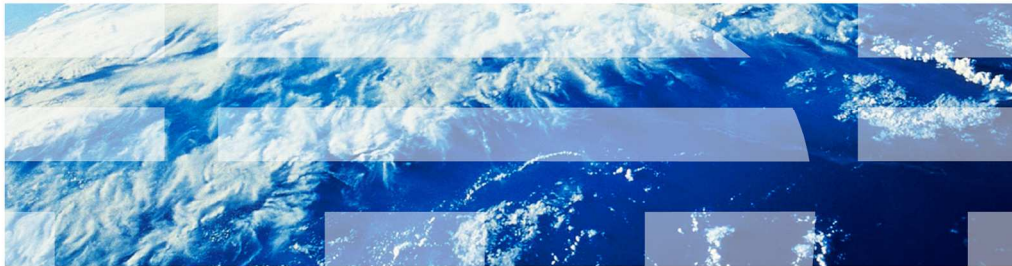


IBM PureApplication System

Disaster recovery



This presentation reviews disaster recovery in IBM PureApplication™ System.



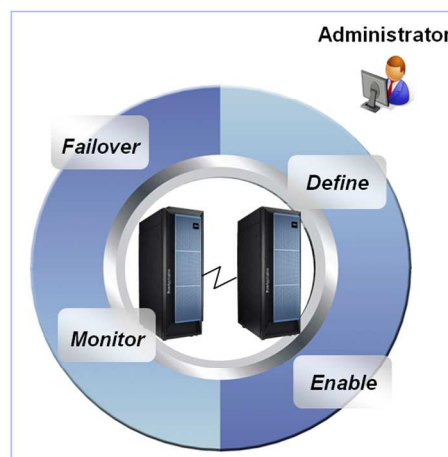
Table of contents

- Overview
- Define the environment
- Enable disaster recovery
- Monitor replication status
- Failover operations

First, an overview of disaster recovery is presented, including capabilities, replication and life cycle. Then you see how to define and enable the disaster recovery environment. Once the environment is setup, you can use built-in monitoring functions to verify that the replications are successful. Finally, you review planned and unplanned failover scenarios.

Disaster recovery capabilities

- Address key business continuity scenarios including planned and unplanned failover
- Disaster recovery provides capability to failover from one rack to another
- Solution coverage for all application workloads
- Planned failover - Zero data loss
- Unplanned failover - Near zero data loss
- Time to recover – Measured in several hours to restart workloads on backup and update external network routers
- Distance between primary and backup racks – Up to 8000 kilometers



The disaster recovery capabilities in IBM PureApplication System cover both planned and unplanned scenarios. For planned failover, you can prove that the disaster recovery environment is setup properly by planning a failover and running for a period of time on the backup system. For unplanned failover, you can quickly recover from primary site failures or rack failures, by starting your workloads on a backup rack. The backup rack is continually updated with changes as they happen on the primary rack, and all workloads are covered in the environment.

For a planned failover, no data loss is experienced. For an unplanned failover, loss of data is limited to data that is in transit from an end-user of a deployed application or an unsaved administrative action. Disaster recovery includes a primary rack which uses asynchronous storage replication to keep a backup rack up-to-date with only seconds of data loss. When an unplanned failover happens, it should take only a few hours to initiate the failover on the backup rack, restart workloads and advertise IP addresses on the external routers.

Using global mirroring replication in the V7000 storage unit, the maximum distance between the primary rack and the backup rack is 8000 kilometers. You can achieve this using fiber channel extenders or storage area network routers.

Replicated data

- V7000 data
 - Hardware replication using global mirroring
 - Copies volumes, images and patterns
- Management data
 - Recreated on backup rack using REST APIs
 - Includes cloud groups, IP groups, virtual machine configuration, users, licenses

The V7000 storage unit uses global mirroring to make asynchronous copies of your disk. This means that the write is considered complete after it is complete at the local disk. It does not wait for the write to be confirmed at the remote cluster.

Management data is replicated through software using REST API's. This includes cloud groups, IP groups, virtual machine configuration, user information and licenses.

Note that after failover virtual machines are started up with the exact same IP addresses and VLAN's so you cannot bring up workloads on the primary rack.

Verify compatibility of primary and backup

- Ensure that both systems are the same model number and have the same hardware configuration
- Ensure that the primary and backup systems are both operating at the same fix pack level
- Ensure that V7000 storage controllers are configured such that one is configured in storage layer mode and the other in replication layer mode
- Ensure that the backup system is clean:
 - Remove deployments, cloud groups, IP groups, storage volumes, user groups except for Everybody, licenses, VLAN ranges
 - Remove user ID's except for admin, ibmeng, the disaster recovery administrator and trust relationship security administrator

The primary rack and the backup rack must be compatible in a disaster recovery environment. There is a verification function in the user interface so you can perform these checks. Also, when you enable the disaster recovery profiles there is automatic verification with error messages for any failures.

You should ensure that the primary and backup systems are of the same hardware platform. For example, a W1500 system can only backup another W1500 system. A W1500 cannot backup a W1700 system. The racks should be the same model number with the same number of compute nodes. Also, both racks should have the same fix pack levels.

In previous releases, racks were shipped with both V7000 storage controllers configured in storage layer mode. To accommodate disk replication, one must be configured in replication layer mode while the other remains in storage layer mode.

The backup system should be a clean system without workload deployments and without configuration objects such as cloud groups, IP groups, volumes and user groups other than the 'Everybody' group, licenses and VLAN ranges. Also, remove user ID's except for admin, ibmeng, the disaster recovery administrator and the security administrator for the trust relationship between racks.

