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April 12-15, 2010 | Rosen Shingle Creek Resort | Orlando, Florida



Chasing Clouds at Boeing: Promise, Challenges and Results of Creating a Utility IT Model

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CHASING CLOUDS

Boeing
Aviall
ILS



Creating a Utility IT Model: Promise, Challenges, Results

Joseph Y. Lacik
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April 14, 2010

Agenda

- **What's a cloud?**
- **Our definition of Cloud**
- **Hype and Reality**
- **Strategy**
- **Opportunity**
- **Case Study:**
 - **Boeing Virtualization & Storage**
 - **Aviall eStock myStock**
 - **ILS Supply Chain**
- **Summary**
- **Q&A**

Avoid Hype to Deliver Results Today

Clouds = Utility Computing



Types of Clouds

Cloud Computing is ...

- Utility IT Services
 - Infrastructure as a Service (IaaS)
 - Platform as a Service (PaaS)
 - Software as a Service (SaaS)

- Based on
 - Virtualization
 - Grid Computing
 - Open Standards (focused on data portability)
 - Loosely Based Architectures
 - ROI

Cloud models

Top SaaS

Software / Applications:

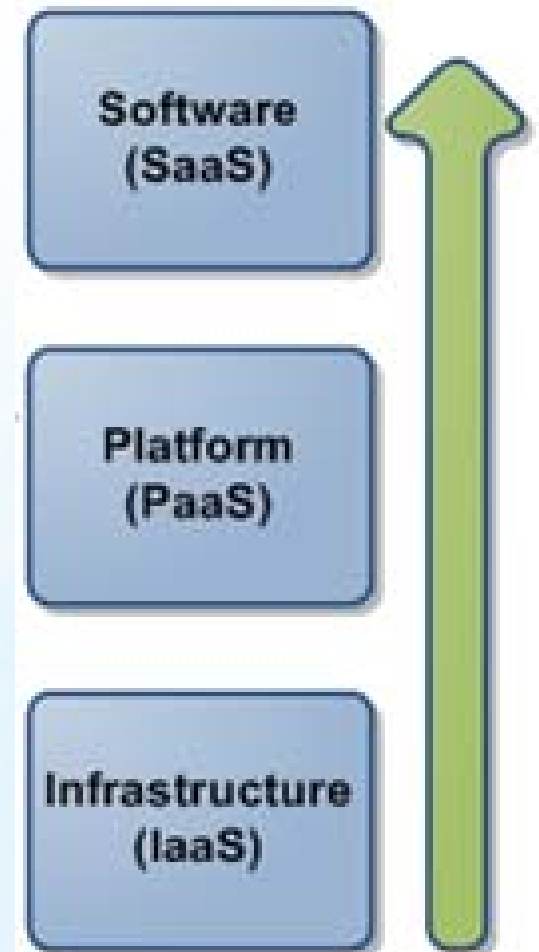
Complete application systems delivered over the Internet on some form of "on-demand" billing system.

Top PaaS

Platform: Development platforms and middleware systems hosted by the vendor, allowing developers to simply code and deploy without directly interacting with underlying infrastructure.

Top IaaS

Infrastructure: Raw infrastructure, such as servers and storage, is provided from the vendor premises directly as an on-demand service.



The promise - Business Benefits (12 – 18 months)

Cost

process compute intensive at fraction of the traditional cost (rental)

inexpensively test
optional scenarios
(trade off analysis)

Flexibility

respond to project startup demands
(rapid provisioning)

