

Cloud Computing

A General State of the Union

ACM / IEEE Computer Society Meeting
Thursday, December 17

imagine. develop. evolve.

Presented by:
David F. Soll

Vice President and Chief Technology Officer
Omicron Consulting



Agenda

- Introduction
- What is Cloud Computing
- Evolution of Computing
- Benefits of Cloud Computing
- Enabling Technologies
- High Availability
- Cloud Security
- Programming Changes
- Examples of Cloud Computing
- Conclusions

Introduction

- **Presenter: David F. Soll**
 - Vice President and Chief Technology Officer, Omicron Consulting
 - 21 Years with Omicron
 - Chair, Princeton/Central NJ IEEE Computer Society
 - Senior Member of the IEEE
 - Recipient of the IEEE Region 1 Award
 - Past Chair, Princeton Chapter of the ACM
 - Senior Member of the ACM
 - Chair, TCF IT Professional Conference
 - Over 30 years in computing

Omicron Consulting

Philadelphia's Leader in Information Technology Consulting



Omicron Fast Facts

- ◆ Founded in 1986
- ◆ Headquarters in Bala Cynwyd
- ◆ Markets Served
 - ◆ Corporate 1000
 - ◆ Process Industries
 - ◆ Financial Services
 - ◆ Manufacturing
 - ◆ Health & Life Sciences
 - ◆ Mid-size Enterprises
 - ◆ Independent Software Vendors
- ◆ Supporting a Local, Regional, and International Client Base
- ◆ Methodology Driven
- ◆ Project Based Consulting
- ◆ 2007 Microsoft Regional Partner of the Year

Omicron's Best and Brightest



1 Bala Avenue, Suite 400
Bala Cynwyd, PA 19004

What is Cloud Computing

- **Well ... It depends**
 - Each Cloud vendor seems to have their own definition
- **In General:**
 - An Internet based computing environment where you pay only for resources that you use
 - A set of pooled computing resources delivered over the Internet
 - Resource allocation can be adjusted
- **Although: A Cloud could be built on-premise**
- **Cloud Computing is the next phase in the evolution of computing**

