Cloud Computing: From Cost Savings to Agile IT

3-days seminar

Cloud computing quickly became a must-have in our IT landscape, and, simply stating, you adopt the cloud or risk falling behind your competition. This seminar will provide an overview of the important IaaS Cloud characteristics and capabilities, compare the offerings of major IaaS vendors, as well as a detailed discussion of Amazon Web Services. While public IaaS Clouds offer substantial benefits, many companies want tighter control and have started to build private Clouds. We will show requirements that should be considered, and how to develop a methodology to approach the implementation of a private cloud. We will also look at another model that is gaining traction: the hybrid cloud, where business critical systems run in a private cloud and less critical applications are handled by public clouds, or where the public cloud is used to handle peak capacity requirements, provide backup capabilities, etc.

One of the most confusing areas of cloud computing is multi-tenancy. Every vendor claims that his product is multi-tenant enabled, but what does this really mean across the entire technology stack – from hardware infrastructure all the way up to application logic? Understanding multi-tenancy is key to determine how the essential cloud benefits (elasticity, auto-scaling) can be exploited.

The seminar will explain how the development of business applications for the Cloud is different from traditional development and deployment of on-premise applications through an in-depth description of PaaS. However, just using a PaaS tool is no guarantee for a successful application – how do we build "cloud ready" applications? The design principles of SOA are much better suited for Cloud applications than a non-service oriented approach. This is key when we want to exploit the economy of scale by building and deploying elastic, multi-tenant applications. We also need to understand the standards and Open Source solutions that can be useful today to mitigate vendor lock-in.

What does it take to migrate a legacy application to the cloud? Not all legacy applications are good candidates and there are typical characteristics that you should recognize as a red flag. Once we have migrated existing applications to the cloud, or if we choose to replace them with SaaS applications, the question of integration becomes inevitable. Connecting them across the boundaries of cloud and on-premise data centers is significantly more challenging than traditional integration behind the firewall.

Cloud computing bears many dangers, for example the creation of shadow IT, the proliferation of virtual machines and uncontrolled cost, the proliferation of data that undermines the authority of a system of record, and many more. How should the cloud be used, who can provision services, how are Service Level Agreements (SLAs) managed – these are important questions to address. We will also discuss the new security risks and how to approach the joint responsibilities for security in a public cloud environment, including high profile examples and standards that can be used to get a running start.

The seminar concludes with examples of Return on Investment (ROI), Total Cost of Ownership (TCO), and an outlook into the future of cloud computing, as well as a discussion how IT has to transform itself in order to stay relevant in face of the new disruptive technologies.

Agenda:

1. Cloud Computing Overview

- Evolution or revolution: what makes cloud disruptive?
- Cloud definition: IaaS, PaaS, and SaaS
- National Institute of Standards and Technology (NIST) cloud reference architecture
- Cloud adoption and typical use cases
- What makes a cloud a cloud?
    a) Resource virtualization
    b) Automated, on-demand provisioning of resources and management capabilities
    c) Shared infrastructure and applications across tenants
- Cloud benefits and challenges
    a) High profile cloud outages
- Exercises for transitioning to the cloud

2. Infrastructure as a Service (IaaS)

- IaaS architecture and key features
    a) NIST IaaS reference architecture
    b) What to look for when selecting an IaaS provider?
- IaaS example: Amazon Web Services (AWS)
    a) Elastic Compute Cloud (EC2) & Amazon Machine Images (AMI)
    b) IaaS+: AWS Application Services and Marketplace
    c) Regions & Availability Zones
    d) Networking & security
    e) Monitoring, Auto Scaling, & Load Balancing
    f) Building scalable and fault-tolerant applications
    g) AWS outages & how to protect yourself
    h) Management interfaces
- Exercises for utilizing IaaS

3. Private and Hybrid Cloud

- Private cloud
    a) Drivers & challenges
    b) The state of private cloud
    c) Key considerations when building a private cloud
    d) How to manage the private cloud
    e) Virtual Private Cloud
- Hybrid cloud
    a) Use cases
    b) Product example: Eucalyptus
- How to select a cloud deployment model
- Exercises for selecting a cloud deployment model

4. Multi-tenancy

- What is multi-tenancy
- Multi-tenancy across the technology stack
- 7 approaches to multi-tenancy

- Considerations for multi-tenant applications
- The ideal multi-tenant system
- Exercises for selecting a multi-tenancy model

5. PaaS: Key Concepts & Major Players

- PaaS defined
- A complete PaaS stack
    a) Where to draw the line: IaaS+ or pure-PaaS or custom-SaaS?
    b) What functionality do we need to build applications for the cloud?
- A detailed look at major PaaS providers:
    a) Google App Engine
    b) Force.com
- Outlook: PaaS adoption and vendor roadmap
- Exercises for utilizing PaaS

6. Cloud Standards and Open Source Software

- Why standards?
- Cloud standards – where are we today
- Cloud portability standards
- Standards for cloud interoperability
- Open Source Software (OSS)
    a) OpenStack
    b) Apache CloudStack

7. Synergy of SOA and Cloud Computing

- Services and SOA defined
    a) Service Layer Model & the concept of loose coupling
    b) Event Driven Architecture (EDA)
    c) What is REST and why is it important for the cloud?
- Synergy of SOA and Cloud - the industry view
- Applying SOA principles to the cloud
- Service-Oriented Infrastructure (SOI)
- Example: GrepTheWeb Application on Amazon
- Putting It All Together: The SOA-Cloud
- Exercises for using SOA and cloud

8. Migrating Existing Applications to the Cloud

- Why move a legacy application to the cloud – or why not?
    a) 3 models for legacy system migration
- Application characteristics to look for that could make a migration fail
- Tools that can help with the migration process
    a) Focus on infrastructure dependencies
    b) Focus on application (re)design
    c) Optimizing for the target cloud
- Exercises for migrating existing applications to the cloud

9. Cloud Integration

- The need for cloud integration and its challenges
- How SOA can help: focus on integration

  a) From application integration to Service Oriented Integration (SOI)
- The need for (inter)mediation
  a) Mediation functionality
  b) The Enterprise Service Bus (ESB)
- From ESB to "Internet Service Bus"
- Product Examples:
  a) Windows Azure AppFabric
  b) IBM Cast Iron
- Integration architecture choices
- Exercises for integrating the cloud

10.   Securing the Cloud

- Extending security into the cloud
- Cloud security is a multi-dimensional problem – who is responsible for what?
  a) Dimension 1: IaaS, PaaS, SaaS
  b) Dimension 2: Network, VM, application, data
  c) Dimension 3: CSP, tenant
- Identity & Access Management across multiple clouds
- Cloud specific security standards
  a) Cloud Security Alliance (CSA)
- Example: US Federal Risk and Authorization Management Program (FedRAMP)
- Exercises for securing the cloud

11.   Governance for Cloud-based Services

- Business vs. IT vs. EA vs. SOA vs. Cloud Governance
- Why SOA governance can be the basis for Cloud governance
  a) Similarities and differences to SOA governance
  b) Developing a Cloud governance methodology
- 6 perspectives on cloud governance
  a) Governance for private, public, hybrid clouds
  b) Delineating responsibilities: cloud provider vs. cloud customer
  c) Switching cloud providers – the worst case test for your governance
- Exercises for cloud governance

12.   Outlook and Conclusions

- Cloud Return on Investment (ROI)
- Total Cost of Ownership (TCO)
- Market outlook
- The Third Platform and the new Enterprise IT
- Exercises for transforming your IT organization