

CS5630

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# Cloud Computing

**Prof. Supreeth Shastri**

*Computer Science*

*The University of Iowa*

# Am I in the right room?

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*A first course in cloud computing*

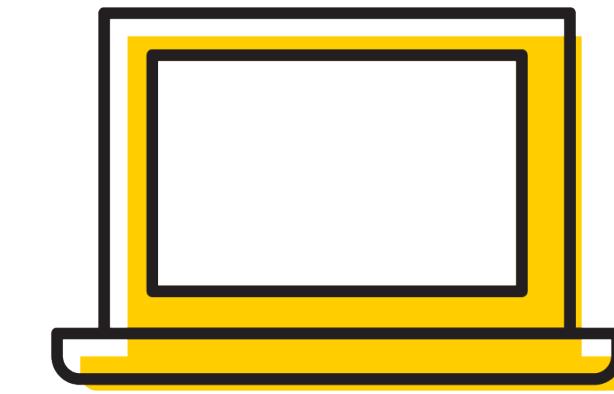
*Technical foundations of cloud and its services w/ a focus on large-scale data processing*



*Graduate students and well-prepared seniors in CS major*

*Prerequisites: CS 2820 and 3620/3640 (min. grade of C)*

*Comfortable in programming (Python)*



**Website:** <https://shastri.info/teaching/cs5630>

**Sessions:** TuTh 9:30 - 10:45am  
(14 Schaeffer Hall)

**Discussions:** <https://ui-cs5630-fall21.slack.com>

# Meet your teaching staff

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## **Supreeth Shastri (instructor)**

- *Joined UI computer science in fall 2020*
- *I'm an experimental computer scientist*
- *Research: Cloud, Databases, Data regulations*

*I started working on cloud as a grad student (and never stopped)*

More: <https://shastri.info>



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*Thesis: Managing financial risks in cloud platforms*

*Total research papers related to cloud computing*

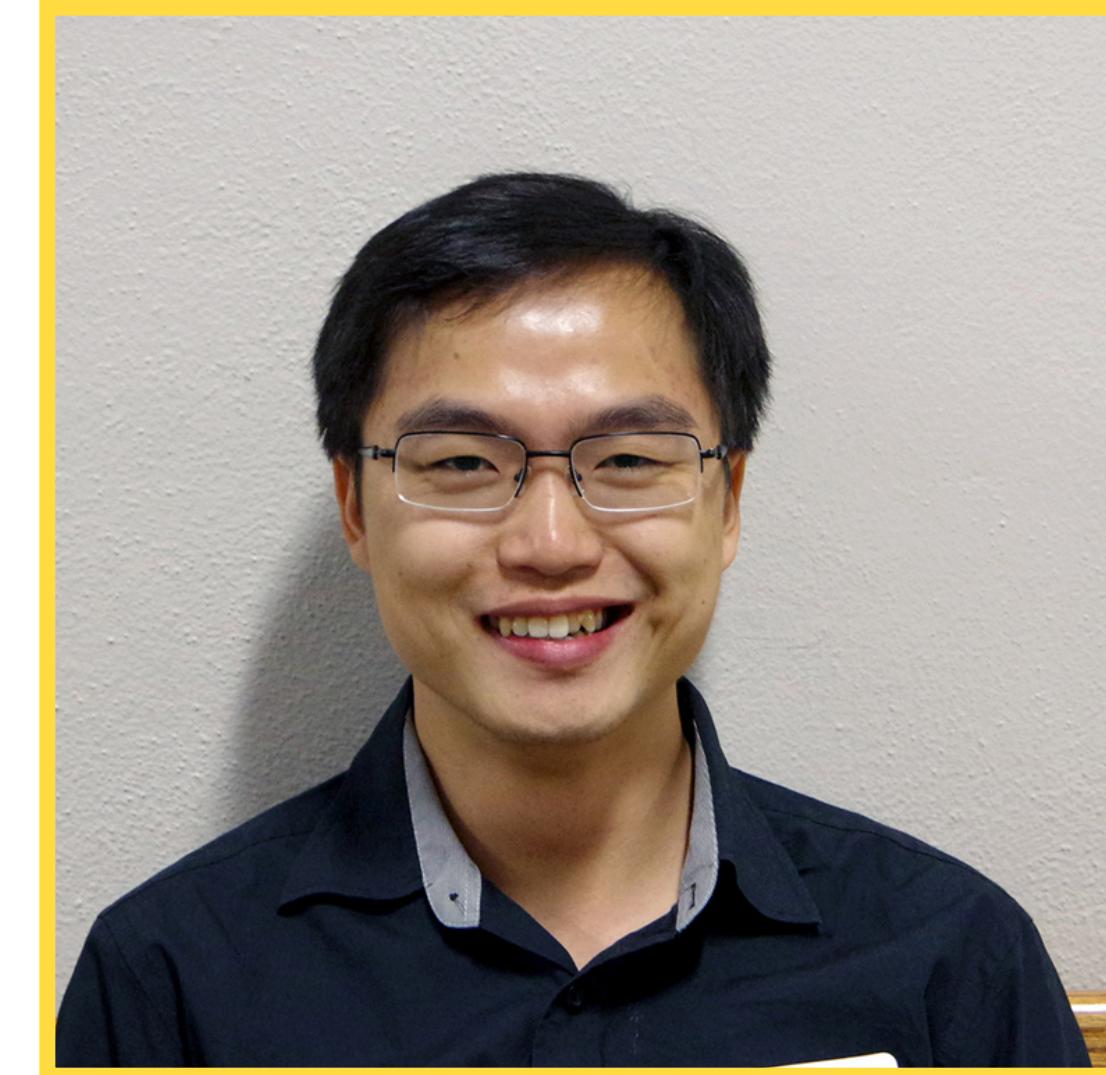
*I'm an organizing member of the ACM Symposium on Cloud Computing*

