

# Introduction to Cloud Computing

## Cloud Computing Business Model

15-319, spring 2010

19<sup>th</sup> and 20<sup>th</sup> Lecture, March 23<sup>th</sup> and 25<sup>th</sup>

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# Lecture Outline

- **Business 101**
- **Business Computing**
- **Business Computing in the Cloud**
  - **Basic Drivers**
  - **Case Studies**
    - Blackboard
    - Qatar Airways
    - Commercial Bank
    - Amazon. COM
  - **New Business Opportunities**

# Business 101...

- Most Important Equation in Business:

$$\text{Profit} = \text{Revenue} - \text{Cost}$$

- **Revenue**: Money that flows into the business.
- **Cost**: Money flowing out of the business.
- The goal is always to maximize **Profit!** (Increase **Revenue** and/or decrease **Cost**).
- However, some organizations are non profitable. They generate profit, but it's used to provide services to the community. Ex: Education City, Carnegie Mellon, UN

# Business 101...

- Another Important Formula:

$$\text{Gross Margin} = \text{Profit} / \text{Revenue}$$

- In a business with high gross margin, revenue grows fast but cost grows slow.
- Examples of businesses with high gross margin: Software/Internet based, drug based.
- Gross Margin is not fixed, how good or bad it is depends on the type of the business!

# Let's look at different types of **Revenues!**

	Products	Services
One Time	<p>Examples:</p> <p>Buying a car</p> <p>IBM sells racks to Qatar Airways for 1 million Riyals.</p>	<p>Examples:</p> <p>Renting a car</p> <p>A company develops a software for a customer for some prices.</p>
Recurring	<p>Examples:</p> <p>Buying Coke, Starbucks Latté,... many times a day.</p>	<p>Examples:</p> <p>IBM have updates that they charges their customers for regularly.</p>

# Let's look at different types of **Costs!**

		Fixed	Variable
/ Predictable / Steady	Examples: Rent Supplies Buying a building Labor	Examples: Materials Utilities Taxes	
	/ Unpredictable / Random	Examples: Legal costs	Examples: Disaster recovery Theft prevention

# Why is it important to know what types of revenues and costs a business has?

- It helps decision making!
- If we are to take any step in the business, the question we should be answering first is: Does it increase revenues? Decrease costs? How? Of which type?
- Mostly, the businesses aims to have recurring revenues because one time revenues don't happen regularly.
- It's important to know what type of costs the business has because each type should be handled differently as part of the risk management problem.
- To dominate your industry, you need to be deliberate about these types, you should not end up with types of revenues/costs. The types should be your goal!

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# Business Computing...

- **Why do businesses want to invest on IT/Computing?**
  - Tracking sales
  - Figuring out where money is spent
  - Figuring out where the money is coming from
  - Paying people
  - Knowing how much goods to buy
  - ...
  
- **How do businesses use IT/Computing?**

# The “Big Three Types of Business Computing”

- Traditional MIS (Management Information Systems)
- Internet Era Computing
- Big Data Computing

# Traditional MIS

- **Book Keeping / Accounting Systems: tracking money, and flow of accounts**
- **Logistics and Operations**
- **ERP (Enterprise Resource Planning) Systems**
- **CRM (Customer Relation Management)**
- **BI (Business Intelligence)**
- **Office Productivity (Google Docs, Microsoft Office, ...)**
- **Communications (Email, ...)**

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## ARE THESE COOL?

**No, but businesses are still spending 70-80% of their costs on them!**

**Keep in mind that all of these can run on the cloud!**

# Internet Era Computing

- **E-Commerce**
  - Retail (stores)
  - B2B (Business to Business)
  - Online Banking
  
- **Intelligence / Info Gathering**
  - Google search maps
  - Directories
  
- **Advertising, Marketing & Public Relations**
  
- **Digital Products**
  - Music, videos, books, ...
  
- **Communications**
  - “Always on”
  - Many media

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*Are these Cool?  
Kind of!*

*All of these  
can also run on  
the cloud!*

# Big Data Computing

## ■ Data Mining / Business Intelligence

Finding correlations based on gathering and analyzing huge amounts of data.

## ■ Predictive Analytics

Predicting future behaviors based on previous behaviors, so services can be provided based on what are you expected to like/do next.

## ■ Automotive Everything

Making use of all the huge amounts of data out there.

