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The Next Generation of Provisioning Using Image Management

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Agenda

- How we got here

- Problems that we face today

- Using the Federated Image Library to address the problems

- Composite images and OVF

- Constructing images from parts

How We Got Here

- Growing emphasis on virtualization
- Server consolidation
- Image deployment instead of software installation

Images Everywhere

- The usefulness of images means that many people will benefit from using them

- The concept of an image is simple, so many people people will want to use them

- The result is a lot of interest in images, and a lot of people using them
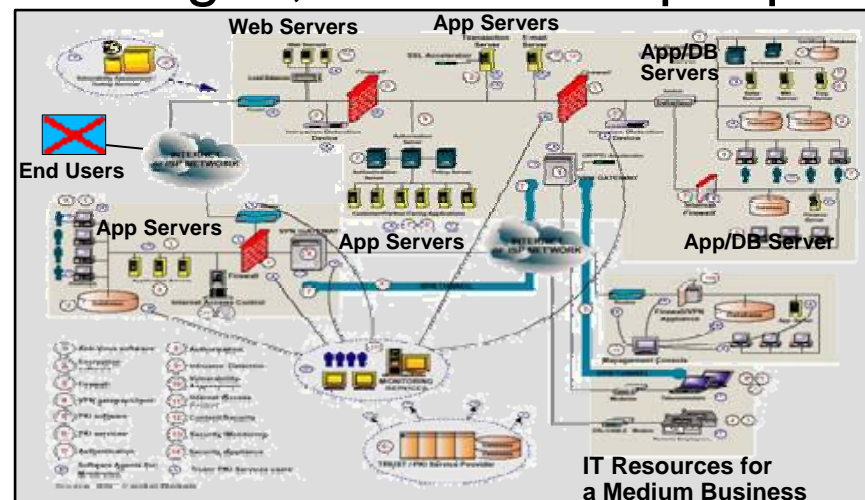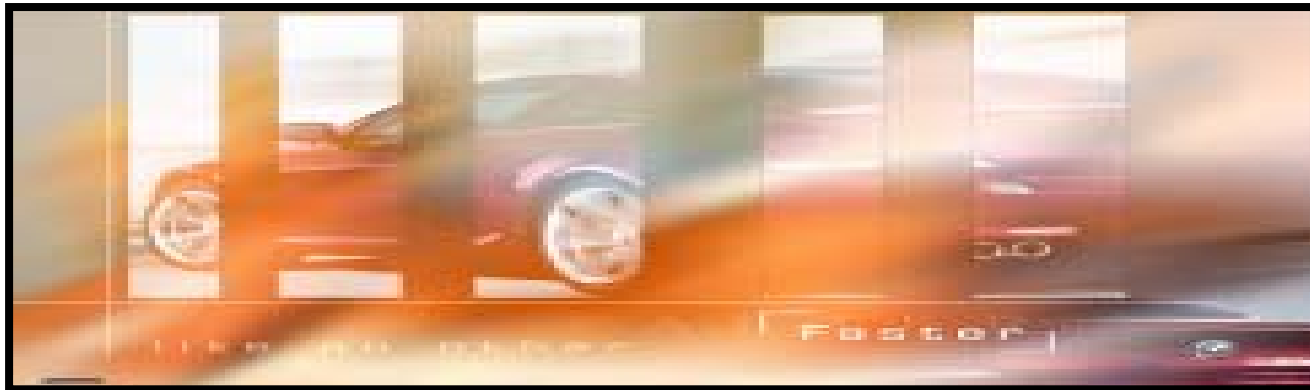
Image Characteristics

- Fast deployment
- Easy to obtain
- Pre-configured
- Resource flexibility

Images Enable New Business & Delivery Models

- Rapid, on-demand resource deployment
- Key underlying technology for Cloud
- Software delivery as a virtual appliance

Business Model Examples

- Bank with extensive IT infrastructure investment offers IT Services and Business applications
  - Delivered and managed via images in a Cloud
- Major telecom provider uses Cloud enablement to provide rapid development and access to third party mobile application providers
  - Enable online image library to develop and deploy infrastructure
- Growth in virtual desktop deployment via images

Capturing Images Is Easy

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

Keeping Track of Images Is Hard

- Images can be copied from place to place

- Often only the name of the image is visible and available for telling images apart

- An organization has many repositories where images are kept

- Each new virtualization technology introduces a new image repository

Understanding Images Is Much Harder

- We quickly forget what is in an image
- Where did it come from?
- Does it contain up-to-date software?
- How is it related to all the other images I know about?
- Is it still being used? Where?

