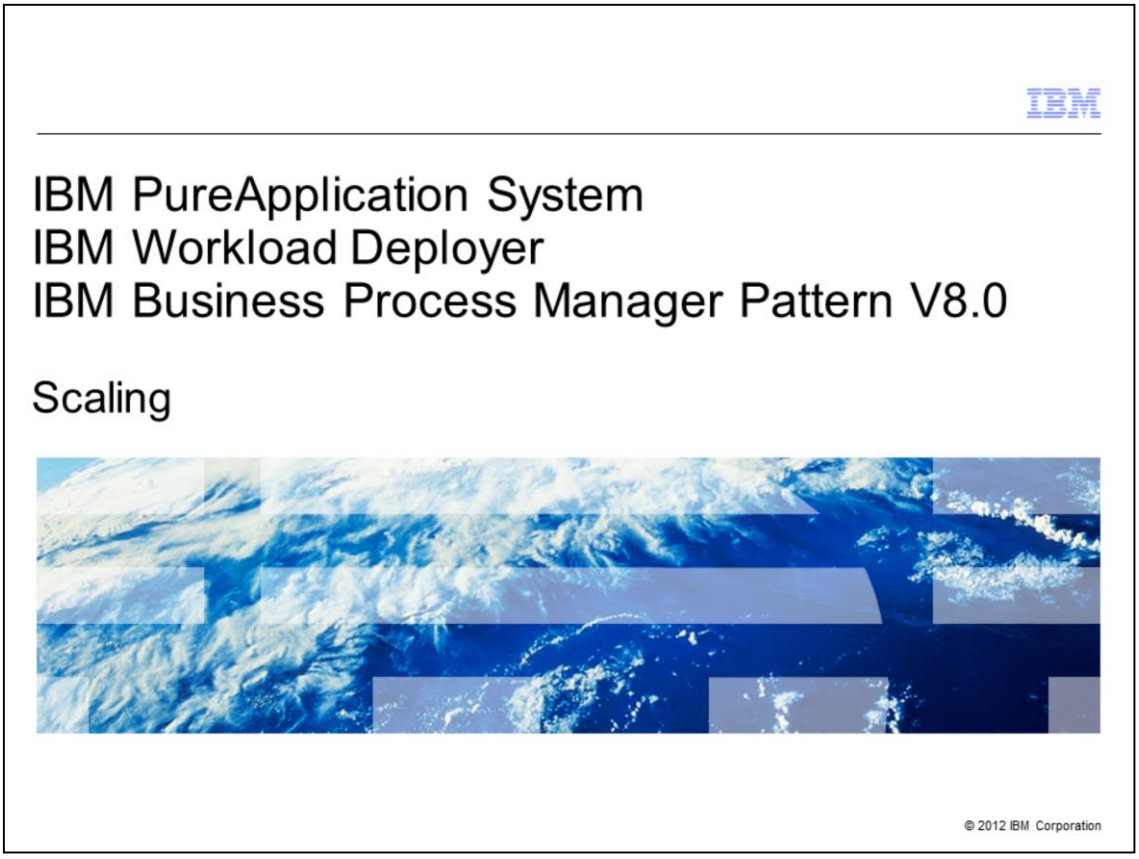
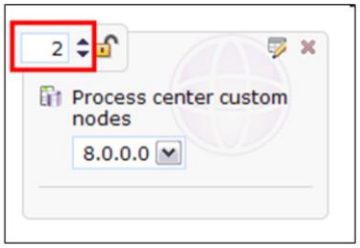


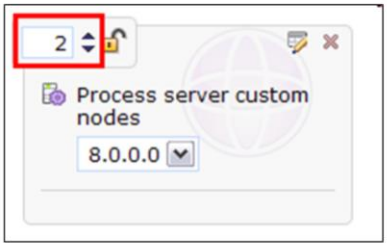
This presentation covers the scaling of the Business Process Manager Pattern V8.0 in IBM PureApplication System and IBM Workload Deployer.

