

# Managing Data & Databases

Session 7

Cloud services and hosted data



Source: Wikimedia

# Format, Structure, Architecture

- Format

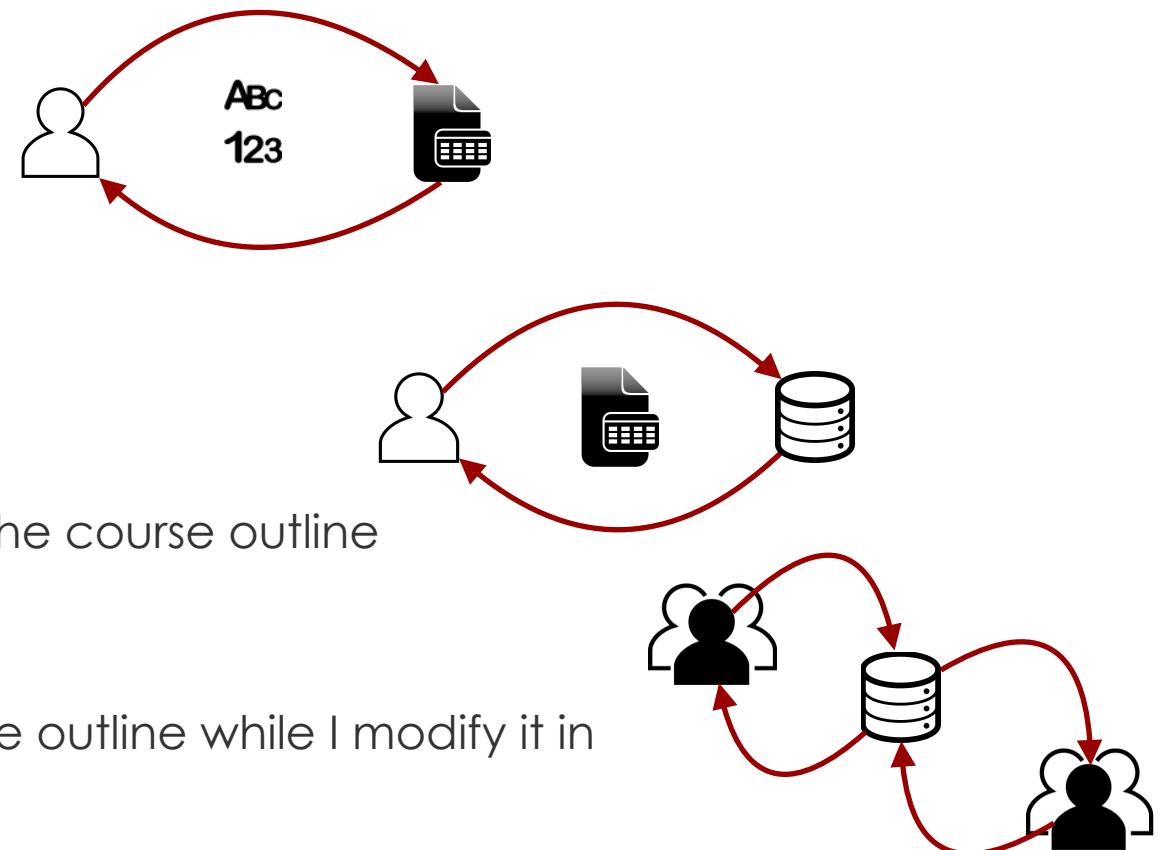
- How to save and retrieve my name
- How to save and retrieve some grades

- Structure:

- How to save and retrieve the class list
- How to save and retrieve all the information in the course outline

