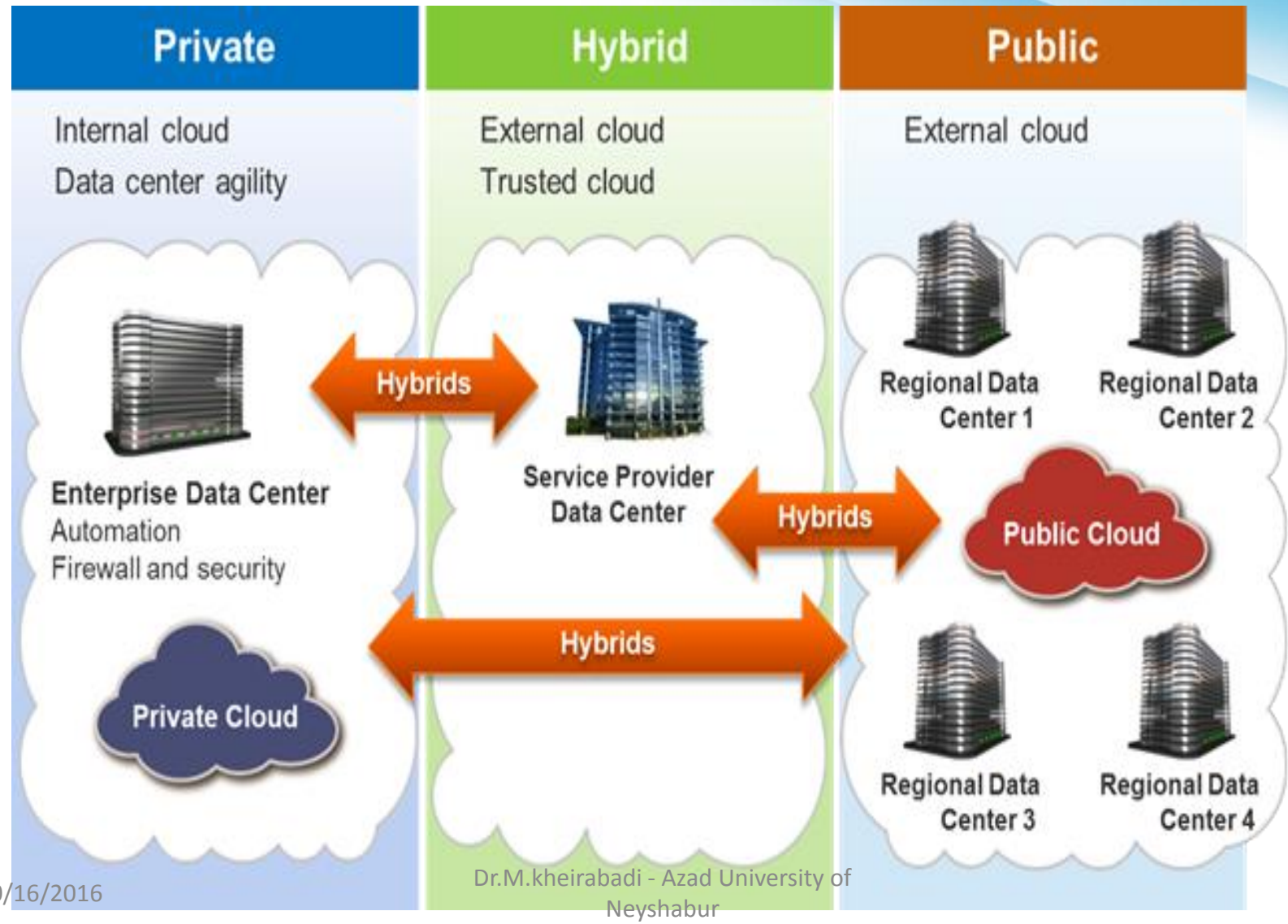
Source: Microsoft.

