Rethink IT. Reinvent Business.

Cloud Computing

Build a low-touch, highly scalable cloud with IBM SmartCloud Provisioning

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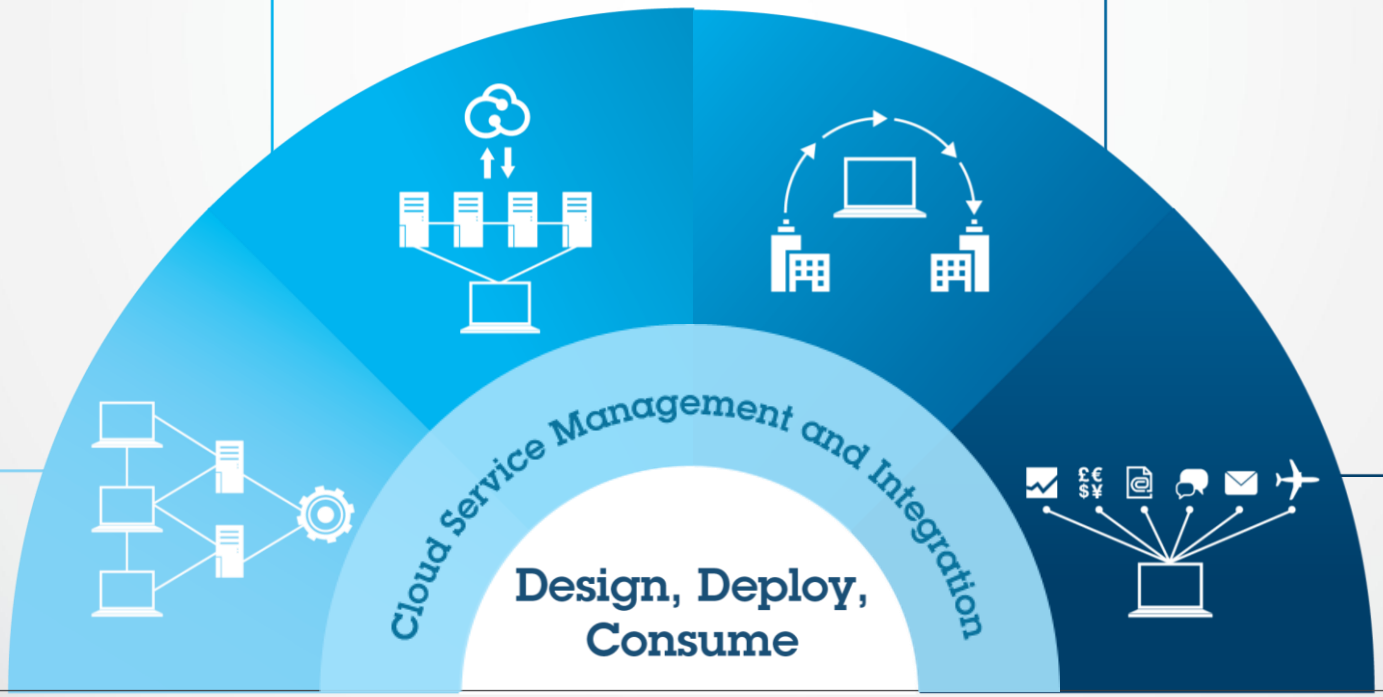
Adoption patterns are emerging for successfully beginning and progressing cloud initiatives

IaaS: Cut IT expense and complexity through a cloud enabled data center

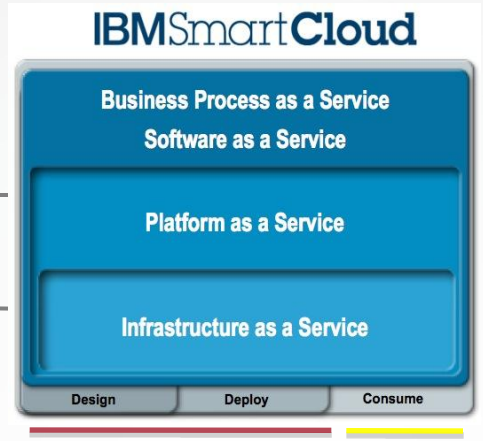
PaaS: Accelerate time to market with cloud platform services

Innovate business models by becoming a cloud service provider

SaaS: Gain immediate access with business solutions on cloud



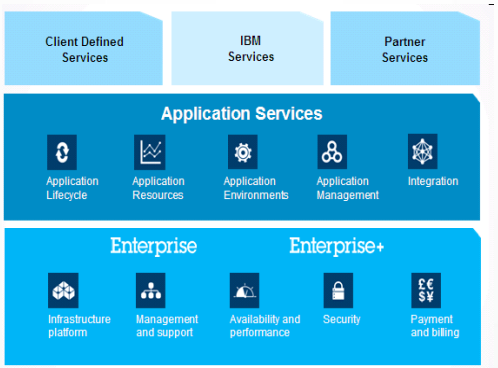
Introducing new capabilities built on our common cloud architecture



IBM SmartCloud Foundation

Easily build and rapidly scale **private cloud** environments with unparalleled time-to-market, integration and management

IBM SmartCloud Services



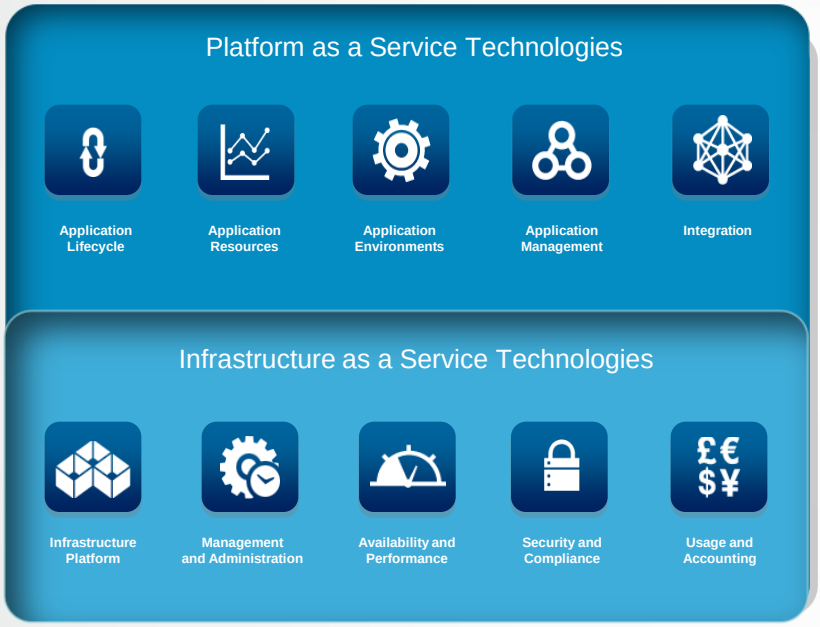
Unprecedented choice, security and portability of applications on **IBM's SmartCloud service delivery platform**

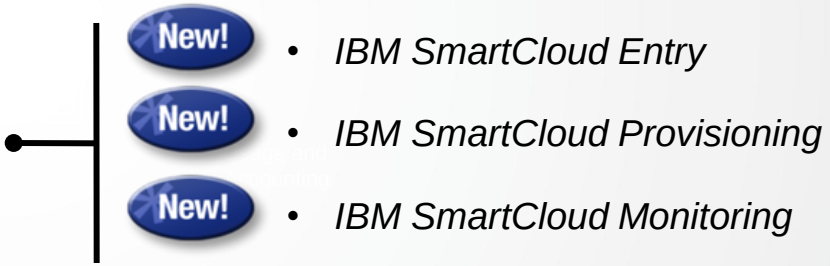
IBM SmartCloud Solutions

Software as a service coupled with deep industry insights, business process skills and analytics

Commitment to open standards and a broad ecosystem

IBM SmartCloud Foundation: Easily build and rapidly scale private cloud environments with unparalleled time-to-market, integration and management