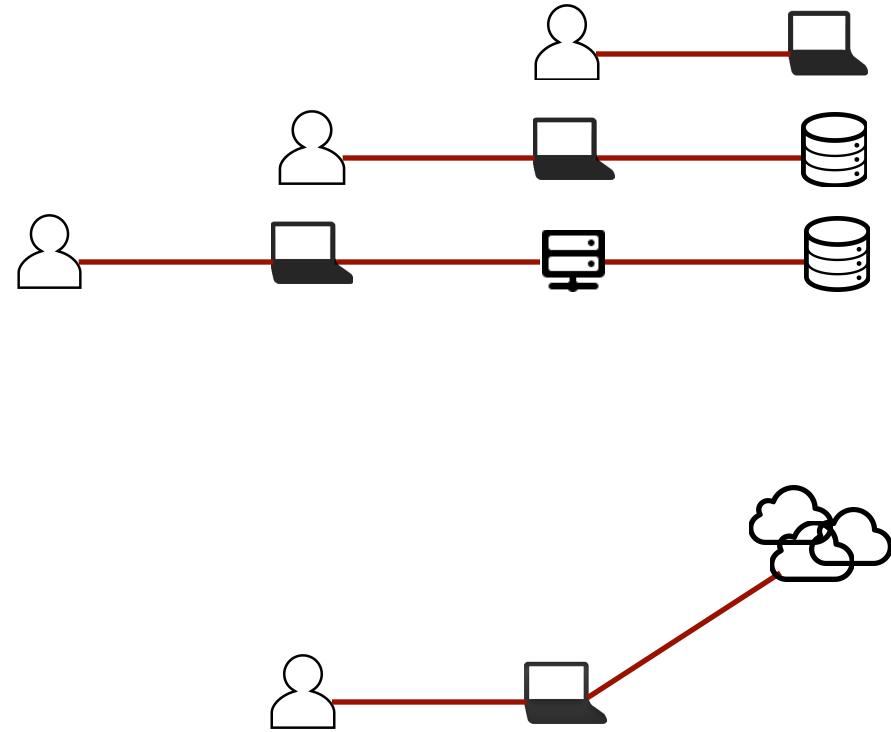
- Architecture:

- How to let the students run queries on the course outline while I modify it in real time

