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FUNDAMENT OF CLOUD SECURITY: TUTORIAL

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Tutorial Outline

- Part 1: Introduction
- Part 2: Cloud Computing Standards
- Part 3: Cloud Security Issues
- Part 4: Cloud Security Policies and Best Practices
- Part 5: Cloud Attack Mechanisms
- Part 6: Cloud Protection and Research Solutions

Contributors/Acknowledgement

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PART 1: INTRODUCTION – CLOUD COMPUTING

Introduction to cloud computing

- Cloud computing is the natural evolution of the internet where computing resources transform into:
  - Infrastructure services
  - Applications services
  - Businesses services
- That are available for the users whenever and wherever they need them.

What is cloud computing?

- An integration of a set of hardware and software: computing nodes, network, storage, services, and interfaces
- With a goal to deliver computing services:
  - software
  - Infrastructure
  - Storage
- To accommodate on demand user requests

Cloud Computing – Motivation

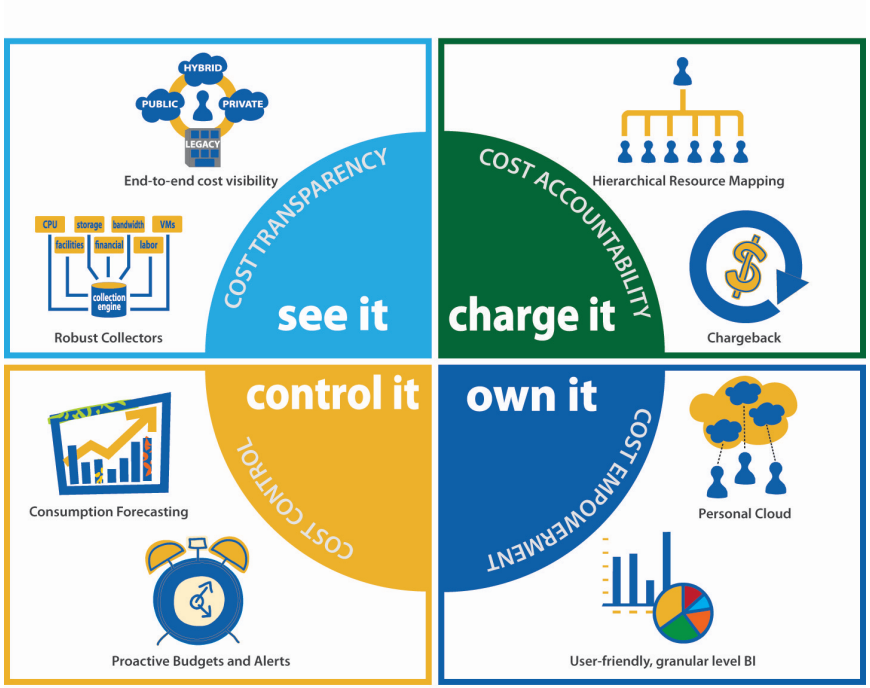
- Car rental services
  - For short period
  - Before you get your own car
  - No need to maintain and upgrade
  - Is popular
- Cloud rental services
  - For short period
  - Before you get your own devices
  - No need to maintain and upgrade
  - Is becoming popular

Cloud Computing Potential Benefits

- Increased Reliability – Duplicated data, logs, better maintenance
- Reduction in IT operating costs (Pay-as-you-Go)
- Scalability and Agility
- Ubiquitous Accessibility – Internet, and perform same task from any where and using any network device
- Levels the playing field
- Fast request-driven provisioning (On Demand)
- Improves collaboration

Cheaper/Cost-effective

- Cloud reduces the following costs:
  - Cost of power usage
  - The infrastructure costs
  - Reliability costs
  - Maintenance costs



Src: http://cloudtimes.org/2012/07/17/5-questions-to-determine-the-real-cost-of-cloud-computing/

Cloud Computing Faster In

- Deployment
- Configuration
- Setting time
- Startup time
- Migration
- Recovery

Greener

- Cloud has the potential to reduce the number of data centers by consolidating the operation of multiple data center and utilizing resources.