You will learn about various scaling topics, such as horizontal scaling, vertical scaling and DB2 DASD scaling.

Horizontal scaling – before deployment

- Horizontal scaling of process center and process server custom nodes only
- Before deployment, specify number of node instances





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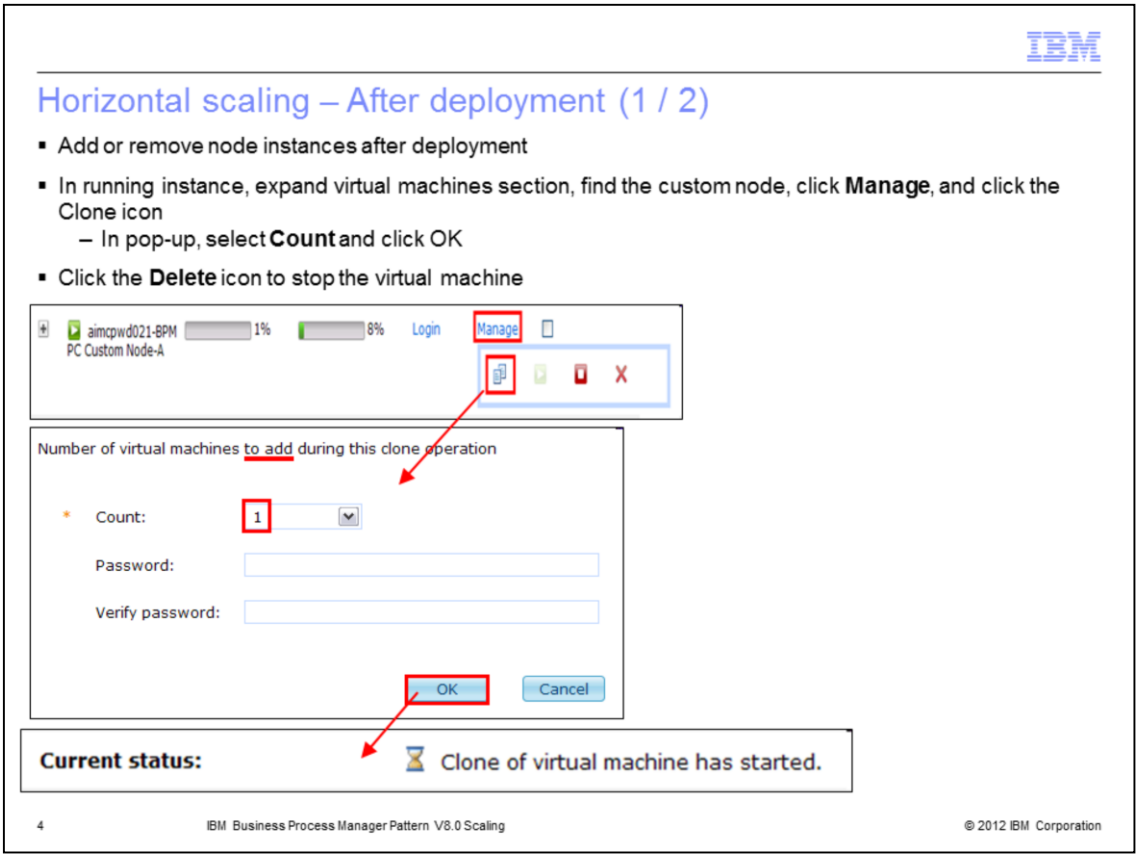
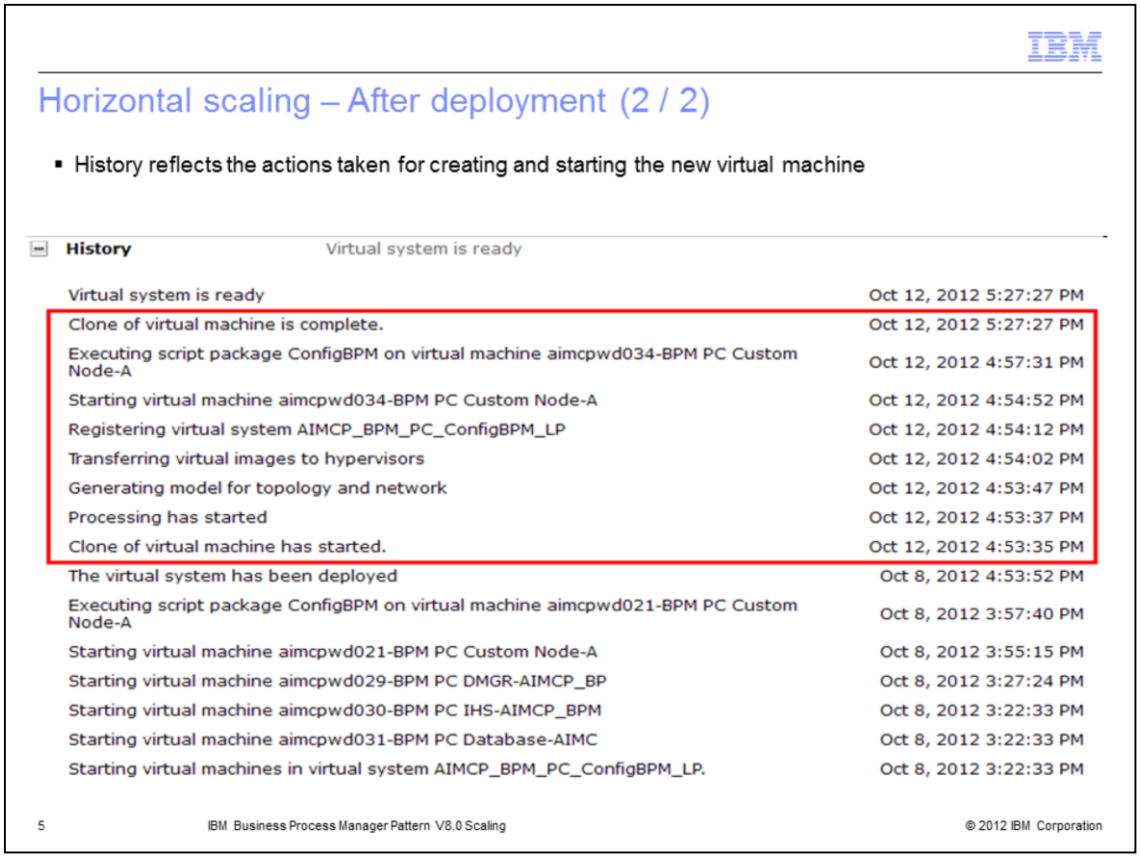
You can horizontally scale a Business Process Manager process center or process server before deployment by manually increasing or decreasing the number of custom nodes in the pattern, as shown in the pictures.

