Architecting and Implementing a Federated Cloud
Cloud Computing
I am here to help
buzzetti@us.ibm.com
Worldwide Centers

- Poughkeepsie, NY
- Montpellier, France
- Makuhari, Japan
- Boeblingen, Germany
What we do
How We Are Like Our Clients
Provide Service to Lines of Business
Must Support Production like Services
Make Effective Use of Resources
Flaws in the Current System
Discourages Sharing
Not Efficient
Limits Experimentation
Stifles Innovation
It's this guy's fault
Vision
How is it different from Hybrid Cloud?
Architecting
Goals
Worldwide
Leverage Assets
Avoid Duplication of Efforts
Standardized Services
ITIL Aligned
High Level Requirements
Service Requester Requirements
Self Service
Service Catalog
View all services offered
Provider Requirements
Site Managed Security
Cookie Cutter Deployment
Federation Requirements
Articles of Federation

Section 1. All legislative Powers herein granted, shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Section 2. The House of Representatives shall be composed of Members chosen every second Year by the People of the several States, and the Electors in each State shall have Qualifications requisite for Electors of the most numerous Branch of the State Legislature.

No Person shall be a Representative who shall not have attained to the Age of twenty-five Years, and been nine Years a Citizen of the United States, and who shall not, when elected, be an Inhabitant of that State in which he shall be chosen.
Consistent Identity
Consistent Operations
Transparency Between Clouds
Implementing
Federated Cloud

Services Selected for Federation:
- BOE
- MAK
- POK
- DAL
- MOP

Virtualized Infrastructure:
- Workload Placement
- Provisioning Services

Service Catalog

Request Service
IBM Cloud Computing RA

Cloud Services
IT capability provided to Cloud Service Consumer

(Virtualized) Infrastructure – Server, Storage, Network, Facilities
Infrastructure for hosting Cloud Services and Common Cloud Management Platform

Common Cloud Management Platform

BSS – Business Support Services
Business-level functionality for management of Cloud Services

OSS – Operational Support Services
Operational-level functionality for management of Cloud Services

Security & Resiliency
Products

Workloads
- Service measurement
- Service reporting
- Usage accounting
- Auditing and controls

Tivoli Service Automation Layer
- Automate process of instantiating and managing a distributed IT environment.

Virtualized Infrastructure Layer
- Virtualized resources
- Virtualized aggregation
- Physical infrastructure

Web, Collaboration and Infrastructure
- Technology
  - Highly Threaded
  - Throughput-oriented
  - Scale Out Capable
  - Lower Quality of Service

Analytics and High Performance Computing
- Technology
  - Compute intensive
  - High I/O Bandwidth
  - High Memory Bandwidth
  - Floating point
  - Scale out Capable

Transaction Processing and Database
- Technology
  - Scale
  - High Transaction Rates
  - High Quality of Service
  - Handle Peak Workloads
  - Resiliency and Security

Business Applications
- Technology
  - Scale
  - High Quality of Service
  - Large Memory Footprint
  - Responsive Infrastructure

Tivoli Monitoring
- Service Request Mgr
- Service Automation Mgr
- TPM Provisioning Mgr
- Tivoli Process Automation Engine
  - Orchestration workflows
- Service Automation Templates
- Image Library
- Workflows

TSAM v7.2
- Usage Reports
- Billing Reports
- VM Control

TADDM

x86
- Hypervisor (KVM, VMware, Xen)
- Storage
- Network

HMC
- NIM
- System p / SUN
- VM Partition
- Storage
- Network

System z
- Hypervisor (zVM)
- HMC
- Storage
- Network

End to End Service Management
Middleware Stack

TSAM v7.2

- Service Request Manager
- Service Automation Mgr
- Tivoli Provisioning Manager
- Tivoli Process Automation Engine
  - Orchestration workflows
- Service Automation Templates

Tivoli Monitoring

TUAM

- Usage Reports
- Billing Reports

Web 2.0 User Interface

Usage

Billing Reports
Phase One
Focus on Multiple Platforms
Service Provider Infrastructure