Cloud Service models



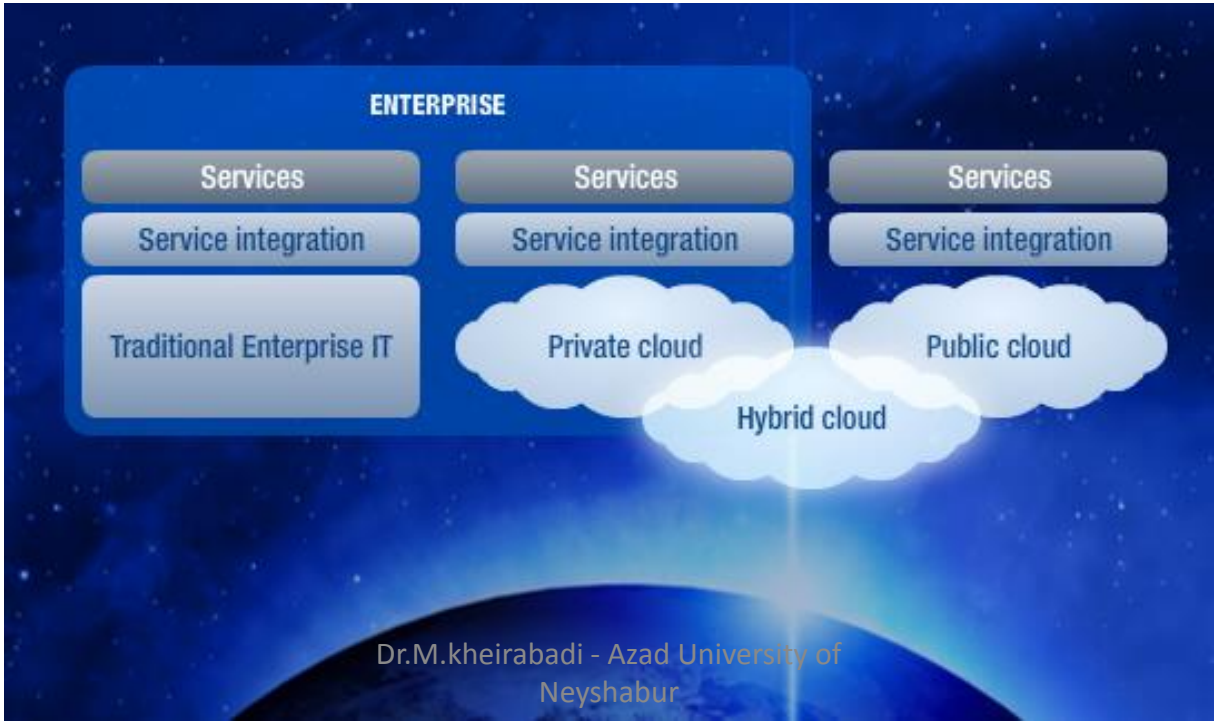
Cloud implementation types

Cloud implementation types



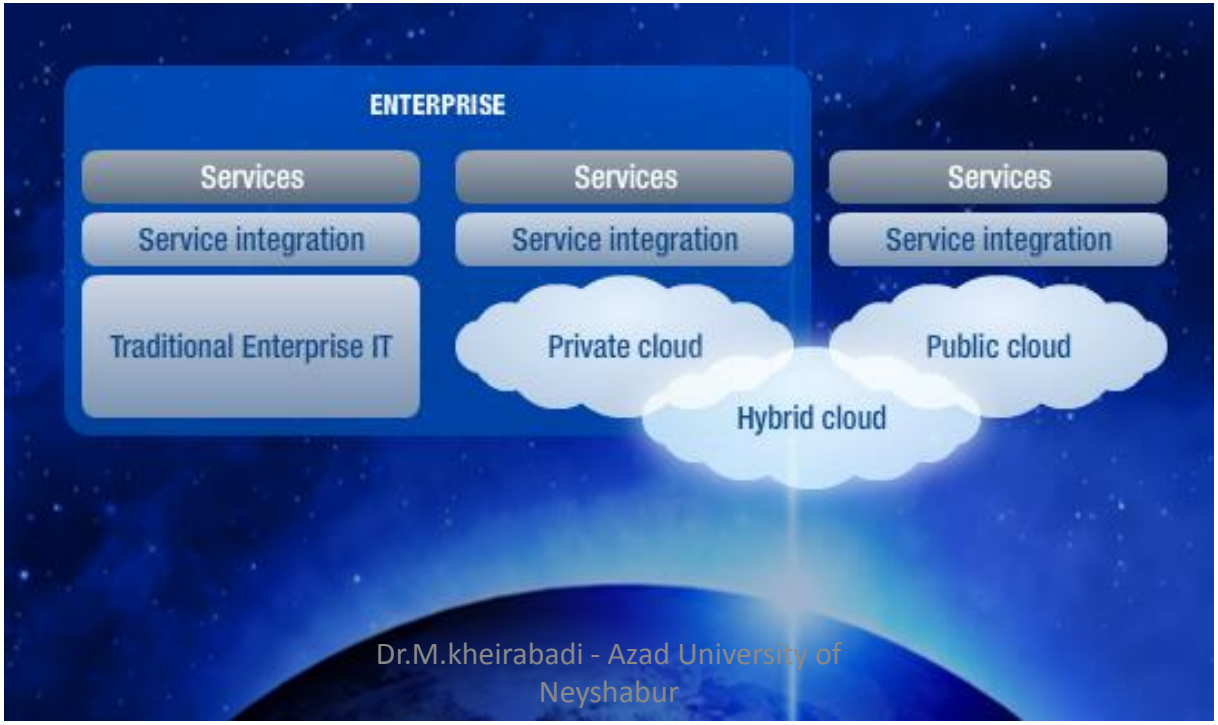
Public Cloud

- Owned and managed by service provider
- Made available to the general public or a large industry group