# Meet your teaching staff

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## *Dat Hong (TA)*

- *5th year doctoral student*
- *Research area: AI, ML, Natural Language Processing*
- *Advisors: Alberto Segre and Tong Wang*
- <https://myweb.uiowa.edu/dthong/>



*Best way to reach your teaching staff is via*  Slack

# Let's talk about the elephant in the room

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The City of Iowa City **requires you wear a mask** in public spaces, including campus buildings; the University **encourages you** to do so.

*I trust that you will make a decision that's best for you and your fellow Hawkeyes.*

*How about your instructor?*



# Course Structure

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## Foundation lectures

Instructor delivered content covering the technical foundations of cloud

## Programming Projects

Learning to use the cloud, program for it, and deploy software on it

## Research papers

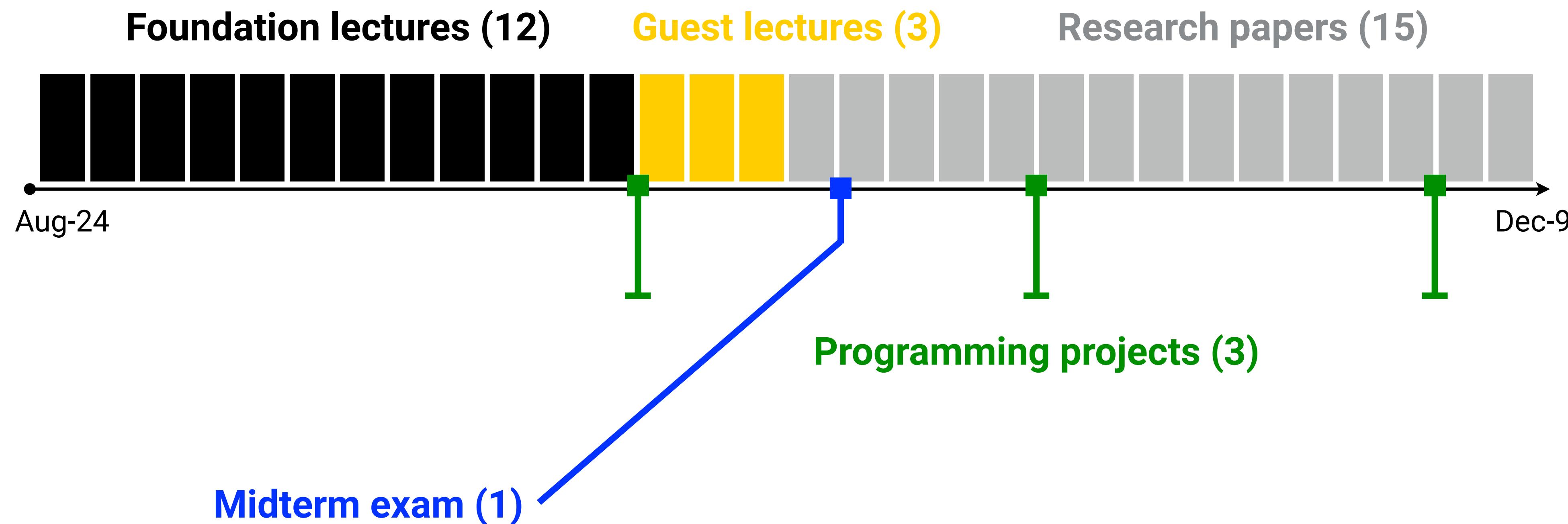
Understanding the (past/future) evolution of cloud services and infrastructure