Controlling Images Is Hard, Too

- Who should be able to see this image?
- Who should be able to deploy it?
- Has this image been replaced by an updated version?
- Can the old image be deleted?

Combining Images Is Manual Labor

- IT services are often provided by several servers combined together

- Capturing their images is done individually

- Similarly, their images are deployed individually

- An administrator is then given the manual job of fixing the configurations of the individual servers so that they work together again

Customer Use Case – ING Bank

- Consolidating 16 data centers into 2

- New data center will be all virtualized and using Cloud delivery model.

- X86, Power, Z platforms: Applications deployed based on workload characteristics.

- Deployment based on standardized (golden) stacks (Images) – OS, Middleware, Applications.

- Patching done by updating golden images

One-Stop Shopping for Images

- The Federated Image Library provides a single application for managing images
  - Keeps track of images
  - Understands images
  - Controls images

- It is a core component of Tivoli provisioning products
  - Tivoli Provisioning Manager (TPM)
  - Tivoli Service Automation Manager (TSAM)

- The Image Library can capture, deploy, and manage composite images
  - A composite image contains the images of servers that work together

Library Organization

- The Tivoli Image Library organizes

  – Master images

  – Saved images

  – Instance images

  – Image repositories

Composite Images

- Multiple virtual servers are captured together

- A templatizing agent is introduced to gather the configurations of common middleware