TSAM

POK
- System p
- System z

MOP
- System p
- System z

BOE
- System p
- System z
Phase Two
Focus on Cross Geography

Poughkeepsie, NY

Montpellier, France

Makuhari, Japan

Boeblingen, Germany
Service Provider Infrastructure

POK
- TSAM (1)
  - System p (2)
  - System z (3)

MOP
- TSAM (1)
  - System p (2)
  - System z (3)

BOE
- TSAM (1)
  - System p (2)
  - System z (3)
Two Service Catalogs

POK

Web 2.0

TSAM

Federated Service Catalog

Local Service Catalog

Service A

BOE

Web 2.0

TSAM

Federated Service Catalog

Local Service Catalog

Service B

MOP

Web 2.0

TSAM

Federated Service Catalog

Local Service Catalog

Service C
Phase Three
Focus on Sharing Services
Service Provider Infrastructure

POK
- TSAM
- System p
- System z

MOP
- TSAM
- System p
- System z

BOE
- TSAM
- System p
- System z
Two Service Catalogs

POK
- Web 2.0
- TSAM
- Federated Service Catalog
- Local Service Catalog
  - Service A
  - Service B
  - Service C

BOE
- Web 2.0
- TSAM
- Federated Service Catalog
- Local Service Catalog
  - Service A
  - Service B
  - Service C

MOP
- Web 2.0
- TSAM
- Federated Service Catalog
- Local Service Catalog
  - Service A
  - Service B
  - Service C
Future
Questions
Backup Charts
Service Provider Infrastructure

- z/Linux Master
- z/Linux MapSRV
- TSAM
- Portal
- TDI
- TUAM
- ITM
- VM Host
- z/VM Host
- z/Linux TDI
- z/Linux TUAM
- z/Linux ITM
- z/Linux
Cloud Computing is a new way to deploy IT services. This session assumes the audience is familiar with cloud concepts. If they are not, spending a few minutes going over the NIST definition would be a good idea.

I am here to help
buzzetti@us.ibm.com

This is me. I am here to help. I include this chart so that people can have my email.
I work with customers. I am an IT specialist and my role is to help customers understand new technologies by doing proof of concepts, white boarding sessions and design workshops.
• The different places where I work. This slide is to show that the Design Center has a world wide presence, and that we can help customers in almost all geographies.

• The Federated cloud is getting support from the geos as well as other.
The client centers do a wide variety of work. We need systems and software to be able to do our jobs, and like many of our customers we are broken up into silos which can make us less efficient.
How We Are Like Our Clients

In many ways we are like our clients. We have similar goals and needs.
Provide Service to Lines of Business

Each unit has to provide service to its line of business. For instance, the benchmarking centers need to be able to show customers that we can run their work load, and do it in such a way that it helps close business. The same is true for the Briefing Centers and the Design Centers.
Must Support Production like Services

• Image from http://www.flickr.com/photos/thetruthabout/2771325035/sizes/l/

• We have to be production like. We might not lose a million dollar an hour like our customers, but it is very costly to us. Many times we are doing work with the customer before a sale is completed and any outage might prevent the sale from going smoothly.
Make Effective Use of Resources

We do not have an infinite budget. We are not sales. We must do the best with what we have.
The current system has a number of faults that Federated Cloud aims to fix. These flaws you will probably see in your own shop.
Discourages Sharing

Each group busy and maintains its own hardware. Since they pay for it, getting resources from outside your groups is difficult.

Each group busy – each group is busy
Benchmarks eat up a lot of resource, but they are not run every single day of the year, in every geo. There are a lot of idle cycles that could be used better.
Limits Experimentation

We can't do sand boxing to test new software and technologies as easily as we want to.
Lots of time is spent build and rebuilding systems. We could do a lot more innovative stuff if we shifted those resources.
The end state. A cloud of clouds supporting a number of groups, with resources from all over the world.
How is it different from Hybrid Cloud?