## Guest lectures

Hear first hand from cloud experts, and interact with them live

# Course Structure

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# Foundation lectures

## Overview

Technical introduction to cloud computing

Four lectures focusing on *data in the cloud, compute in the cloud, and security of the cloud*

## Cloud provider perspective

Design and operation of datacenters

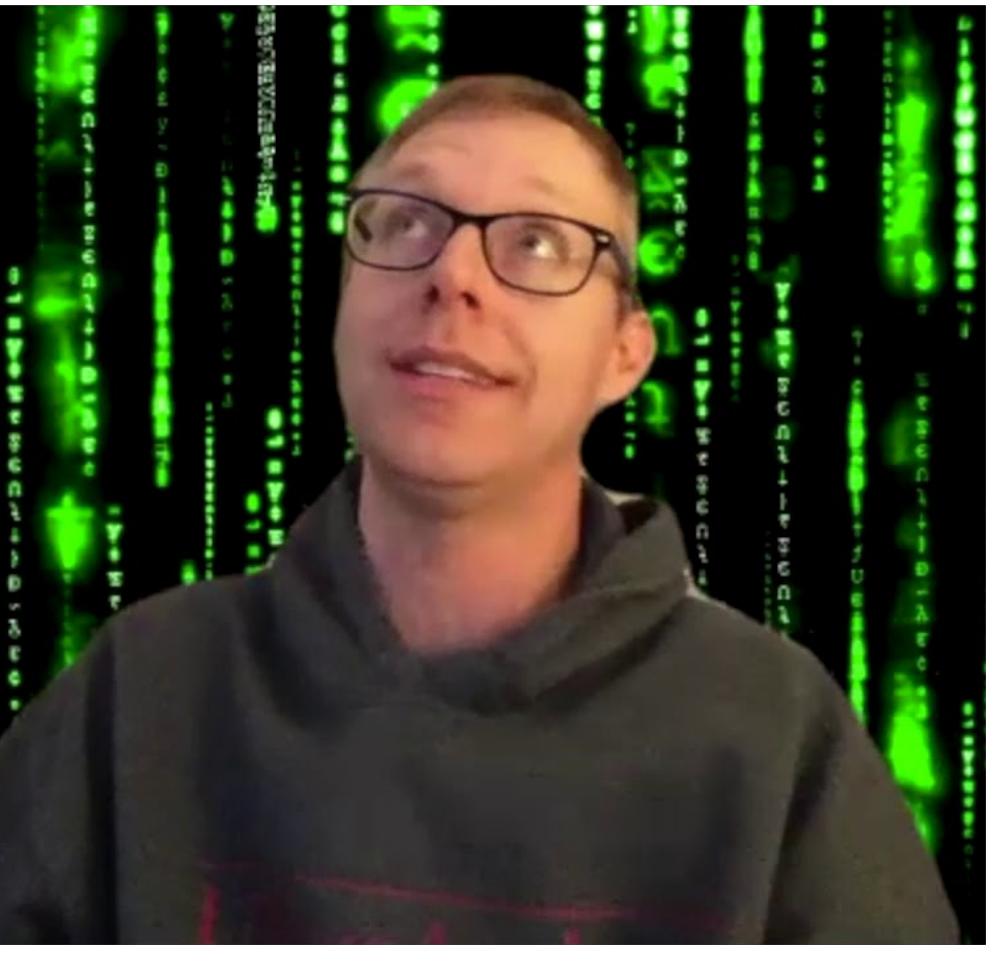
Four lectures based on Google's experience in building and managing their datacenters