Evolution of Computing

Mainframe



PC



Client
Server



Web
Services



Cloud

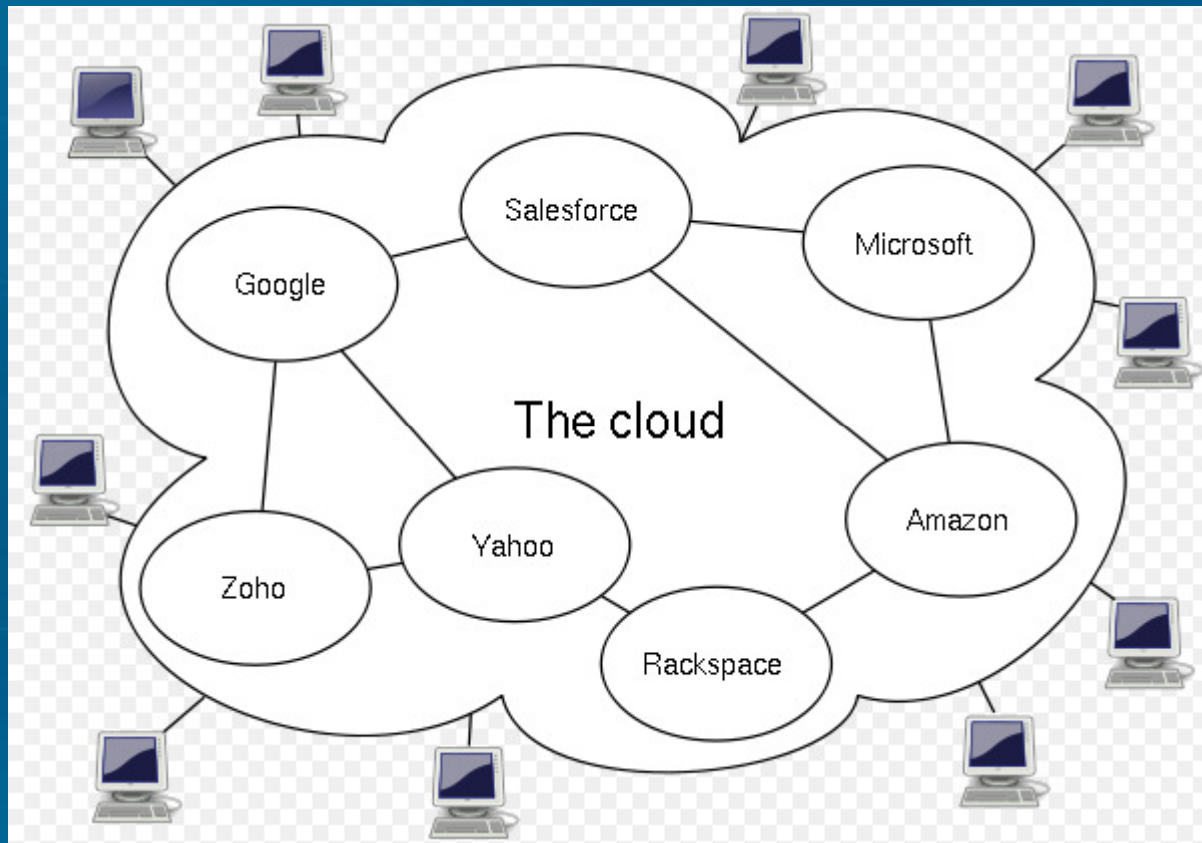


According to surveys of CIO's and CTO's, Cloud Computing is going to be important, but there is not enough understanding of what it is to have any specific plans for it.

What is Cloud Computing

- What is the difference between “hosted” and “cloud”?
 - Cloud solutions may be “hosted” or can be built on-premises (depends upon your definition of cloud)
 - Not all “hosted” solutions are in a “cloud”
 - A “cloud” is dynamic
 - Resources can be added or removed to fit the need
 - In a traditional hosted environment, resources are allocated based on peak load requirements
 - In a cloud, they can be dynamically allocated

Wikipedia Picture of the Cloud

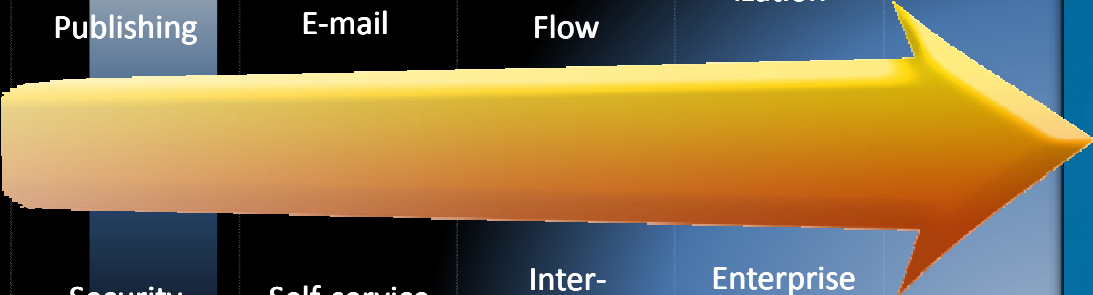


Benefits of Cloud Computing

- Predictable any time, anywhere access to IT resources
- Flexible scaling of resources (resource optimization)
- Rapid, request-driven provisioning
- Lower total cost of operations
 - Only pay for what you use

Personal Productivity Focus

Business & User Focus	Discreet Purpose Apps	Personal Productivity 'Suite'	Email-led PC/ Productivity Explosion	Widespread Internet Publishing	Collab beyond E-mail	Dynamic Information Flow	Consumerization
	1989	1995	1997				
CIO Focus	Data Processing	Acquisition cost	Total Cost of Ownership	Security	Self-service	Inter-operability	Enterprise Cloud



Source: Microsoft

Dec. 8, 2009 - Microsoft announced a new Server and Cloud division that combines Windows Azure and the Windows Server and Solutions groups. The new Server and Cloud division is part of the Server & Tools Business headed by Bob Muglia.

Underlying Enablers of Cloud Computing

- **Virtualization**
 - Cloud Resources are typically virtual
 - Each machine can be dynamically allocated (since it is virtual)
- **New API's**
 - Provide dynamic resource allocation
 - Abstract Resources
 - i.e.: Database Server abstracted allows scaling of the database layer without code changes
- **Claims Based Authentication Model**

Other Supporting Technologies

- **Blade Servers**
 - Allows for high-density of servers
- **SAN**
 - Provides high-speed fault-tolerant storage solutions
- **Multi-core Processors**
 - Intel just announced a 48 core processor
 - Intended specifically for cloud environments

