ENT303 - Migrating Enterprise Applications to AWS: Best Practices, Tools, and Techniques

Abdul Sathar Sait and Tom Laszewski, AWS

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We Will Discuss

1. Calculating Total Cost of Ownership (TCO)
2. Licensing and Architecture
3. Migration Approach and Best Practices
4. Migration Tools and Services
5. Customer Project Migration: Lessons Learned
Calculating TCO
In Your TCO Analysis

**DOs**
- 3- or 5-year amortization
- Use 3-year heavy RIs or fixed RIs
- Use volume RI discounts
- Ratios (VM:physical, servers:racks, people:servers)
- Mention tiered pricing
  (Less expensive at every tier: network I/O, storage)
- Cost benefits of automation
  (Auto Scaling, APIs, AWS CloudFormation, AWS OpsWorks, Trusted Advisor, optimization)

**DON’Ts**

**BONUS**
In Your TCO Analysis

**DOs**

Forget power/cooling  
(compute, storage, shared network)

**DON’Ts**

Forget administration costs  
(procurement, design, build, operations, network, security personnel)

Forget rent/real estate  
(building depreciation, taxes, shared services staff)

Forget VMware licensing and maintenance costs

BONUS

Forget to mention cost of “redundancy”, multi-AZ facility
In Your TCO Analysis

**DOs**

- Time from ordering to procurement
  (Releasing early = increased revenue)
- Cost of “capacity on shelf” (top of step)
- Incremental cost of adding an on-premises server when physical space is maxed out

**DON’Ts**

- Real cost of resource shortfalls (bottom of step)
- Cost of disappointed or lost customers when unable to scale fast enough

**BONUS**
Licensing and Architecture
Licensing and Support

Microsoft

Pay-as-you-go
• SQL Server Standard Edition
• Windows Server

BYOL
• SQL Server Enterprise Edition
• SharePoint Server
• Microsoft Windows Server

Microsoft “License Mobility through Software Assurance”
Licensing and Support

Oracle

Pay-as-you-go
- RDS for Oracle SE One

BYOL
- Enterprise license agreement
- Unlimited license agreement
- Oracle partner network
- BPO license
- Oracle Technology Network

Processor & socket licensing
- 0.25 core multiplier for standard licenses (sockets)
- 0.5 core multiplier for enterprise licenses (processor)
Licensing and Support

**SAP**

**Pay-as-you-go**
- SAP Hana One Business Edition
- BOBJ BI 4.0 w/5 user licenses
- Trial / Developer Editions

**BYOL**
- Primary model for most SAP applications
- Existing licenses can be used on AWS

**User-based Licensing**
# On-Premises Infrastructure Mapped to AWS

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<tr>
<th>Technology Stack</th>
<th>On-Premises Solution</th>
<th>AWS</th>
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<td>Network</td>
<td>VPN, MPLS</td>
<td>Amazon VPC, VPN, AWS Direct Connect</td>
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<td>Security</td>
<td>Firewalls, NACLs, routing tables, disk encryption, SSL, IDS, IPS</td>
<td>AWS security groups, AWS CloudHSM, NACLs, routing tables, disk encryption, SSL, IDS, IPS</td>
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<tr>
<td>Storage</td>
<td>DAS, SAN, NAS, SSD</td>
<td>Amazon EBS, Amazon S3, Amazon EC2 Instance storage (SSD), GlusterFS</td>
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<td>Computer</td>
<td>Hardware, virtualization</td>
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<td>Content delivery</td>
<td>CDN solutions</td>
<td>Amazon CloudFront</td>
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<td>Databases</td>
<td>DB2, MS SQL Server, MySQL, Oracle, PostgreSQL, MongoDB, Couchbase</td>
<td>Amazon RDS, Amazon DynamoDB, DB2, MS SQL Server, MySQL, PostgreSQL, Oracle, MongoDB, Couchbase</td>
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<td>Load balancing</td>
<td>Hardware and software load balancers, HA Proxy</td>
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<td>Scaling</td>
<td>Hardware and software clustering, Apache ZooKeeper</td>
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<td>Domain name services</td>
<td>DNS providers</td>
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<td>Amazon RedShift</td>
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<td>Messaging and workflow</td>
<td>Messaging and workflow software</td>
<td>Amazon Simple Queue Service, Amazon Simple Notification Service, Amazon Simple Workflow Service</td>
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<td>Caching</td>
<td>Memcached, SAP Hana</td>
<td>Amazon ElastiCache, Memcached, SAP Hana</td>
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<td>Archiving</td>
<td>Tape library, off site tape storage</td>
<td>Amazon Glacier</td>
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<td>Email</td>
<td>Email software</td>
<td>Amazon Simple Email Service</td>
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<td>Identity management</td>
<td>LDAP</td>
<td>AWS IAM, LDAP</td>
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<td>Deployment</td>
<td>Chef, Puppet</td>
<td>AMIs, AWS CloudFormation, AWS OpsWorks, AWS Elastic Beanstalk, Chef, Puppet</td>
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<td>Management and monitoring</td>
<td>CA, BMC, Rightscale</td>
<td>Amazon CloudWatch, CA, BMC, Rightscale</td>
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Services Key to Enterprise Migrations

