The Cloud: Opportunity or Threat

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Agenda

• A few (a very few) words about the cloud
• Opportunities
• Threats
• How SOA and the cloud work together
• A case study
• Where we go from here
A Few Words About the Cloud
Before the cloud

- If you wanted to start an enterprise, you needed an IT shop.
- Massive costs in hardware, software, power, administrative staff
- Prohibitive cost to entry
What if...

• You could have unlimited computing resources?
  – All the processing power you want
  – All the data storage you want
  – Data mining whenever you want

• **Cloud computing will be the biggest change to our industry since the rise of the Internet.**
Cloud characteristics

- Rapid elasticity
- Measured service
- On-demand self-service
- Ubiquitous network access
- Location-independent resource pooling

The cloud

“Cloud is more of a delivery model than a new technology.”

– IBM’s Ric Telford
You’re on the Cloud Already

• If you use Flickr or Facebook or LinkedIn or Twitter or Backpack or [insert hundreds of other sites here], you’re using the cloud.
Cloud services

• The application in the sky
• The hard drive in the sky
• The database in the sky
• The machine in the sky
The opportunity
The opportunity

• The amount of information we have to manage is exploding.
  – Storage shipments are growing 54% per year
• Massive expenditures on maintenance
  – On average, 70¢ of every dollar is spent on maintenance
• CPUs sitting idle
  – In distributed environments, up to 85% of the computing capacity is idle
The opportunity

• Data centers account for 2% of all the electricity consumed in the U.S.
  – Some projections say this could double by 2011.
  – A data center can consume up to 100 times more energy than an ordinary office building.
  – 30% of the servers in the U.S. operate at less than 2% of capacity.
The economic opportunity

Virtualization + Standardization + Automation + Energy efficiency = Reduced costs

Reduced costs free up your budget for new investment
CAPEX → OPEX
The business opportunity

= Optimized business

Agility

Business & IT alignment

Service flexibility

Industry standards

Focus those new investments on making your business better
The opportunity

• Cloud computing lets organizations pay for the computing power they need when they need it.
• Cloud providers distribute the cost of power consumption, administration and maintenance.
The threats
The threats

• There are significant economic and organizational benefits to letting someone else manage parts of your infrastructure.
  – Let someone else buy the machines and power them and cool them and apply fix packs and keep admins on hand....

• But that means a loss of control.
Loss of control

• The most significant concern among architects considering the cloud is security.

• In house:
  – I’m trusting [someone I know] to take care of my data and applications.

• In the cloud:
  – I’m trusting [someone at Vendor X] to take care of my data and applications.
Security

• If I’m storing my data elsewhere, security as crucial as ever.
• If I’m running my applications elsewhere, security is as crucial as ever.
• Cloud computing doesn’t introduce any new security issues.
  – It doesn’t make them easier to solve, but it doesn’t create any new ones.
• You can reuse much of your existing security infrastructure.
Identity / Federated Identity

• Identity management, particularly federated identity management, is crucial for cloud computing.
  – Technologies such as LDAP and SAML are useful here.

• You can reuse much of your existing authentication infrastructure.
Reliability

• If I have less physical control over my infrastructure, it’s vital that the cloud be reliable as possible.
  – Some providers have SLAs that guarantee uptime and responsiveness.
  – Some providers deliver private clouds via hosted or colocated data centers.

• Reliability isn’t a new problem, but the cloud gives us someone else to blame.
Regulatory issues

• Many enterprises can’t use a public cloud at all.
  – Laws prohibit certain types of data from being stored off-premises.
• The private cloud is an important architectural pattern being used in many enterprises.
• Location awareness is a key concern for many (potential) cloud users.
• Data retention and data destruction are important also.
Transactions & concurrency

• Many enterprise applications require transactions and concurrency.
  – There needs to be only one copy of the data
  – Any changes to the data have to be synchronized
• This is very difficult to scale.
Cloud architectures

• Be aware that many public cloud services aren’t designed for the enterprise.
  – That doesn’t mean, “It’s not enterprise-class yet,” that means, “It’s not ever going to be enterprise-class.”

• You have to understand how these services work to figure out if they’re right for you.
Propagation latency

• For reliability, scalability and performance, many cloud services are designed as massively redundant, massively distributed systems.

