Amirkabir University of Technology
(Tehran Polytechnic)

Cloud Computing

Introduction

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My Background and Contact Details

- Seyyed Ahmad Javadi
  - PhD from Stony Brook University
  - Postdoc from University of Cambridge
  - Interest: Cloud computing, performance analysis

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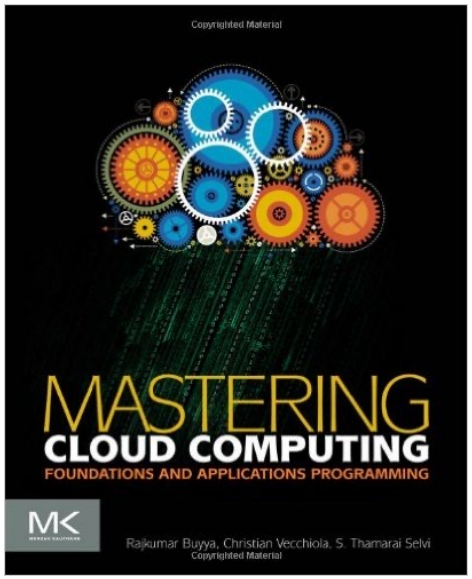
Course Introduction

- Saturday and Monday (15:00-16:30pm)
  - **Attend class on time**

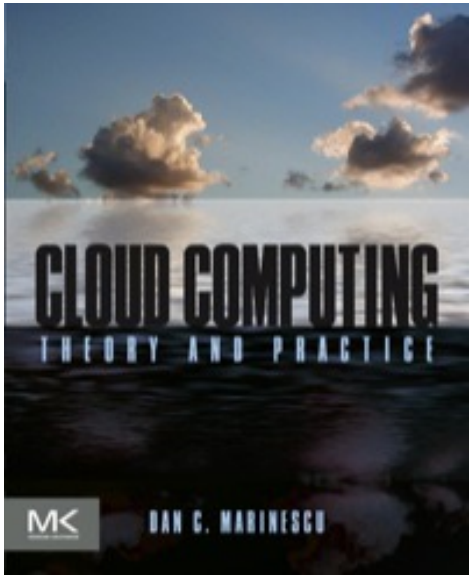
- Course web page
  - Check the webpage on regular basis
  - Everything will be posted on CW
  - Post All your Questions on CW Forums
    - Check forum history before posting any question

- Office hours and TA classes
  - TBD

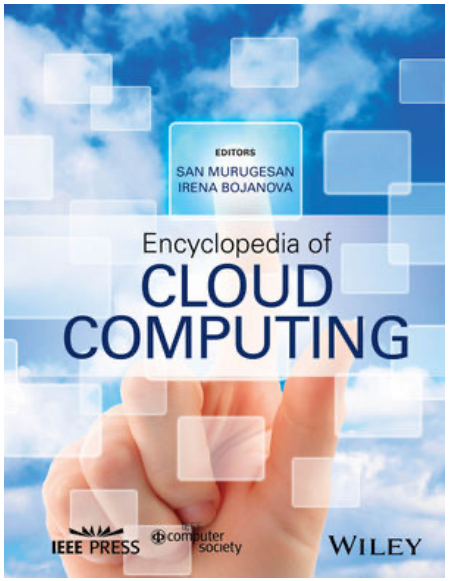
Resources



"**Mastering Cloud Computing: Foundations and Applications Programming**", Buyya et. al.



"Cloud Computing, Theory and Practice" Marinescu et. al.



"Encyclopedia of Cloud Computing", Murugesan et. al.

Course Logistics

Section	Score	Considerations
Assignments	5	Four practical homework
Midterm exam	4	1401/08/16
Team project	3 + 1	In Kubernetes
Final exam	7	1401/10/28
Quiz	0.5	one or two
Class participation	0.5	Considering number of attendance
Technical presentation	0.5	Topics are raised during the lectures
Total	20+1.5	Good luck ☺

Harsh penalty for plagiarism and cheating

Syllabus

- Introduction to Cloud Computing
- Virtualization
- Containers
- Kubernetes
- Programming Models and MapReduce
- Hadoop Yarn and Apache Spark
- OpenStack
- Load balancing and auto-scaling

Cloud Computing at a Glance

- Leonard Kleinrock, (ARPANET, 1969):

  "As of now, computer networks are still in their infancy, but as they grow up and become sophisticated, we will probably see the spread of 'computer utilities' which, like present electric and telephone utilities, will service individual homes and offices across the country."