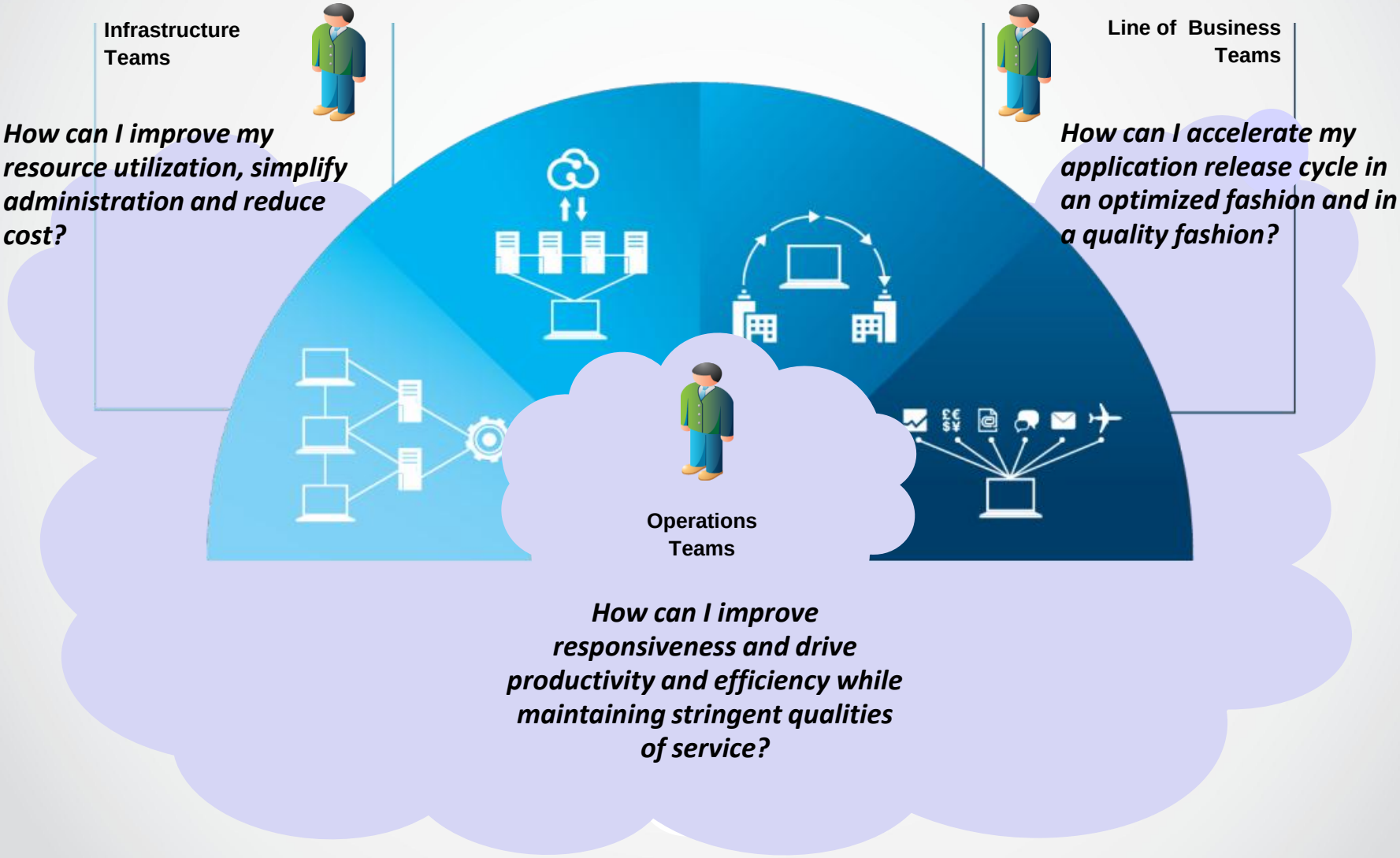




- *IBM SmartCloud Entry*
- *IBM SmartCloud Provisioning*
- *IBM SmartCloud Monitoring*

- **Resilient** to the velocity of changing business needs
- Choice and **flexibility** in hybrid environments
- Enterprise-class, **workload aware** infrastructures
- **Built-in analytics** for improved insight and decision making

What we are hearing from our customers

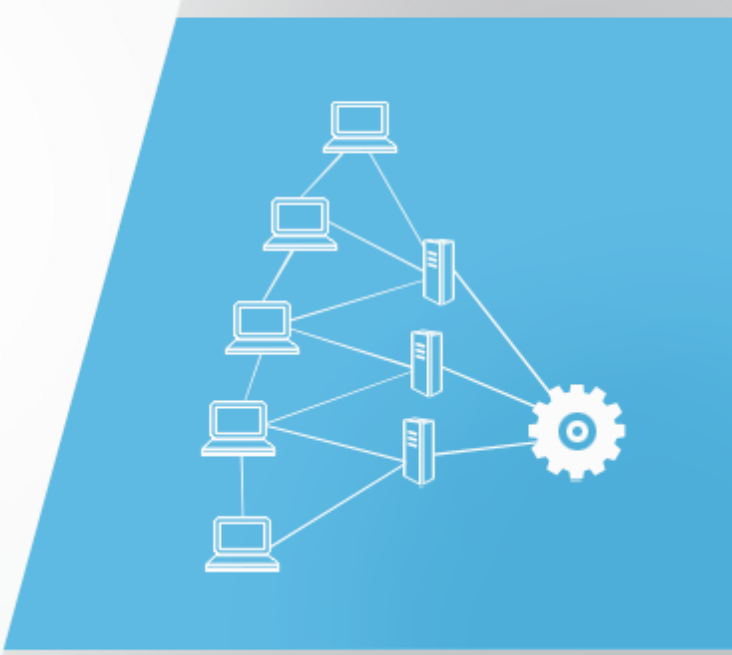


Build a low-touch, highly scalable cloud with IBM SmartCloud Provisioning

IBM SmartCloud Provisioning is a true Infrastructure-as-a-Service cloud, reducing cost and providing a highly scalable, rapid-deployment environment with near- zero downtime, image lifecycle management and automated recovery across heterogeneous platforms.

Key benefits:

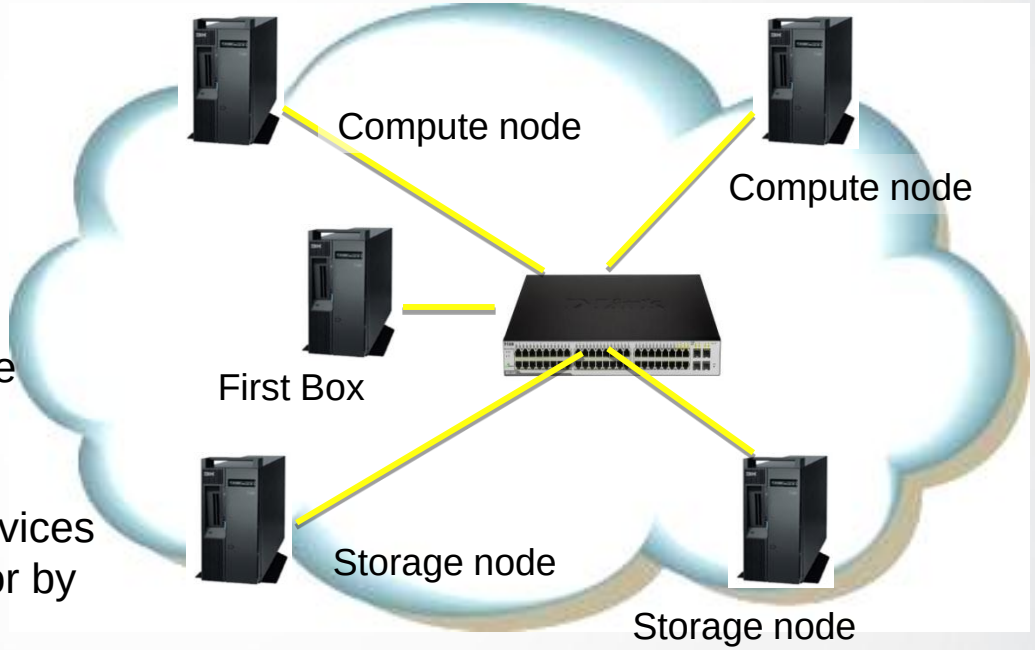
- **Rapid scalable deployment** designed to meet business growth with near-instant deployment of 100s of virtual machines
- **Control image sprawl** and reduce business risk through rich analytics, image versioning and federated image library features
- **Image construction and composition tool** transforms the complex and time consuming process of creating virtual images into simple graphical tool.
- **Reliable, non-stop cloud** capable of automatically tolerating and recovering from software and hardware failures
- **Save IT labor resources at scale** by enabling self-service request and highly automated operations
- **Reduce complexity** through ease of use and improve time to value



Quickly Get Started with SmartCloud Provisioning

- Quickly stand up a cloud
  - Start small and scale based on need
  - No additional pre-reqs such as databases, app servers, messaging middleware
  - Freedom of choice for hypervisors
    - Avoid expensive vendor lock in
    - VMWare ESX, KVM, Xen
- Highly cost effective solution
  - Requires no additional hypervisor management tools
  - Requires no HA hardware or software
- Rich set of interfaces into the cloud
  - Web Interface, scripting and web services
  - All function can be driven by a user or by scripts for complete automation

IBM SmartCloud Provisioning



- Out-of-the-box and running in less than 4 hours
- Get started with only 4 servers

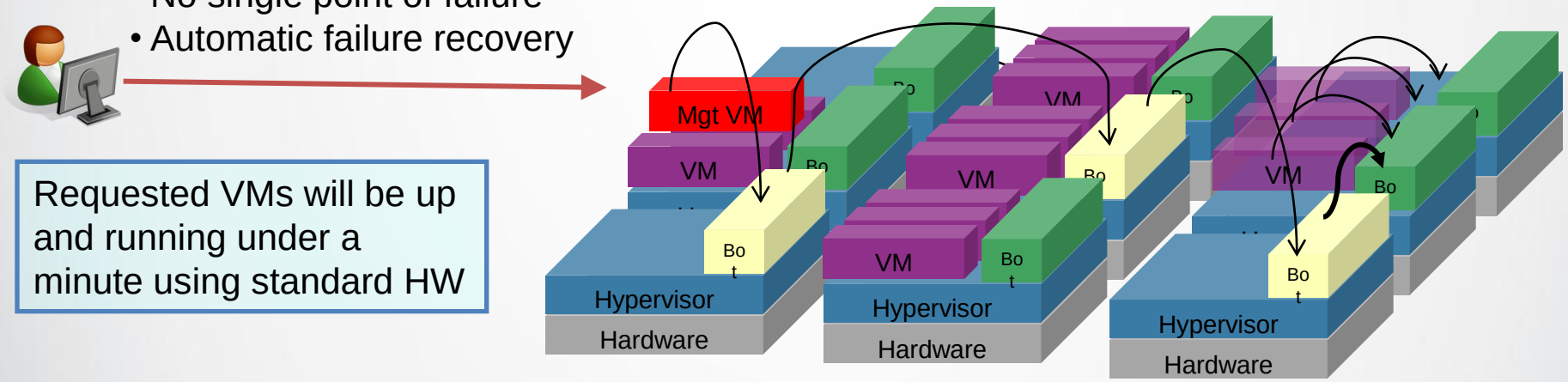
Provides Unparalleled Scalability, Speed and Fault Tolerance

- It's **Fast**
  - Can start 100 VMs in under 3 mins
  - Can start a single VM and load OS in under 10 seconds
  - Can go from bare metal to ready for work in under 5 minutes

- It **Scales** up to and beyond 50,000 VMs in an hour (50 nodes)
  - Add capacity by simply plugging in a blade or server
  - Writes only the data you change
  - Peer-peer architecture to avoid traditional bottlenecks

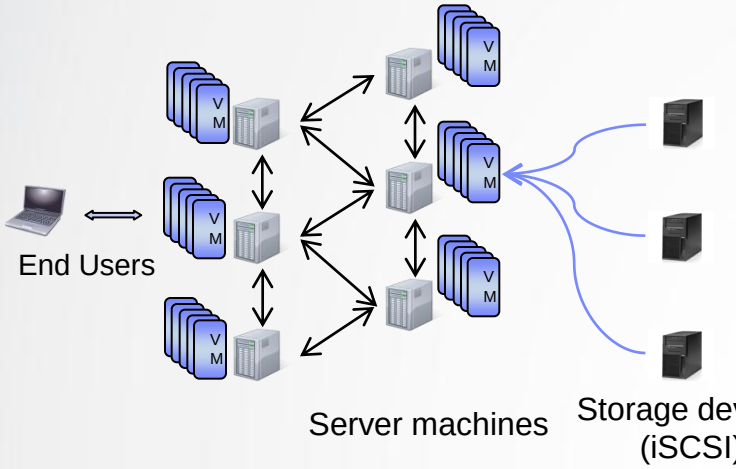
- It's **Fault-Tolerant**
  - "Live Update" capability to patch or upgrade the Cloud
  - No single point of failure
  - Automatic failure recovery