VPC
Services Key to Enterprise Migrations

PIOPS
Services Key to Enterprise Migrations

AWS Direct Connect
Services Key to Enterprise Migrations

AWS CloudFormation
Enterprise Migration Path

- **Value to Business**:
  - High
  - Low
  - Medium

- **Time to Execute**:
  - Low
  - Medium
  - High

- **Phase 1**
- **Phase 2**

- **Stages**:
  - Archiving
  - DR and HA
  - Test, Dev, And POCs
  - Production

Graph represents the migration path with stages and their corresponding values and time to execute.
Database Backup to AWS
Disaster Recovery Site on AWS
Enterprise Application HA Architecture
Enterprise Database Detailed Architecture
Migration Approach and Best Practices
Migration Challenges

- People, Process, Technology
  - Knowledge & Training
  - Migration Experience
  - Not Primary Business Activity
  - Attempting Too Much at Once
  - Fear

Fear of attempting too much at once is a significant challenge in migration.
Identifying Applications to Move

**Standalone** applications are **easy** to move

Application with **loosely coupled SOA**-based integrations are **good candidates**

Tightly integrated application needs more planning
Invest in Proof of Concept Early

Proof of concept will **answer** tons of **questions** quickly.

Will help identify **gaps** and **touch points**.

Give you a good **estimation** of the task ahead.
Migrating Data into AWS Cloud

- **File transfer** to Amazon S3 or EC2 using S/FTP, SCP, UDP, Aspera, Attunity
- Configure on-premises **backup application** (like NetBackup, CA, CommVault, Riverbed) to use Amazon S3
- AWS **Storage Gateway** for asynchronous backup to Amazon S3
- AWS Import/Export service: **Ship your disk to AWS**
- **Database backup** tools like Oracle Secure Back
- **Database replication** tools like GoldenGate, DbVisit
The Migration Continuum

- **Forklift**
  - May be only option for some apps
  - Run AWS like a virtual co-lo (low effort)
  - Does not optimize for on-demand (overprovisioned)

- **Embrace AWS**
  - Minor modifications to improve cloud usage
  - Automating servers can lower operational burden
  - Leveraging more scalable storage

- **Optimize for AWS**
  - Redesign with AWS in mind (high effort)
  - Embrace scalable services (reduce admin)
  - Closer to fully utilized resources at all times
Migration Tools and Services
Migration Services

Application Portfolio Analysis
- Racemi, Blue Phoenix, Cast Software, Micro Focus, TSRI
- Cast Software Is Open Systems

Code Migration
- Blue Phoenix, Ispirer, TSRI, Racemi
- PowerBuilder to Java, Oracle Forms to Java

Data Migration Services
- Data Strategies (tape), mLogica, PracTrans
- Same to Same, or One Vendor to New Vendor

ERP Systems
- App Associates (Oracle EBS), Back Office Associates (SAP), DLZP ( Peoplesoft), Loyalty Methods (Siebel)
- Requires Deep Application Knowledge

AWS Specific
- AWS Import/Export, CloudTP (PaasLane), Racemi
- Automated Tools
Migration Tools

Management and Monitoring
- BMC CLM, Boundary, HP OpenView, Tivoli, CA Spectrum Automation Manager, MS System Center Plug-in, Oracle EM Plug-in, RightScale, SAP Data Provider

Auditing and Logging
- Alert Logic Log Manager
- CA Audit, CloudCheckr
- Trend Micro, Xceedium Xsuite
- Ylastic

Data Migration
- Data Expedition
- Aspera
- Attunity CloudBeam
- Riverbed Whitewater
- Tsunami

Backup and Recovery
- CA, Commvault
- EMC Data Domain
- Netapp
- Oracle OSB
- Panzura
- Riverbed Whitewater
- Symantec, Zadara