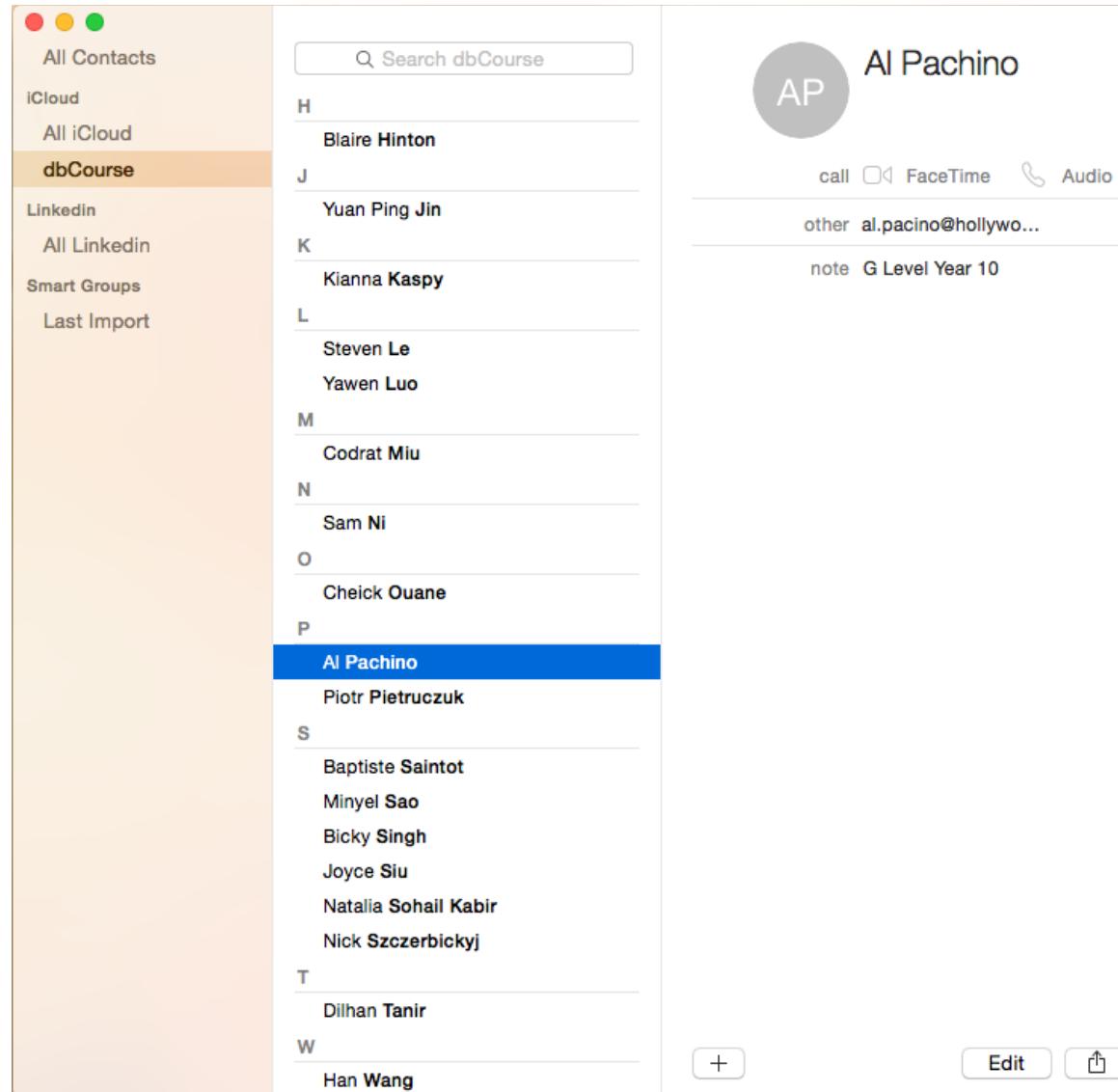


# Information System Architecture

- Desktop
- Client-Server (Two-tier)
- Multi-tier
- Cloud?



# The Desktop Architecture



# The Desktop Architecture

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The screenshot shows a desktop application window titled 'LIBRARY'. The left sidebar contains a navigation menu with sections like 'All Papers' (selected), 'Reading List', 'Recent', 'Last Import', 'Last Read', 'My Collections', and 'Papers' (expanded, showing 'Data Driven', 'Epistemic Objects', 'GBP Term Paper', 'Item Response', 'Microinstitutionalism', 'Pharmacogen', 'Protecode', 'Reuse', 'Readables', 'Samer Course', 'Special Issues', and 'Teaching'). Below this is a 'Shared Collections' section with 'Recycle' options for 'Archive' and 'Trash'. The main content area displays a list of academic papers. At the top of the list is 'The Determinants of Individual Performance and Collective Value in Private-Collective Software Innovation' by Ned Gulley and Karim R Lakhani (SSRN eLibrary, 2010). Below it is 'The Determinants of National Innovative Capacity' by Scott Stern et al. (2000). Further down is 'The Development and Enforcement of Group Norms' by Daniel C. Feldman (AMR, 1984). Other visible titles include 'The Diffusion of an Innovation Among Physicians' by James Coleman et al. (Sociometry, 1957), 'The Diffusion of Microfinance' by ABHIJIT BANERJEE et al. (2012), 'The Digitization of Word of Mouth: Promise and Challenges of Online Feedback Mechanisms' by Chrysanthos Dellarocas (Management Science, 2003), 'The Dimensions and Antecedents of Team Virtuality' by Bradley L. L Kirkman and John E. Mathieu (Journal of Management, 2005), 'The Dimensions, Antecedents, and Consequences of Emotional Labor' by J. Andrew Morris and Daniel C. Feldman (AMR, 1996), and 'The Diffusion of an Innovation among Physicians' by James Coleman et al. (Sociometry, 1957). The right side of the interface includes a search bar ('Q Author'), a toolbar with icons for 'Read' and 'Cite', and a 'So' button. A large central panel displays the title 'The Diffusion of an Innovation among Physicians<sup>1</sup>' and author information for James Coleman, Elihu Katz, and Herbert Menzel. A preview of the paper's PDF is shown at the bottom right.