IBM SmartCloud Provisioning



Requested VMs will be up and running under a minute using standard HW

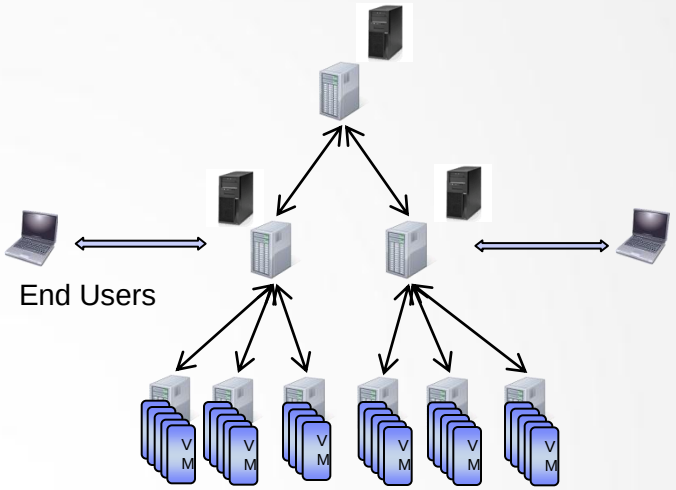
IBM SmartCloud Provisioning vs traditional hierarchical architecture



No single points of failure, no bottlenecks in data serving/processing, no intervention to repair broken parts!

- **Multiple, load balanced** instances of all services
- **Parallel** processing against storage
- **Self-adapting** peer-to-peer communication & coordination
- **Recovery oriented** computing
- **Network deployed** software & image updating

- **Distributed** request processing, data storage and messaging
- Designed to run on **lower cost** hardware and storage devices
- All services **monitor** and restart each other, and dynamically elect the leader
- Base software is loaded via **network boot** (PXE)
- **Services are images**, so update themselves by restarting with new image version



Failures that will impact your users, slowdowns that your users will notice, and extra work for the admin team!

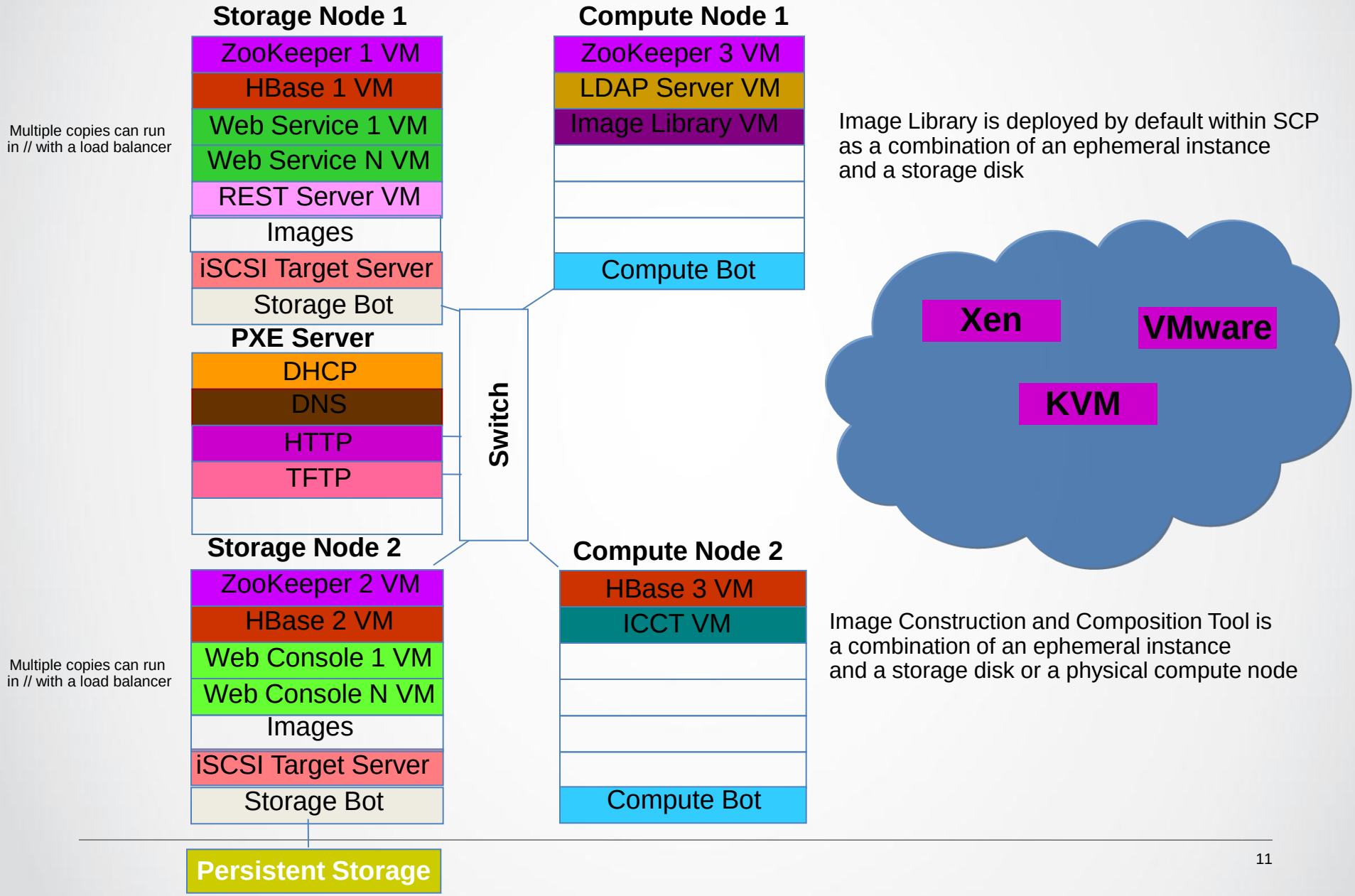
- **Single** instance of **critical** services
- **Serialized** processing
- **No automatic** restart and rerouting of requests
- Patches and upgrades go **everywhere**

- Requires **very high** cost hardware
- The bigger the cloud the **worse** the damage
- Request for images bound to a **single location**
- **Serialized, slow access** and susceptible to peak overloads
- Patches/upgrades require **taking down** the Cloud to apply and they need to be carefully applied
- When a service breaks, that part of **the system is out**
- **Admins** have to troubleshoot and fix

Nice to know

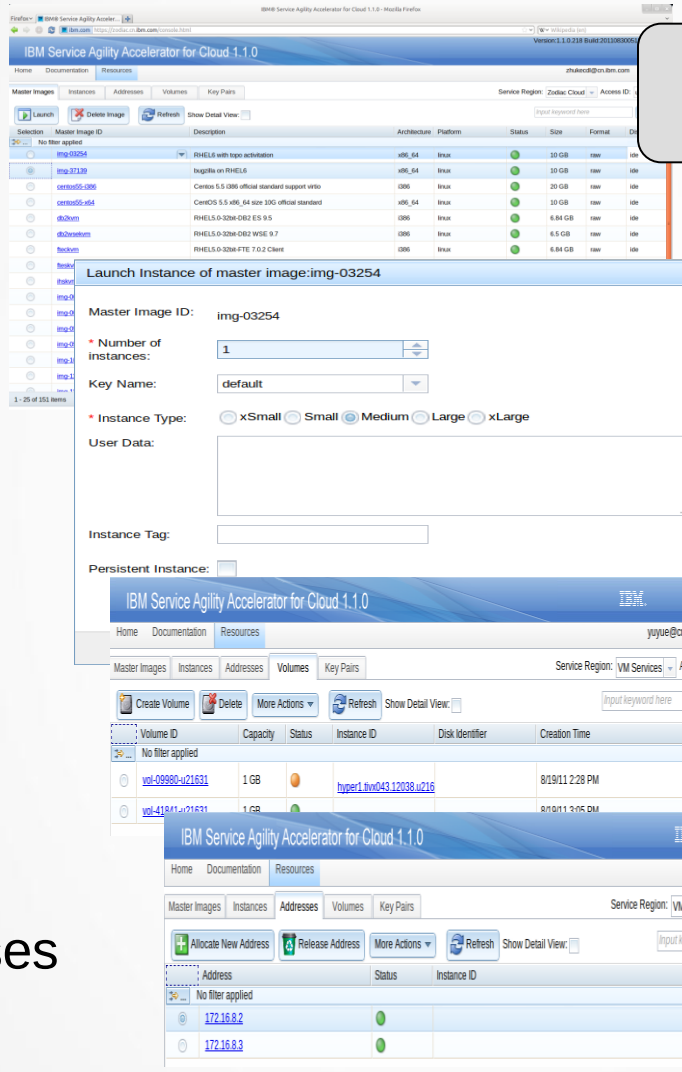
- Leverage Open Source software:
  - **HBase™**: a scalable, distributed database that supports structured data storage for large tables
  - **ZooKeeper™**: A high-performance coordination service for distributed applications
  - **OpenLDAP™** Software: an open source implementation of the Lightweight Directory Access Protocol
  - **Dojo Toolkit**: an open source modular **JavaScript** library
  - **HTML**
- Small footprint … less than 300MB of which 80MB for **Java™** library
- Offer a variety of interfaces: UI, command line, REST APIs
- **IBM Infrastructure as a Service APIs submitted to DMTF (Desktop Management Task Force), also used by IBM SmartCloud Enterprise**

SCP's Virtual Machines Role for Near Zero Downtime



Option to use UI, command line or web service to:

- Select images
- Create virtual servers
- Attach storage
- Bind IP addresses



Choose from a list of pre-configured, pre-tested images

Choose number of virtual servers needed and a simple server configuration to avoid lots of complicated settings (CPU allocations, memory settings, etc.)