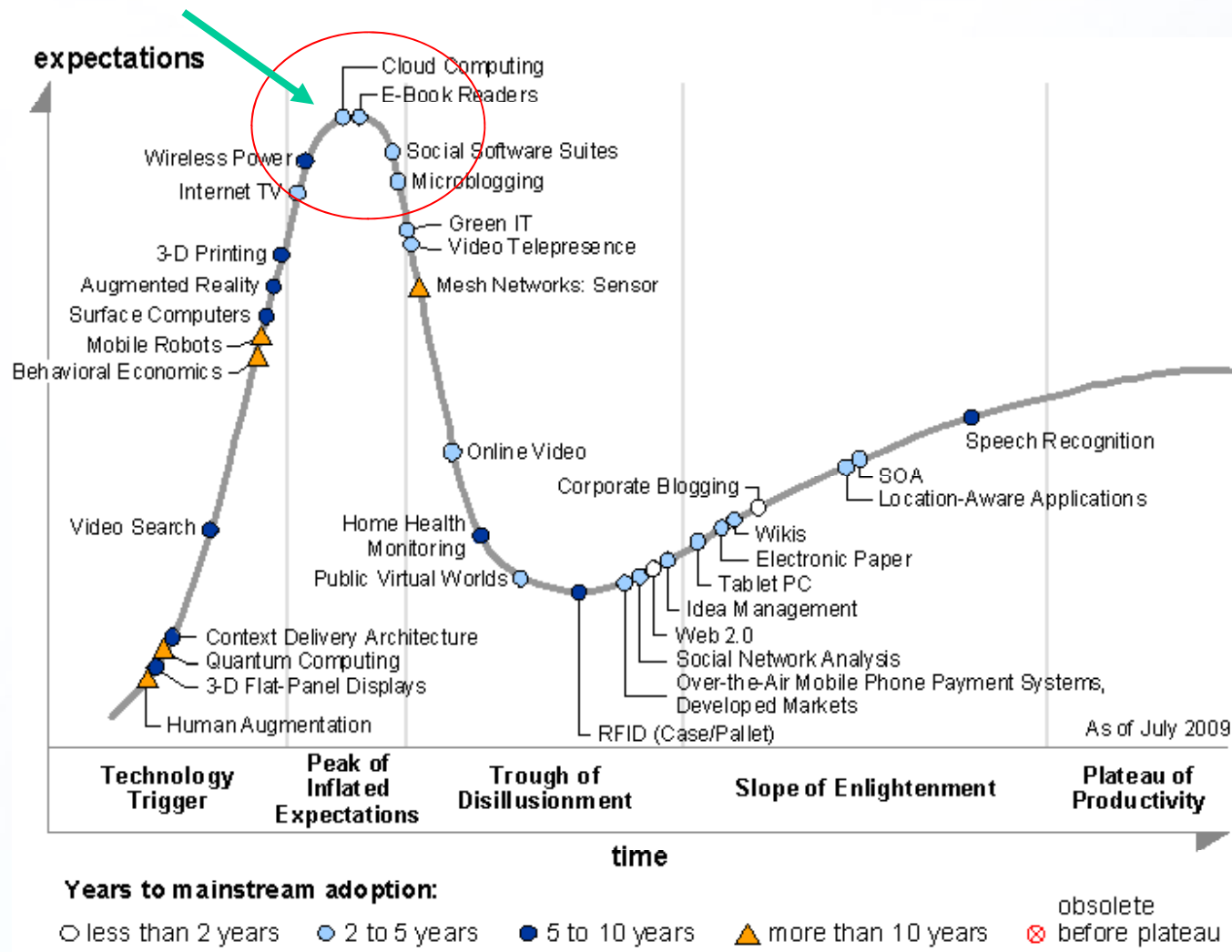
expand deployment into multiple geographic locations
(reach)

Agility

massively scale up (& down) without capital expenditures (elastic)