Disaster recovery life cycle overview

- Define the disaster recovery environment
 - Manual tasks for racks and connectivity
 - Definitions for primary and backup
- Enable disaster recovery
- Monitor the disaster recovery environment
 - Provides near-real time status of both disk and management database replication
 - Allows drill-down view to isolate disk replication to cloud group or system volume
- Failover operations
 - Initiate planned or unplanned failover
 - Manual tasks to complete infrastructure definitions at backup rack and start workloads

This slide shows the life cycle for the disaster recovery environment.

When defining the environment, there are a few manual tasks that are required to prepare the racks for disaster recovery and to setup fiber channel connectivity. Then, you create disaster recovery profiles, one on each rack in the disaster recovery relationship and you need to validate that the environment is configured properly before enabling disaster recovery.

When you enable disaster recovery, replication begins for the disks and management data. For a fully loaded V7000, it can take some time to do the initial copy, but after that, it is just delta copies. You enable the profile on the backup rack first, then you enable the profile on the primary rack.

Monitoring functions are provided to check the replication status between the racks. You can see the status of disk and management data, and drill down to check status by cloud group or specific volumes.

There are failover operations for both planned and unplanned failovers. For a planned failover, you start the failover on the primary profile, then follow that with a failover operation on the backup profile. For an unplanned failover, you initiate the failover operation on the backup profile. After failover, there are manual tasks required to start selected workloads and advertise IP addresses.



Section

Define the disaster recovery environment

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Disaster recovery

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This section shows you how to define the disaster recovery environment.

Preliminary steps

- Common steps for both racks
 - V7000 storage controller reconfiguration for v1.0 racks
 - Create V7000 fiber channel connectivity between racks
 - Define trust user id
- Steps for backup rack
 - Manually configure the top of rack switches
 - Stop running workloads and creating new configurations

In previous releases, the racks were shipped with both V7000 storage controllers configured in storage layer mode. When configured in this manner, both V7000 storage controllers operate independently of each other and as a result, volumes managed by different V7000 storage controllers cannot be included in the same consistency group. To overcome this limitation, one of the V7000 storage controllers on a rack is configured in replication layer mode while the other remains in storage layer mode. New racks are already configured in this manner, however racks for previous versions need to be reconfigured.

A fiber channel connection to a device such as the Brocade Fiber Channel switch is required to enable the connection of storage controllers. Creating this connection involves creating a zone for the ports on the V7000 storage controllers. To create the zone, you need the world wide port number so this has been added to the user interface. You can access it in the menu: Hardware > Storage devices > Storage node.

When disaster recovery is enabled, the primary rack issues REST API calls to the backup system. A trust relationship simplifies exchanging data between primary and backup systems. You need to use the same user ID and password on both systems, and this user ID must have the security administrator role.

You need to manually configure the top of rack switches on the backup rack such that the VLAN assignments to external ports are equivalent to those of the primary rack. You should make sure that the switches are configured similarly from the beginning and that any changes to the primary rack switches are replicated in the backup rack's switches as they occur.

There is a restriction that the backup rack is dedicated for recovery. Workloads might not run on a rack configured as a backup. There should be no configuration performed on the rack other than the configuration required to be a backup. Any unexpected configuration on the backup rack prevents the backup role from being enabled.

IBM

Create a new disaster recovery profile

- User ID with full permissions for 'Disaster recovery administration'

9 Disaster recovery © 2013 IBM Corporation

You need to create a disaster recovery profile on the primary rack and the backup rack. You can access the disaster recovery page in the system console within the System menu. To create a profile, your user ID should have full permissions for 'Disaster recovery administration'.

When creating the profile, you specify the peer management location which is the peer's management IP address. You also specify the user and password for establishing the trust relationship. This user should have full permissions for 'Security administration'.

The screenshot displays the IBM PureApplication System console. At the top, the navigation bar includes 'Welcome', 'Cloud', 'Hardware', 'Reports', and 'System'. The main content area is titled 'Disaster Recovery Profiles' and shows a list with 'Production DR Profile' selected. The 'Production DR Profile' card is expanded, showing three sections: 'Enable', 'Monitor', and 'Failover'. The 'Enable' section is active, with a 'Validate' button highlighted in a red box. Below the 'Enable' section, a message states: 'CWZIP92241 The disaster recovery profile is defined.' Below this message, there are statistics for 'Jobs' (Pending: 0, Started: 0) and 'Events' (Error: 0, Warning: 0). At the bottom, a table provides details for the 'Production DR Profile':

Name	Production DR Profile
Description	DR profile for production system
Role	
Peer management location	172.21.64.32

At the bottom of the console, the page number '10' is visible on the left, 'Disaster recovery' in the center, and '© 2013 IBM Corporation' on the right.

This shows the profile after it has been created. There are three sections on the profile which are Enable, Monitor and Failover. The latter two are disabled since the profile has not been enabled. But the next step is to validate that the rack is ready to participate in a disaster recovery relationship.

Validated disaster recovery profile

The screenshot displays the IBM System Console interface for a 'Production DR Profile'. The profile is in a 'Validated' state, indicated by a green checkmark in the left-hand navigation pane. The main content area is divided into three sections: 'Enable', 'Monitor', and 'Failover'. The 'Enable' section shows two steps: 'Step 1: Validate prerequisites and connectivity' (with a 'Revalidate' button and a green checkmark) and 'Step 2: Select disaster recovery role and enable replication' (with an 'Enable' button). A message box below the steps states 'CWZ1P92301 Disaster recovery validation succeeded.' The 'Monitor' section shows 'Management Data: Stopped' and 'Storage: Unconfigured'. The 'Failover' section shows 'Step 1: Prepare the system for failover' and 'Step 2: Failover to the backup system'. At the bottom, there are summary statistics for Jobs, Events, Name, Description, Role, and Peer management location.

