



# **Cloud Computing**

## **Introduction**

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# Contact Details

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# Course Introduction

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- Saturday and Monday (15-16:30 pm)
  - Attend class on time
  - Class 201
  - No more than 3/16 absence is allowed
  
- 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

# Cell Phone and Laptop Policy

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- Class use policy: Don't!
- Cell phones should be off or silenced
- Texting is strictly prohibited in class
- Laptops and tablets may NOT be used in class: No email, browsing, Facebook, Twitter, Instagram during class lectures
- Violations may result penalties



# Course Logistics

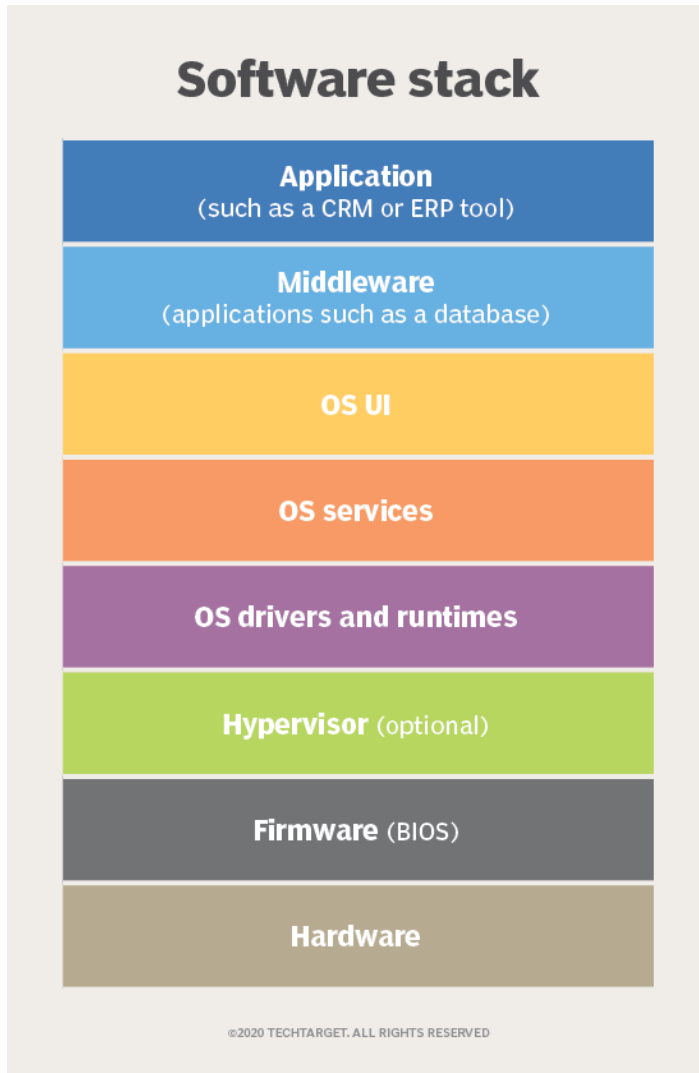
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Section	Score	Considerations
Assignments	7	Four practical homework
Midterm exam	3	1402/01/26
Team project	3 + 1	In Kubernetes
Final exam	7	1402/3/27
Technical presentation	1	Topics are raised during the lectures
Total	20 + 2	Good luck 😊

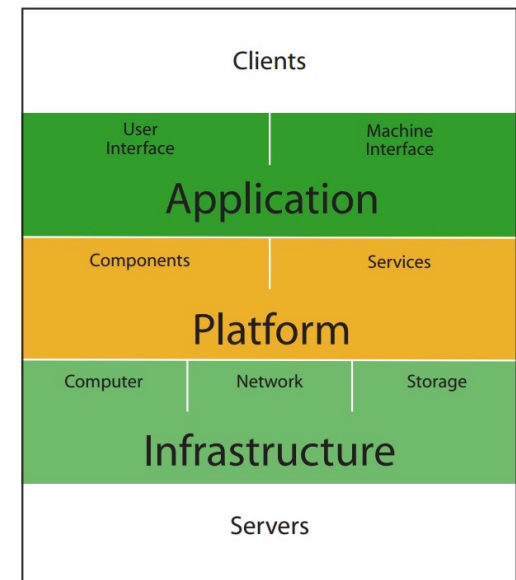
You are in a right place if you intend to do the programming assignments

Harsh penalty for plagiarism and cheating

# Execution of an Application



What are the *key challenges* for developing and deploying computer applications?