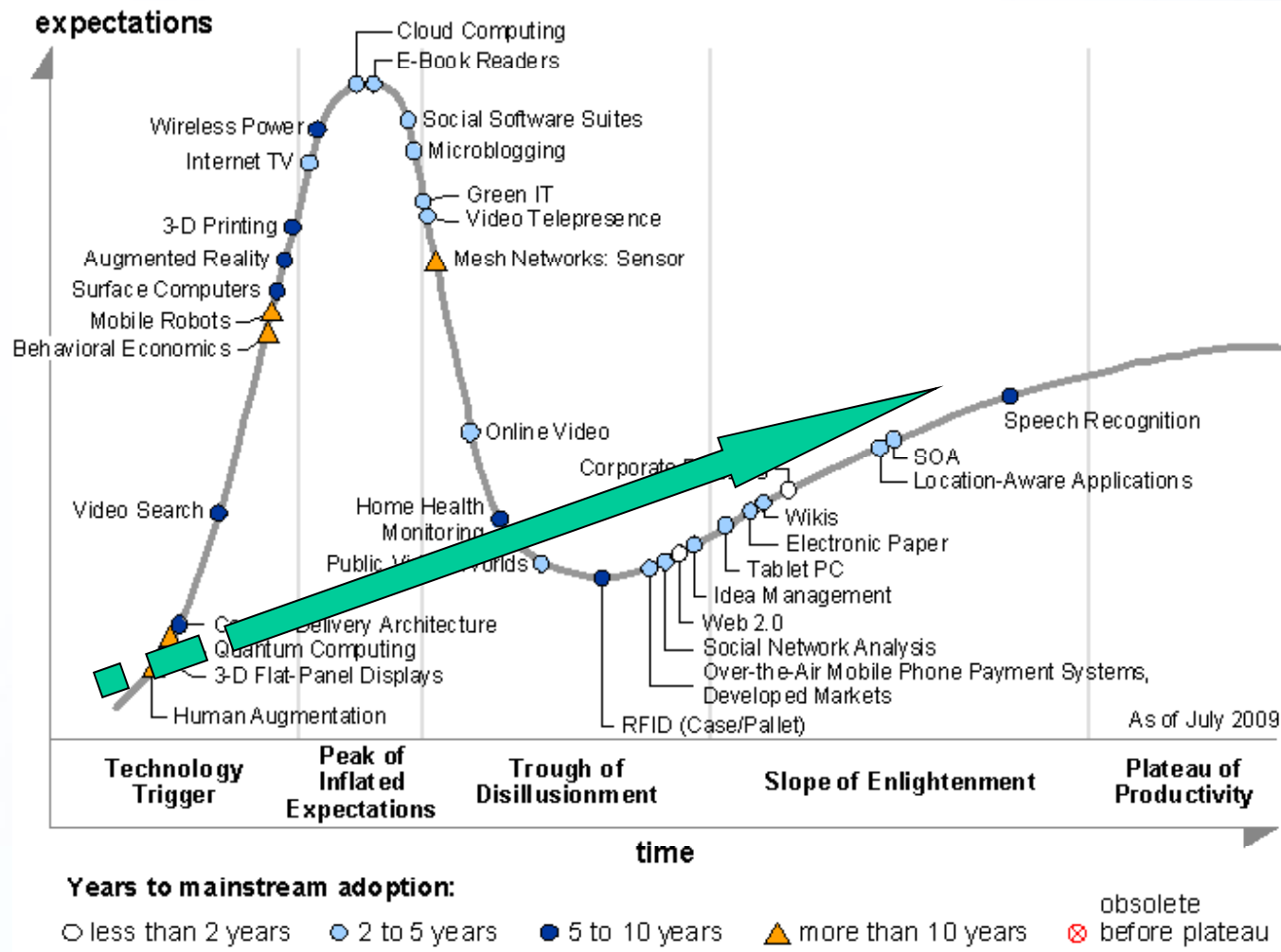
new innovative ideas and technologies (research)

Reality Check: Cloud Computing is at the Peak of Inflated Expectations



Source: Gartner July 21st, 2009

Our Flight Plan: Adopt Technology Skeptically



Source: Gartner July 21st, 2009

Our Flight Plan – Cloud Strategy

If we know there's hype, can we avoid the pitfalls?

- Leverage internal and external clouds.
- Start with virtualization as an enabler.
- Leverage existing technology aggressively.
- Lead and follow!