- Dependencies between virtual servers are captured in OVF metadata

- The composite image is deployed to create multiple virtual servers

- Dependencies between virtual servers are reconfigured at deployment time

- The results are multiple virtual servers that are ready to work together as soon as they are deployed
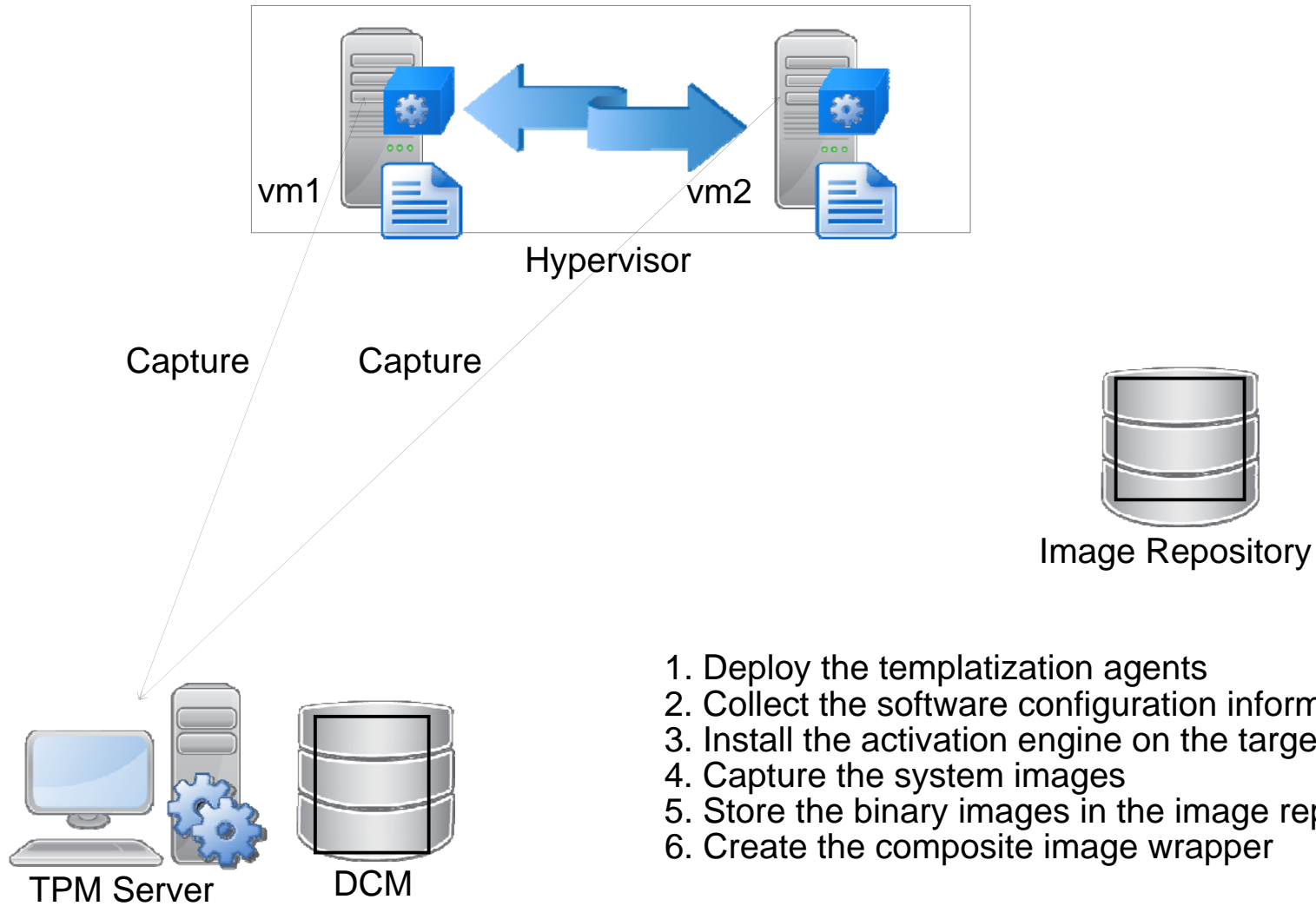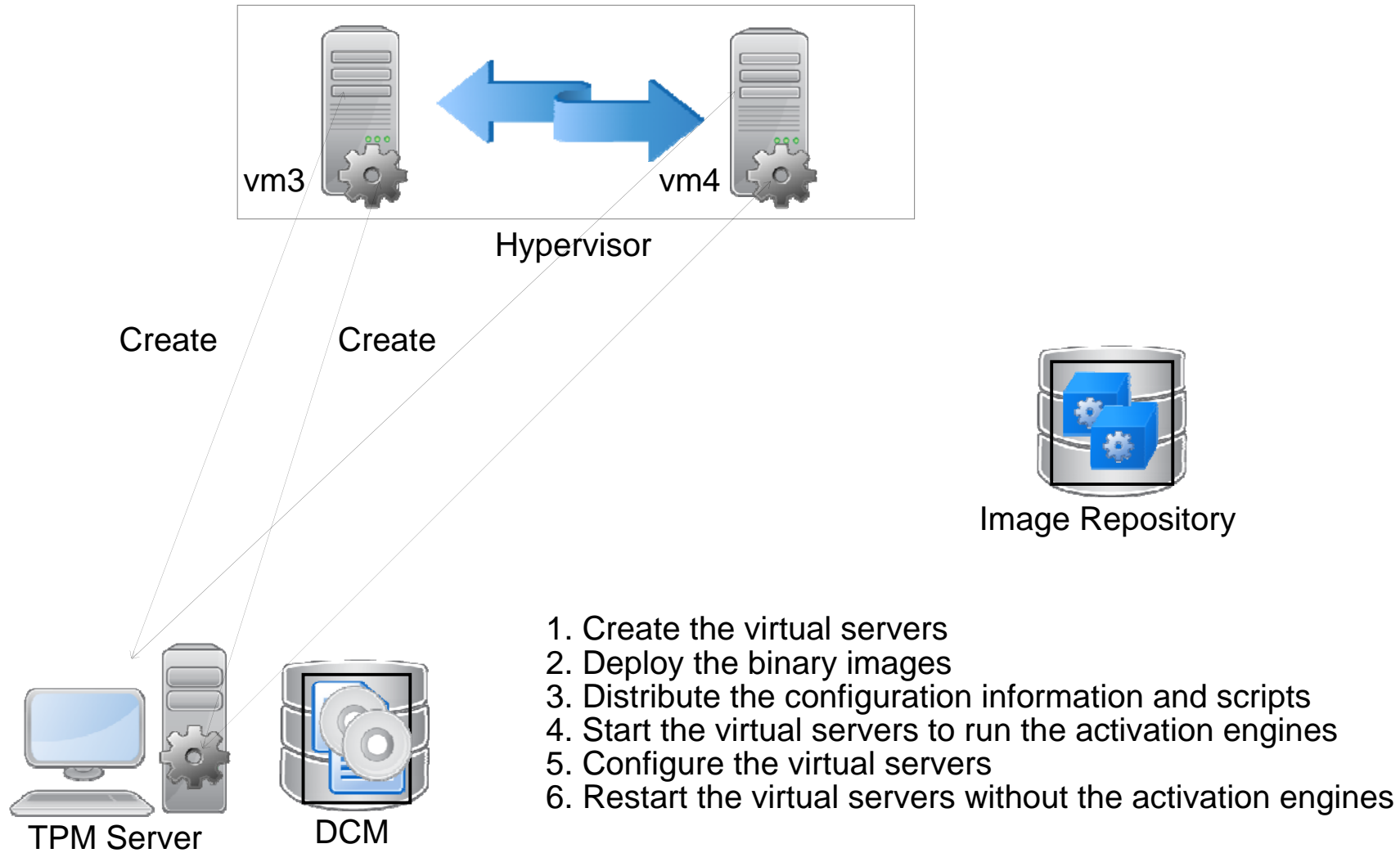
Usage of OVF and the Activation Engine

