Cloud Computing and Big Data – What's the Big Deal

Arlene Minkiewicz, Chief Scientist
PRICE Systems, LLC
arlene.minkiewicz@pricesystems.com

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Agenda

- Introduction
- Cloud Computing
  - Defined
  - Benefits and Risks
- Big Data
  - Defined and Applied
  - Examples
- Wrap Up

Introduction

- Cloud computing is a paradigm that opens the door for utility computing
- Instead of investing in hardware, software and infrastructure, organizations can access through the cloud on an as-needed basis
- Still lots of hype – some vendors have their head further in the clouds than their technology

Introduction

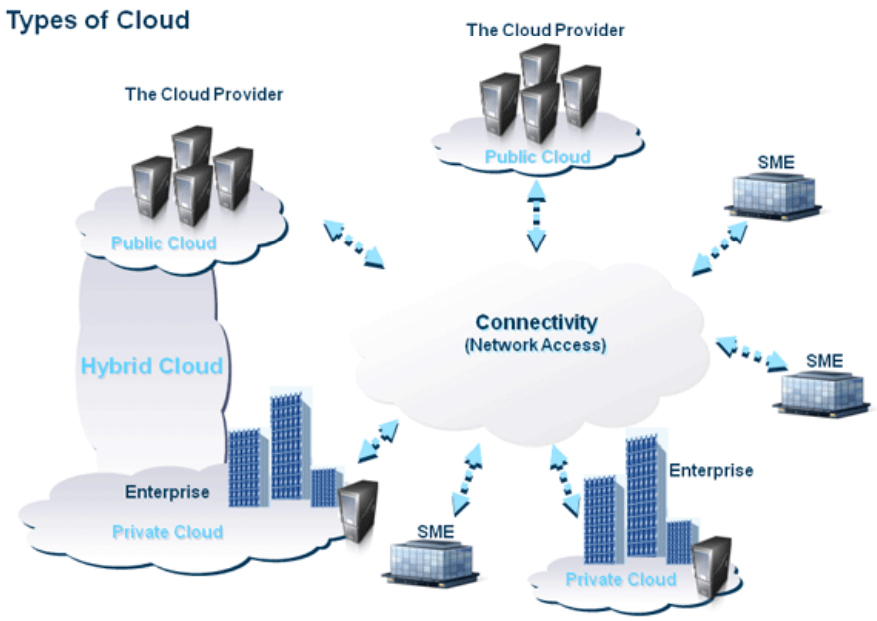
- Cloud computing is a notion that's gaining traction
  - Office of Management and Budget (OMB) under direction of the White House has instructed federal agencies that starting in 2012 they are expected to consider 'cloud first' for IT initiatives whenever it makes sense
  - Survey conducted for SafeGov.org in Sept 2011 finds federal agencies working diligently yet cautiously towards cloud computing.
  - Survey conducted by Forrester Research commissioned by BMC Software
    - 327 enterprises in US, Europe and Asia-Pacific were polled
    - 58 percent run mission critical workloads in unmanaged (meaning unmanaged by the company) public clouds
    - 79 percent plan to run mission critical workloads in the next two years

You are probably already a cloud consumer!

Cloud Computing

- Consumers of cloud computing access hardware, software and networking capabilities from third party providers
- The cloud can be defined as resources and applications that are available on the Internet or other network via any device that connects to the Internet or other network
- According to National Institute of Standards and Technology (NIST), cloud computing delivers the following…
  - On demand self service
  - Ubiquitous network access
  - Location independent resource pooling
  - Rapid elasticity
  - Measured services

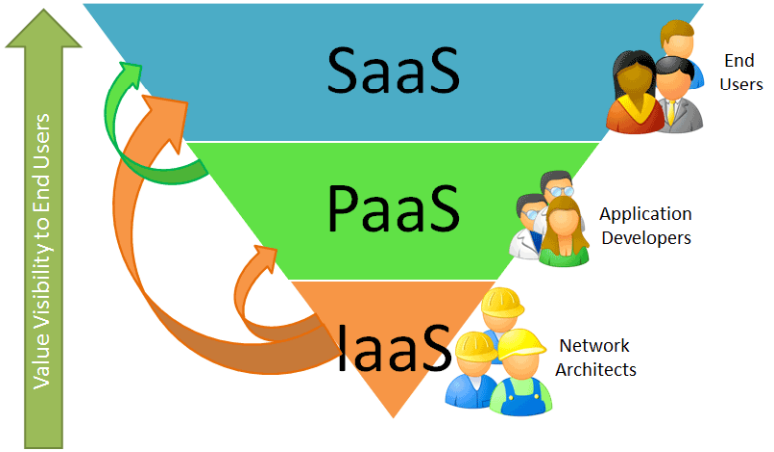
Cloud Computing



- Four types of clouds
  - Public cloud
  - Private cloud
  - Community cloud
  - Hybrid cloud

Cloud Computing

- Cloud computing offerings include
  - Software as a Service (SaaS)
    - Project management
    - Customer Relationship Management (CRM)
    - Human Resources (HR)
  - Platform as a Service (PaaS)
    - Database
    - Development and Testing
    - Business Intelligence
  - Infrastructure as a Service (IaaS)
    - Backup and Recovery
    - Storage
    - Computation



Cloud Computing Benefits

- Cost savings
- Agility
- Scalability
- On-Demand Availability
- Portability
- Environment
- Increased Innovation
- Disaster Relief