The Boeing Opportunity: Scale



9,683 physical servers
5,900 virtual servers
4,900 cluster servers
Plus proprietary servers

Average workday logins:

- 300K total
- 30K Boeing Suppliers



- 188K+ desktops
- 19K Team sites
- 128K Meetings/month



1.3M help center calls/yr



- 68 peta-bytes traffic/month
- 7800 local area networks
- 10M enterprise streaming media plays/views



- 7 Mainframes
- High Performance Computing
Cray XP, Linux Clusters (~10,000 servers)
- 5 Teradata environments

~8600 applications:

- Engineering & Manufacturing Systems
- Supply Chain & Logistics Systems
- Corporate Systems



35M viruses blocked /month



- 11 Peta-bytes managed storage
- 125 Peta-bytes offline/near-line backup



- 25M internal web pages
- 5M hits/day on www.boeing.com



- 158,000 Employees in 70 countries and 49 states
- 189 international sites
- 22,000 suppliers in 100 countries

Leverage Virtualization Technology to Expand Internal Cloud

Server Virtualization & Consolidation: Results Today

We started with:

- Over 12,000 dedicated servers
- Often one application or database per server
- Recognized opportunity to leverage new technology for efficiency

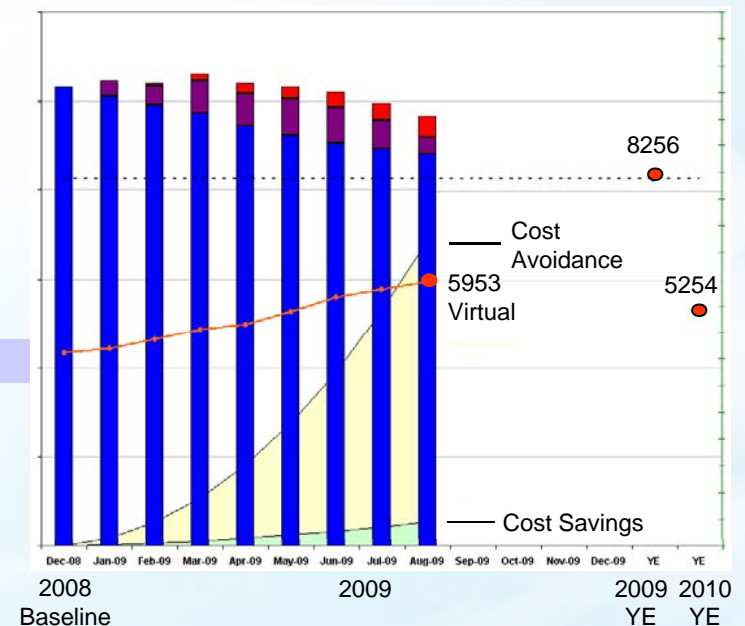
Where are we now:

- Second year of a three year virtualization program
- Inventory accuracy significantly improved
- Over 5900 virtualized servers in production
- Eliminated 4250 servers out of the environment
- Significantly matured Physical to Virtual processes (~140 conversions per month)
- Program savings – reduce 10% of server budget to date
- Server provisioning down to four-day cycle time
- Established shared hosting services
- Significant savings in power consumption (enough to power 3500 homes)

Next year:

- Improved virtual server provisioning cycle time
- Eliminate 50% of physical server population – reduce 20% of server budget
- Establish enterprise-wide shared hosting environments & services

Distributed Server Virtualization 2009



Leveraging server virtualization to drive efficiency



Storage Transition to a Utility Service

	2004	2005	2006	2007	2008
Sites added to the Enterprise Service	Wichita	St. Louis	Seal Beach, Mesa, Philadelphia, Houston, Huntsville, Wash. DC, Moscow	Anaheim	Huntington Beach, Long Beach, El Segundo
Application Domains added to the Enterprise Service	Manufacturing System	Manufacturing System	File Services Shared Server integration	Manufacturing Engineering and Customer Support	Disaster Recovery and Replication for Critical Business Applications
Incremental Infrastructure Variation Reduction					
Capacity	200 TB	2.2 PB	3.9 PB	6.5 PB	10.1 PB

Key Benefits realized:

Boeing Storage Service Performs* Better Than the Top 25% Quartile in:

- 36% lower total cost per GB
- 21% lower total cost of the service
- 21% lower total storage labor

*Source: Gartner

Optimizing data storage as it continues to grow

What is eStock?