I get this question a lot. Basically, Hybrid cloud is when you are using resources from two or more clouds of a different type. Federated cloud is when you are sharing the same set of services across different siloed resources.
Phase one of this project when designing how it would work. And the first step is....
Defining the goals of the project. These are very high level, and they are user based on the flaws in the current system.
Federated cloud needs to have support from all the Geos
We have to leverage assets amongst the centers effectively.
Avoid Duplication of Efforts

We have to avoid duplication of effort. If a group in France builds a really cool service that will build WAS on zLinux, I should be able to use that same server on their resources or my own.
We have to have standard services that are supported in every geo. Things like basic IaaS.
We need to ensure that we have proper alignment with industry best practices such as ITIL. After all we are providing services, and we have to make sure that we have proper service level agreements and life cycles.
Hey, that is where I work!
These goals mimic that of NIST but are called out here for clarity.
The requirements are broken down by the role that would need them.
Self Service

One has to be able to obtain the usage of a service without intervention from the service provider.
Service Catalog

There has to be a catalog that is federated from all members that an end user can have access to.
End users have to be able to view every service that is offered. This helps them avoid asking for a duplicate service.
Provider Requirements

These are the requirements that a provider or member of the federation is interested in.
Site Managed Catalog

A site should be able to manage their own service catalog and pick and choose what services they wish to offer up into the federation.
Each site should be able to manage the security of their environment as if they were not in a federated cloud.
Each site may have different network restrictions for instance, and we must be able to support that.
Cookie Cutter Deployment

If you request a service be deployed in MOP, it should look similar if not identical to that in POK
The rules that make this a federation.
This is still a work in progress but this is the document that represents all the bylaws of the federation. It states what is supported and what is not as well as how to join and leave the federation.
Consistent Identity

Same user profile as you go from site to site.
Consistent Operations

Things like monitoring and chargeback should be consistent across all members of the federation.
Transparency Between Clouds

It should not matter what cloud your server is going to be instantiated in. To the end user they should all be the same.
Implementing

How did we get from the goals and requirements to a working system?
First we drew a pretty diagram.
We looked at what was around at IBM and where there was already a large amount of work done in the cloud space. We are trying to reduce duplication here.

In this diagram we chose to focus Federated Cloud around the OSS level.
We had to choose a product that would enable us to build a cloud. We chose Tivoli Service Automation Manager since it had the most promise and was already being used by customers.
Automate process of instantiating and managing a distributed IT environment.
Phase one was really just an exploration phase. We need to know if our software and hardware were up to the challenge of federation.

Second half 2009 and first half of 2010.
The biggest thing was we wanted to have more than one type of IaaS. We picked System p and System z since really has not been done before.
Single TSAM, multiple resource pool. Services were named accordingly (POK System p AIX. MOP System z Linux)

Found some flaws in the products and some flaws in our planning. Mostly, having a single TSAM run by a few people in POK seemed more like an Oligarchy than a Federation.
Second Phase. The phase we are in now. Started in early 2010, overlapping with the first.

We now had a really good understanding of what we could do with the current state of our software and hardware portfolio.
Focus on Cross Geography

- Poughkeepsie, NY
- Montpellier, France
- Makuhari, Japan
- Boeblingen, Germany

The difference in focusing on each siloed entity being allowed to have their own internal cloud.

We focus on geo, but this could be project team, or hardware group. Doesn't really matter how your environment is broken up.
Notice the difference? There is no single point of control. Each site can control everything that they own.
We are doing this by creating two service catalogs in each center, one that is for local use and one that is in the federation. A service can live in both catalogs, so there is no duplication.

The Web2.0 will look at my local catalog, and then look at everyone else's Federated Catalog.

At this point services can only be deployed on the location the provides them (I can't get service B on hardware in POK).
Phase Three

Just starting now, and will continue into the second half of 2011.
Focus on Sharing Services

We want to be able to take a service from one site and deploy it on another sites hardware.
The Service provider infrastructure will look the same.
We will still have the same 2 service catalogs. But now I can ship Service B to every other site.
Add more groups in the federation. Even ones that don't have hardware, but can create services.

Build Composite services. (A PaaS that is built on top of some IaaS)
Questions
Backup Charts