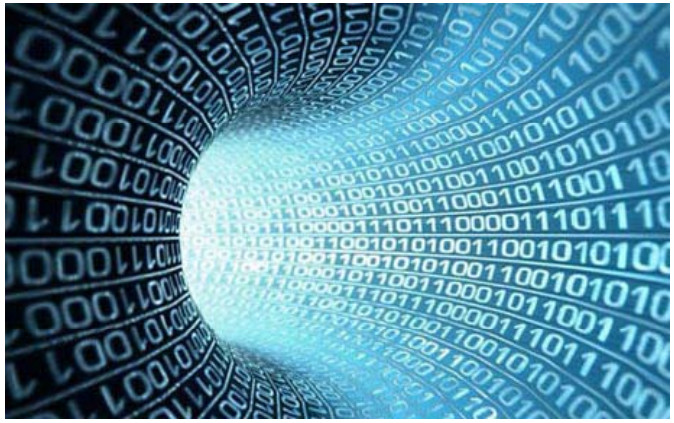
Study conducted by Deloitte 2010

Could Computing Risks and Challenges

- Security
- Reliability
- Vendor Lock In
- Loss of Control
- Data Governance
- Legal Concerns

Big Data - Defined

- Defined by Forrester as “the techniques and technologies that make capturing value from data at extreme scales economical”
- Wikipedia defines it as “a collection of data sets so large and complex that it becomes difficult to process using on-hand database management tools or traditional data processing applications”
- Or in plain language – number crunching of epic proportion accomplishing in minutes what may have taken weeks several years ago



Big Data & the Cloud?

- The notion of Big Data can exist with cloud computing
- The question is whether the notion of Big Data would have been conceived without the cloud
- We share our thoughts, pictures, videos, etc. through cloud based apps such as Facebook, Twitter, Google+, etc.
- We shopped online to the tune of $162 billion in 2011
- The average number of Google searches per day went from 60 million in 2000 to 4.717 billion in 2011.
- All these applications exist in the cloud and their providers take Orwellian interest in every transaction and query that is made
- This is how Facebook knows who to recommend as your friend and how Amazon knows what books you might like to read

Big Data & Cloud

Cloud computing is an enabling technology for Big Data

Add to this the vast amount of data collected from other applications and devices that collect and transmit data

This data is collected in many formats… text, video, still, audio, sensor reading, GPS coordinates, radio frequency identification readers(RIF), etc. – all thrown into the same pot

- Big Data is the tools and techniques that make it possible to process these large amounts of data in varying formats
- Full circle back to the cloud - where else can we find nearly unlimited access to storage and processing power?

Big Data in Practice

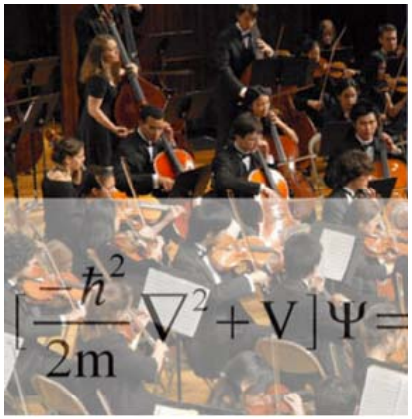
- Potential uses include:
  - Threat detection
  - Battlefield analysis
  - Business intelligence
  - Machine reading
  - Medical research
  - Health care monitoring
  - And the list goes on…..

- Not to say we can't already do these things… Big Data opens the door to do them more efficiently and effectively

Big Data in Practice

- The National Science Foundation along with 9 other research funding organizations announced Round 3 of the Digging into Data Challenge on Feb 5, 2013
- Some of the projects that Round 2 awardees are working on include…
  - Chartex – new ways of exploring full text content of digital historical records.
    - Use medieval charters documenting life from 12th to 16th centuries
    - Natural Language Processing and Data Mining applied to extract information and find new relationships between entities
    - Virtual workbench to allow historians to explore information in a free form fashion unimpeded by the restrictions of meta data.

Big Data in Practice



- Some of the projects that Round 2 awardees are working on include…
  - The Electronic Locator of Vertical Interval Successions (ELVIS) – the first large data driven research project on Musical Style
    - Study the changes in European polyphony from 1300 to 1600 using advanced musical information retrieval techniques
    - Apply analytical methods to compare highly contrasting kinds of music that are unified by common concepts of tonality, consonance, dissonance and voice leading
- While very academic – these examples provide a window into the kinds of research Big Data makes possible
- More can be found at the Digging into Data Challenge website www.diggingintodata.org

Big Data in Practice

- A few more practical examples from programs the Department of Defense is working on…
  - The Insight Program – an adaptable integrated human-machine Exploitation and Resource Management System
    - Next generation of Intelligence, Surveillance and Reconnaissance (ISR) Technology
    - Provides analysis and exploitation of date from many sources including imaging and non-imaging sensors, and other sources in the battlefield
    - Apply behavioral discovery and prediction algorithms to assess battlefield threats and inform the tactical users on the battlefield to support decision making

Big Data in Practice

- A few more practical examples from programs the Department of Defense is working on…
  - The Minds Eye Program – safely provide surveillance capability using visual intelligence
    - Soldiers performing surveillance activities in uncontrolled areas could be replaced with smart cameras
    - This smart camera can make distinctions between activities that appear threatening and those that do not and could report only on those that do
    - This technology differs from today's state of the art in that it adds perceptual and cognitive underpinnings to recognize and react to what's actually going on in a situations

- The Big Data Fact Sheet provides more examples at http://www.whitehouse.gov/sites/default/files/microsites/ostp/big_data_fact_sheet_final_1.pdf

Conclusion

- Cloud computing allows organizations to offload their IT resource requirements and responsibilities to outside providers
- In so doing, it creates an environment where huge amounts of data can be collected, stored and processed.
- Big Data is the notion of doing useful things with this data in an efficient manner. Cloud computing enables this notion
- Big Data has the potential to change the world through making it possible for researchers to efficiently and effectively comb through mountains of heterogeneous data
- Final Big Data Example - Discovering how children learn language

Questions

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