The Determinants of Individual Performance and Collective Value in Private-Collective Software Innovation  
Ned Gulley and Karim R Lakhani | SSRN eLibrary, 2010

• The Determinants of National Innovative Capacity  
Scott Stern et al. | 2000

■ The Development and Enforcement of Group Norms  
Daniel C. Feldman | AMR, 1984 vol. 9 (1) pp. 47-53

The Diffusion of an Innovation Among Physicians  
James Coleman et al. | Sociometry, 1957 vol. 20 (4) p. 253

The Diffusion of Microfinance  
ABHIJIT BANERJEE et al. | 2012

The Digitization of Word of Mouth: Promise and Challenges of Online Feedback Mechanisms  
Chrysanthos Dellarocas | Management Science, 2003 vol. 49 (10) pp. 1407-1424

■ The Dimensions and Antecedents of Team Virtuality  
Bradley L. L Kirkman and John E. Mathieu | Journal of Management, 2005 vol. 31 (5) pp. 700-718

The Dimensions, Antecedents, and Consequences of Emotional Labor  
J. Andrew Morris and Daniel C. Feldman | AMR, 1996 vol. 21 (4), Academy of Management pp. 986-1010

The Diffusion of an Innovation among Physicians<sup>1</sup>

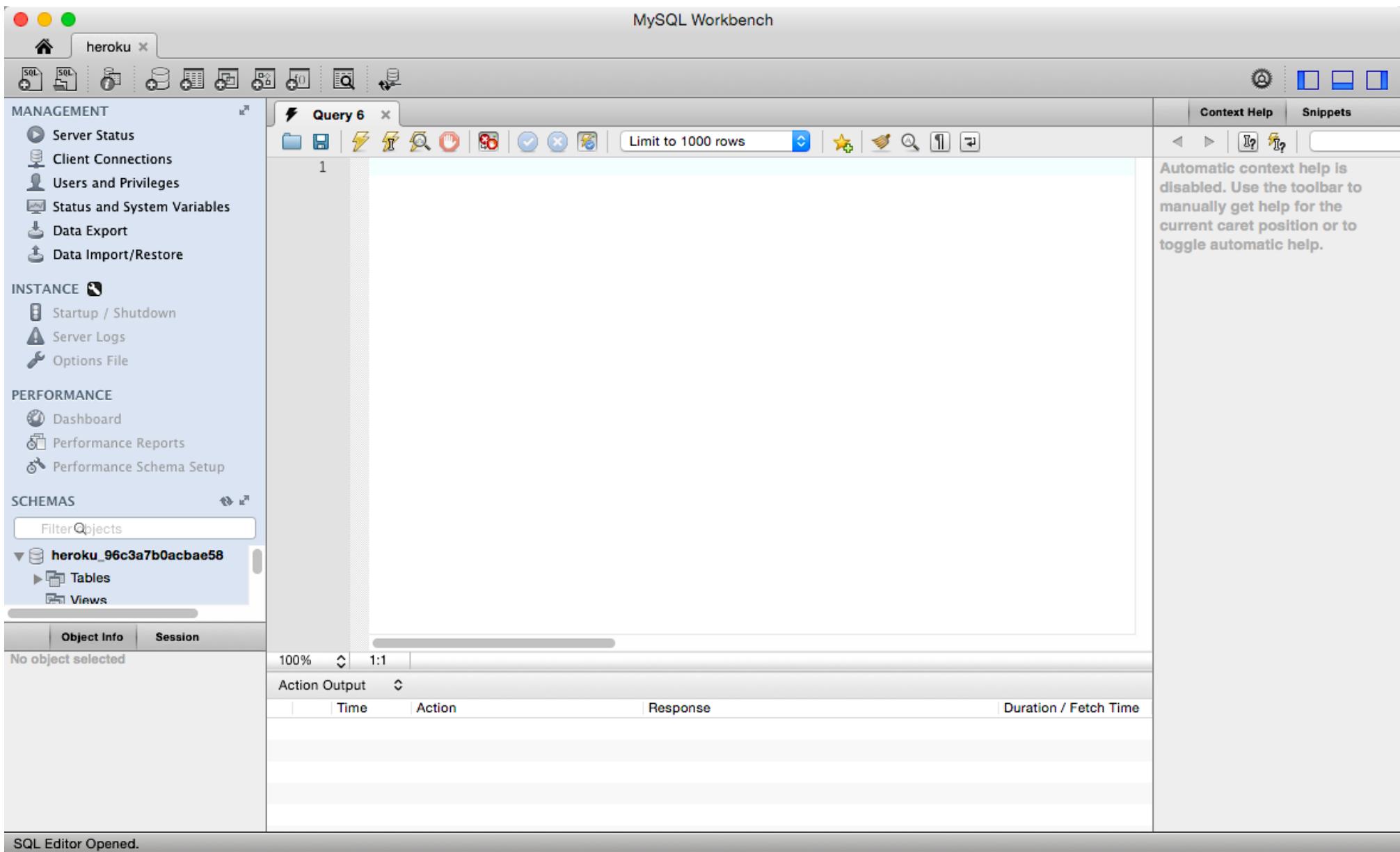
JAMES COLEMAN, ELIHU KATZ, *University of Chicago*