- Automatic Inventory Management Program
- Optimize Inventory Levels
- Reduce Transaction Costs

Aviall *eStock* Flexibility



Level 1 – aviall.com

Level 2 – Integrated system

Level 3 – Fully integrated system

Aviall *My eStock* option

Level 1 - aviall.com

- **Certification requirements**
- **Material Safety Data Sheets**
- **“M.O.” - Multi-line order function**
- **Shopping lists**
- **Order tracking**
- **Back order reports**



Level 2 – Integrated System



- **Features include:**
 - Customer-specific inventory established and managed in the program
 - Automatic replenishments
 - Contracted pricing

Level 3 – Fully Integrated System



- **The same great features as level 2 with added benefit**
 - Technological transfer or exchange of inventory level, for immediate stock replenishment
 - Limited data input required

Level 3 – Fully Integrated System



- Use your system to update eStock
- Done via a tab delimited flat file (.TXT),
However we can accept any type of file you can transmit.
- The flat file ideally needs to have five columns with Part Number, Quantity, Customer Locations code Date and Time.
- A Stock on hand up date file and automated order reports will be returned via email to you as often as you need.

Aviall *My eStock* option



- Your proprietary inventory can also be maintained and managed with *eStock* technology
 - Bar-coded
 - Notification of requirement of item
 - Same great reporting as *eStock*

Manage My eStock Item List

[VIEW/UPDATE ONE ITEM](#)
[ADD MY eSTOCK ITEMS](#)
[DELETE MY eSTOCK ITEMS](#)
[eSTOCK](#)

Customer Account: 999540

Shipping Address 2 - COD SALES - DALLAS 209:2750 REGENT BLVD, DALLAS TX 75261

[BACK TO eSTOCK LOCATIONS](#)

Delete	MyeStock PN	Description	Manufacturer	MIN	MAX	UPC	User Comment
<input type="checkbox"/>	20967	Kirk	James	1	1		
<input type="checkbox"/>	212-412-010-001	Bell Part	Textron Bell	2	12		
<input type="checkbox"/>	DIET COKE	Soda 20 oz	The Coca Cola Co	1	6	04904500	1.00
<input type="checkbox"/>	DUSTER II	Canned Air	Kensington	6	12	017693915047	3.25
<input type="checkbox"/>	ENDUST	Wipes pk of 40	Sera Lee Househo	1	6	031600297002	2.50
<input type="checkbox"/>	N6199Q	C152	Cessna	0	0		
<input type="checkbox"/>	RTV123-30Z (30 DAYS)	SHELF LIFE 5/4/2	rtv	1	1		

Select All Items to Delete

DELETE

Aviall's Web Services

- Aviall is working with software vendors whose software is currently being used by Aviall Customers.
- Upgrades will Allow the customer to conduct business with Aviall direct from their current systems.
- Additional purchase of software is not required.
- Speeds up transactions for both the customer and Aviall.
- Takes cost out of the process.

Aviall *eStock* program benefits



- **NO CHARGE implementation**
- **Reduced inventory**
- **Reduced spoilage of shelf-life items**
- **Guaranteed stocking levels**
- **Reduced shipping costs**
- **Reduced Hazmat fees**
- **Contracted pricing**

Aviall *eStock* program benefits

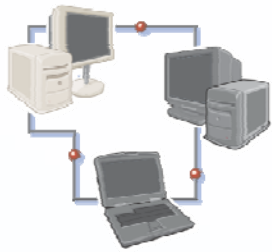


- Flexible to customer requirements
- Reduction of administration
- Free up procurement time to concentrate on more expensive, critical items
- Reduce exposure to AOG situations
- Inventory reports on demand

What is Web Services?