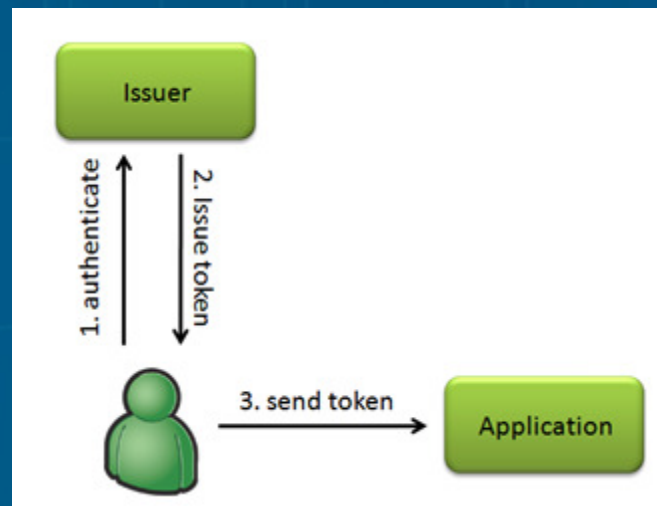
Cloud Availability

- **Cloud architectures allow for HA**
 - Resources can be dynamically allocated
 - Clouds can contain both redundant systems as well as redundant physical sites
 - New API's provide resource independent access
- **Redundant Sites Provide**
 - Site Failure Coverage
 - Power Failure
 - Earthquake & Other Disaster Failures
 - Connectivity Failures

Cloud Security

- **Claims Based Authentication**

- A trusted authority (Issuer) issues a signed security token containing a set of claims (credentials) which is given to the application for validation
- The application will authenticate the user if the security token is valid and signed by a trusted issuer



Cloud Development

- **Scalability Abstraction**
 - Server Farming only works for stateless environments
 - New API's are needed to provide abstraction to database scalability
 - Some Cloud vendors have their own database engines with the abstraction built-in (makes applications non-portable)
 - Microsoft Azure provides a database abstraction layer that is portable

Cloud Computing Offerings

- **Types of Cloud offerings:**
 - Bare Operating System
 - Web or Portal Infrastructure
 - Applications
 - Web Services
 - Database Services
 - Customizable Application Services

Cloud Offering Examples

- **Bare Operating System – RackspaceCloud**
 - <http://www.rackspacecloud.com/>
 - Formerly Mosso, a division of Rackspace
 - Provide various Linux Distributions
 - Also support “Sites”
 - Web Server, both Linux and Windows
 - O/S Managed by hosting service

Cloud Offering Examples

- **Web or Portal Infrastructure – Microsoft**
 - SharePoint Online
 - Rich Portal Capabilities
 - Excel Services
 - Forms Services
 - Visio Services
 - Access Services
 - Business Data Services
 - Search Services

Cloud Offering Examples

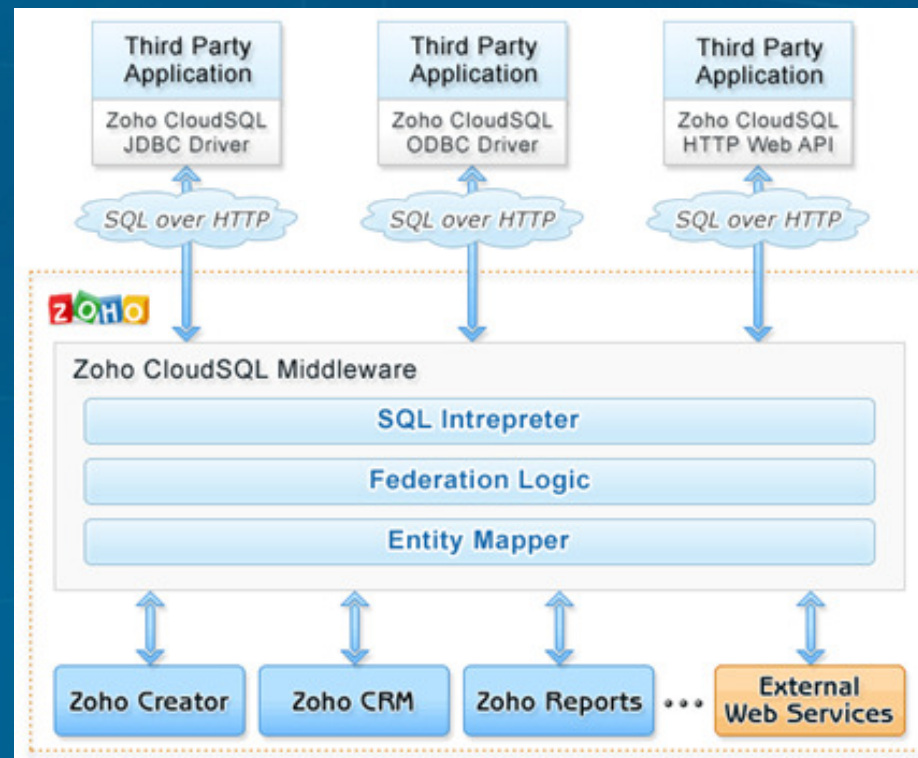
- Applications – Google Apps
 - <http://www.google.com/a>
 - Pre-built, fully functional applications
 - Mail
 - Calendar
 - Word Processing
 - Dynamic Web Pages
 - etc.