Cloud Computing at a Glance (Cont.)

- A model consisting of services commoditized and delivered in a manner like utilities
  - Such as water, electricity, gas, and telephony.
- Users pay service providers only when they access the services.

Cloud computing is the most recent emerging paradigm promising to turn the vision of "computing utilities" into a reality.

Cloud Computing at a Glance (Cont.)

- The term ***cloud*** often denotes the infrastructure as a "cloud"
  - Businesses and users can access applications as services from anywhere in the world and on demand.

Cloud Computing at a Glance (Cont.)

- Cloud computing can be summarized as follows:

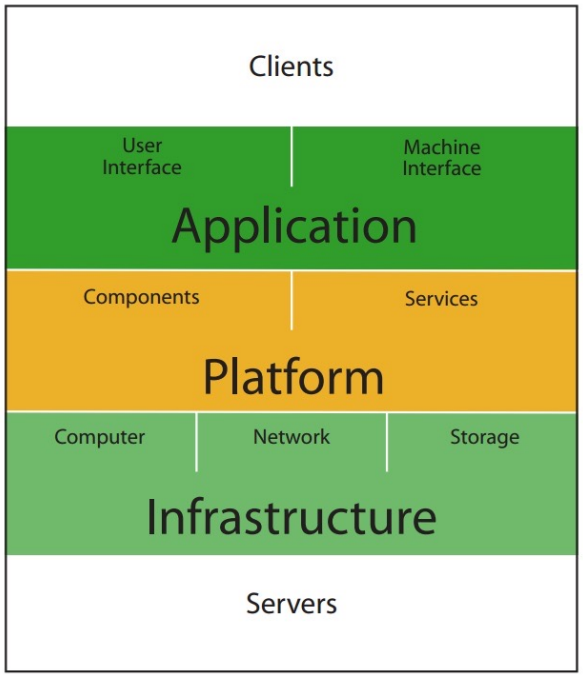
  "I don't care where my servers are, who manages them, where my documents are stored, or where my applications are hosted. I just want them always available and access them from any device connected through the Internet. Indeed I am willing to pay for this service for as a long as I need it."

The Vision of Cloud Computing

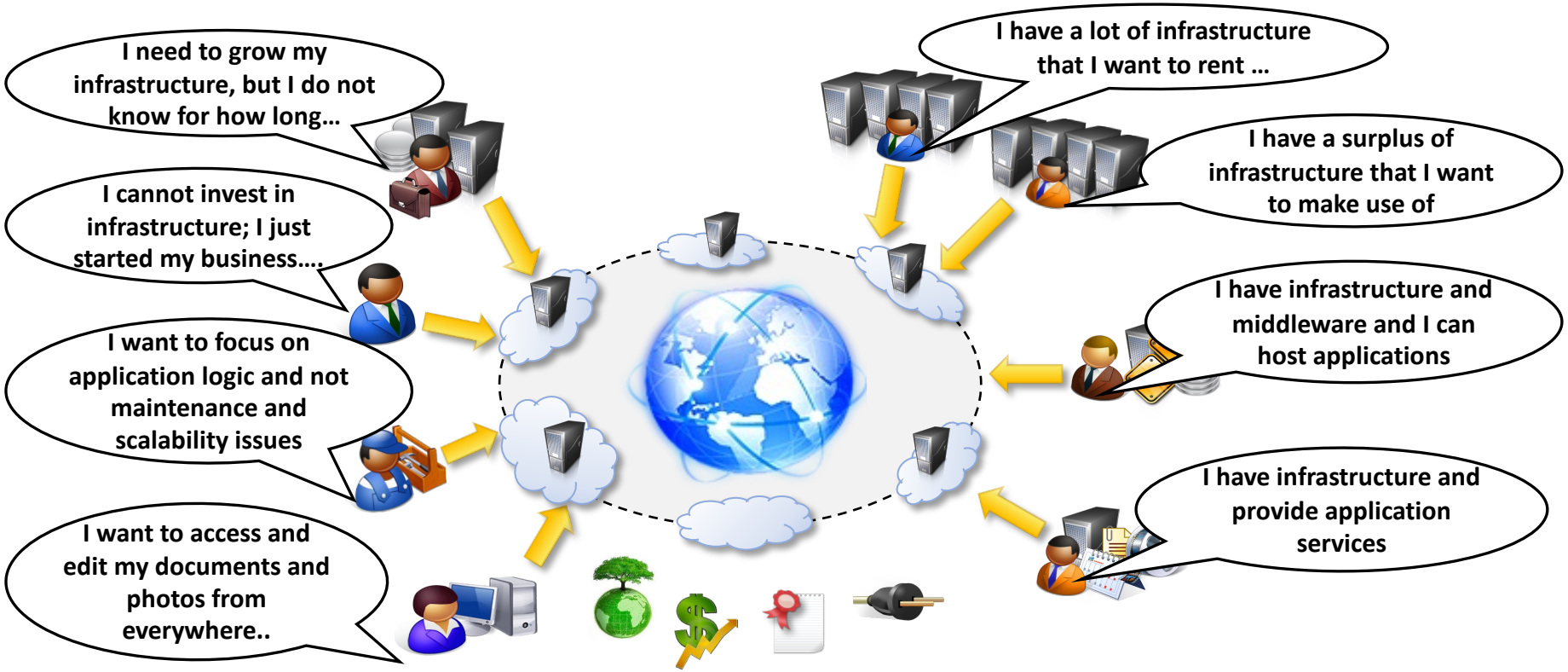
- Allowing anyone with a credit card to provision virtual hardware, runtime environments, and services.
  - These are used for as long as needed, with no up-front commitments required.