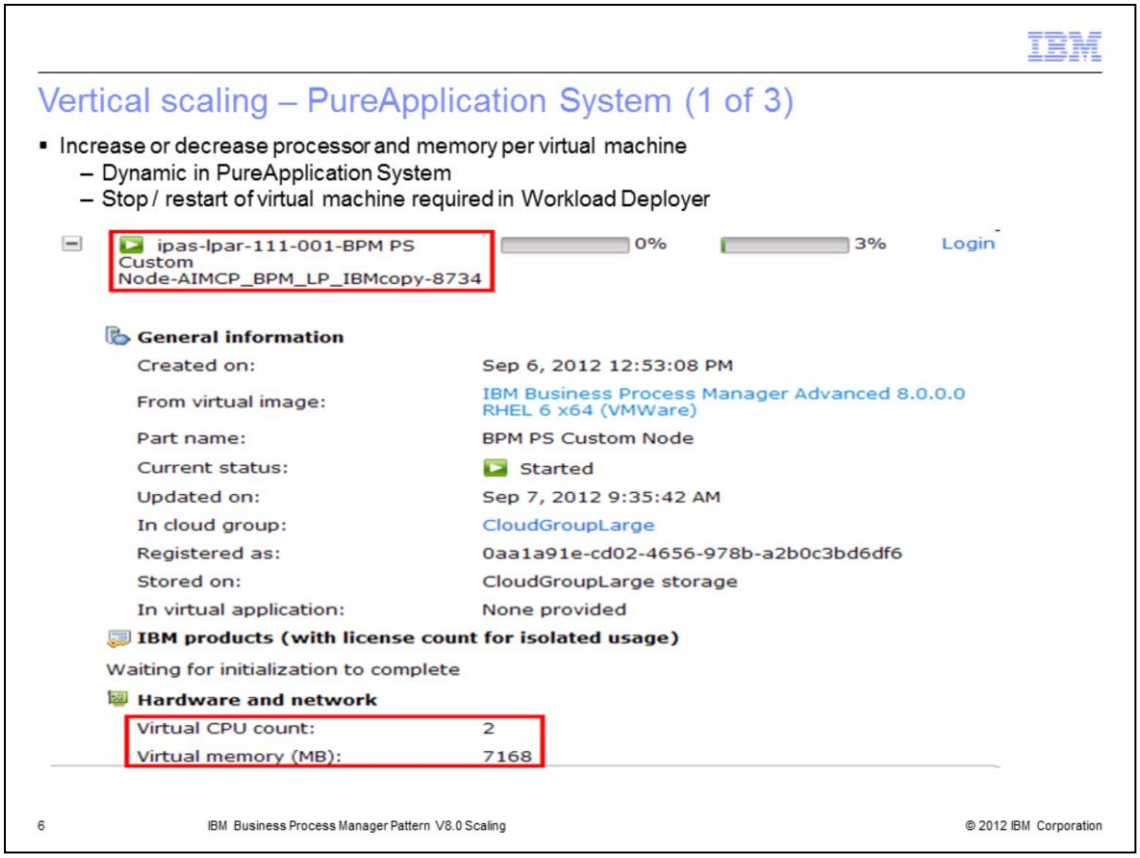


The same custom nodes can also be horizontally scaled after deployment. To do so, find the appropriate virtual machine in the running virtual system instance panel, click the Manage link and then click the Clone icon. A pop-up window is displayed where you can add the number of custom node virtual machines required by using the Count pull-down field. Optionally you can provide a password for the new virtual machine. If you don't provide a password, the new virtual machine will use the default of the original virtual machine. If you need to delete the virtual machine to scale back, then use the Delete icon instead of the Clone icon.

The Current status of the newly cloned virtual machine will indicate that the clone has started.



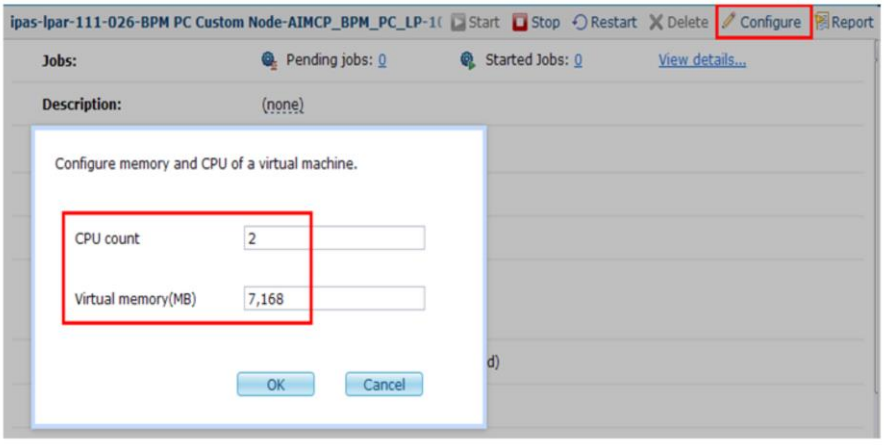
The History section of the deployment provides all the relevant messages about the newly cloned virtual machine, as seen is this picture.