Jobs	Pending: 0	Started: 1	View details...
Events	Error: 0	Warning: 0	View details...
Name	Production DR Profile		
Description	DR_profile for production system		
Role			
Peer management location	172.21.64.32		

This slide shows a profile which has been validated, and a message indicates that the validation succeeded. Notice that the state of the profile changes to 'Validated' which is indicated by the green check mark. The next step is to enable the disaster recovery role.



Section

Enable disaster recovery

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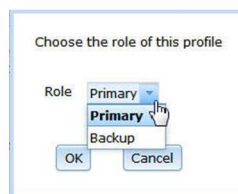
Disaster recovery

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This section shows you how to enable the disaster recovery environment.

Enable disaster recovery

- Backup rack must be enabled before enabling the primary rack
- Once enablement is started on primary:
 - Initial copies for disk and management database replication from primary to backup system are started
 - Provides replication status information on both primary and backup system



The backup rack must be enabled before the primary rack. If backup rack is not enabled, then the enable action on the primary rack fails.

On the profile page, select the button labeled 'Enable', then you are prompted to choose the role, either 'Primary' or 'Backup'.

After enablement is complete for both racks then initial copies begin for the disks and management data. This process can take a long time to complete depending on the network speed and size of the data. After the initial copies are complete, then the changes are replicated as they occur. You can monitor the status of the replication at any time on either of the racks.

Backup role enablement in progress

The screenshot displays the 'Backup DR profile' configuration page in the IBM PureASv11 interface. The page is divided into several sections: 'Enable', 'Monitor', and 'Failover'. The 'Enable' section shows two steps: 'Step 1: Validate prerequisites and connectivity' (with a 'Revalidate' button) and 'Step 2: Select disaster recovery role and enable replication' (with an 'Enable' button). The 'Monitor' section shows 'Management Data' with 'Storage' status as 'Stopped' and 'Unconfigured'. The 'Failover' section shows 'Step 1: Prepare the system for failover' and 'Step 2: Take control from the primary rack'. A red box highlights a message: 'CWZIP9238I Disaster recovery enablement is in progress. Waiting for the primary system to be enabled.' Below this, the 'Jobs' section shows 'Pending: 0' and 'Started: 3'. The 'Events' section shows 'Error: 0' and 'Warning: 2'. The 'Name' field is 'Backup DR profile', the 'Description' is 'DR profile for backup system', and the 'Role' field is 'Backup'. The 'Peer management location' is '172.21.16.32'. The page number '14' and 'Disaster recovery' are at the bottom left, and '© 2013 IBM Corporation' is at the bottom right.

Jobs	Pending: 0	Started: 3	View details...
Events	Error: 0	Warning: 2	View details...
Name	Backup DR profile		
Description	DR profile for backup system		
Role	Backup		
Peer management location	172.21.16.32		

On this slide, you can see the backup profile after enable has been selected. A message indicates that enablement in progress, because the primary rack has not been enabled yet. The role field shows that it is in the backup role.

Primary role enabled

Production DR Profile Disable X Delete

Enable ✓
 Step 1: Validate prerequisites and connectivity ✓
 Step 2: Select disaster recovery role and enable replication ✓

Monitor
 View the replication status

Failover
 Step 1: Prepare the system for failover
 Step 2: Failover to the backup system

Management Data:
 Storage: Pending
 Unconfigured

ⓘ CWZIP9239I Disaster recovery is enabled in primary role.

Jobs: Pending: 0 Started: 1 [View details...](#)

Events: Error: 0 Warning: 0 [View details...](#)

Name: Production DR Profile

Description: DR profile for production system

Role: Primary

Peer management location: 172.21.64.32

15 Disaster recovery © 2013 IBM Corporation

Here you can see the primary profile after it has been enabled. A message indicates that disaster recovery is enabled in the primary role. The role field also shows that it is in the primary role. Notice also that the Monitor and Failover sections are now available for your use.

The screenshot displays the IBM System Console interface for a Backup DR profile. At the top, a blue banner reads "Backup role enabled". Below this, a notification bar states: "The system is in disaster recovery backup mode: Workload Console is disabled and only certain operations on System Console are available." The main content area is divided into three sections: "Enable" (with a checkmark), "Monitor" (with a monitor icon and "View the replication status" link), and "Failover" (with a server rack icon and "View details" link). A message box indicates "CWZIP9240I Disaster recovery is enabled in backup role." The "Jobs" section shows "Pending: 0" and "Started: 4". The "Events" section shows "Error: 0" and "Warning: 2". The "Name" field is "Backup DR profile" and the "Description" is "DR profile for backup system". The "Role" field is "Backup". The "Peer management location" is "172.21.16.32".

On this slide, you can see the backup profile after the primary profile has been enabled. A message indicates that backup rack is now enabled. The role field also shows that it is in the backup role. Notice also that the Monitor and Failover sections are now available for your use and the Workload Console is disabled.