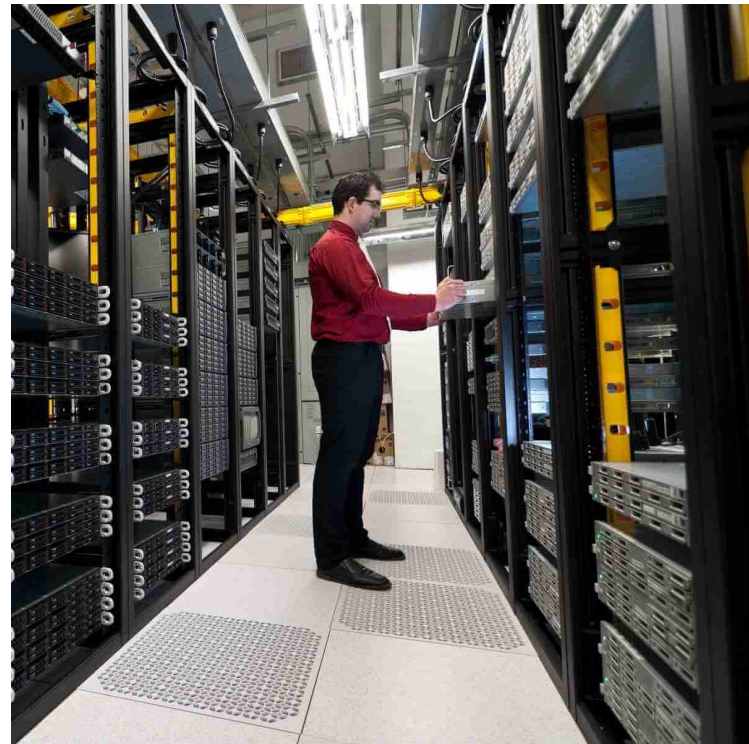
Source: <https://www.techtarget.com/searchapparchitecture/definition/software-stack>

# Building and Operating Data Centers

- ✓ Cooling data centers
- ✓ Servers are idle most of the time
- ✓ Managing scale and growth
- ✓ networking at scale
- ✓ Security