You can also vertically scale any virtual machine by increasing or decreasing the CPU and memory per virtual machine. The process is different for Workload Deployer and PureApplication System. This slide and the next two slides describe the process for PureApplication System. This slide shows the virtual machine name and the current settings for the CPU count and virtual memory in PureApplication System.

Vertical scaling – PureApplication System (2 of 3)

- Increase or decrease processor and memory per virtual machine
  - Dynamic in PureApplication System (conditional for memory)
  - From Virtual Machine screen, select **Configure**, and modify processor and memory
  - For a memory change, there are conditions for a dynamic change:
    - If memory is less than 3GB then can be changed to maximum of 3GB
    - If memory is more then 3GB, then can be changed to 16 times current setting
    - In all other cases, virtual machine must be stopped, change made, then restarted



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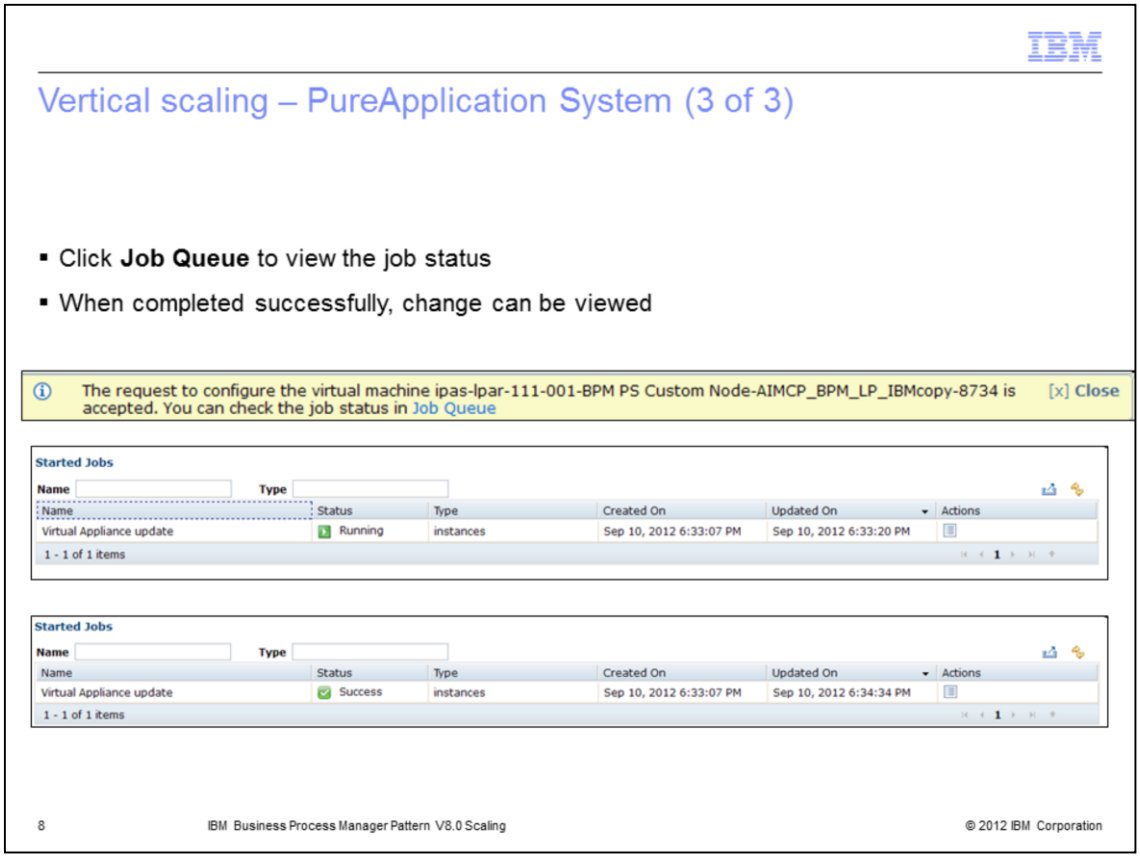
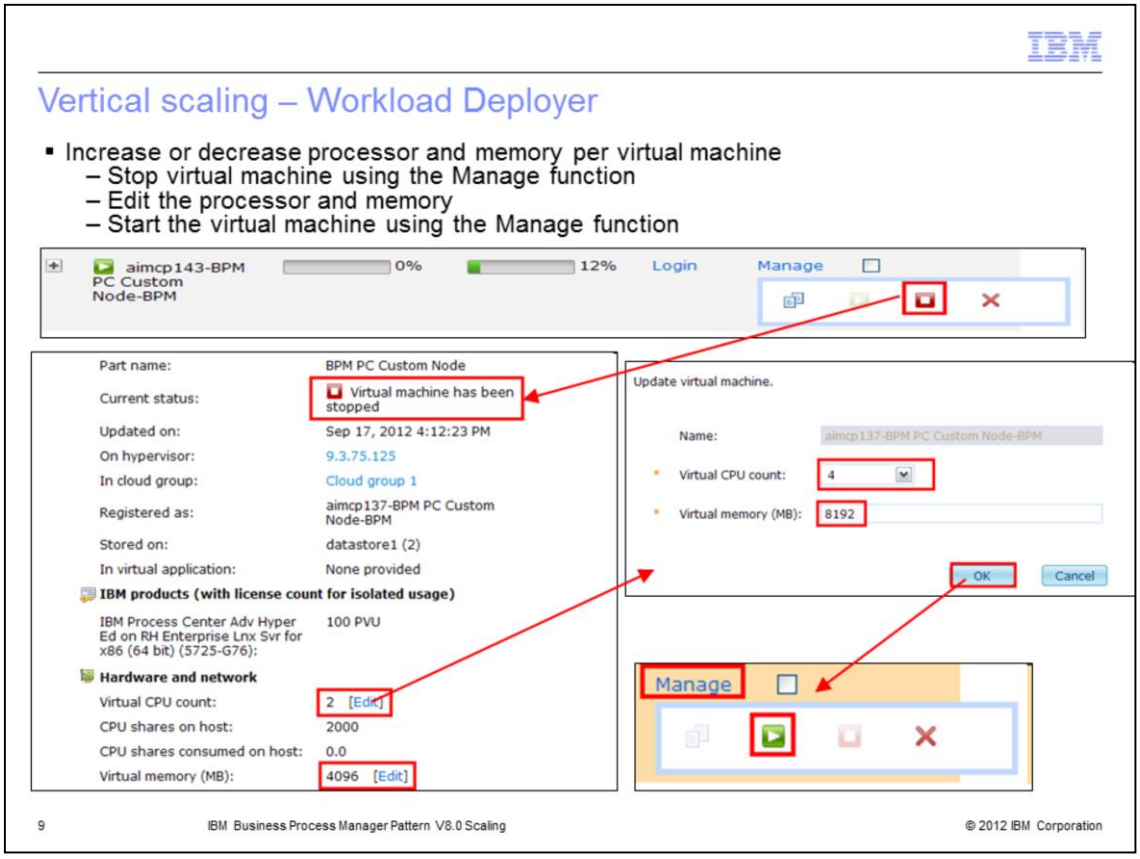
On the previous slide, you located the virtual machine name. Use that name to find the virtual machine in the running virtual system instance panel under the Instances tab. Then click Configure. In the pop-up window, you can modify the CPU count and virtual memory. Then click OK.