## Cloud user perspective

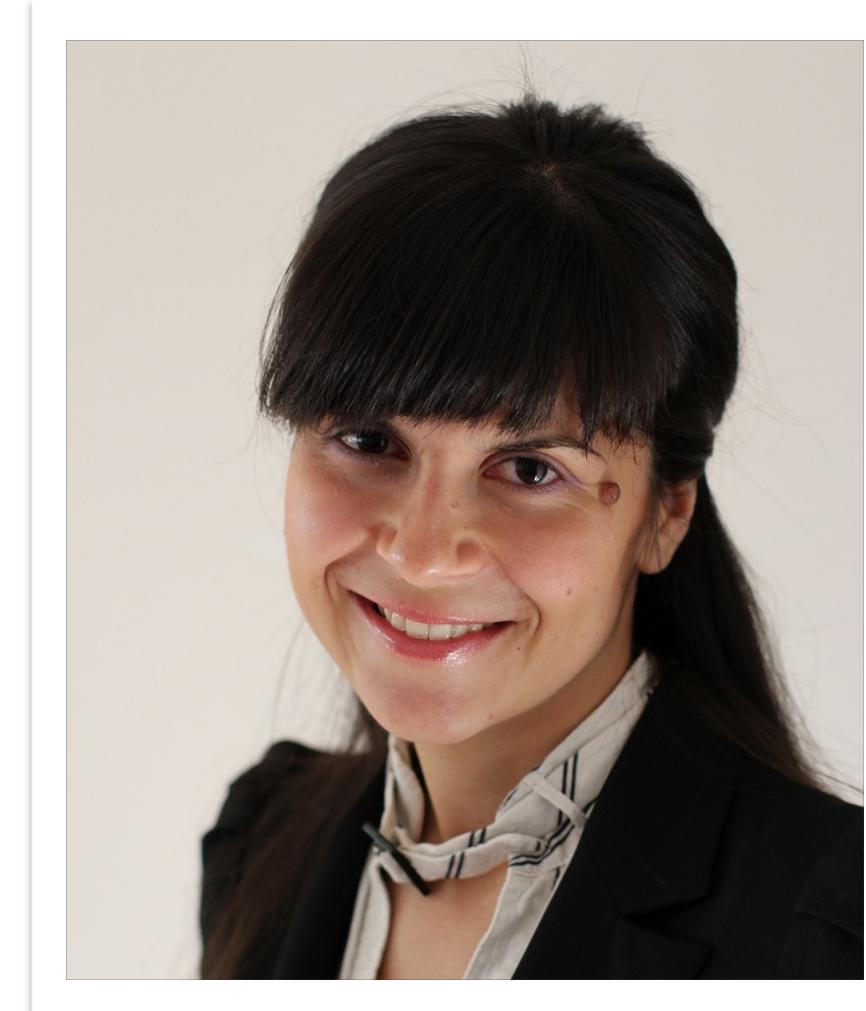
Data analytics on the cloud

Three lectures covering the popular data analytics frameworks: *Hadoop and Spark*

# Guest lectures



**Prof. David Irwin**  
UMass Amherst  
*Area: cloud and sustainability*



**Prof. Renata Borovica-Gajic**  
University of Melbourne  
*Area: data analytics*



**Prof. Mohammad Shahrad**  
University of British Columbia  
*Area: serverless computing*

# Research papers

## **Cloud is still active research and development phase**

There are no established textbooks/courses for cloud computing

An effective way to understand its evolution (past/present) is to read research papers

## **Reading research papers is a useful skill**

Any advanced job (in engineering or research) would require you to do this

In this course, I expect you all to read and digest ~15 papers

## **Modalities**

Students (in groups of two) will present a research paper to the class

You will lead the discussion, answer all the questions, and submit a review of the paper

# Programming projects

(tentative list)

## Project-1

Infrastructure-as-a-service (IaaS)

Learning to configure and use AWS EC2 VMs; benchmarking its performance

## Project-2

Data analytics frameworks

Install, configure, and use Hadoop/Spark for a simple data analysis task

## Project-3

Data analysis on the cloud

Use AWS Elastic MapReduce (EMR) to perform the same data analysis at scale

# Grading

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## Grade allocations

Type	Number	Weight
Spot quizzes (in class)	20	20%
Midterm exam	1	25%
Paper Presentation	1	25%
Programming Projects	3	30%