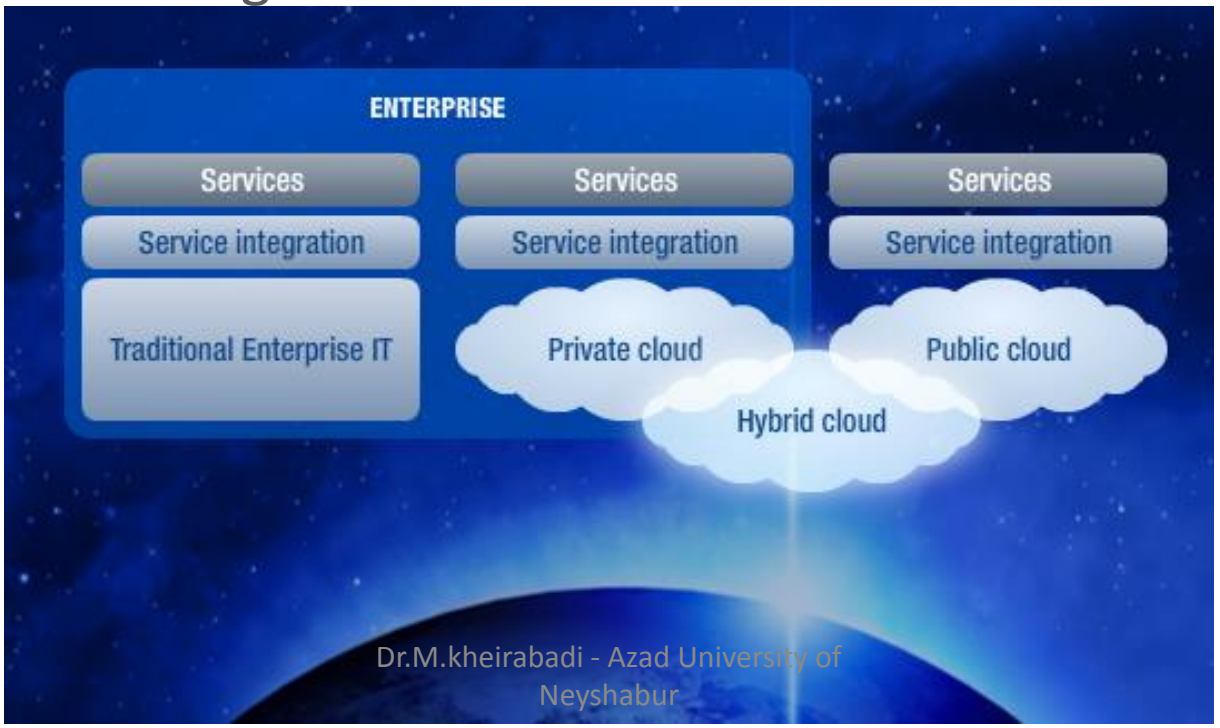
Private Cloud

- Operated solely for an organization
- May be managed by the organization or a third party
- Limits access to enterprise and partner network
- Retains high degree of control, privacy and security