	Emissions 2007 ($MtCO_2e$)	Percentage 2007	Emissions 2020 ($MtCO_2e$)	Percentage 2020
World	830	100%	1430	100%
Server farms/Data Centres	116	14%	257	18%
Telecoms Infrastructure and devices	307	37%	358	25%
PCs and peripherals	407	49%	815	57%

$MtCO_2e$ = Metric Tonne Carbon Dioxide Equivalent
$GtCO_2e$ = Gigatonne Carbon Dioxide Equivalent

i Climate Group and the Global e-Sustainability Initiative (GeSI)(2008). SMART 2020: enabling the low carbon economy in the information age. Available at http://www.smart2020.org/_assets/files/03_Smart2020Report_lo_res.pdf

More Flexible

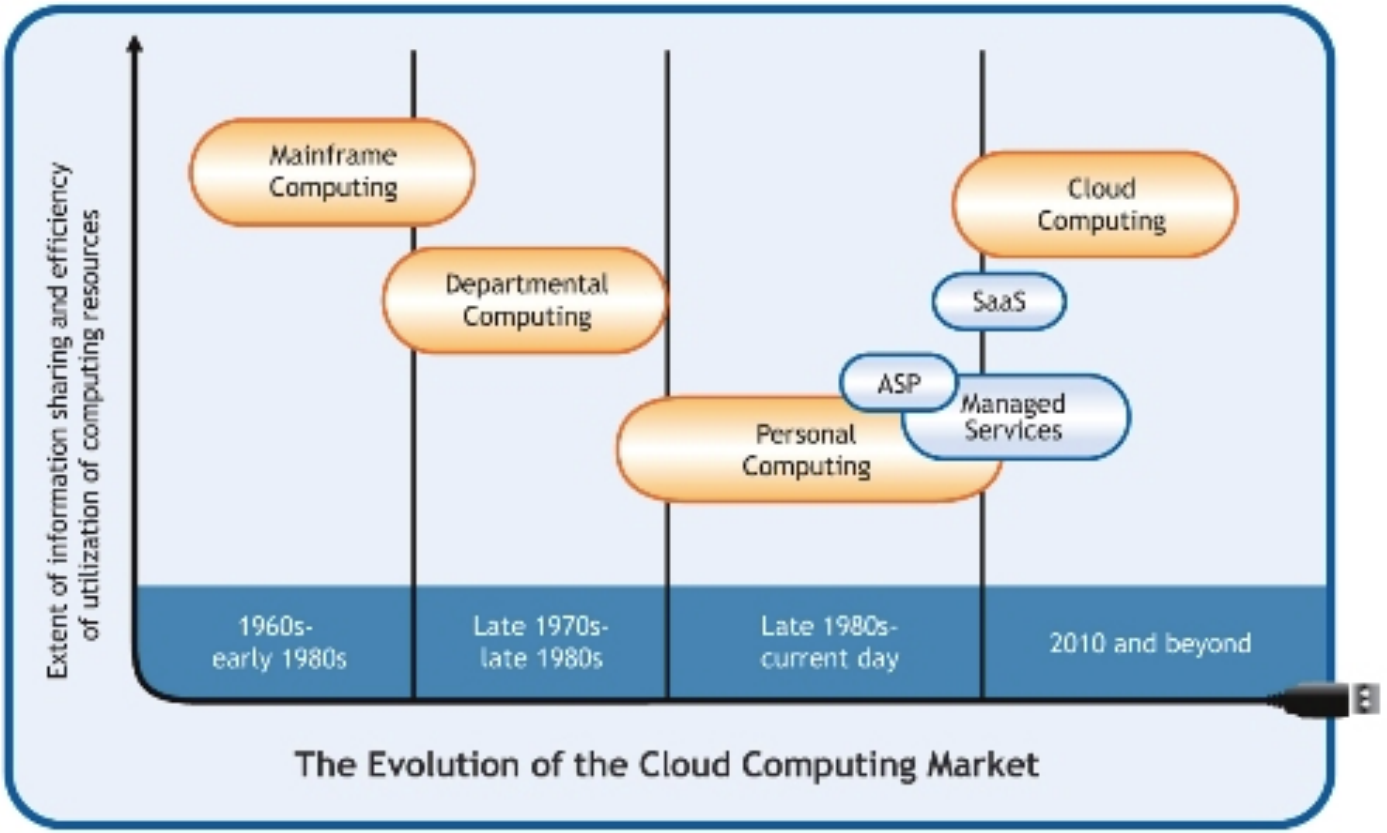
- Flexible pricing model
- Flexible services
- Flexible acquisition model
- Flexible delivery Models

