Could Computing: Concepts and Cost Considerations

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

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"If computers of the kind I have advocated become the computers of the future, then computing may someday be organized as a public utility just as the telephone system is a public utility … the computer utility could become the basis of a new and important industry"

John McCarthy, 1961

Agenda

- Introduction
- Cloud Computing
- Benefits
- Risks and Challenges
- Cost Considerations
- Examples and Findings
- Other Impacts of Cloud Computing
- Conclusions

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

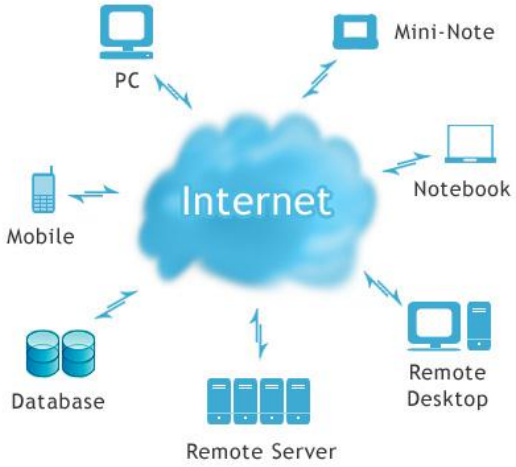
- Cloud computing is a notion that's gaining traction
  - Gartner predicts that one in 5 businesses will not own its own IT assets by 2012
  - Office of Management and Budget (OMB) under direction of the White House has instructed federal agencies that starting in 2012 they are expected to consider 'cloud 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

Cloud Computing

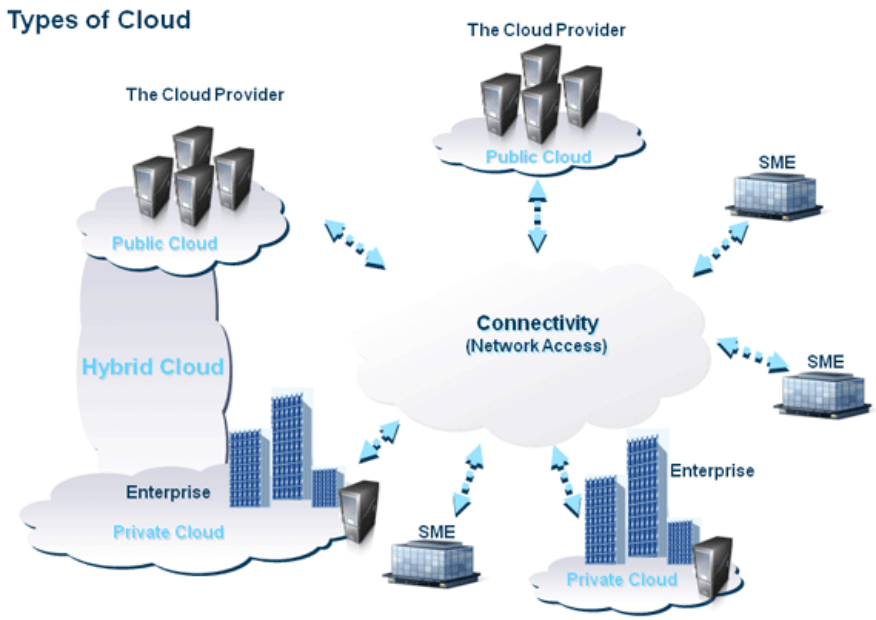
- Consumers of cloud computing access hardware, software and networking capabilities from third party providers,
- The cloud can be defined as resources and applications that are available on the Internet or other network via any device that connects to the Internet or other network
- According to National 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

- Cloud computing providers offer Internet connected servers which house applications and can store date
- Capabilities provided include
  - Content management
  - Database
  - Communication infrastructure
- Virtualization and scaling automated
- Control and access through Application Program Interfaces (APIs) or web services