The Vision of Cloud Computing (Cont.)

- The entire stack of a computing system is transformed into a collection of utilities:
  - Can be provisioned and composed together to deploy systems in ***hours*** rather than **days.**
  - *With virtually* ***no maintenance costs***.



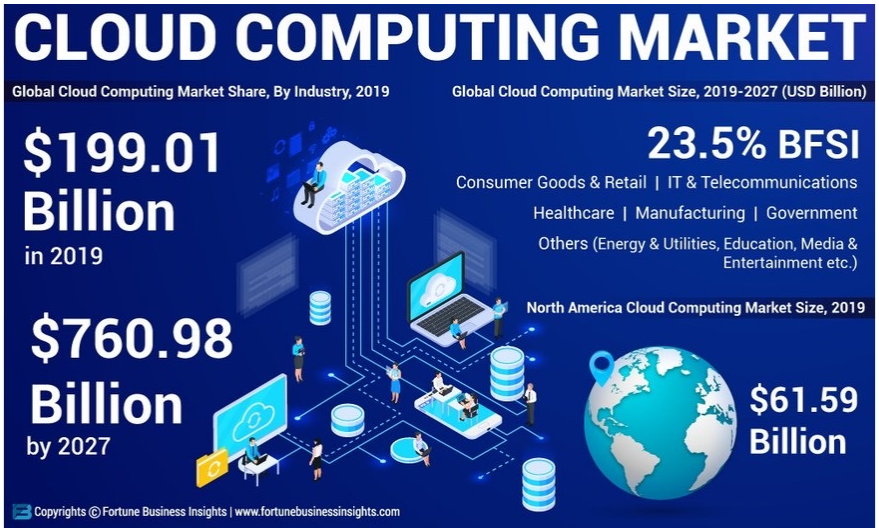
The Vision of Cloud Computing (Cont.)



The Vision of Cloud Computing (Cont.)

- The long-term vision of cloud computing is ***that IT services are traded as utilities in an open market.***
  - Nowadays, the discovery of services is often done by human intervention.
- Simply entering our request in a global digital market trading cloud computing services.

https://www.prnewswire.com/news-releases/cloud-computing-market-to-hit-usd-760-98-billion-by-2027-rising-demand-for-improved-virtual-access-to-information-among-industries-to-foster-steady-growth-fortune-business-insights-301050305.html



Defining a Cloud

- The term ***cloud*** has historically been used in the telecommunications industry as an ***abstraction of the network***.
- It then became the symbol of the Internet.
  - Applies to cloud computing: an Internet-centric way of computing.

Defining a Cloud (Cont.)

- U.S. National Institute of Standards and Technology (NIST) Definition:

"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 provisioned and released with minimal management effort or service provider interaction."

Practical Examples

- Large enterprises can offload some of their activities to cloud.

https://nerdssupport.com/top-6-companies-found-success-cloud/

https://customerthink.com/top-10-companies-using-cloud-and-why/

Practical Examples

- Start-ups can afford to translate their ideas into business results **more quickly**, without excessive up-front costs.

Practical Examples

- Developers can focus on the **business logic** rather than dealing with the **complexity of infrastructure management and scalability**.

https://insights.dice.com/employer-resource-center/cloud-computing-benefits-developers/

Practical Examples

- End users can have their documents accessible from **everywhere and any device**.