- **Web Services are Web-based applications that use agreed on format to exchange information between Aviall and a customer.**

Collaboration Moving to the Cloud



1980's
Work Group
Computing



2000s
Intranet
Computing

Today
**Social
Computing**

Cloud Computing is a Better Model



Multi-tenant

No Capital Expense

Pay-as-you-go

Modest Operating Expense

Elastic

Scales With Your Business

“Multi-tenant application platforms represent the **state of the art** foundation for cloud-based business applications.”

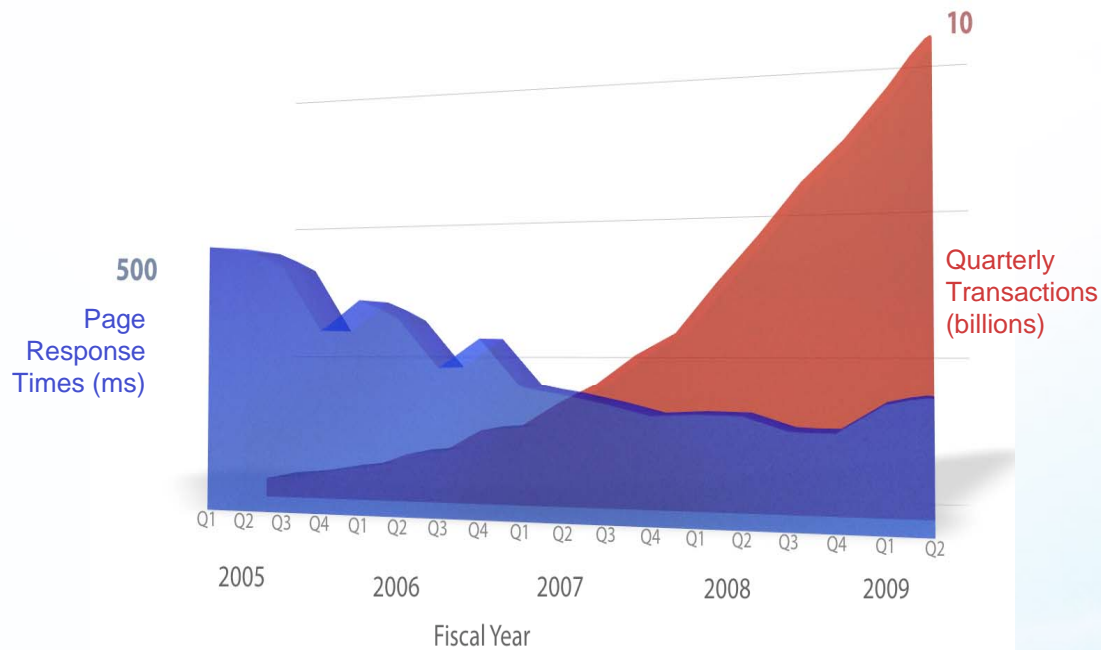
Yefim Natis, VP, Distinguished Analyst



“Companies were able to reduce their three year TCO by 54%, saving \$560,000 per application.”



Trusted Performance and Reliability



Performance has **Continually Improved** even as customer workloads drastically increase

ILS Supply Chain Solutions with Force.com is Cloud Computing for the Enterprise

We do
Infrastructure
Services



Network
Storage
Operating System
Database
App Server
Web Server
Data Center

We do
Application
Services



Security
Sharing
Integration
Customization
Web Services
API
Multi-Language

We do
Operations
Services



Authentication
Availability
Monitoring
Patch Mgmt
Upgrades
Backup
NOC

YOU
get to focus on
innovation



Build your work flows
Build your reports and
dashboards
Tune your user interface
Focus on your operations
Optimize your Supply
Chain

Summary

- Clouds and the commoditization of IT is coming
- Hype abounds – but technologies also exist TODAY
 - Value today is reduced cost, higher resiliency
 - Promise us ubiquitous, transparent delivery
- Scale fundamental to success for internal clouds
- Outstanding questions (e.g. security) to be addressed



Thank You!

Questions?