Section

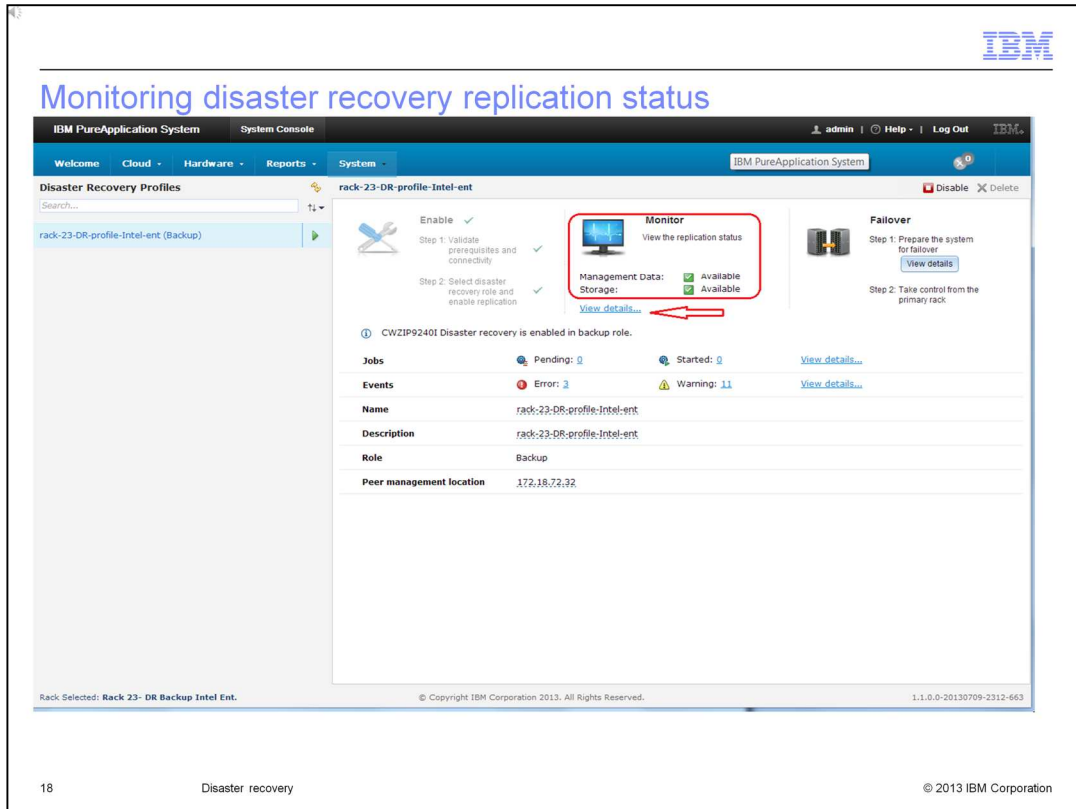
Monitor replication status

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Disaster recovery

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This section shows you the monitoring capability for checking disaster recovery status.



Monitoring is provided on both the primary and backup racks and the information displayed is similar. A summary of the replication monitoring status is displayed on the disaster recovery profile panel. There are two types of replication monitoring: management data monitoring and storage monitoring. Detailed monitoring information for both is obtained by clicking on the “view details” link.

Full visibility to real-time replication status

IBM PureApplication System System Console

Disaster Recovery Monitoring

Management Data Replication State: Available

Workload Data Replication State: Available

Storage controller connection state: Connected

Disk replication state for workload management: Available

Cloud groups Images

Name:	RC2 - cloud group
Disaster recovery storage state:	Available
Disaster recovery storage reason:	CWZIP9212I The disk replication state for cloud group RC2 - cloud group has changed from pending to available because all volumes that are associated with this cloud group have completed copying.
Last state change time:	7/12/13, 2:06 PM

Name:	TestCG
Disaster recovery storage state:	Available
Disaster recovery storage reason:	CWZIP9212I The disk replication state for cloud group TestCG has changed from pending to available because all volumes that are associated with this cloud group have completed copying.
Last state change time:	7/12/13, 2:06 PM

Name:	magic
Disaster recovery storage state:	Available
Disaster recovery storage reason:	CWZIP9212I The disk replication state for cloud group magic has changed from pending to available because all volumes that are associated with this cloud group have completed copying.
Last state change time:	7/12/13, 2:06 PM

Rack Selected: Rack 23- DR Backup Intel Ent. © Copyright IBM Corporation 2013. All Rights Reserved. 1.1.0.0-20130709-2312-663

You can see the replication state of the management database and disk. For disk replication, you can drill-down to volumes by cloud group, and you can view replication by images. There are two tabs, one for cloud groups and one for images.

You can obtain additional information about the storage controller connection state and the disk replication state for workload management by hovering the cursor over the information icon.

The screenshot displays the IBM PureApplication System System Console interface. At the top, the navigation bar includes 'Welcome', 'Cloud', 'Hardware', 'Reports', and 'System'. The main content area is titled 'Disaster Recovery Monitoring' and shows the following status:

- Management Data Replication State:** Available (7/10/13, 6:42 PM)
- Workload Data Replication State:** Available
- Storage controller connection state:** Connected
- Disk replication state for workload management:** Available

Below this, the 'Cloud groups' tab is active, showing details for the 'RC2 - cloud group':

- Name:** RC2 - cloud group
- Disaster recovery storage state:** Available
- Disaster recovery storage reason:** CWZIP92121 The disk replication state for cloud group RC2 - cloud group has changed from pending to available because all volumes that are associated with this cloud group have completed copying.
- Last state change time:** 7/12/13, 2:06 PM

The 'Virtual machines' section shows a total of 273 VMs, with 273 available. A filter dropdown is set to 'not available'. A table lists the virtual machines and their disks:

Name	recovery storage state	Disaster recovery storage progress	Capacity	Last state change time
ipas-1par-075-003-BPM PC Database-BPM Adv Process Center-1092	Available			7/12/13, 2:06 PM
Hard disk 1	Available		12 GB	7/12/13, 2:06 PM
Hard disk 2	Available		20 GB	7/12/13, 2:06 PM
vm_BPM_PC_Database_3_disk_0	Available		30 GB	7/12/13, 2:06 PM
ipas-1par-075-004-BPM PC IHS-BPM Adv Process Center-1092	Available			7/12/13, 2:06 PM
ipas-1par-075-005-BPM PC DMOR-BPM Adv Process Center-1092	Available			7/12/13, 2:06 PM
ipas-1par-075-007-BPM PC Custom Node-BPM Adv Process	Available			7/12/13, 2:06 PM

Red boxes and arrows in the original image highlight the cloud group icon, the 'not available' filter, and the first virtual machine row.