## Course grades

Final Grade	Cutoff
A	90%
B	80%
C	70%
D	60%
F	<60%

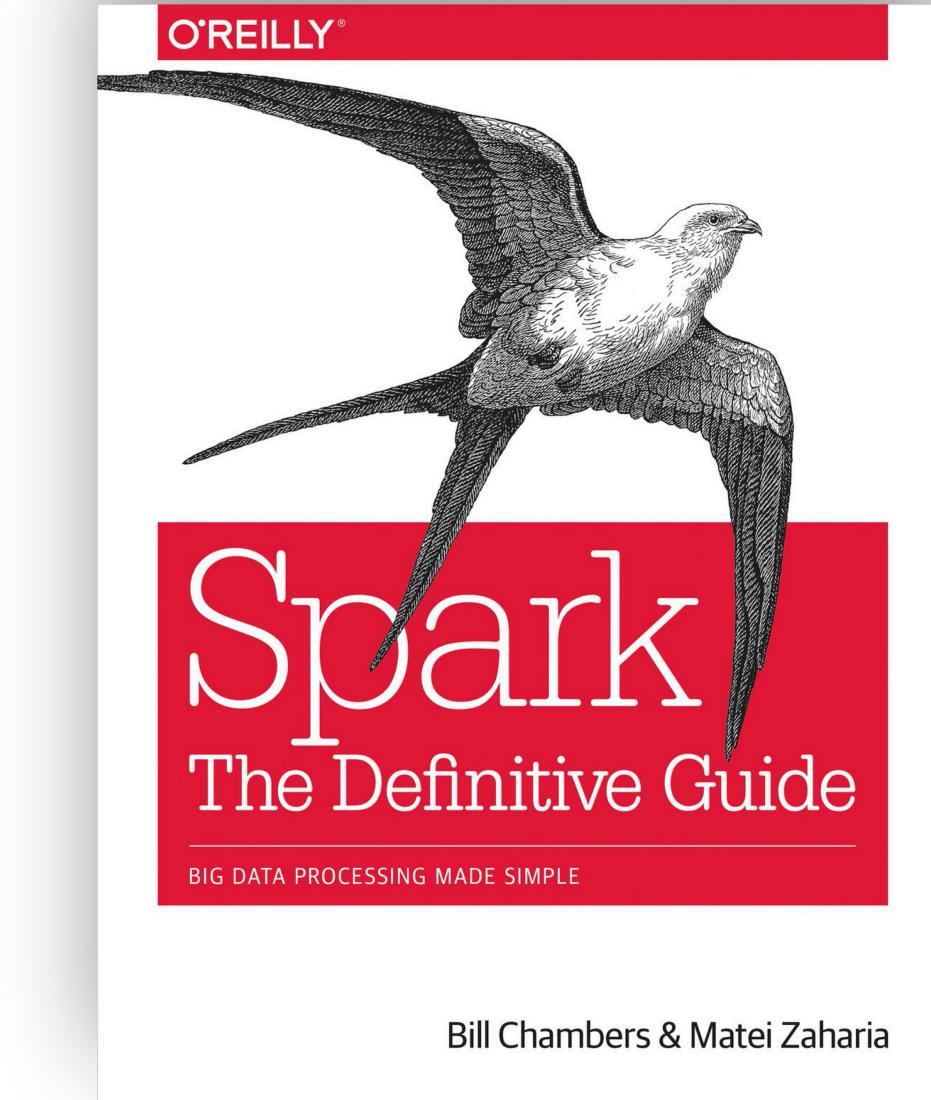