• But that redundancy means any changes made to your data have to be propagated across the cloud.
  – The delay between the time you make the change and the time the changes are propagated is called propagation latency.
Cloud storage

• Cloud storage services are typically built as massively redundant, massively distributed systems.

• When you make a change to your data, those changes have to be propagated to all of the copies of your data.

• Someone accessing your data from the nearest data center might not see those changes.
Cloud databases

• For scalability and performance reasons, many cloud databases act differently than you might expect:
  – Most of them aren’t relational
  – Many of them don’t support schemas
  – Many of them don’t support common operations
One more time

• You have to understand how these services work to figure out if they’re right for you.
SOA and the cloud
SOA and the cloud

• Both started bottom-up
• Both started with massive hype
• Both don’t work without governance

• You need an architect, a blueprint, and an executive who is both enlightened and powerful.
  – SOA and cloud computing aren’t simply coding issues.
The joys of abstractions

• SOA uses abstractions to remove middleware details from an application.
• Cloud computing uses abstractions to remove infrastructure details from the mind of the architect.
• Both technologies let you focus more on your business and less on technical details.
SOA and the cloud

• SOA and the cloud are a perfect match; it doesn’t make sense to do cloud computing without SOA.
  – We want to combine the flexible architecture of SOA with the flexible infrastructure of the cloud.

• We’re not building silos in the sky.
A case study
A case study

• An insurance company has a claims application used to capture data about their policy holders and the property damage they suffer.
  – The application submits data to the enterprise system. The data is secured as it moves from the application back to the enterprise.

• Only licensed agents of the company should be able to use the application.
A case study

- A hurricane is headed for the Gulf Coast.
- This has the potential to create an enormous load on the company’s IT infrastructure.
- The company decides to use the cloud to host virtual machines as needed.
  - Each VM runs the claims application.
  - VMs are started and stopped automatically.
The cloud to the rescue!

• Security is still critical:
  – As each VM runs the claims application, a VPN connection is used to transmit the gathered data back to the enterprise system.
  – The cloud provider guarantees that the physical disk hosting a VM image is cleared out when the VM is shut down.
The cloud to the rescue!

• Using the cloud lets the company keep a reasonable level of capacity in-house.
• They don’t have to buy, maintain, power and cool enough machines to handle the highest imaginable workload.
• The company only pays for the extra processing power when they need it.
Where We Go From Here
Issues with the Internet, 1994

- “It’s not secure.”
- “I don’t want to lose control of my infrastructure.”
- “I don’t know how reliable it is.”
- “I don’t know if my partners are going to use it.”

- All of these were important, legitimate issues.
  - With VPNs and other technology, the industry solved these problems.
Issues with the cloud, 2010

• “It’s not secure.”
• “I don’t want to lose control of my infrastructure.”
• “I don’t know how reliable it is.”
• “I don’t know if my partners are going to use it.”
• **All of these are important, legitimate issues.**
  
  – We’ve got some work to do, but the massive economic opportunities mean someone will find a way to solve these problems.
Vendor lock-in

• If there’s a new technology, any talented programmer will want to use it.
  – Maybe the shiny new thing is appropriate for what we’re doing.
  – Maybe not.
  – We’re probably going to use it anyway.

• The challenge is to walk the line between using the newest, coolest thing and avoiding vendor lock-in.
The Open Cloud Manifesto

- A statement of principles for openness in cloud computing
- **More than 350 supporters and growing**
- Join the “Open Cloud Manifesto” LinkedIn group
- [opencloudmanifesto.org](http://opencloudmanifesto.org)
Openness in action

- The Cloud Computing Use Cases group is focused on documenting customer requirements.
- Version 3 of the paper is focused on security. It’s available at bit.ly/1FXRAH.
- Join us at cloudusecases.org.
developerWorks cloud zone

- Dozens of articles on cloud computing, including introductions, code samples, tutorials and podcasts.
- [ibm.com/developerworks/cloud](http://ibm.com/developerworks/cloud)
Summary

- Although cloud computing has threats and technical challenges, the economic and business opportunities are enormous.
- The flexibility of SOA and the flexibility of cloud computing are complementary.
  - Your existing investments in SOA are a perfect match for the cloud.
Once again – The hype!

Cloud computing will be the biggest change to our industry since the rise of the Internet.
Thanks!

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