Here you see the cloud group tab which shows the status by cloud group. One of the cloud groups has been expanded so you can see more detailed information. In the drill down for this cloud group, you see a list of virtual machines. One of the virtual machines has been expanded so you can see detailed information about its disks. If an initial copy of a disk was being performed, the percentage complete would be shown as well.

By default, only the virtual machines that are not available are shown. To see all virtual machines, select "All" for the drop down box "Filter by current virtual machine state".

Image status

IBM PureApplication System System Console admin Help Log Out

Welcome Cloud Hardware Reports System

Disaster Recovery Monitoring

Management Data Replication State ✔ Available

Management data replication state reason: CWZIP02641 The management data replication state has changed to available. Continuous replication of management data is functioning properly.
Last state change time: 7/10/13, 6:42 PM

Workload Data Replication State ✔ Available

Storage controller connection state: ↔ Connected ⓘ
Disk replication state for workload management: ✔ Available ⓘ

Cloud groups **Images**

Name	Status	Disaster recovery storage state	Disaster recovery storage progress	Capacity	Last state change time
Advanced Middleware Configuration v1.1 for x86 1.1.0.0	✔ Available	✔ Available		48,002 GB	7/12/13, 2:00 PM
DB2 Enterprise 10.1.0.2	✔ Available	✔ Available		35,002 GB	7/12/13, 2:00 PM
DB2 Enterprise 9.7.0.8	✔ Available	✔ Available		35,002 GB	7/12/13, 2:00 PM
IBM Business Process Manager Advanced 6.0.1.0 RHEL 6 x64 (VMWare)	✔ Available	✔ Available		35,346 GB	7/12/13, 2:00 PM
IBM OS Image for Red Hat Linux Systems	✔ Available	✔ Available		12,002 GB	7/12/13, 2:00 PM
WebSphere Application Server 7.0.0.27 32-bit RHEL 6 x86_64 (VMWare)	✔ Available	✔ Available		26,194 GB	7/12/13, 2:00 PM
WebSphere Application Server 7.0.0.27 64-bit RHEL 6 x86_64 (VMWare)	✔ Available	✔ Available		26,316 GB	7/12/13, 2:00 PM
WebSphere Application Server 8.0.0.6 32-bit RHEL 6 x86_64 (VMWare)	✔ Available	✔ Available		26,202 GB	7/12/13, 2:00 PM
WebSphere Application Server 8.0.0.6 64-bit RHEL 6 x86_64 (VMWare)	✔ Available	✔ Available		26,202 GB	7/12/13, 2:00 PM
WebSphere Application Server 8.5.0.2 32-bit RHEL 6 x86-64 (VMWare)	✔ Available	✔ Available		27,456 GB	7/12/13, 2:00 PM

1 - 10 of 12 items

Rack Selected: Rack 23- DR Backup Intel Ent. © Copyright IBM Corporation 2013. All Rights Reserved. 1.1.0.0-20130709-2312-663

21 Disaster recovery © 2013 IBM Corporation

On this slide, you see the images page where the images are listed along with disaster recovery storage state, storage progress, capacity and last state change time.

The screenshot displays the IBM PureApplication System System Console interface. The main heading is "Fiber connection broken – Monitoring summary". The interface shows a disaster recovery profile named "rack-23-DR-profile-Intel-ent". The profile is in the "Monitor" state, and the "Storage" status is highlighted in red as "Disconnected". The console also shows a list of jobs, events, and a table with details for the profile.

Jobs	Pending: 0	Started: 0	View details...
Events	Error: 3	Warning: 10	View details...
Name	rack-23-DR-profile-Intel-ent		
Description	rack-23-DR-profile-Intel-ent		
Role	Backup		
Peer management location	172.18.72.32		

When a storage replication error occurs, the status in the storage monitoring summary on the disaster recovery profile page changes from 'Available' to 'Disconnected', 'Failed', or 'Stopped'. In this case, the fiber connection is broken, which creates a storage replication error and the status changes to disconnected.

Fiber connection broken – Events issued

The screenshot shows the IBM PureApplication System System Console interface. At the top, a notification states: "The system is in disaster recovery backup mode: Workload Console is disabled and only certain operations on System Console are available." Below this, the navigation menu includes Welcome, Cloud, Hardware, Reports, and System. The main content area displays a list of events filtered by source: "Disaster Recovery Information rack-23-DR-profile-Intel-ent".