HERBERT MENZEL, *Columbia University*

Anthropologists and sociologists have long been concerned with the processes through which customs, practices, attitudes, or messages spread. Traditionally, these processes have been studied by examining the ecological distribution of the trait at successive points in time. In a few cases, the actual transmission of messages from person to person has been traced out. (e.g., 1, 3, 4, 5, 10) A still different approach to the study of this

# The Two-tier Architecture

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# The Multi-tier Architecture

The screenshot shows a web browser window for the McGill Minerva system at [horizon.mcgill.ca](http://horizon.mcgill.ca). The browser's address bar and various tabs are visible at the top. The main content area features the McGill logo and a large banner image of two students working on laptops. Below the banner is a navigation menu with links for MAIN MENU, Personal, Student, Faculty, Employee, Applicant, and Financial Aid/Awards. A search bar and language links (FRANÇAIS, SITE MAP, HELP, EXIT) are also present. The main content area is titled "Main Menu" and displays a welcome message for "Mahmood Shafeie Zargar". It includes sections for Personal Menu, Student Menu, Faculty Menu, Employee Menu, Applicant Menu, and Financial Aid & Awards Menu, each listing specific functions available to the user.

Welcome, Mahmood Shafeie Zargar, to Minerva - McGill's Administrative Systems! Last web access on Jan 24, 2015 at 03:05 PM

**Personal Menu**  
Change Minerva PIN or Security Question; Create / Change McGill Password; Update addresses, phone numbers (mobile and landline) and emergency contact information, Email address, name, and other personal data, View or add your Canadian Social Insurance Number.  
Important Notice for Students: Please read the [McGill Email Policy](#).

**Student Menu**  
Register for course sections; Add/Drop course sections; Change your curriculum; Choose Satisfactory/Unsatisfactory option; Withdraw from course sections; Review fees; Verify your academic program; Apply for graduation; View grades and order transcripts; Tax receipts; Generate a Degree Evaluation (selected programs); Mercury.

**Faculty Menu**  
Display your class list; View your class schedule; Enter final grades; Create a course in *myCourses*; Create requests for course proposals and revisions; View your multiple choice exam marks and statistics reports.

**Employee Menu**  
Pay stubs; Direct Deposit; Benefits; Job summary; Tax slips; Employee equity; Salary policy confirmation; Floating holiday conversion; Staff training registration; Organization Chart.

**Applicant Menu**  
File an application for admissions; View status of existing applications, including the receipt of supporting documents; Confirm space in Residence (eligible students).