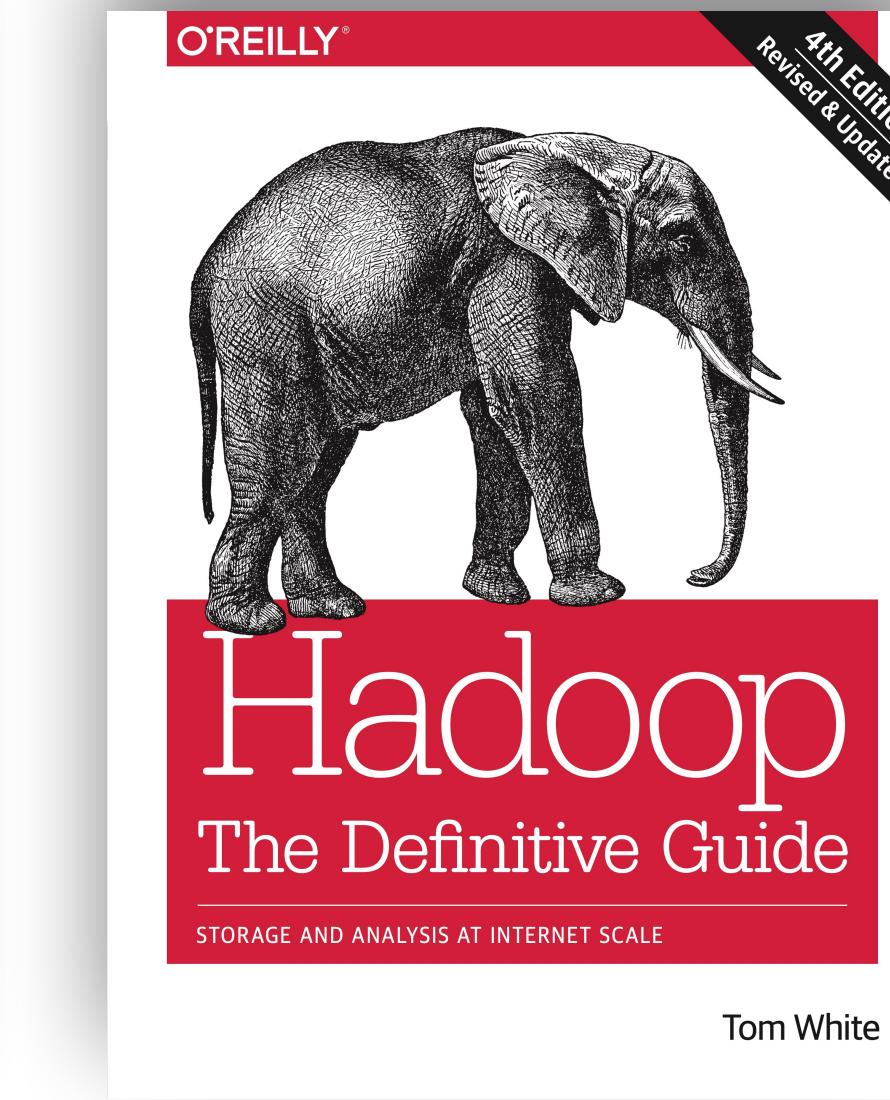
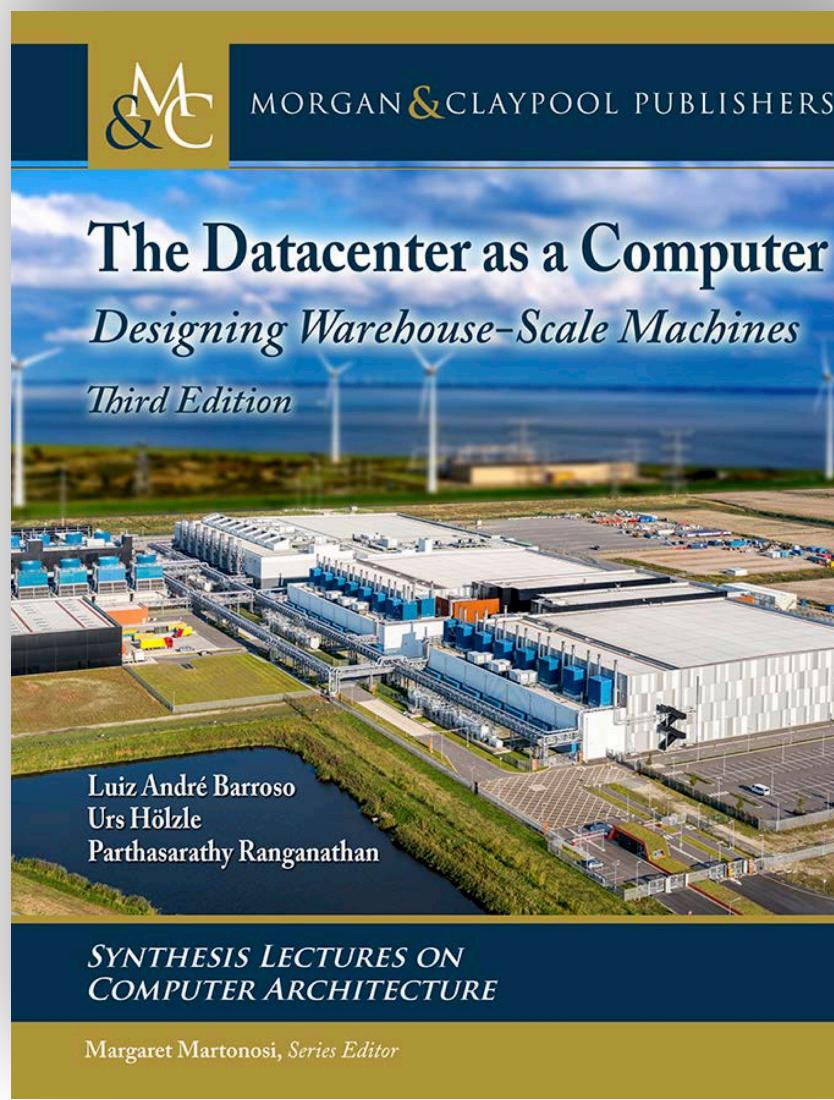