Event text	Type	Severity	Category	Time interval	Chronological	Updated on	Count	Actions
<input type="checkbox"/> CIVZP9218 The disk replication state for Workload Management has changed from pending to available because a volume has completed copying.	Disaster Recovery	Informational	Alert			Jul 12, 2013, 2:06:07 PM	4	
<input type="checkbox"/> CIVZP9217 The disk replication state for Workload Management has changed to pending because a volume has begun to copy. The state will become available when the copy completes.	Disaster Recovery	Informational	Alert			Jul 12, 2013, 2:00:50 PM	4	
<input type="checkbox"/> CIVZP9221 The storage controller connection state has changed to connected.	Disaster Recovery	Informational	Alert			Jul 12, 2013, 1:59:20 PM	4	
<input checked="" type="checkbox"/> CIVZP923E The storage controller connection state has changed to disconnected. Check fibre channel connectivity. The state will become connected when the partner is visible.	Disaster Recovery	Warning	Alert			Jul 12, 2013, 1:43:09 PM	1	
<input checked="" type="checkbox"/> CIVZP9219E The disk replication state for Workload Management has changed from available to stopped because a volume encountered a problem. Check fibre channel connectivity and restart disk replication.	Disaster Recovery	Warning	Alert			Jul 12, 2013, 1:43:00 PM	1	
<input type="checkbox"/> CIVZP925J The management data replication state has changed to available. Continuous replication of management data is functioning properly.	Disaster Recovery	Informational	Alert			Jul 10, 2013, 6:42:11 PM	7	
<input type="checkbox"/> CIVZP9240 Disaster recovery is enabled in backup role.	Disaster Recovery	Informational	Alert			Jul 10, 2013, 4:41:15 PM	3	
<input type="checkbox"/> CIVZP9338 Disaster recovery enablement is in progress and is deleting image cache volumes.	Disaster Recovery	Informational	Alert			Jul 10, 2013, 4:38:47 PM	3	
<input type="checkbox"/> CIVZP9253 The management data replication state has changed to pending while waiting for data replication to start on the primary system.	Disaster Recovery	Informational	Alert			Jul 10, 2013, 4:36:50 PM	3	

A red arrow points to the two events with IDs CIVZP923E and CIVZP9219E, which are related to a fiber connection issue. The footer of the screenshot shows "23 Disaster recovery © 2013 IBM Corporation".

Most likely, you are not monitoring the disaster recovery profile looking for a change in the storage monitoring summary. So an event is triggered when a disk replication error is encountered. As shown in this slide, two events were issued when the fiber connection was broken.

Fiber connection broken – Monitoring details

IBM PureApplication System System Console | admin | Help | Log Out

Management Data Replication State: Available

Management data replication state reason: CWZIP9264I The management data replication state has changed to available. Continuous replication of management data is functioning properly.
Last state change time: 7/10/13, 6:42 PM

Workload Data Replication State: Disconnected

Storage controller connection state: Disconnected ⓘ

Disk replication state for workload management: Stopped ⓘ

Cloud groups | Images

RC2 - cloud group
 Disaster recovery storage state: Stopped
 Disaster recovery storage reason: CWZIP9213E The disk replication state for cloud group RC2 - cloud group has changed from available to stopped because one or more volumes that are associated with this cloud group have encountered a problem. Check fibre channel connectivity and restart disk replication.
 Last state change time: 7/12/13, 1:43 PM

TestCG
 Disaster recovery storage state: Stopped
 Disaster recovery storage reason: CWZIP9213E The disk replication state for cloud group TestCG has changed from available to stopped because one or more volumes that are associated with this cloud group have encountered a problem. Check fibre channel connectivity and restart disk replication.
 Last state change time: 7/12/13, 1:43 PM

Virtual machines Total: 157 Stopped: 157

Filter by current virtual machine state: not available

Name	Disaster recovery storage state	Disaster recovery storage progress	Capacity	Last state change time
ipaa-Inst-072-002-OMGR-RC2 - PDA-2013 - hvconf-121	Stopped			7/12/13, 1:43 PM
ipaa-Inst-072-003-MS Onlr Node-RC2 - PDA-2013 - hvconf-122	Stopped			7/12/13, 1:43 PM
ipaa-Inst-072-004-MS Onlr Node-RC2 - PDA-2013 - hvconf-123	Stopped			7/12/13, 1:43 PM
ipaa-Inst-072-006-MS Onlr Node-RC2 - PDA-2013 - hvconf-124	Stopped			7/12/13, 1:43 PM
ipaa-Inst-072-007-MS Onlr Node-RC2 - PDA-2013 - hvconf-125	Stopped			7/12/13, 1:43 PM

Total: 457 Stateful 0

Rack Selected: Rack 23 - DR Backup Intel Ent. | Copyright IBM Corporation 2013. All Rights Reserved. | 1.1.0.0-20130709-2312-663

24 | Disaster recovery | © 2013 IBM Corporation

Additional diagnostic information may be required when a disk replication error event is triggered. The monitoring details page provides an explanation of disk replication issues along with diagnosis and potential corrective actions. In this case, since the storage area network connectivity was lost the storage controller connection state is disconnected. Since the storage controller state is disconnected, the status of all disk replication is also stopped. Since the status of all disk replication is stopped, the status of all virtual machines is stopped.

Fiber connection restored – Monitoring details

Disaster Recovery Monitoring

Management Data Replication State Available

Management data replication state reason: CWZ1P9764I The management data replication state has changed to available. Continuous replication of management data is functioning properly.
Last state change time: 7/10/13, 6:42 PM

Workload Data Replication State Stopped Restart

Storage controller connection state: Connected

Disk replication state for workload management: Stopped

Cloud groups

RC2 - cloud group Stopped

Disaster recovery storage state: Stopped
Disaster recovery storage reason: CWZ1P9213E The disk replication state for cloud group RC2 - cloud group has changed from available to stopped because one or more volumes that are associated with this cloud group have encountered a problem. Check fibre channel connectivity and restart disk replication.
Last state change time: 7/12/13, 1:43 PM

TestCG Stopped

Disaster recovery storage state: Stopped
Disaster recovery storage reason: CWZ1P9213E The disk replication state for cloud group TestCG has changed from available to stopped because one or more volumes that are associated with this cloud group have encountered a problem. Check fibre channel connectivity and restart disk replication.
Last state change time: 7/12/13, 1:43 PM