- Open Virtualization Format (OVF) provides a way to describe an image
  - Image contents can be described
  - Configurable parameters can be described
  - Virtual hardware configurations can be described
- An activation engine uses scripts and information form the OVF metadata to configure the new virtual server at first boot up

Composite Image Capture Flow

vm1

vm2

Hypervisor

Capture   Capture

Image Repository

1. Deploy the templatization agents
2. Collect the software configuration information
3. Install the activation engine on the targets
4. Capture the system images
5. Store the binary images in the image repository
6. Create the composite image wrapper

TPM Server   DCM

Composite Image Deployment Flow

vm3   vm4

Hypervisor

Create   Create

Image Repository

1. Create the virtual servers
2. Deploy the binary images
3. Distribute the configuration information and scripts
4. Start the virtual servers to run the activation engines
5. Configure the virtual servers
6. Restart the virtual servers without the activation engines

TPM Server   DCM

Instance Images

- Instance images record the deployments of master images to create virtual servers

- Usage of a master image can be tracked by listing all of its instances

- The master image for a virtual server is found by tracing back through its instance image

- Instance images retain the software and virtual hardware configuration used for virtual server creation
 - This information supports auditing, impact analysis, and troubleshooting

Image Versioning

- Images are connected in an ancestor-descendent relationship

- For a selected image, viewing its family tree shows its history and currency

- The Image Library can automatically detect when to link images
  - When capturing an image from a virtual server that was deployed from a master image, the two images are linked

- Images can also be manually connected, and the correct version numbers are determined automatically