Optionally, add one or more storage volumes to your virtual server

Optionally, add “public” IP addresses to your virtual servers so that other machines can reach them easily

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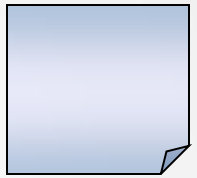
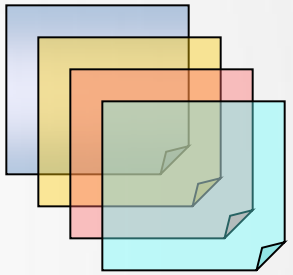
Cloud Computing

Image Lifecycle Management

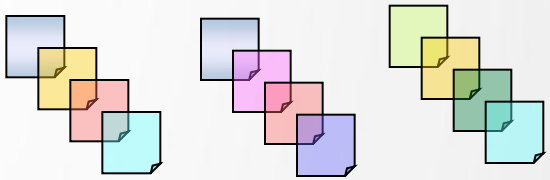
What's the problem with Virtualization and Standardization?



1 In the beginning, there was the **perfect image**…



2 Then users starting **making changes** and "snapshots"…
…and what they put in the images is unknown…



3 Then they get copied to **multiple locations**…
…and some change again…

4 Then you need to apply a critical security patch…**how?** … **where?**

Image library brings a proven approach to managing images

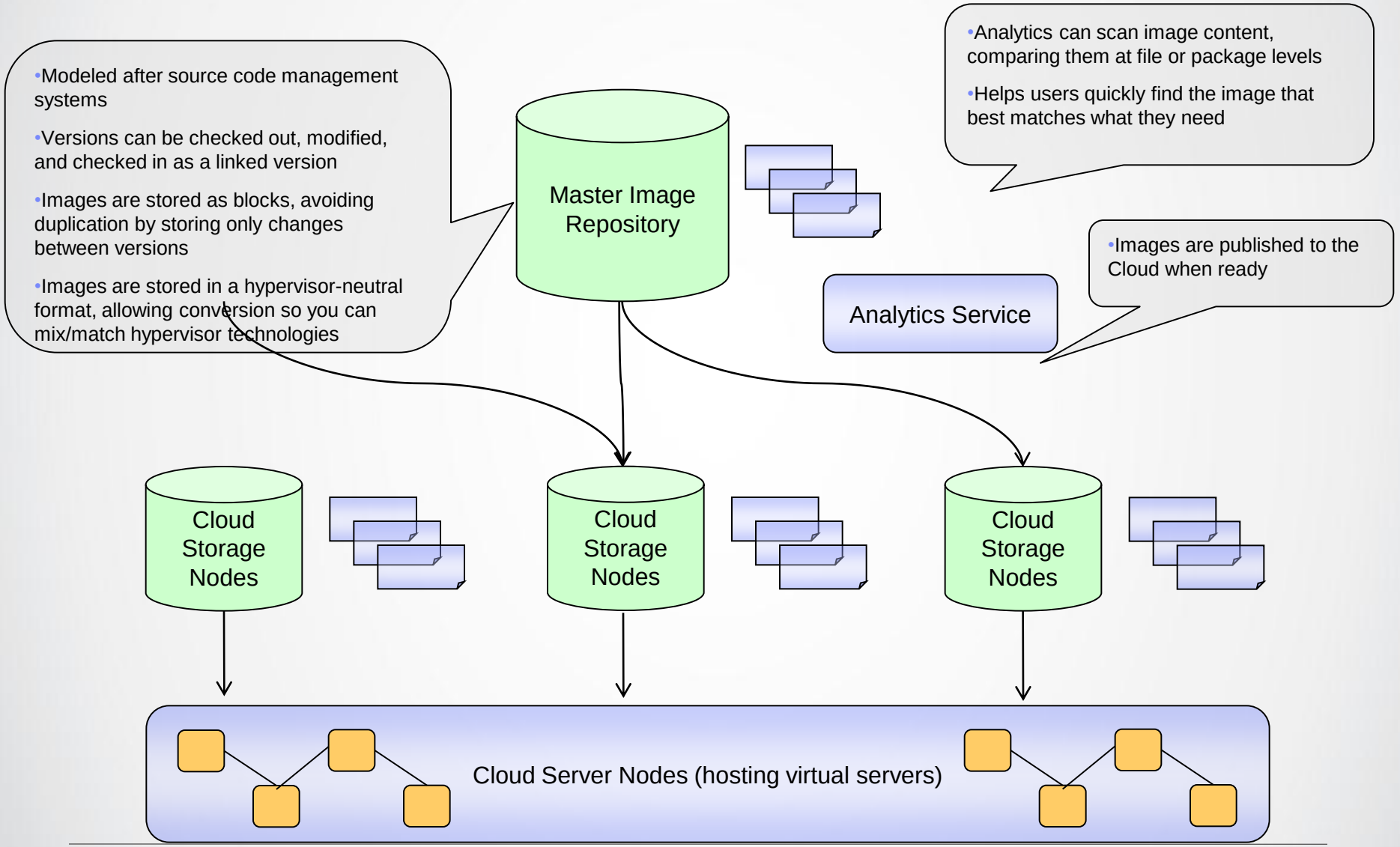
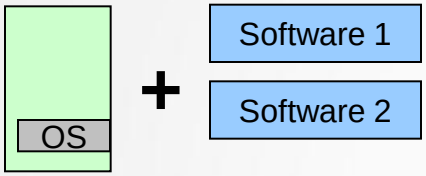


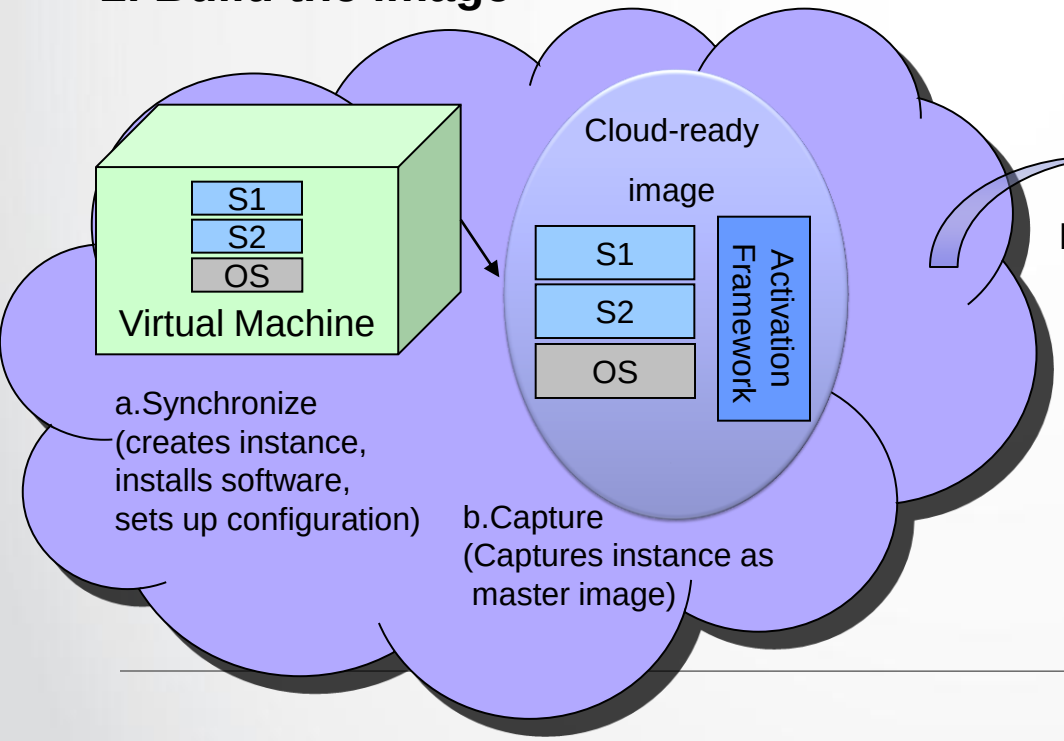
Image construction ensures your images are compliant

1. Design the image

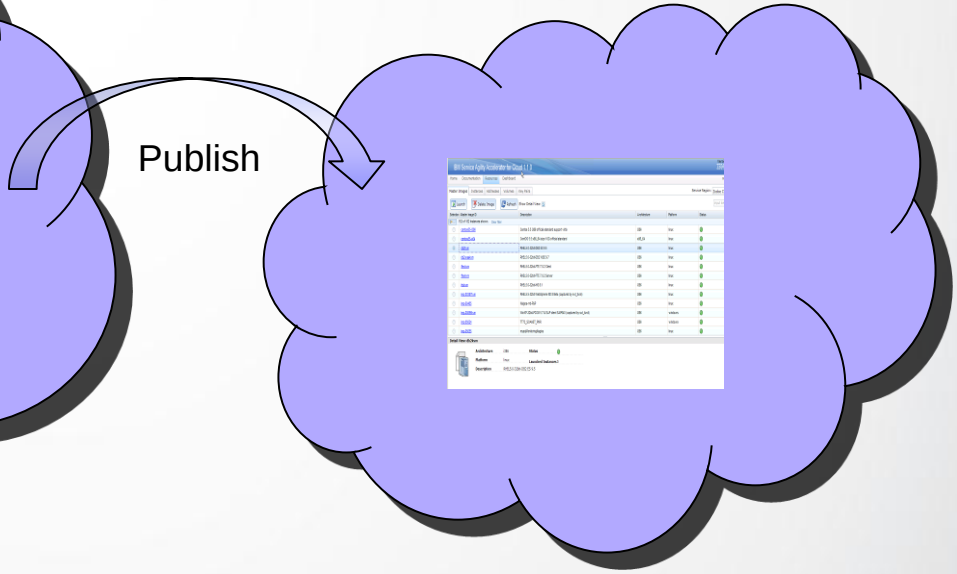


- Images often have predefined versions of software that don't match corporate policies for security or licensing
  - eg Operating System service pack level, Apache web server build level
- The Image Construction and Composition Tool allows you build an "image recipe", using your company's approved OS and software as ingredients, and then "cook" an image that delivers what the users want and keeps you out of audit jail

2. Build the image



3. Use image



Capturing images is easy

- There are many tool that simplify the process
- All you need is enough space the store them