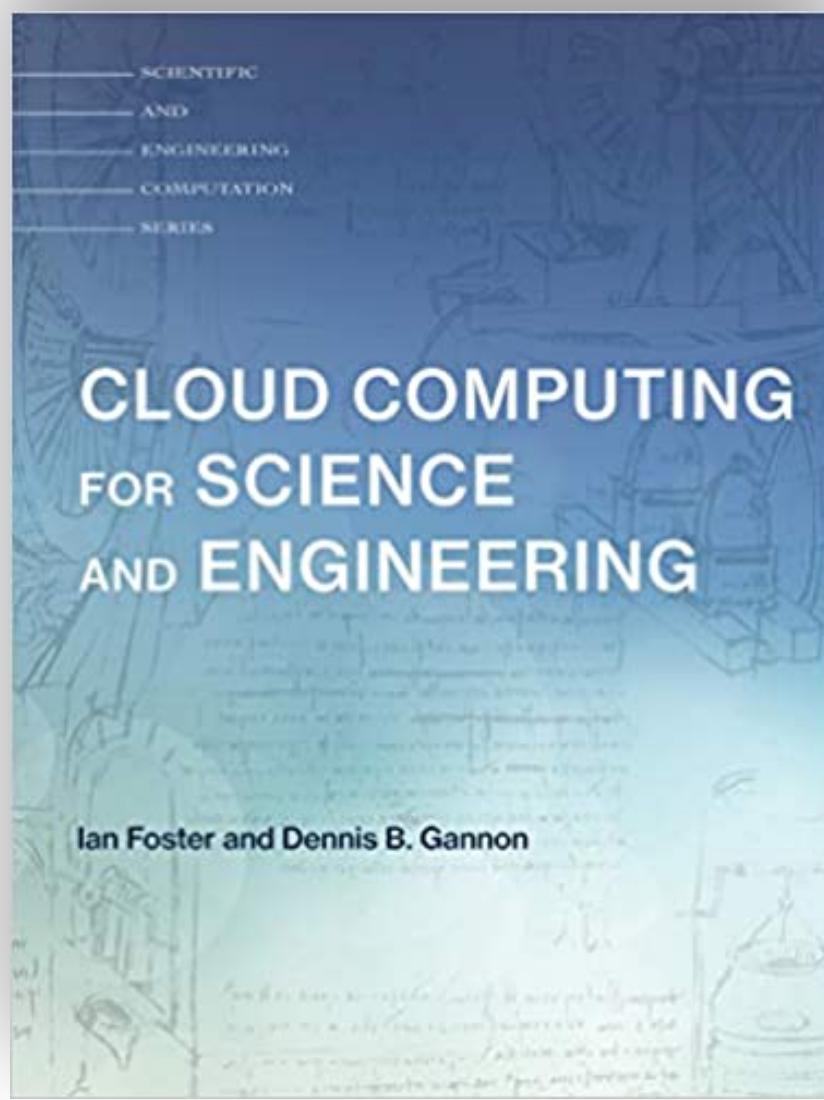
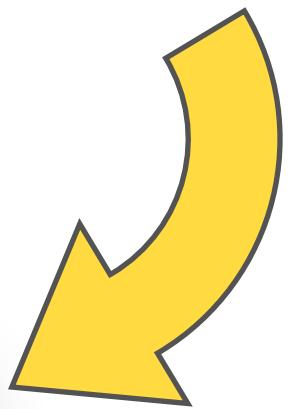
*I expect most of you to be in this range*