Deploy and Capture with Versioning

Image Library

V1.1

V1.2

Capture request

Capture request

V1.2

V1.2.2.1
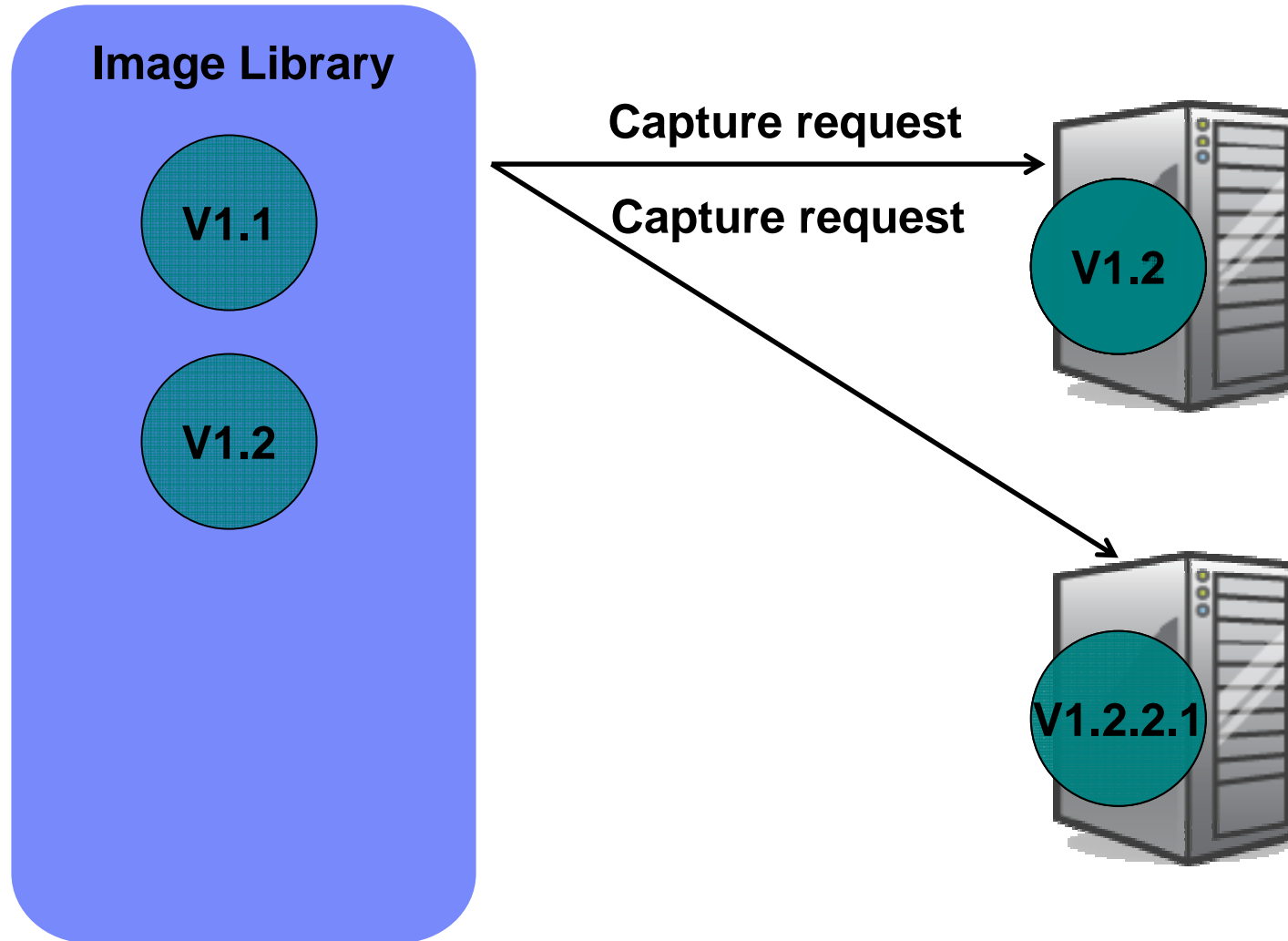
Saved Images

- Saved images are personalized images associated with a particular virtual server

- Saved images are used to restore an existing virtual server to a previous state

- Saved Images can also be used to recreate a deleted virtual server

Image Access Control

- Not all teams need access to all images

- Publishing an image to a team gives that team access
  - Applies to both master and saved images

- The unpublish action removes access for an image from a team

- An image can be "retired" by using a global unpublish to remove all access
  - Administrators continue to have access
  - Information about the image is retained

Building and Importing Images

- The IBM Image Construction and Composition Tool creates images from parts
  - An alternative to capturing an image of a running system

- These images can be imported into the Image Library and deployed to create new virtual servers
  - The image archives (OVA files) are copied to an Image Library repository

- The import operation understands versioning
  - The image being imported can be linked to an image already in the Image Library

Conclusion

- Image management is recognized by IBM as an important problem facing business today

- IBM is investing significantly in developing products and technologies to address the challenges

- A major delivery of image management capabilities was delivered in December, 2010 as Tivoli Provisioning Manager 7.2.0.1
  - Federated Image Library
  - Composite Image Deployment and Capture
  - Workload mobility
  - Image versioning
  - Instance image management
  - Interoperability with the IBM Image Construction and Composition Tool

Products and Resources

- www.ibm.com/tivoli

- IBM White Paper, "Taking control of the virtual image life cycle process: Putting virtual images to work for you"
  - TIW14068-USEN-00

- The IBM Image Construction and Composition Tool is available on alphaworks
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