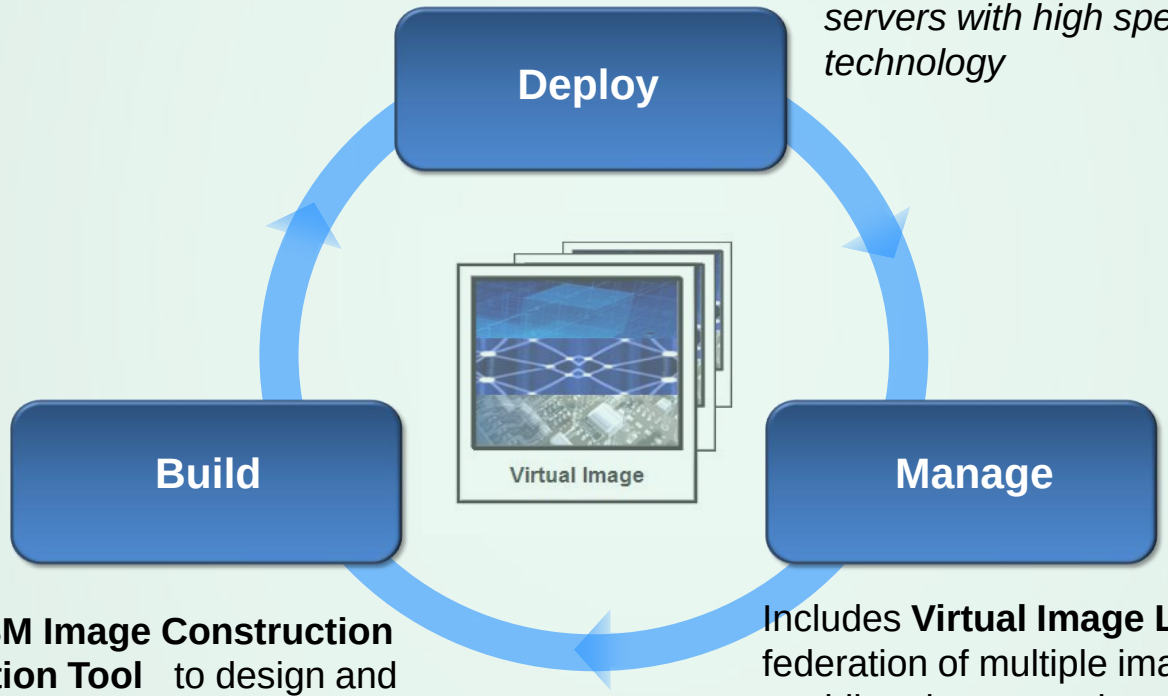
However managing images is hard

Standardization	How to contain the proliferation of image variants?
Search	How does one find a useful image?
Version control	Who did what to which image, and when?
Drift Detection	Identify images that diverge from initial configurations
Vulnerability	Images must be updated with security patches
Image building	Reduce manual labor to compose images

Image Management Framework

IBM Smart Cloud Provisioning provides a solution for all stages of image lifecycle management

Can instantiate images onto virtual servers with high speed and low touch technology



Includes the **IBM Image Construction and Composition Tool** to design and generate semantically rich images

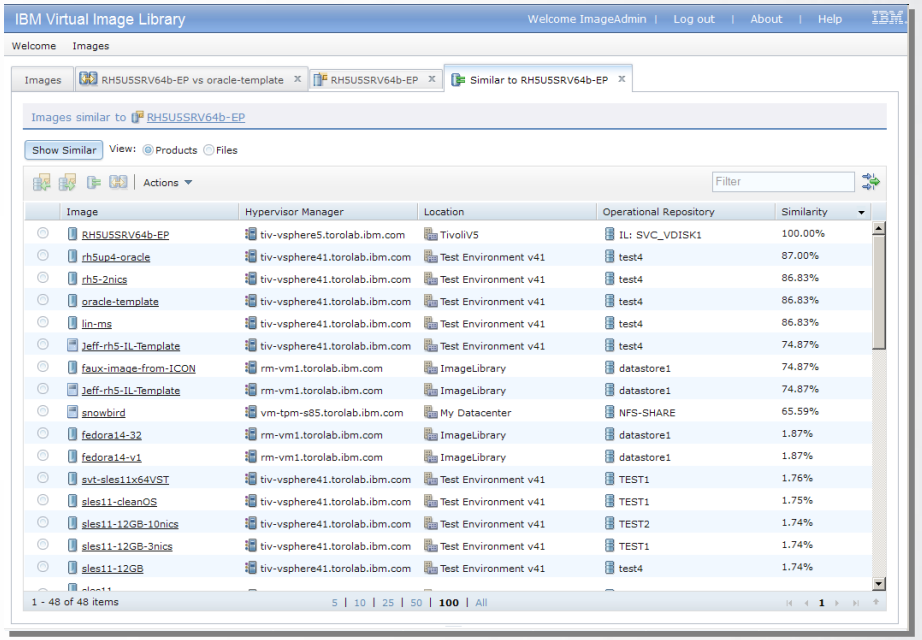
Includes **Virtual Image Library,** which allow federation of multiple image repositories, enabling deep search, consolidation, analysis of vulnerabilities, versioning and drift detection of virtual images

Standardize: reduce image proliferation and consolidate images

I have hundreds / thousand of images.
How can I contain the proliferation of image variants?

The IBM Virtual Image Library can

- Analyze image content and rank images by similarity
- Determine image differences with a side-by-side comparison
- Convert images across hypervisors, reducing number of image variants



Administrator can consolidate similar images into fewer copies, reducing storage and maintenance costs.

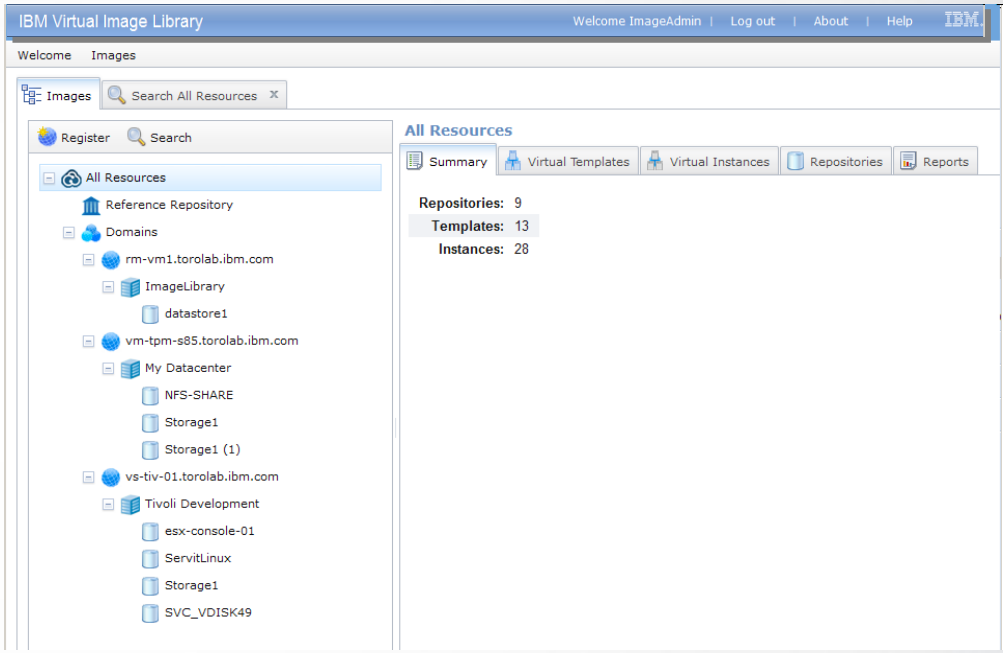
Administrators can get the confidence they need to consolidate images without disrupting the business.

Search across multiple repositories

I have multiple image repositories and no single view where I can see all of them. How do I find a useful image?

The IBM Virtual Image Library can

- Federate multiple image repositories from multiple hypervisors into a single view
- Search images based on their content, not only on their name
- Discover images without requiring agents



Administrators can create a single view where all images of the data center are displayed, reducing the effort spent browsing multiple repositories.

Images can be searched based on their content, allowing a simple and intuitive identification of images when needed.

Version control: keep track of versions and changes

Who changed which image and when?
Which running virtual machine has been affected by the changes?

The IBM Virtual Image Library can

- Keep version changes and determine “family” tree of images and running virtual machines
- Perform diff of images at product or file level

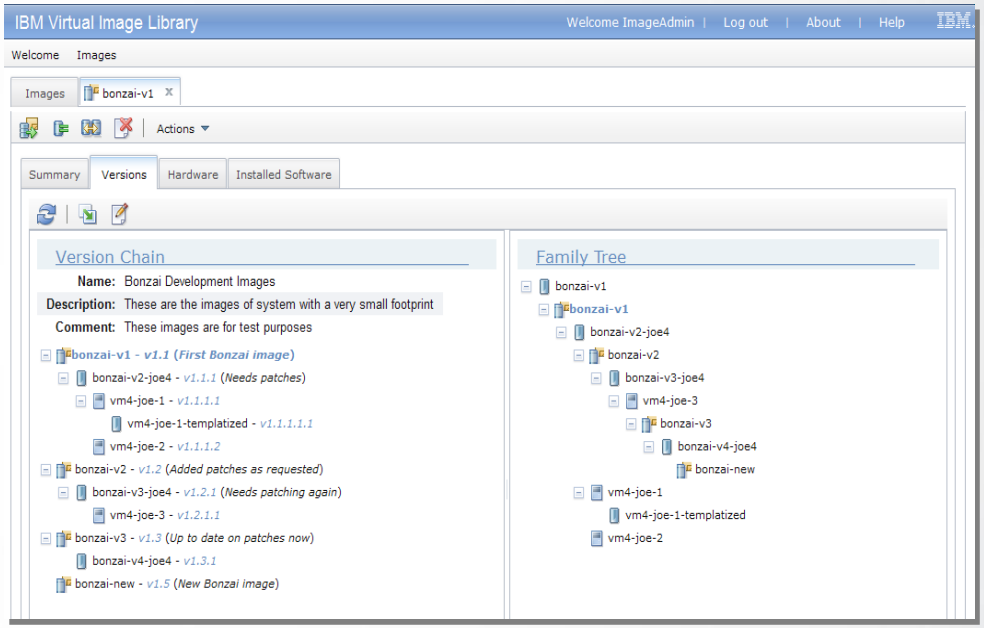


Image administrators can improve the visibility of their images and easily identify the provenance of images.