More Agile

- Agile On-Demand resource allocation
- Start-ups use cloud computing to decrease their service prototyping time.
- Agile application development
- SOA (Software Oriented Architecture)

SOA can be utilized on top of cloud infrastructure for agile application development

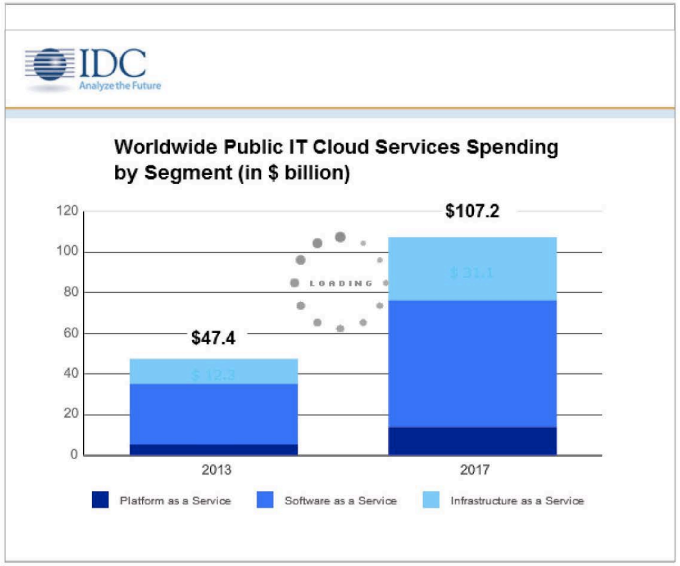
How the Cloud is growing?



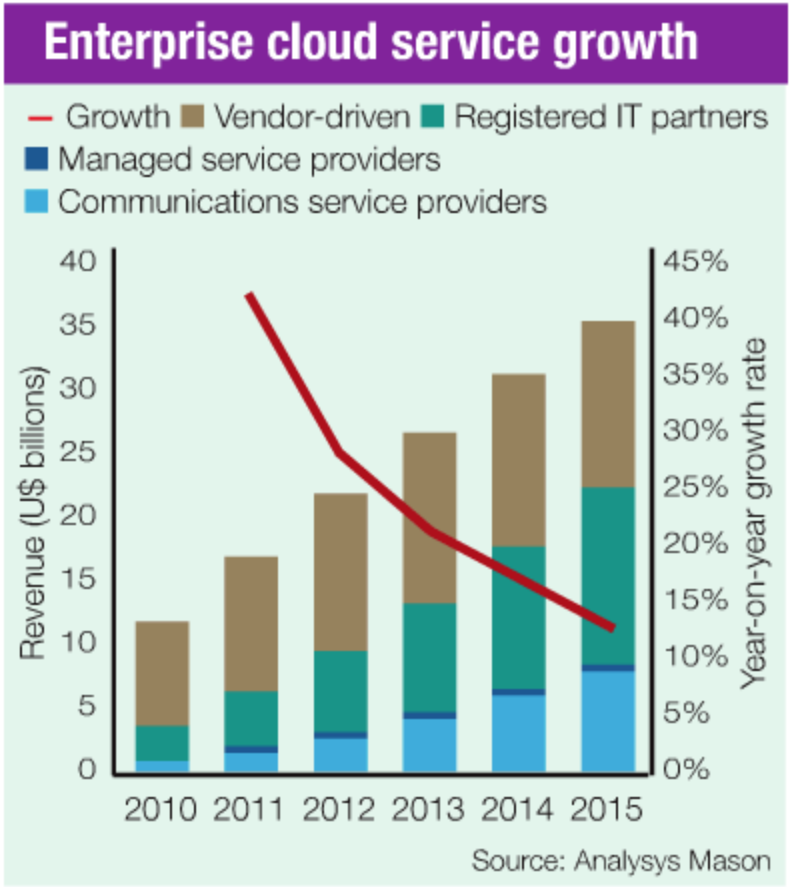
** Source:http://www.forbescustom.com/TechnologyPgs/CloudComputingP1.html [accessed: May 26, 2013]*