- We will use +/- grading
- We will not curve the grades

# No required textbook!

- *Cloud is a new area and is fast evolving*
- *Cloud builds on multiple CS sub-disciplines: OS, networking, distributed systems, economics, database systems, and a variety of application areas (e.g., NLP, vision)*

*That said, there are books that I do recommend (and have used in this course)*



# Ground rules and policies<sup>+</sup>

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## ***Attendance and absence***

*Attend classes regularly; contribute to classroom/Slack discussions; participate in spot quizzes*

*CLAS policy for excused absences*



## ***Academic integrity***

*Read the policy, and read it again. We are really serious about it.*

*First offense gets a score of zero. Repeated violation gets F for the course and will be reported to the Dean's office.*

## ***Late submissions***

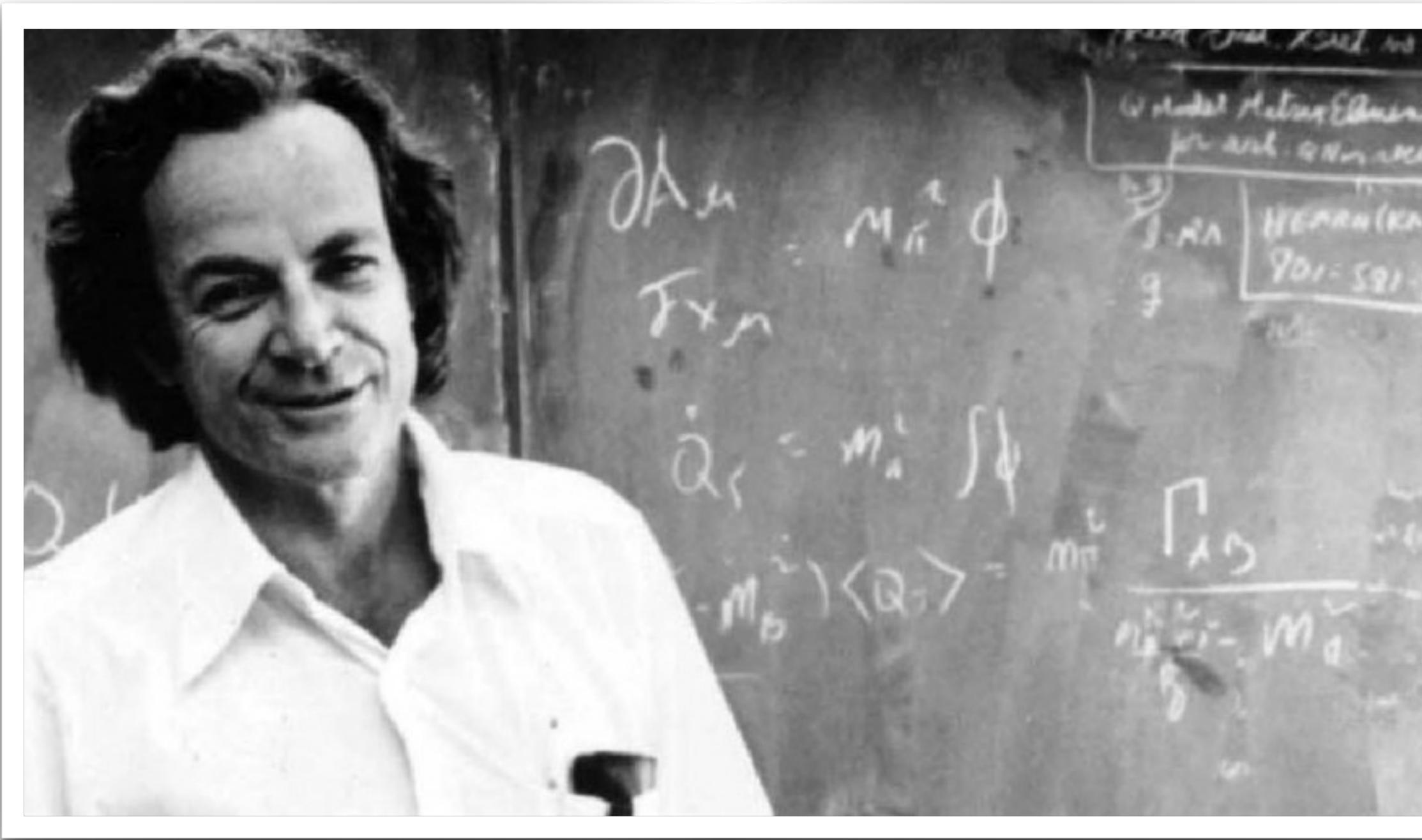
*All submissions are due midnight on the specified date.*

*We will not accept any late submissions. However, you can turn in partial solutions (for partial credits).*



*If you have a COVID-19 related situation, please reach out*

# My teaching philosophy



“ Students don't need a perfect teacher. Students need **a happy teacher**, who's gonna make them excited to come to school and grow a love for learning ”

– Richard Feynman

# **Spot Quiz (ICON)**

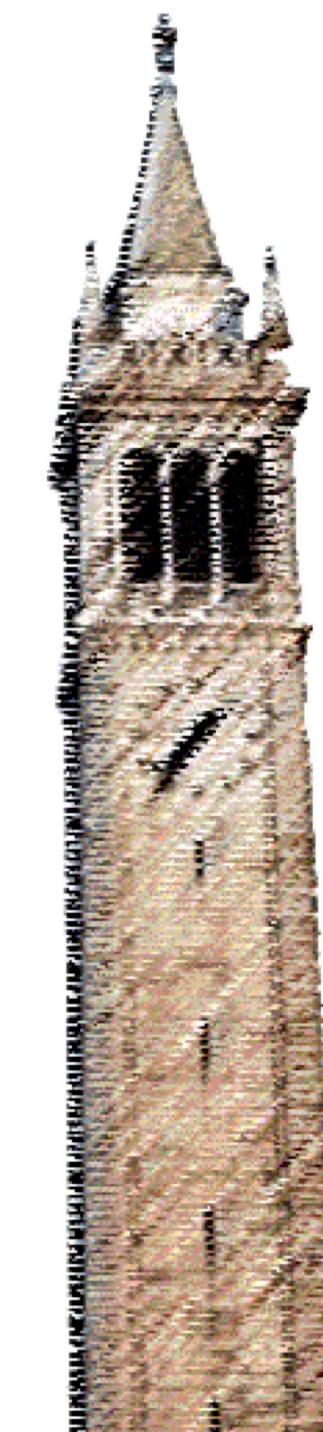
# Next Lecture

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*A comprehensive overview of cloud computing*

- *What, why, and how of the cloud*
- *Technical and economic foundations*
- *Challenges and opportunities*

**Above the Clouds: A Berkeley View of Cloud Computing**



*Michael Armbrust  
Armando Fox  
Rean Griffith  
Anthony D. Joseph  
Randy H. Katz  
Andrew Konwinski  
Gunho Lee  
David A. Patterson  
Ariel Rabkin  
Ion Stoica  
Matei Zaharia*

Electrical Engineering and Computer Sciences  
University of California at Berkeley

Technical Report No. UCB/EECS-2009-28  
<http://www.eecs.berkeley.edu/Pubs/TechRpts/2009/EECS-2009-28.html>

February 10, 2009