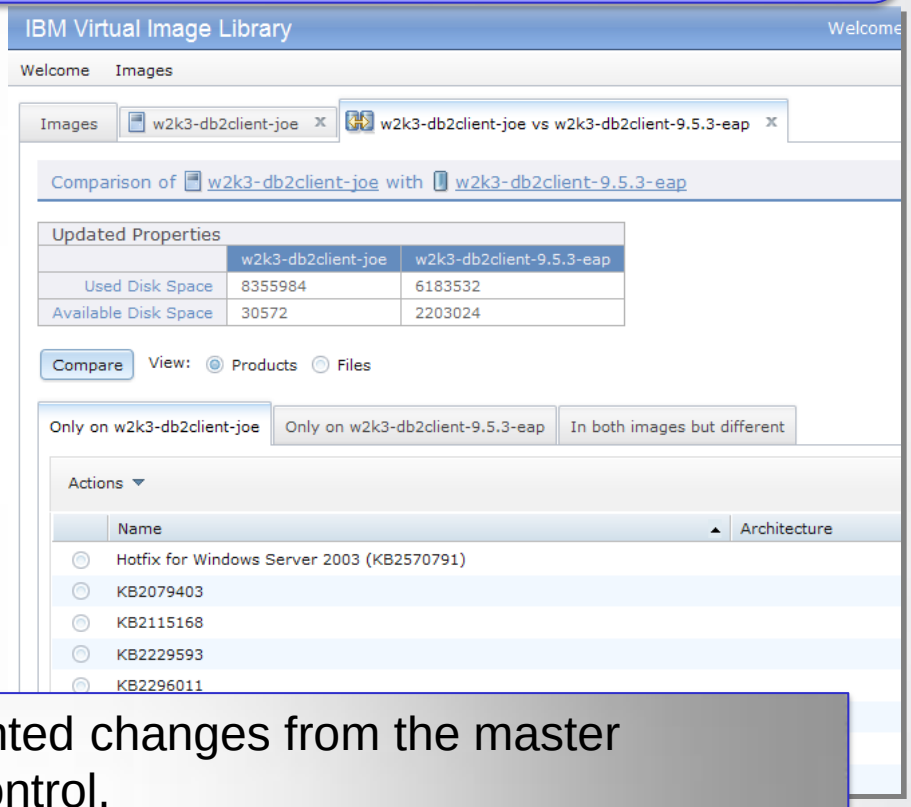
They can also determine which running instances has been affected by a change of image.

Drift Detection: detect unwanted changes from master images

How can I detect images that diverge from initial configurations?

The IBM Virtual Image Library can

- Store master images into a single reference repository
- Compare current (dynamic) state of the VM against the master image from which it was deployed and detect drift



The administrator can identify unwanted changes from the master configuration and keep drift under control.

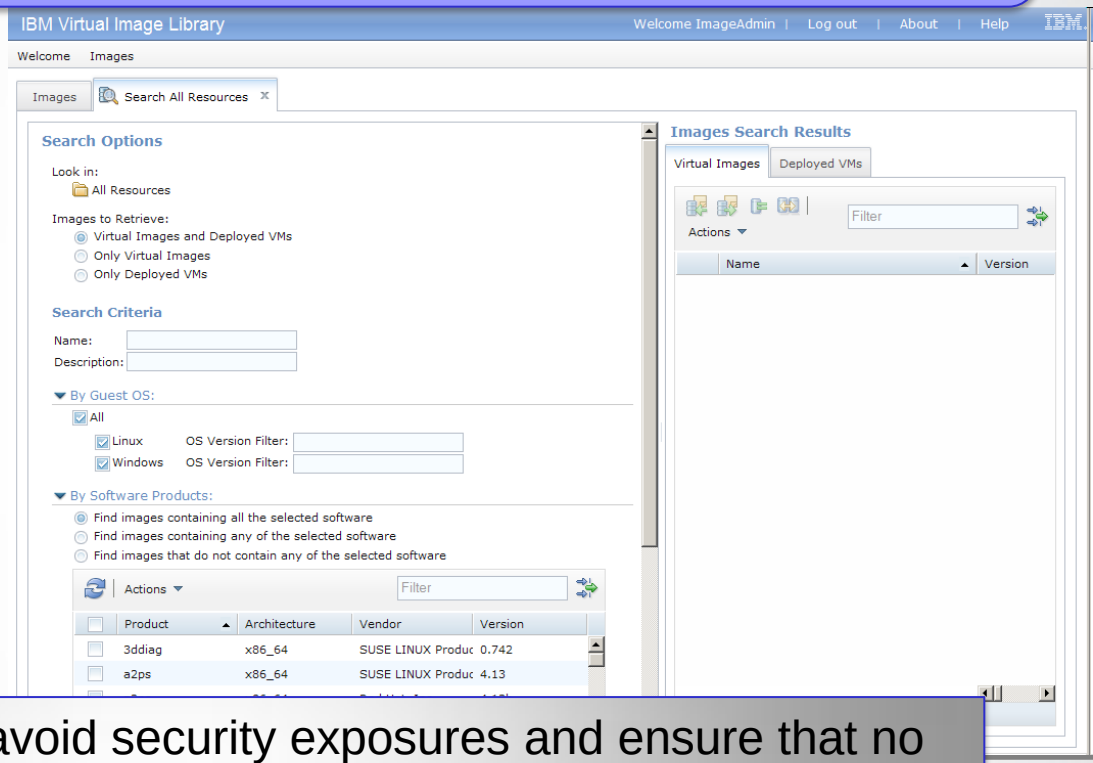
No interference with the running VM, as drift detection does not require agents in the OS.

Vulnerability: detect vulnerability exposures

Which images must be patched?
How do I detect images with security exposures?

The IBM Virtual Image Library can

- Identify images that do not contain the latest security patches, ensuring vulnerability exposures are avoided.
- Introspect image content and identify unwanted software



The image administrator can avoid security exposures and ensure that no virtual machines are created without the proper level of security patches.

Reduce incident costs through continuous detection of deviations.

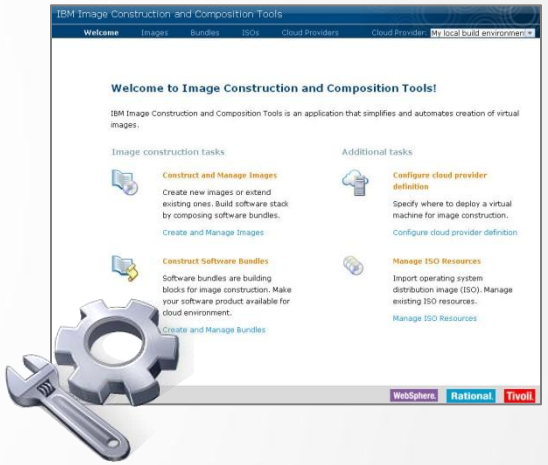
Image building: compose and extend images

How do I easily modify and update an image?
How can I quickly compose an image with a complex software stack?

The IBM Image Construction and Composition Tool can

- Simplify, Automate and Standardize virtual image building
- Quickly compose images by dragging and dropping into an image editor canvas components like software bundles, scripts, activation parameters.

Image Construction Tool



Administrators can use a simple model-driven tool to compose virtual images, which does not require deep programming skills.

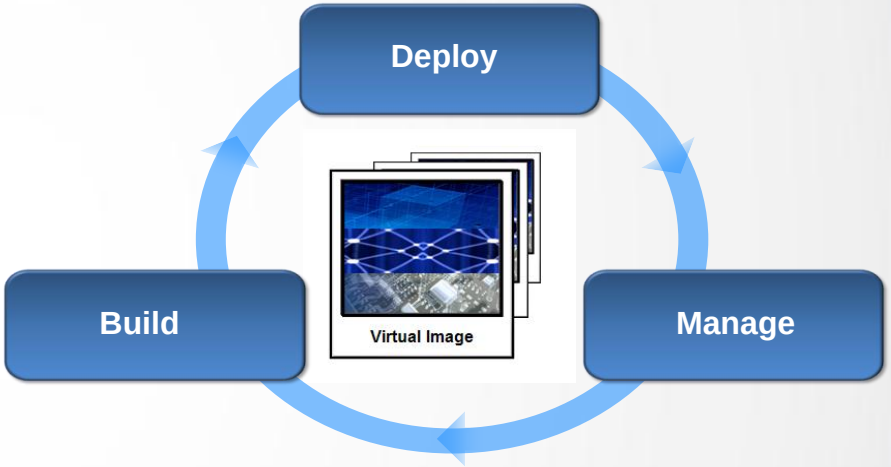
Make it easier for operation teams to deploy complex software stack and achieve image standardization.

Conclusions

Smart Cloud Provisioning provides the solution to address the challenges of building – deploying – managing virtual images

Technology differentiators included in **IBM Smart Cloud Provisioning**

- **IBM Virtual Image Library**: version controlled federated image library
- **IBM Image Construction and Composition Tool**: compose images with semantically rich metadata



Learn More

Smart Cloud Provisioning

http://www-01.ibm.com/software/tivoli/products/smartcloud-provisioning/

Defeat image sprawl, once and for all

http://www.ibm.com/developerworks/websphere/techjournal/1112_col_willenborg/1112_col_willenborg.html

Contacts

Murtuza Choilawala Product Manager, SmartCloud Provisioning

Marco Sebastiani Product Manager, Tivoli Image Management Solutions

Case study: Dutch Cloud

Our Customer's Business

- DutchCloud is a leading ISP based in the Netherlands, focused on SME customers in a few key industries (Healthcare, Electronics).
- DutchCloud offers a range of Cloud based services from fully managed IaaS through to disaster recovery solutions.
- Customers select DutchCloud for the quality of service delivered and its service assurance.

The Business Challenges

- DutchCloud was looking for a light-weight, highly functional solution for core cloud service delivery.
- Current challenges are to improve the delivery of Cloud services in terms of cost, speed, agility, minimized operations and industrial strength solutions.
- Scale delivery costs to business volumes.
- Support delivery through a Reseller model.

Cloud Business Benefits

- Rapid deployment of new services in seconds rather than hours. (Deployed 100's of new VM instances in under 5 minutes).
- No/low maintenance, minimized operational administration, and no outages required for upgrades.
- Changing the delivery of DR services from cold-standby (capital intensive) to rapidly deployed (utilization efficient) and significantly more cost effective for customers and CSPs.