Cost Management
- CloudHealth Apptio

AWS CloudWatch Alert

AWS Storage Gateway

Amazon EBS Snapshot

AWS Trusted Advisor
Customer Project Migration Lessons Learned
Business Overview

Global manufacturing company with operations in APAC, Europe, and North America

Key Business Drivers

1. Vendor consolidation
2. Infrastructure management challenge across multiple locations
3. Hardware refresh cycles and cost optimization
What Was Achieved

• Capital and operational cost reduction by avoiding new hardware purchases and by redeploying IT staff to projects that directly supported the core business

• Other benefits included:
  – 55% reduction in total IT operations costs
  – 35% reduction in backup infrastructure costs
  – Ability to start and stop nonproduction services to reduce operational costs
  – Reduction in the number of IT vendors (from 6 to 3)
  – Able to perform an office relocation of HQ in early 2013, with no interruptions to business leveraging the centralized AWS computing platform
Migration Process

**Assessment**
- Complete study of IT infrastructure & costs, including recommendations and a detailed plan
- Perform cost analysis and estimate project duration and resources

**Proof of Concept**
- Build POC environments for each critical application and validate functionality
  - Perform functional, integration testing

**Migrate Non-Mission Critical Applications**
- Migrate Test / DEV application
- Migrate noncritical applications like Track-it
- Migrate backups and validate restore process

**Migrate Business Critical Applications**
- Migrate infrastructure components like domain controller, monitoring solutions
- Migrate E-Business Suite, OBIEE
- Tune – enhance - optimize

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AWS Infrastructure

• Complete infrastructure for North America on Amazon Web Services
  – Office locations and warehouses connected via VPN to VPC on AWS
  – Oracle EBS/OBIEE on Linux

• Complete in-house infrastructure including SQL Server, Oracle EBS, OBIEE and domain controllers, track-it applications, LACROSSE etc.

• Migrate from Tivoli tape backups to Amazon S3 backups using Zamanda/Glacier, Snapshots

• Integrated active directory with Salesforce.com, Office 365, various file, print, fax services throughout North America

• All production backups to Amazon S3 using third-party tool

• All nonproduction backups to Amazon S3 (reduced redundancy store)
Please give us your feedback on this presentation

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As a thank you, we will select prize winners daily for completed surveys!
Here are some additional resources:

- Get started with a free trial
  - [http://aws.amazon.com/free](http://aws.amazon.com/free)
- White papers
- Reference architectures
- Enterprise on AWS
- Executive-level overview: Extending Your Infrastructure to the AWS Cloud (4 minutes)
  - [http://www.youtube.com/watch?v=CsGqu5L_PFI](http://www.youtube.com/watch?v=CsGqu5L_PFI)
- Simple Monthly Pricing Calculator
- TCO calculator for web applications
Customer Migration (Discussed in the Slides) Overview

- **Source**
  - Infrastructure – on-premise hosted servers
  - Hardware – (Dell PowerEdge, HP ML110)
  - Storage – (Dell Power vault)
  - Database – Oracle 9i/10g, SQL server
  - Fusion middleware
  - Packaged applications – Oracle E-Business Suite, Oracle Business Intelligence Suite, La-crosse, Mobile Field Service
  - Integration with Force.com platform
  - Firewalls, direct connectivity across multiple locations - (CISCO, Barracuda)
  - Tape backups - (Dell ML6000)

- **AWS**
  - EC2, Amazon EBS, Amazon VPC
  - Multiple instance types (m1.medium, m1.large, m1.xlarge)
  - Storage EBS, PIOPS, Amazon S3, Amazon Glacier
  - Management and monitoring using Nimsoft Monitoring Solution hosted on AWS
  - Connectivity using VPN tunnels
  - Archiving using Amazon Glacier
  - Data transfer using AWS Export/Import
  - DR configuration across regions
Customer Source System Technical Details

- **Oracle E-Business Suite**
  - Database (RHEL 4)
    - Oracle 9i – 8 cores / 32-bit
  - E-Business Suite (RHEL 4)
    - 11.5.8 – 4 cores / 32-bit
- **Oracle Business Intelligence**
  - Database (RHEL 5)
    - Oracle 10g – 4 cores
  - OBIEE 10g (RHEL 5)
    - OBIEE 11g – 4 cores
- **Microsoft SQL servers**
  - Database (Win2008\Hyper-V )
    - MS SQL Server 2005
- **Mobile Field Server**
  - MWA ( Win 2008\VM Ware )

- **Oracle E-Business Suite**
  - Database & E-Business Suite
- **Oracle Business Intelligence**
  - Database & OBIEE 10g
- **Multiple VPN tunnels from multiple customer locations**