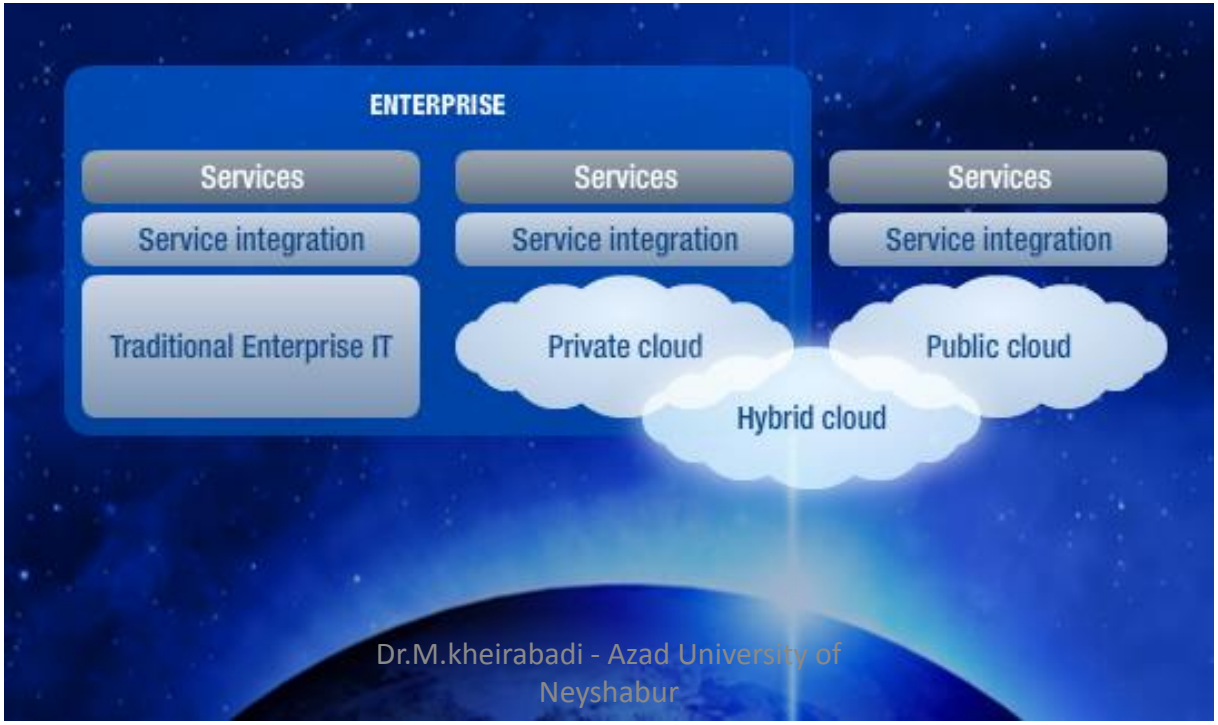
Community Cloud

- shared infrastructure by several organizations which have shared concerns
- May be managed by the organizations or a third party
- Costs are spread over fewer users than a public cloud but more than a single tenant



Hybrid Cloud

- Composition of two or more clouds (private, community, or public) bound together by standardized or proprietary technology that enables data and application portability



Examples

Public Cloud

- Public clouds service to any paying customer.
- E.g. : Amazon(S3 & EC2), Google, Microsoft, Sales force

Private Cloud

- Private clouds are assessable only to the company employees.
- E.g. : HP data center, IBM, Sun, Oracle, 3tera

Hybrid Cloud

- Organizations may host critical applications on private clouds.
- where as relatively less security concerns on public cloud.
- usage of both public and private together is called hybrid cloud

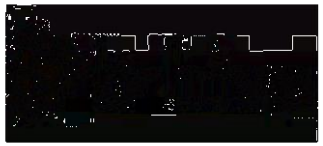
Cloud Operating Systems

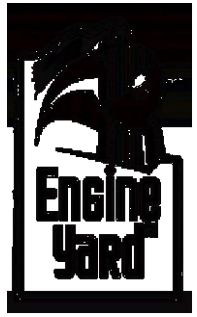
- Eye OS
- Amoeba OS
- Glide OS
- Start force
- myGoya
- CorneliOS
- Lucid Desktop
- Cloudo, Ghost, Zimdesk, Start force etc.,

Distributed vs. Grid vs. Cloud

	Distributed	Grid	Cloud
Time	Weeks to Months	Days to Weeks	Minutes
Scalability	Slowest, Rigid & Costly	Slower, somewhat flexible, Costly	Instant, Flexible, Pay-per-usage
Cost	High CapEx	Costly, sometimes month/year contracts, no CapEx	No contracts, usage based, no upfront costs
"Green"	Low	Low	High - virtualized
Pricing model	Buy Servers & Colo costs whether used or not	Rent Servers & Hosting costs whether used or not	Rent based on usage only

Commercial Clouds





Conclusion

Cloud Computing is the fastest growing part of network based computing . It Provides tremendous benefits to customers of all sizes: simple users, developers, enterprises and all types of organizations.

References

- Cloud computing, by Khalid Agdmoun, accessed Oct 2016 in SlideShare
- Introduction to cloud computing, by Divyanshu Sunwani, accessed Oct 2016 in SlideShare
- Introduction to cloud computing, by Yossi Cohen