What Did We Do?

- Implementation of IBM SmartCloud Provisioning as the core delivery platform across multiple compute and storage nodes.
- KVM hypervisor delivery for VMs supporting minimized license cost.
- Customer, management, and VLAN separation for multi-tenant isolation at the network and presentation layer.
- Integration with IBM V7000 Storwize storage and SmartCloud Provisioning to offer customers variable SLAs for storage.

Benefits to Dutch Cloud from IBM SmartCloud Provisioning

Rapid service delivery

- Obvious agility benefits, but opens new possibilities for changing processes. Moving from static models to highly dynamic delivery (for instance changing how cold-standby DR services can be provided).
- Pilot provisioned 200 VMs in under 5 mins.

High scale, low touch

- Absolutely minimised administration, through high levels of automation, and automatic management and self healing.
- Highly distributed architecture enables better utilisation and no outages to operations within the cloud.
- Failures are automatically detected, and easily recovered.

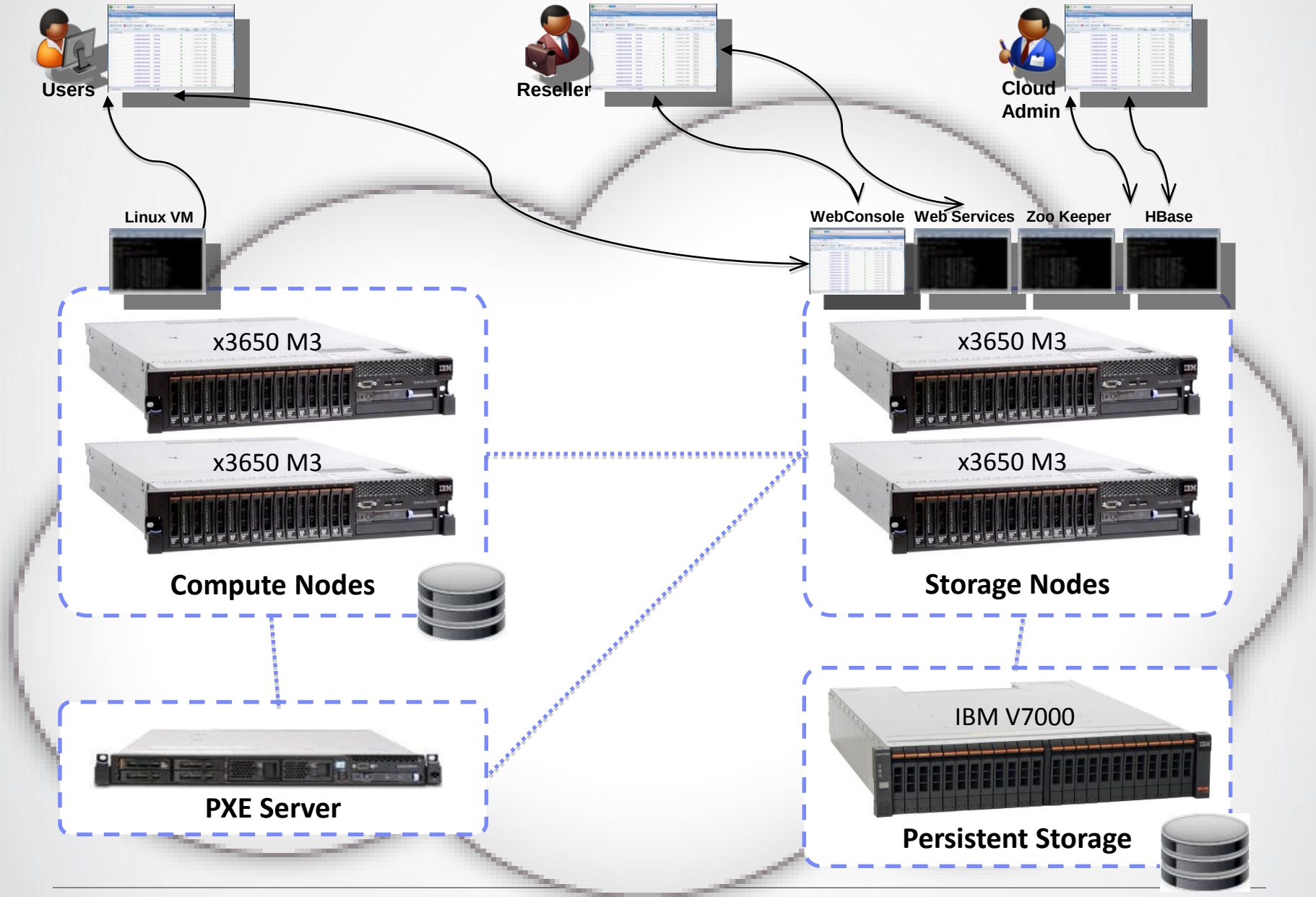
Supports “Reseller” model

- Segregated resources and branding of portal allows delegate control of resources to Cloud partners.

Open Standards

- Hypervisor and hardware agnostic – can even support mixed hypervisor environments.
- Talks directly to the hypervisor negating the need for licenced management components (eg. vCenter)
- Easy to extend, using commodity skills, with low effort.

Solution Overview



Case Study: Leveraging IBM SmartCloud Provisioning throughout the Development Lifecycle

Business Challenge

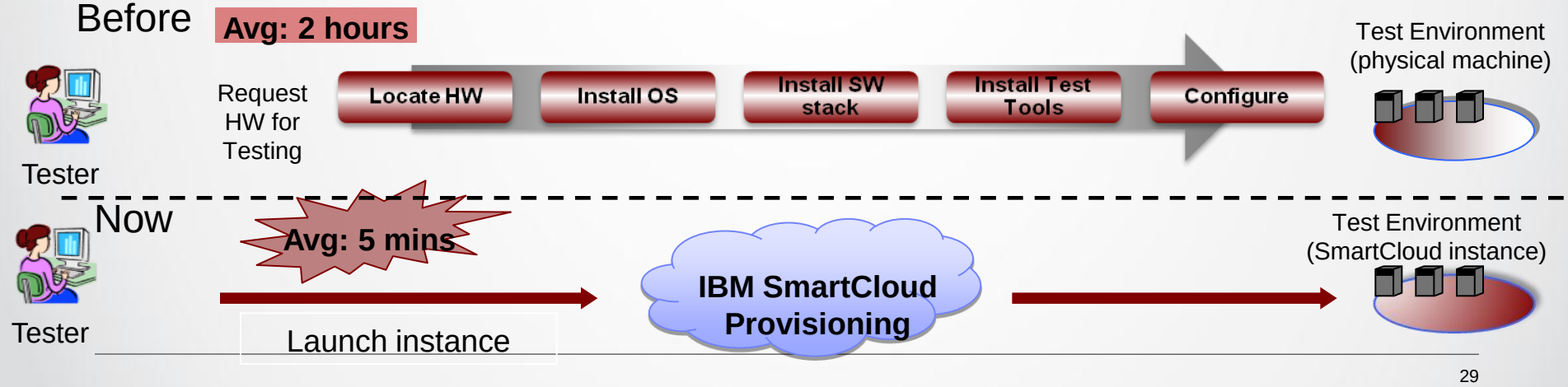
Hardware constraints
- Significant number of machines required to support development life-cycle
- Low HW utilization rates
- Forced to use outdated HW

Time constraints
- Required time to setup a complex topologies
- Significant time spent on setup rather than testing

Skills requirements
- Training engineers to setup complex software stack

Solution

Leverage SmartCloud Provisioning to rapidly stand up development and test environments
- Currently using SmartCloud in 28 development and test projects in Tivoli
- Reduced setup time from 2 hours to 5 minutes
- Returned 356 old physical machines to surplus
- Enables more time to be spent validating software instead of setting up environments



Use Case : Build and manage a fault tolerant cloud

Use Case: Deploy highly available cloud infrastructure that automatically tolerates HW and SW failures and scales with no manual configurations

Cloud Admin sets up a infrastructure-as-a-service cloud which allows cloud users to deploy applications in the cloud. He is responsible to mange and maintain availability for this infrastructure so the cloud has high reliable and available. To achieve this he will use the OOTB fault tolerance infrastructure provided by IBM SmartCloud Provisioning. He makes sure depending on number of Compute nodes and storage nodes in his environment he is able to maintain a 7x24 up and running cloud. IT Admin requests deployment of an image across several VM instances. Image is selected from the image library and provisioned across racks with each node provisioning VMs. A hardware failure occurs and a blade is removed. The work is automatically balanced across remaining blades with no disruptions in running the workloads.

Audience:

Users: IT Cloud Admin, Operations team, LoB

Challenge(s) this Scenario Addresses:

Non availability of cloud infrastructure in event of hardware failure which impacts SLA's

Cloud Project:

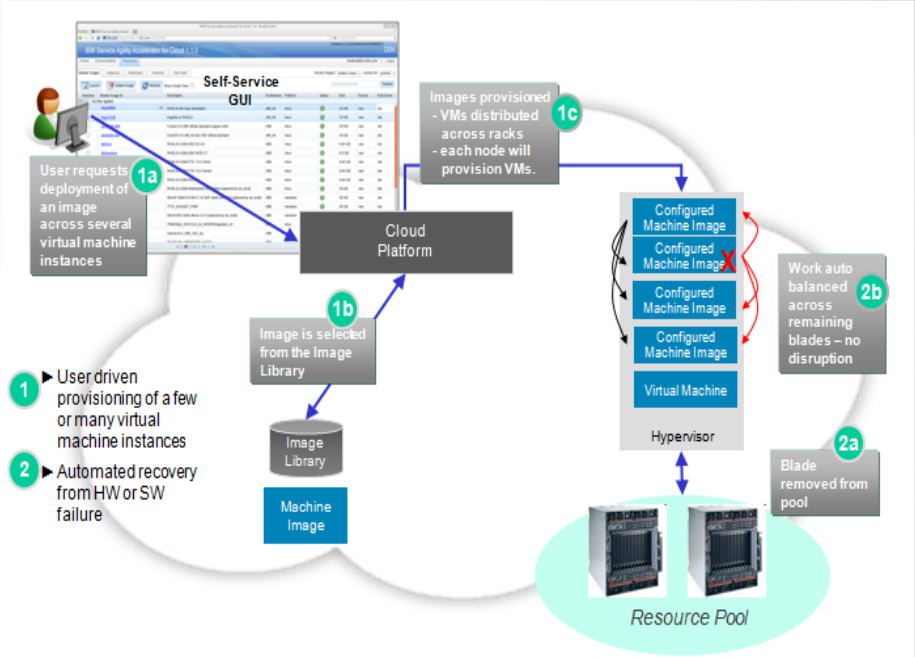
Implementing a Entry Cloud Infrastructure

Pre-reqs:

x86 servers, IBM SmartCloud Provisioning, RHEL ISO

What you Sell

IBM SmartCloud Provisioning



Customer Value

- Zero downtime, tolerates hardware failures driving higher customer satisfaction
- Power up and forget: Scale up cloud infrastructure with no manual configuration and rapid cross domain provisioning
- Choice through extensive hypervisor and platform support

Competitive Differentiators:

- 99.9% system availability
- OOTB fault tolerance capability which is deployed during installation.
- Ability to add resources with no manual intervention.