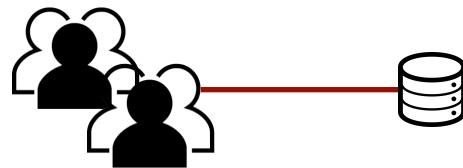
**Financial Aid & Awards Menu**  
Apply for Financial Aid; View application status; View award status; View document requirements; View loan details.

RELEASE: 8.3.0.3

## Some Cloudy Terms

- Commodity Hardware
- Virtualization
- Scalability (Size independence)
- Instance
- SaaS (Software as a service)
- PaaS (Platform as a service)
- IaaS (Infrastructure as a service)
- Load Balancing
  - Cluster vs. Worker
  - Sharding, Partitioning and Replication
- Elasticity of Computation & Bandwidth (Volume independence)
  - Dedicated vs. Reserved vs. Provisioned vs. On-demand vs. Spot

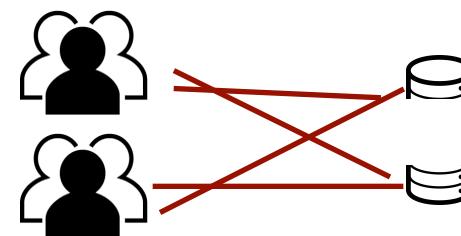
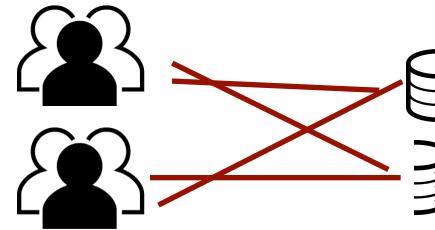
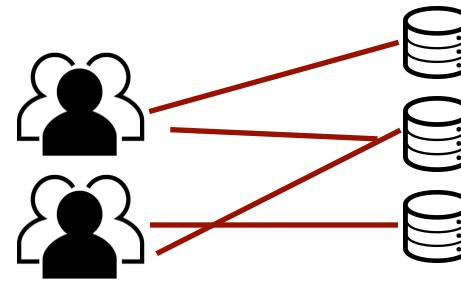
## Load balancing at the database level



Vertical  
Partitioning

Sharding  
(Horizontal Partitioning)

Replication



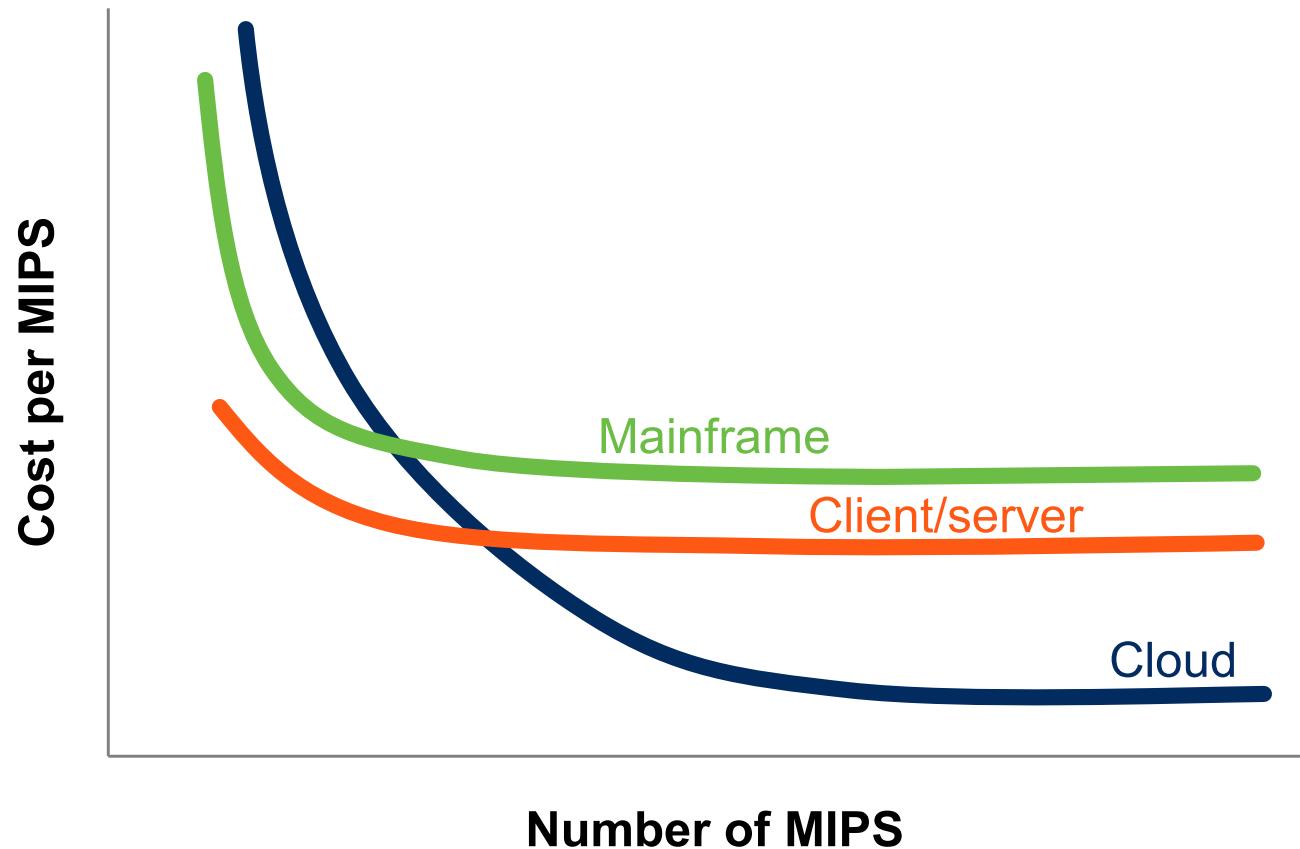
## Why is the cloud worth it for the clients?