HP G9 Server



<https://windowsreport.com/best-hp-rack-server/>

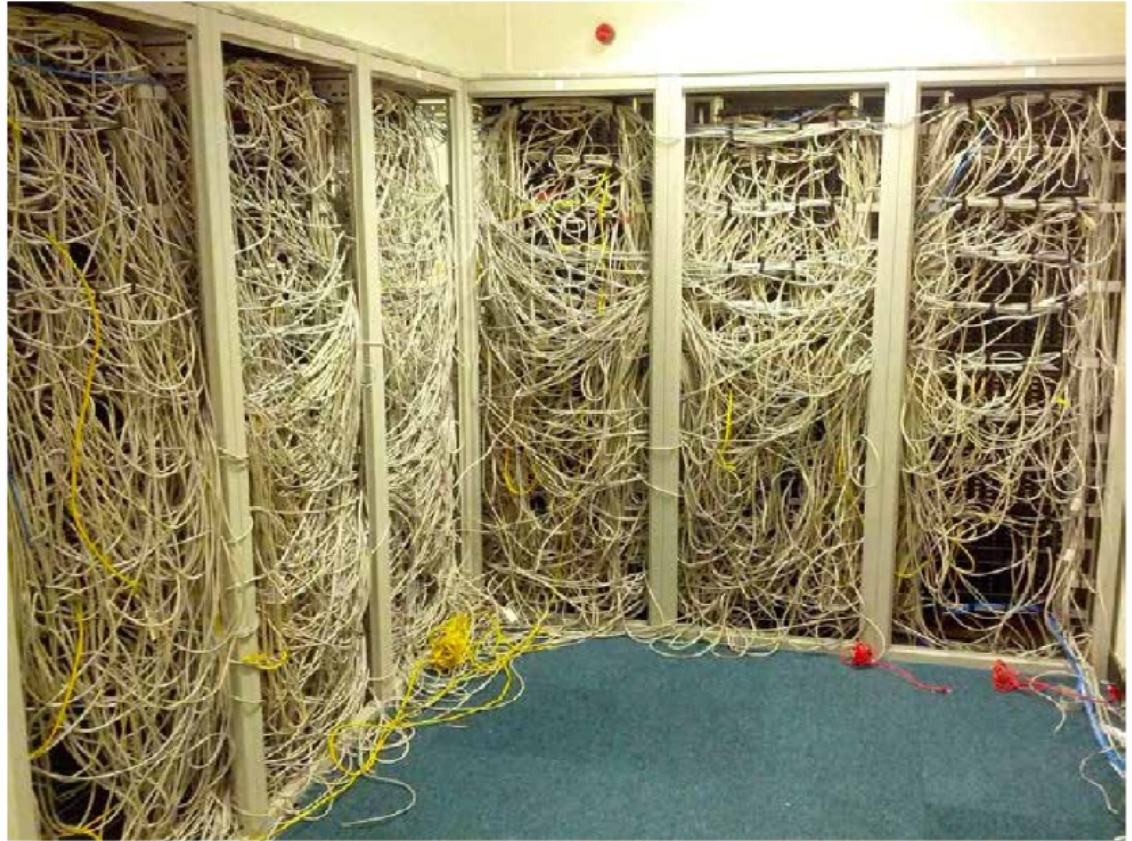


# Networking at Scale

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[David Samuel Robbins, gettyimages.ch]