Use Case: image Lifecycle Management

Use case: Control image sprawl and reduce business risk with rich analytics, image versioning and federated image library to standardize images

Organization has virtualized IT, but needs to implement preventative measures to control image sprawl. IT Architect designs and models the full stack image according to company policies, synchronizes the image , and captures instances as cloud ready image to publish to master image repository. The IT Admin controls image versions and federates across all images by converting image formats and editing and analyzing image to optimize impact on storage, and then selects an image from the library to deploy to repositories in the cloud.

Audience:

Users: IT Admin, Buyers:

Challenge(s) this Scenario Addresses:

Image Sprawl and drift

Cloud Project:

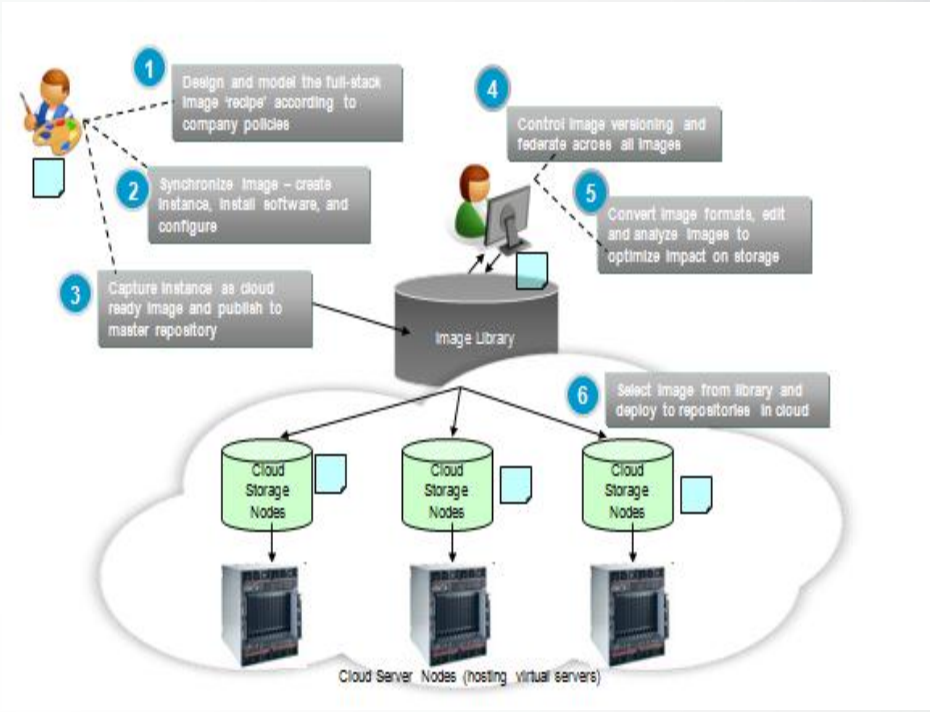
Implementing a Entry Cloud Infrastructure

Pre-reqs:

x86 servers / , XEN / Linux guests, KVM / Linux & Windows guests, VMware / Linux & Windows guests

What you Sell

IBM SmartCloud Provisioning



Customer Value

- Reduced data storage through smarter analytics and single instance storage can reduce image storage costs by up to 80%
- Reduced risk of using non-compliant images that could have security exposure
- Over 70% reduction in image provisioning time and labor costs through automated image lifecycle management

Competitive Differentiators:

- Heterogeneous, federated image library management providing single source of control across all images.
- Simplified creation of rich, full stack images saving significant (up to 90%) admin time verses OS only images

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Use Case: Rapid deployment and low touch resource addition

Use Case: User driven rapid deployment of few or 100's of vm's across heterogeneous platforms and hypervisors

IT Admin needs to provision few to hundreds of VMs in minutes across multiple hypervisors and platforms in a fault-tolerant environment . IT Admin requests deployment of an image across several VM instances. Deploy fails due to lack of resources. New blade is powered on and allowed PXE boot to our infrastructure. In less than 6 minutes with no manual configuration, resource is available in cloud to be consumed. IT Admin resubmits provisioning job, Image is selected from the image library and provisioned across racks with each node provisioning VMs. A hardware failure occurs and a blade is removed. The work is automatically balanced across remaining blades with no disruptions in running the workloads.

Audience:

Users: Operations team, Line of Business

Challenge(s) this Scenario Addresses:

Scaling up cloud resources

Cloud Project:

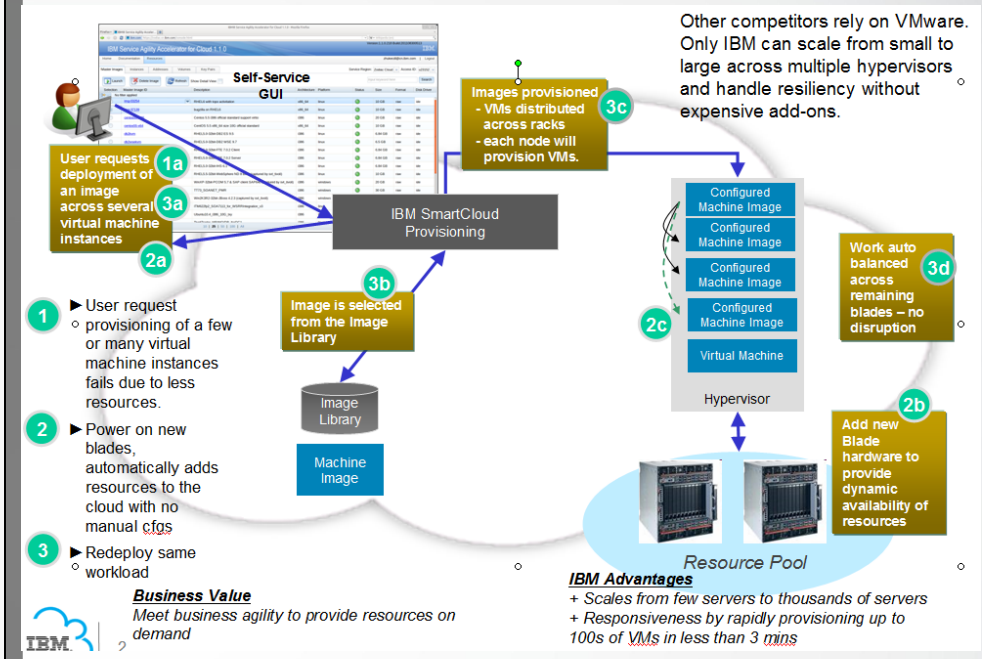
Implementing a Entry Cloud Infrastructure

Pre-reqs:

x86 servers, hypervisor

What you Sell

IBM SmartCloud Provisioning



Customer Value

- Power up and forget: Scale up cloud infrastructure with no manual configuration and rapid cross domain provisioning
- Choice through extensive hypervisor and platform support

Competitive Differentiators:

- 99.9% system availability
- Responsiveness by rapidly provisioning up to 100s of VMs in less than 3 mins
- Scale from few to 1000s of VMs to meet business demands

Collaborating with us

If you would like to:

- Hear the latest news on ***IBM SmartCloud Provisioning***
- Familiarize yourself with the product functionalities
- Help IBM to improve product functionality and usability
- Get in touch with our Subject Matter Experts

➢ *You can participate in any of our Customer Interaction Program activities,* which can include:

- ✓ Open Beta https://www14.software.ibm.com/iwm/web/cc/earlyprograms/tivoli/P2044/index.shtml
- ✓ Design Validation, collective group calls to review main design points
- ✓ Usability sessions, individual sessions that we will set up in accordance with you, on a one on one basis
- ✓ See the product working, with development Demos
- ✓ Work with a preconfigured Virtual Beta environment. Explore the product, either with our direct support or in an unattended mode, without the effort of installation and configuration.
- ✓ Download and try the Beta Code, and influence its development.

➢ For more details go to **Service Management Connect*** at https://www.ibm.com/developerworks/servicemanagement/cvm/index.html, or contact valory_batchellor@uk.ibm.com, our Customer Interaction focal point

***Service Management Connect:** *You can connect, learn, and share with Integrated Service Management (ISM) professionals in Service Management Connect. Get access to developers and technical experts who provide their perspectives and expertise to help you implement ISM solutions.*

Summary – IBM Smart Cloud Provisioning

- Only IBM Smart Cloud Provisioning can meet the expectations the business and your users have on an Infrastructure Cloud service:

- *Reduced labor costs, standardization, and business agility*
- *User-driven, always available, very fast access*
  - through…

- Self-service…for users who click and users who script

- A very smart infrastructure…that keeps you “live” all the time

- Highly standardized delivery…that can change fast but avoid chaos

Additional resources

More information:

- IBM SmartCloud Provisioning product-related content
- Join the community: Tivoli Service Management Connect - Cloud and Virtualization
- Join the Open beta program
- IBM SmartCloud Provisioning for the Academic community (code: aCRFL5EN)
- Get informed on IBM cloud initiatives: http://www.ibm.com/cloud
- Get informed about Tivoli cloud solutions: ibm.com/tivoli

Training & education:

- Get Tivoli education: www-01.ibm.com/software/tivoli/education
- IBM SmartCloud Provisioning Self Paced Virtual Class

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