## ■ Store and Search Everything

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*Are these Cool?  
Yes, Very Cool!*

*These are very interesting, they need the cloud!  
But people are still working out how to get them  
through the cloud.*



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# Business Computing in the Cloud

## Basic Drivers...

- **Why Should businesses move to Cloud Computing?**
- **What business functions should a business consider moving to the cloud?**
- **What benefits will they achieve by moving to a cloud platform?**
- **What costs and risks will they face in doing so?**
- **How can they mitigate these costs and risks?**

# Business Computing in the Cloud

## ■ Remember the Equation:

$$\text{Profit} = \text{Revenue} - \text{Costs}$$

## ■ Basic Drivers:

- Increase **Revenue**
- Decrease **Costs**
- Increase **Revenue/Costs**

# Business Computing in the Cloud

## Basic Drivers

- Even if the basic drivers are the same, how they apply in each business is different!

- Examples:

The drivers for Qatar Airways to provide iPhone Interface for their customers is different than the drivers for Google to provide Google Earth!

For Qatar Airways, the driver is to make it easy for customers to do reservations

For Google, the whole driver is to get more people to use their site and get advertising revenue!

# Business Computing in the Cloud

## Basic Drivers

- The degree of understanding of basic drivers for business computing in the cloud is different among the “big three business computing types”.
  - Traditional MIS: drivers for business computing in the cloud are well understood
  - Internet Computing: During the last 15 years, drivers were kind of understood
  - Big Data Computing: Drivers are not well understood

# Business Computing in the Cloud – Basic Drivers

- To understand the drivers of moving to cloud computing in a business for each of the computing types, we should be asking:

**What is the Value Proposition of Business Computing in the Cloud?**

- **Value Proposition:**

**What makes the service/product that I am selling valuable to a customer in terms of benefits to be received and costs to be reduced.**

# Business Computing in the Cloud – Basic Drivers

## Value Proposition of Business Computing

### Benefits:

- Efficiency (less time to deliver a task)
- Scalability
- Quality (of service, of experience, ...)
- Revenue Growth (growth in # of customers, and profit/customer)
- Better planning
- Faster/better decision making

# Business Computing in the Cloud – Basic Drivers

## Value Proposition of Business Computing

### Predictable Costs:

- Initial Infrastructure (predictable, fixed or variable)
- Maintenance Required (for infrastructure, and software/systems)
- Training (business process reengineering)
- IT Staff (employees and consultants)
- Business disruption during the transition period

### Random Costs:

- Security Issues: stolen licenses, breaking and disruptions, crashing machines.
- Disasters, Natural, Lawyers: insurance, price to risk, getting sued, ....



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# Case Studies...

- How can companies move some of their processes to the cloud considering their profits, costs, and revenues?
- Remember the 3 main services offered by the cloud: **IaaS**, **PaaS**, and **SaaS**
- These could be offered on a **Private** cloud or a **Public** one.
- For each of the following examples:
  - Blackboard
  - Qatar Airways
  - Commercial Bank
  - Amazon. COM

**Which of these services make more sense? On what type of the cloud? What could be the benefits gained? What costs could occur?**

# Let's Consider Blackboard...

	Products	Services
One Time	<p>Examples:</p> <p>Buying a car</p> <p>IBM sells racks to Qatar Airways for 1 million Riyals.</p>	<p>Examples:</p> <p>Renting a car</p> <p>A company develops a software for a customer for some prices.</p>
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# Let's Consider Blackboard...

	IaaS	PaaS	SaaS
Public Cloud	<p>Blackboard moved to public cloud.</p> <p>Infrastructure reduced</p> <p>Costs reduced</p>	<p>Might be good...</p>	<p>Legal obligations, encryption could be a solution.</p> <p>Legal issues and disaster recovery: where the data is hosted (Qatar VS US) Who owns the data?</p>
Private Cloud	<p>Blackboard hosted on a Virtual Machine on a private cloud.</p> <p>Benefits: Infrastructure cost decreased.</p>	<p>Does this make sense?</p> <p>Maybe not with BB. But it might with things like .net and J2EE!</p>	<p>Could work, but kind of a weird idea!</p>

Can you think about the other examples?

# Conclusions

- **It's easy to get caught up in all the technological hype behind cloud computing**
  - It's a disruptive technology (changes the way things are done)
  - Some benefits are immediately apparent but some of the risks are not well understood
  - Companies are mainly interested in how it affects their costs and gross margins.
  
- **Each Company / Business Process has it's own characteristic and hence may or may not fit into the cloud computing models**
  - Certainly not a one-size-fits-all model!