- Lower barriers to entry and exit (zero investments and sunk costs in most cases)
- Larger choice due to platform-independence and commoditization of hardware and software
  - The providers have to offer competitive prices as the costs of switching fall for the clients
- Ubiquity of the services
- Value-added services
- Lower human overhead costs (like any other outsourced function)
- Continuity of service
- Hassle-free updates
- Flexibility of contracts and finances
  - Different modes of exploitation and payment
- Elasticity of resources (volume-independence)
  - Lower risk (due to fluctuations)
- Scalability of solutions (size-independence)
  - Expandability

## Why is the cloud worth it for the providers?

- Economies of scale
  - Including minimized risk due to high volume
- Economies of scope
  - Including minimized risk due to diversity of resources required by different activities
- Added value through service and information integration
- Resource pooling and yield management

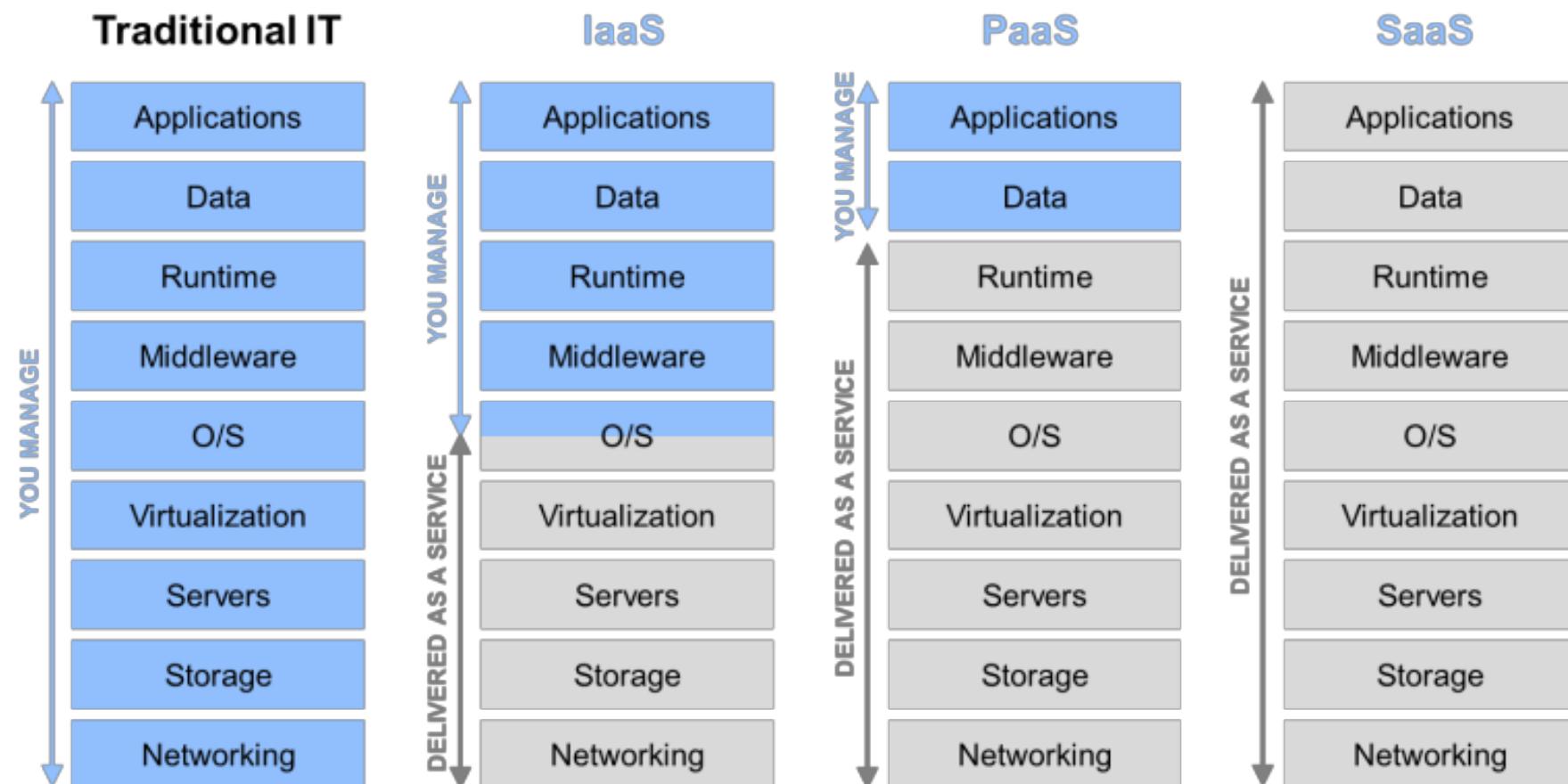
## Cloud and the decreasing cost of computation



Source: Microsoft

<http://news.microsoft.com/download/archived/presskits/cloud/docs/the-economics-of-the-cloud.pdf>

# Cloud and the outsourcing of enterprise information systems



Source: Microsoft

<http://news.microsoft.com/download/archived/presskits/cloud/docs/the-economics-of-the-cloud.pdf>

## What is problematic about the cloud?

- Data ownership
- Data access
- Service level agreement
- Change management
- Legal jurisdiction
- Regulatory compliance
- Security
- Software license
- Data location
- Recovery
- Long-term viability
- Investigative support

Source: Gartner 2008-2010 via

<http://www.cio.com/article/2435262/enterprise-software/gartner--seven-cloud-computing-security-risks.html>

<http://www.efytimes.com/e1/48120/fullnews.htm>

Icons and vector graphics:

Silky Line Icons by Custom Icon Design - <http://www.customicondesign.com/free-icons/silky-line-icon/>

Mini Icon Set by Custom Icon Design - <http://www.customicondesign.com/free-icons/mini-icon-set/mini-icon-set-part-3/>

Linecons by DesignModo - <http://desigmodo.com/linecons-free>

Web0.2ama by chrfb - <http://chrfb.deviantart.com/art/Web0-2ama-165156124>

Token by brsev - <http://brsev.deviantart.com/art/Token-128429570>