Cloud Offering Examples

- **Web Services – Amazon**
 - <http://aws.amazon.com/>
 - Amazon EC2 & S3
 - EC2 – Elastic Compute Cloud
 - S3 – Simple Storage Service
 - Resizable Compute Capability
 - Auto Scaling – allocate resources based on definable conditions
 - Development Environments:
 - IBM sMash
 - Jboss Enterprise Application Platform
 - Ruby on Rails

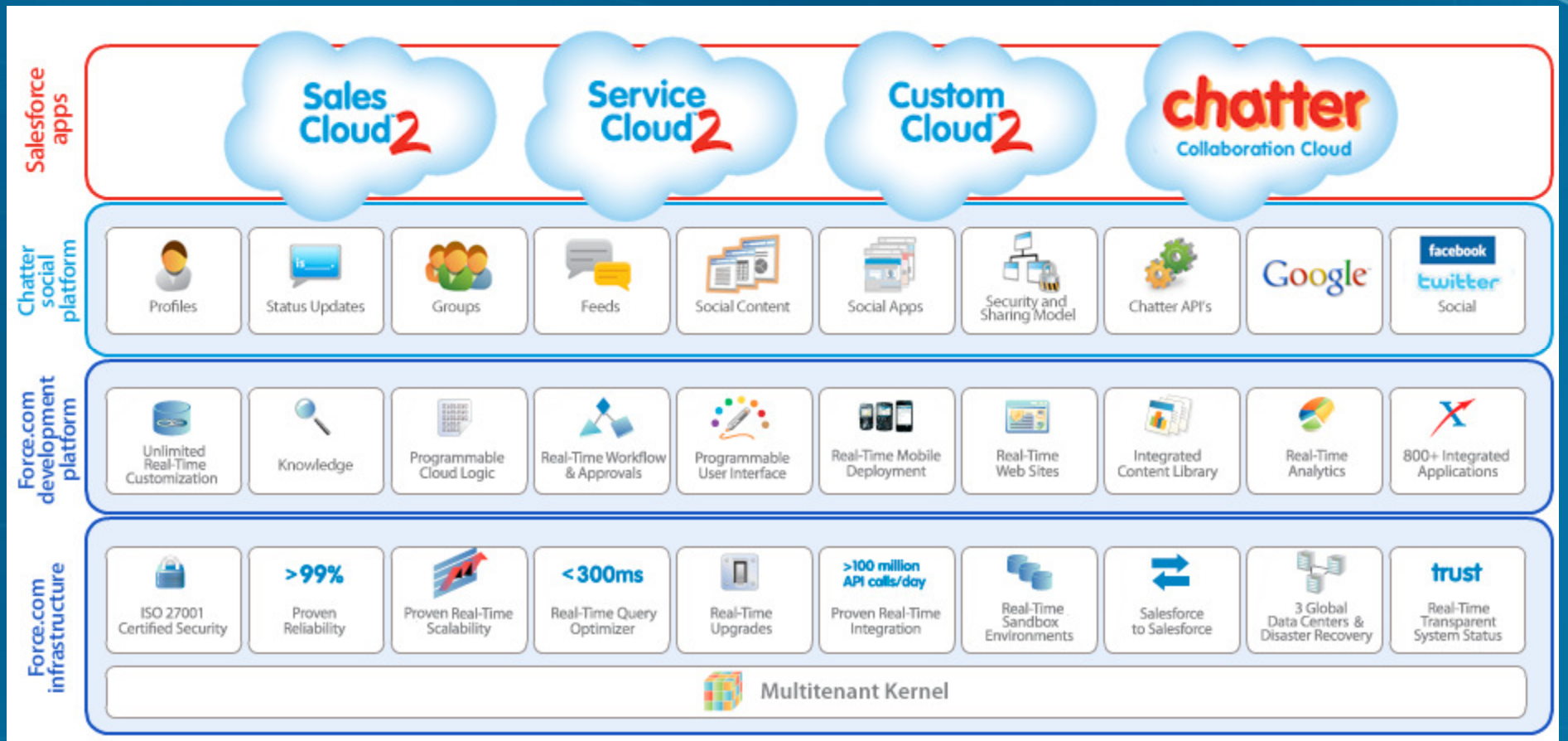
Cloud Offering Examples

- Database - Zoho's CloudSQL
 - <http://www.zoho.com>
 - Cloud based relational database



Cloud Offering Examples

- Customizable Application Services – force.com



Other Cloud Offerings

- **IBM – Cloud Management Tools**
 - Cloud Services Lifecycle Management
 - Cloud Security Management
 - Cloud Storage Management
- **Microsoft – Azure**
 - Cloud API's
 - Resource Management
 - Resource Abstraction
 - Claims Based Authentication

Other Cloud Offerings (cont'd.)

- **VMware**
 - VMware vCloud
 - Based on VMware infrastructure
 - vSphere Virtual Operating System
 - VMware vCloud Express
 - Infrastructure as a service (IaaS)
 - Pay as you go
 - VMware vCloud API
 - An interface for providing and consuming virtual resources in the cloud
 - Enables deploying and managing virtualized workloads in internal or external clouds as well as interoperability between clouds

Cloud Vendors

- 3Leaf Systems
- 3PAR
- 3Tera
- 10Gen
- Adaptivity
- Agathon Group
- Akamai
- Amazon EC2
- Apache Hadoop
- Appirio
- Appistry
- AppNexus
- Apprenda
- Appzero
- Aptana
- Arjuna
- Asankya
- AT&T
- Bluewolf
- Boomi
- Box-Net
- Booz Allen Hamilton