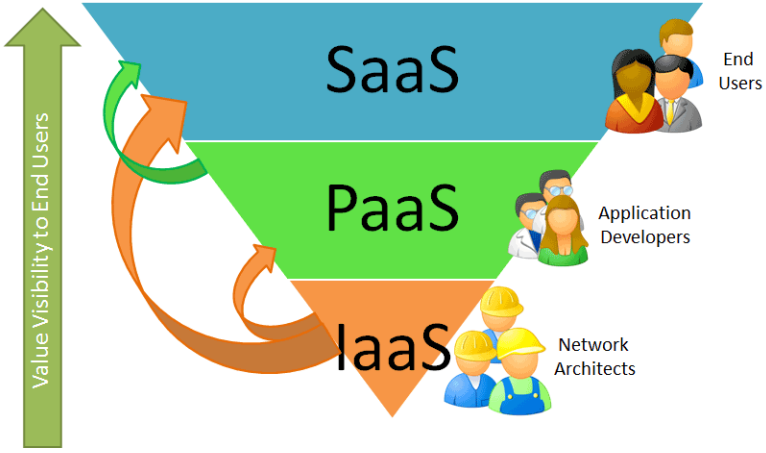
Cloud Computing



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

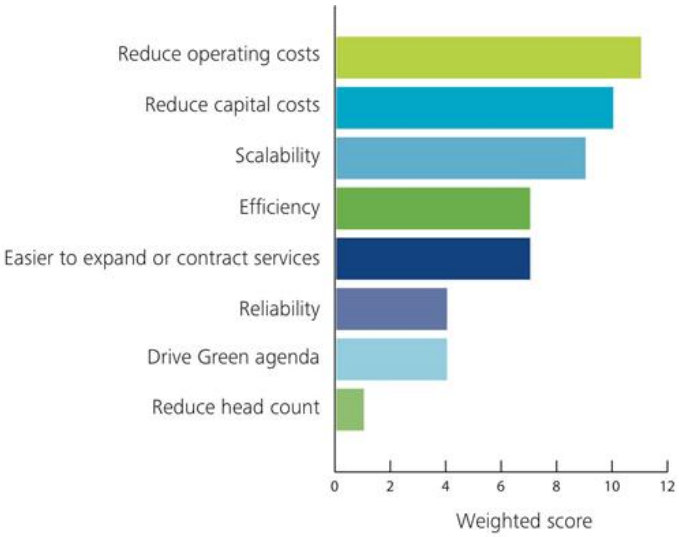
Cloud Computing

- 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



Benefits of Cloud Computing

- Cost savings especially to Small to Medium Enterprises (SMEs)
  - Licensing and maintenance fees for software
  - Acquisition and maintenance of equipment
  - No need to resource to peak needs
  - Reduce needs to space, power and IT staff
- Agility
- Reliability
- On demand availability
- Portability
- Reduced harm to the real clouds
  - Study conducted by Microsoft, Accenture and WSP Environments and Energy found that for large deployments energy use and carbon emissions reductions > 30% and for small deployments as much as 90%



Study conducted by Deloitte 2010

Risks and Challenges

- Security is a key concern – causing organizations to avoid the cloud or adopt private clouds
- Federal, state or organizational regulations about where data can physically reside
- Standards
- Portability – not necessarily an easy transition from one vendor to another
- Loss of control over IT capabilities
- Increased costs for organizations with large amounts of data and high bandwidth requirements
- Technology is still immature

Cost considerations

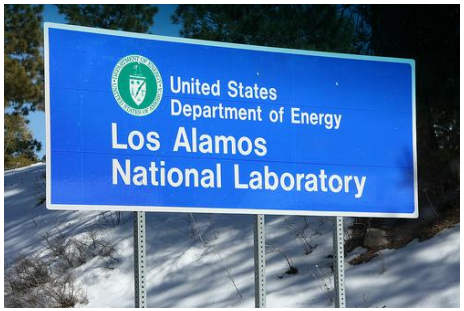
- When evaluating cost benefits for a cloud migration the following things should be considered
  - Operational costs as a function of amount of capability and data being moved to the cloud
  - Migration costs based on the complexity based on the nature of the capability and the volume of data being migrated
  - Equipment and licensing that can be eliminated
  - Organizations current level of efficiency of operations
  - Type of cloud
  - Requirements for security
  - Organizational and culture considerations

Examples and Findings

- Los Alamos National Laboratories
  - The Challenge

    Rollout of new projects – it could take as much as 30 days to provision servers for a project.

  - The Solution
    - On demand architecture with virtualization
    - Private cloud since security was an issue
    - Microsoft © SharePoint for cloud workflows and integration point
    - VMWare© vCloud Director to manage and operate cloud
    - VMWare© vShield for security
  - The Results
    - Servers can be provisioned in 30 minutes
    - Virtualization made it possible to eliminate hardware
    - They predict eventual savings to be $1.3 M



Examples and Findings

- Defense Information Systems Agency (DISA)
  - The Challenge

    Implementation of new software and systems at the DoD was expensive, time consuming and conducted in an environment not conducive to cross collaborate and ubiquitous delivery
  - The Solution
    - Created Forge.mil which provides tools and services for rapid development, testing and deployment of software to entire DoD
    - CollabNet provides software development platform that facilitate reuse and collaboration for Forge.mil's 5000 users
  - The Results
    - DISA estimates that Forge.mil saves between $200,000 and $500,000 per project

Examples and Findings

- US Federal Government ‘s website USA.gov
  - The Challenge

    Access to this website ebbs and flows dramatically based on conditions in the country and the world
  - The Solution
    - GSA moved USA.gov to Terremark’s Enterprise Cloud service
  - The Results
    - Site upgrade time went from nine months to one day
    - Monthly down time went from 2 hours to near 0 (99.99% availability)
    - Total annual cost of $650,000 resulting in a 72% cost savings over the legacy USA.gov operational and personnel costs.

Impacts of Cloud Computing

- Many predict cloud computing will be as big as the Internet with respect to impacts on society
- Democratization of content
  - Ubiquitous data
  - Available to anyone with a browser and network connection
- Big Data analysis
  - Distributed computing
  - Virtualization
  - IBD and ETH Zurich use cloud to analyze disease causing proteins to fight antibiotic resistant bacteria

Impacts of Cloud Computing

- Mobile cloud computing
  - Access to cloud through mobile phones and tablets
  - Location based capabilities
- Shifting job market
  - IT jobs shift away from individual business to consolidated data centers
  - More openings for jobs focused on improving the business

Impacts of Cloud Computing

- Level the playing feel
  - Start-ups without huge up front investment in capital
  - Small and medium businesses can compete
- How we educate and what we need to learn
  - Universities are embracing cloud enabled ways to share knowledge
  - Facts and information ubiquitous
- Improve customer satisfaction
  - Utility model means app providers know what features are popular

Conclusions

- Cloud computing offers businesses and federal agencies an alternative to meeting their IT needs with in-house resources
- Cloud providers promise many benefits and there is evidence that these benefits exist and are realizable
- Benefits include cost reduction, increased availability, reduced waste, scalability and virtualization
- There are also concerns as the technology is still immature and issues such as security, standards and portability need to be address
- The US Federal Government appears to be embracing the cloud with its cloud first initiative considering cloud solutions first whenever and wherever it makes sense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