Virtual machines Total: 157 Stopped: 157

Filter by current virtual machine state: not available

Name	Disaster recovery storage state	Disaster recovery storage progress	Capacity	Last state change time
ipas-nsar-072-002-DMGR-RC2 - PGA 2013 - hsc08-121	Stopped			7/12/13, 1:43 PM
ipas-nsar-072-003-4HS Only Node-RC2 - PGA 2013 - hsc08-122	Stopped			7/12/13, 1:43 PM
ipas-nsar-072-004-4HS Only Node-RC2 - PGA 2013 - hsc08-123	Stopped			7/12/13, 1:43 PM
ipas-nsar-072-006-4HS Only Node-RC2 - PGA 2013 - hsc08-124	Stopped			7/12/13, 1:43 PM

Rack Selected: Rack 23 - DR Backup Intel Ent. © Copyright IBM Corporation 2013. All Rights Reserved. 1.1.0.0-20130709-2312-663

Once the fiber connection is restored the storage controller connection state becomes connected. The states of the disks and virtual machines remain stopped. An option to restart disk replication opens. While in the stopped state, the disks are in a consistent state. Restarting disk replication temporarily puts the disks into an inconsistent state while it catches things up. A planned failover cannot occur while disks are in an inconsistent state.

IBM PureApplication System System Console

admin | Help | Log Out

Welcome Cloud Hardware Reports System

Disaster Recovery Monitoring

Management Data Replication State Available

Management data replication state reason: CWZIP92641 The management data replication state has changed to available. Continuous replication of management data is functioning properly.
Last state change time: 7/10/13, 6:42 PM

Workload Data Replication State Pending

Storage controller connection state: Connected

Disk replication state for workload management: Pending

Cloud groups Images

Name:	RC2 - cloud group
Disaster recovery storage state:	Pending
Disaster recovery storage reason:	CWZIP92111 The disk replication state for cloud group RC2 - cloud group has changed to pending because one or more volumes that are associated with this cloud group began copying. The state will become available when the copy completes.
Last state change time:	7/12/13, 2:00 PM
Name:	TestCG
Disaster recovery storage state:	Pending
Disaster recovery storage reason:	CWZIP92111 The disk replication state for cloud group TestCG has changed to pending because one or more volumes that are associated with this cloud group began copying. The state will become available when the copy completes.
Last state change time:	7/12/13, 2:00 PM
Name:	magic
Disaster recovery storage state:	Pending
Disaster recovery storage reason:	CWZIP92111 The disk replication state for cloud group magic has changed to pending because one or more volumes that are associated with this cloud group began copying. The state will become available when the copy completes.
Last state change time:	7/12/13, 2:00 PM

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Once restart is selected, the disk replication state moves to pending until all remote copies catch up. Pending indicates that a disk is in an inconsistent state. The more common reason for a disk to be in an inconsistent state is that the initial copy of the disk is being performed.

Disk replication returns to available – monitoring details

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Management Data Replication State: ✔ Available

Management data replication state reason: CWZ1P92641 The management data replication state has changed to available. Continuous replication of management data is functioning properly.
 Last state change time: 7/10/13, 6:42 PM

Workload Data Replication State: ✔ Available

Storage controller connection state: ↔ Connected ⓘ

Disk replication state for workload management: ✔ Available ⓘ

Name	Disaster recovery storage state	Disaster recovery storage reason	Last state change time
RC2 - cloud group	✔ Available	CWZ1P92121 The disk replication state for cloud group RC2 - cloud group has changed from pending to available because all volumes that are associated with this cloud group have completed copying.	7/12/13, 2:06 PM
TestCG	✔ Available	CWZ1P92121 The disk replication state for cloud group TestCG has changed from pending to available because all volumes that are associated with this cloud group have completed copying.	7/12/13, 2:06 PM
magic	✔ Available	CWZ1P92121 The disk replication state for cloud group magic has changed from pending to available because all volumes that are associated with this cloud group have completed copying.	7/12/13, 2:06 PM

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Once things catch up, the disk replication state returns to available.