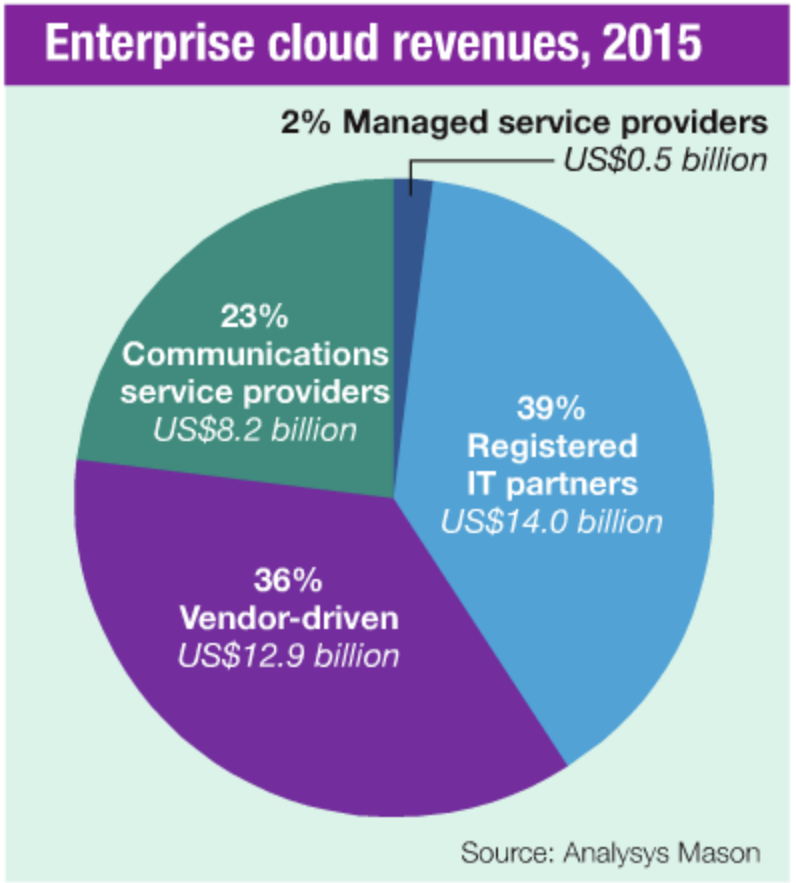
Cloud Computing Growth

- Cloud usage is like having a customized cellular plan with all the features and functionality that you want, paying only for what you use, and with the ability to cancel at anytime without penalties or additional fees.
- IDC forcasts worldwide public IT cloud services spending to reach nearly $108 Billion by 2017.



Cloud Spending Growth





* Source:http://www.totaltele.com/view.aspx?ID=461502 [accessed: May 26, 2013]

Cloud Benefits for Start-ups

A survey by Rackspace-Manchester shows Cloud adoption has reduced the IT costs, of small companies by an average of 23 percent (amounts to an average of close to $500,000).

Source: Rackspace Hosting, Manchester Business School.

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Cloud Computing Boosts Next Generation of Startups, Survey Shows

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Cloud computing isn't just potentially delivering savings and flexibility for existing organizations. It is also laying the groundwork for a new generation of business startups, a new survey finds.

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Cloud Benefits for Start-ups

- Cloud Benefits are mentioned to be (*Rackspace survey*):
  - Savings through avoiding IT infrastructure costs 58%
  - Ability to scale up cost effectively 48%
  - Easier to deploy, use and manage than on-premise solutions 46%
  - Ability to buy only what is needede 45%
  - Productivity gains due to less time dealing with IT issues 41%
  - More control over what we spend 38%
  - Predictable monthly costs help to manage cash flow 36%
  - Access to industry expertise from cloud providers 27%
  - Access to the same caliber of high performing services that larger competitors use 24%

Source: *Rackspace Hosting, Manchester Business School.*