- CA
- Callidus Software
- Cassatt
- Cisco
- Citrix
- Cloud9 Analytics
- CloudBerry Lab
- Cloudera
- Cloudscale
- Cloudswitch
- Cloudworks
- Coghead
- CohesiveFT
- Cordys
- Cumulux
- Dataline
- Dell
- Desktoptwo
- ElasticHosts
- Elastic Compute Cloud
- Elastra
- EMC
- Engine Yard
- ENKI
- Enomaly
- Enomalism
- Eucalyptus
- eVapt
- EyeOS
- FlexiScale
- Force.com
- Fortress ITX
- G.ho.st
- GigaSpaces
- GoGrid/ServPath
- Google
- gOS
- Grid Dynamics
- Hadoop
- Heroku
- Hosting.com
- HP
- Hyperic
- IBM
- iCloud
- IMOD
- Intel
- Interoute
- iTricity
- Joyent
- JumpBox
- Juniper Networks
- Kaavo
- Kadient
- Keynote Systems
- Layered Technologies
- LinkedIn
- LongJump
- Meeza
- Mezeo Software
- Microsoft
- Morgan Stanley
- MorphExchange
- Netsuite
- newScale
- Ning
- Nirvanix
- Novell
- OpenNebula
- OpSource
- Oracle
- OTOY
- Parallels
- ParaScale
- Penguin Computing
- Platform Computing
- Q-layer
- Qrimp
- Quantivo
- Quickbase
- Rackspace
- Red Hat
- Reservoir
- Rhomobile
- RightScale
- Rollbase
- rPath
- S3
- Salesforce.com
- Savvis
- ServePath/GoGrid
- SIMtone
- Skytap
- SLA@SOI
- SmugMug
- SOASTA
- Strikelron IronCloud
- Sun
- Terremark
- The GridLayer
- ThinkGrid
- Unisys
- Univa UD
- vCloud
- Vertica
- Virtual Workspaces
- VMware
- WorkXpress
- Yahoo!
- Zetta
- Zimory
- Zoho
- Zuora

Conclusions

- Cloud Computing holds some strong promises
 - Highly Scalable
 - Highly Available
 - Dynamically allocate resources
 - Pay only for resources that you use
- Cloud Computing is not yet well understood
- Cloud Computing is still in its infancy

Questions