Section

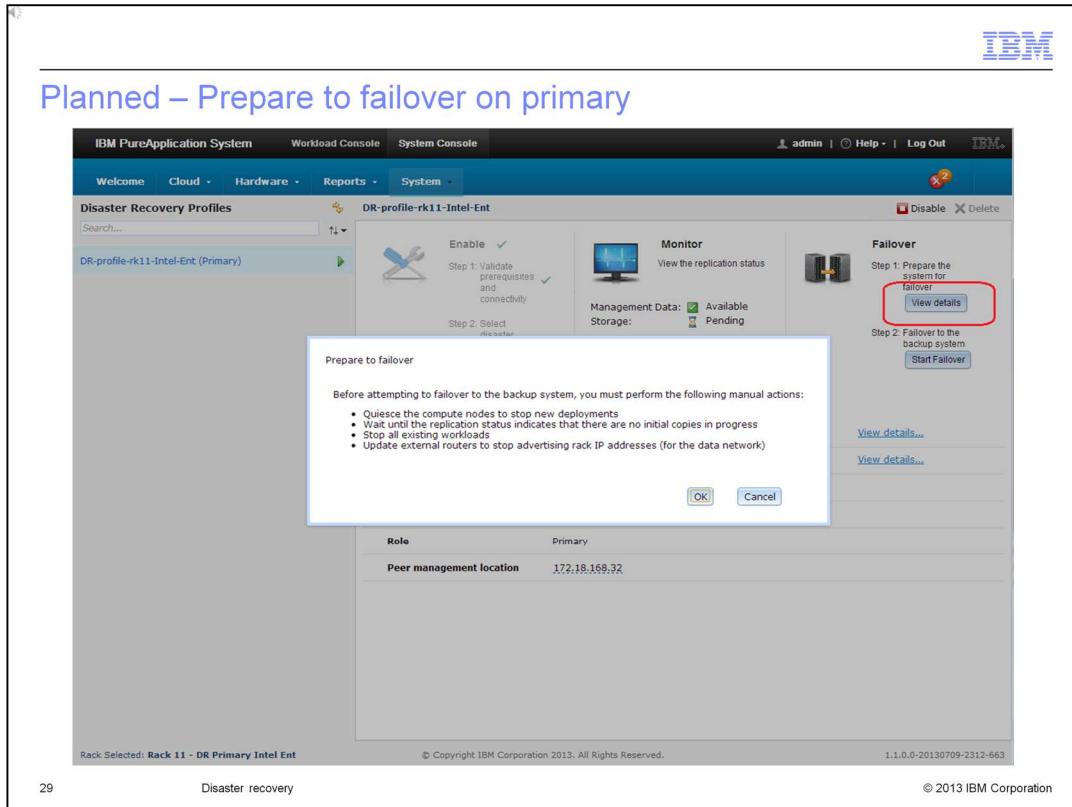
Failover operations

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Disaster recovery

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This section covers failover operations for planned and unplanned scenarios.



For a planned failover, you initiate it on the primary disaster recovery profile, then follow up with the actual failover on the backup rack. On the primary profile in the first step, click 'View Details' and a popup reminds you of the manual actions that need to be performed. You should quiesce the compute nodes to ensure no new deployments take place. Also, verify that the replication status shows that the initial copies are complete. You should stop the workloads on the system and update the external routers to stop advertising the rack IP addresses.

Planned – Failover on primary

The screenshot displays the IBM Disaster Recovery Profiles interface. The main window shows the configuration for 'DR-profile-rk11-Intel-Ent'. The 'Failover' section is active, and a modal dialog box is open with the question 'Are you sure you want to failover the system?' and 'OK' and 'Cancel' buttons. The 'Start Failover' button in the 'Failover' section is highlighted with a red box.

Property	Value
Description	DR-profile-rk11-Intel-Ent
Role	Primary
Peer management location	172.18.168.32

- After failover, role shows '(none)' and state shows 'Validated'
- Need to complete the failover on the backup

Planned and unplanned - Prepare to failover on backup

The screenshot displays the 'Backup DR profile' configuration page. A modal dialog box titled 'Prepare to failover' is open, showing a dropdown menu for 'Type of failover' with 'Planned' selected. The dialog contains the following text:

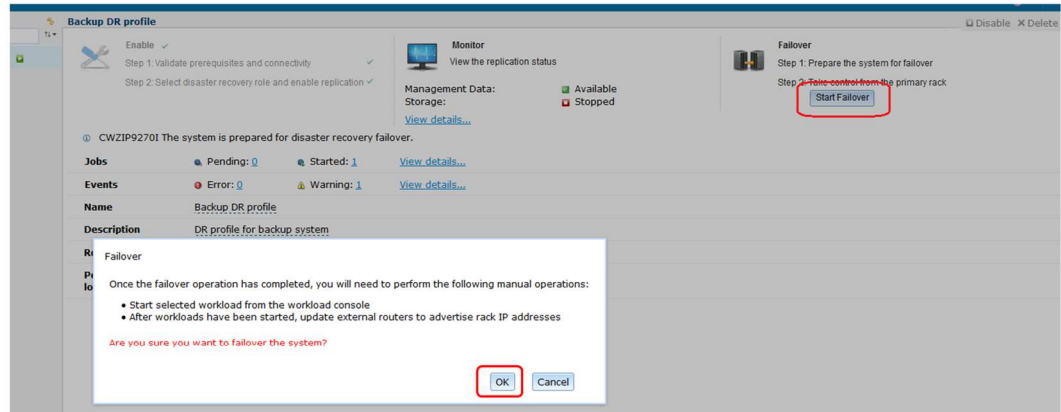
Before attempting to take control from the primary system, you must perform the following manual actions:

- Ensure that each cloud group with a virtual instance has at least one compute node
- Activate cloud groups on backup rack
- Manually update TOR configuration as needed to make all VLANs from primary rack available

A red arrow points to the 'OK' button in the dialog box. The background interface shows the 'Backup DR profile' configuration steps, including 'Enable', 'Monitor', and 'Failover' sections.

For both planned and unplanned scenarios, it is a two step process to initiate the failover on the backup rack. In the backup profile click 'View Details', then in the dialog select the type of failover, either Planned or Unplanned. In the dialog, it reminds you of the manual actions to perform on the backup rack, including adding compute nodes to the cloud groups and configuring the top of rack switches. Once these manual tasks are complete, click OK. Adding a compute node to a cloud group will activate the cloud group.

Planned and unplanned - Failover on backup



- After failover, role shows '(none)' and state shows 'Validated'

When you are ready to perform the failover, on the backup profile click 'Start Failover' and then click 'OK'. After completing the operation, the profile role shows '(none)' and the profile state shows 'Validated'. After the operation completes, you can start your workloads and update the routers to advertise rack IP addresses.

Summary

- Disaster recovery scenarios include both the planned and unplanned failover of virtual system and application patterns from a primary system to a backup system.
- Disaster recovery uses disk replication between systems to ensure real time cloning of management infrastructure quick recovery and near zero data loss

In this presentation, you have reviewed the disaster recovery scenarios including planned and unplanned failovers. You have learned about replication for disk and management data, monitoring replication state, and failover operations.



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