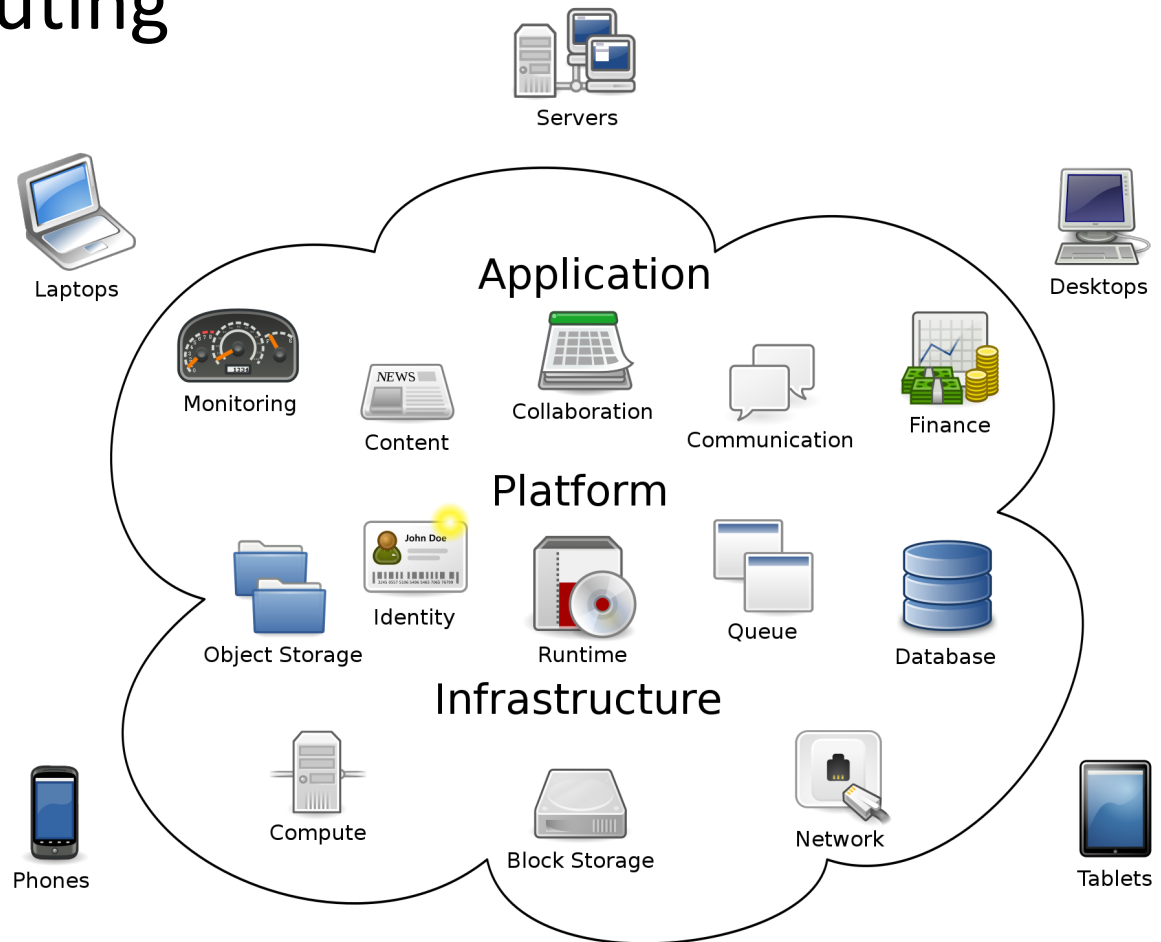


[@AlexCWheeler, Twitter]



# One Solution to All These Challenges

## ➤ Cloud Computing



# Cloud Computing at a Glance

- 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.*



# Defining a Cloud (cont.)

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## ➤ 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.”*

# The Vision of Cloud Computing

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- 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.



# Practical Examples

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- 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 (cont.)

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





# Practical Examples (cont.)

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- 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 (cont.)

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

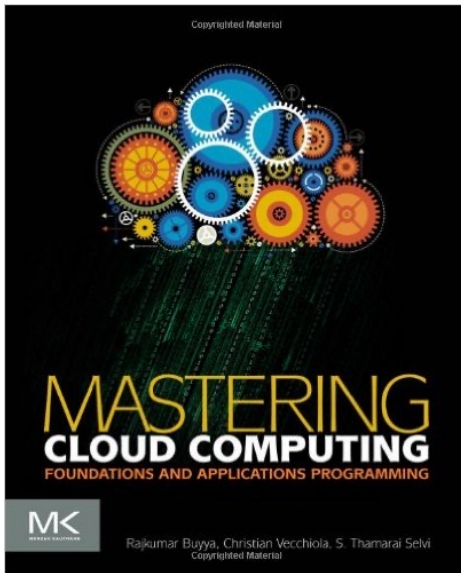


# Syllabus

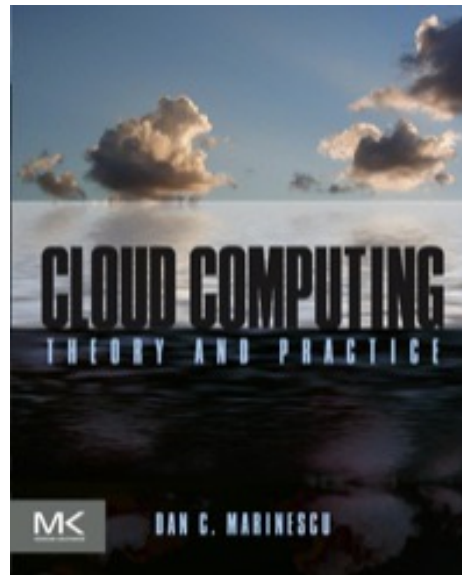
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- Introduction to Cloud Computing
- Virtualization
- Containers
- Kubernetes
- Programming Models and MapReduce
- Hadoop Yarn and Apache Spark
- OpenStack
- Load balancing and auto-scaling

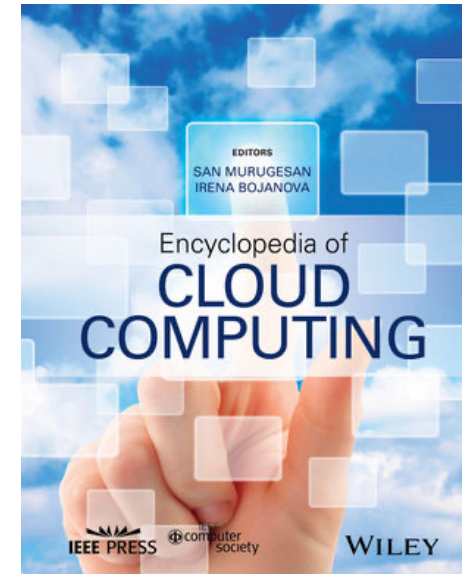
# Resources



**“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.**