Changes to the memory allocation only go into effect immediately, without a virtual machine restart, under the following conditions. If the current memory allocation is less then 3 gigabytes and you change it to a value that is less than or equal to 3 gigabytes, then it will go into effect immediately. Or, if the memory allocation is currently more than 3 gigabytes and you change it to a value that is less than or equal to 16 times the current allocation, then it will go into effect immediately. In all other cases, you must first stop the virtual machine, then make the memory allocation change, and then restart the virtual machine.

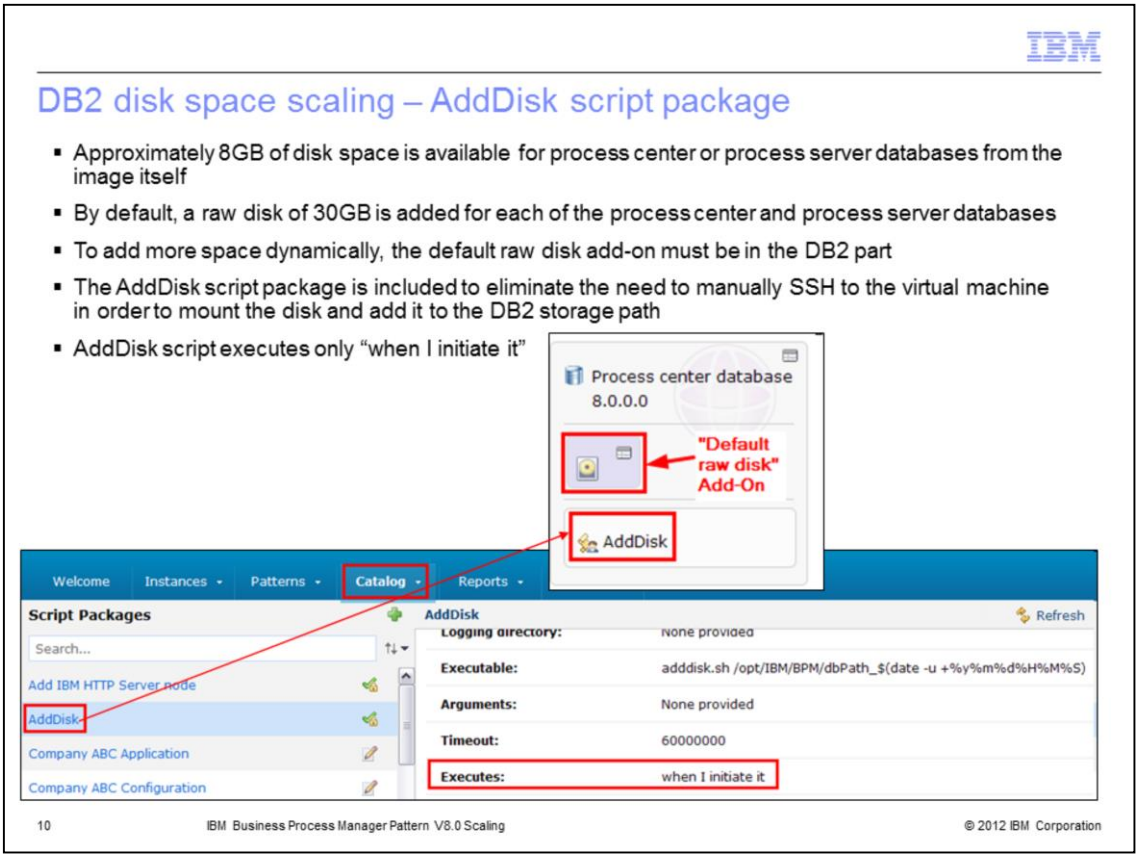


When you change the CPU count or memory allocation, as described on the previous slide, a job is submitted. You can click the Job Queue link provided to go to the Job Queue screen. Initially the job is in Running status and, assuming it completes successfully, will change to Success status when completed. You can then go back to the running virtual system instance panel to verify that the changes have been made correctly.

This completes the process for changing the CPU count or memory allocation for PureApplication System.

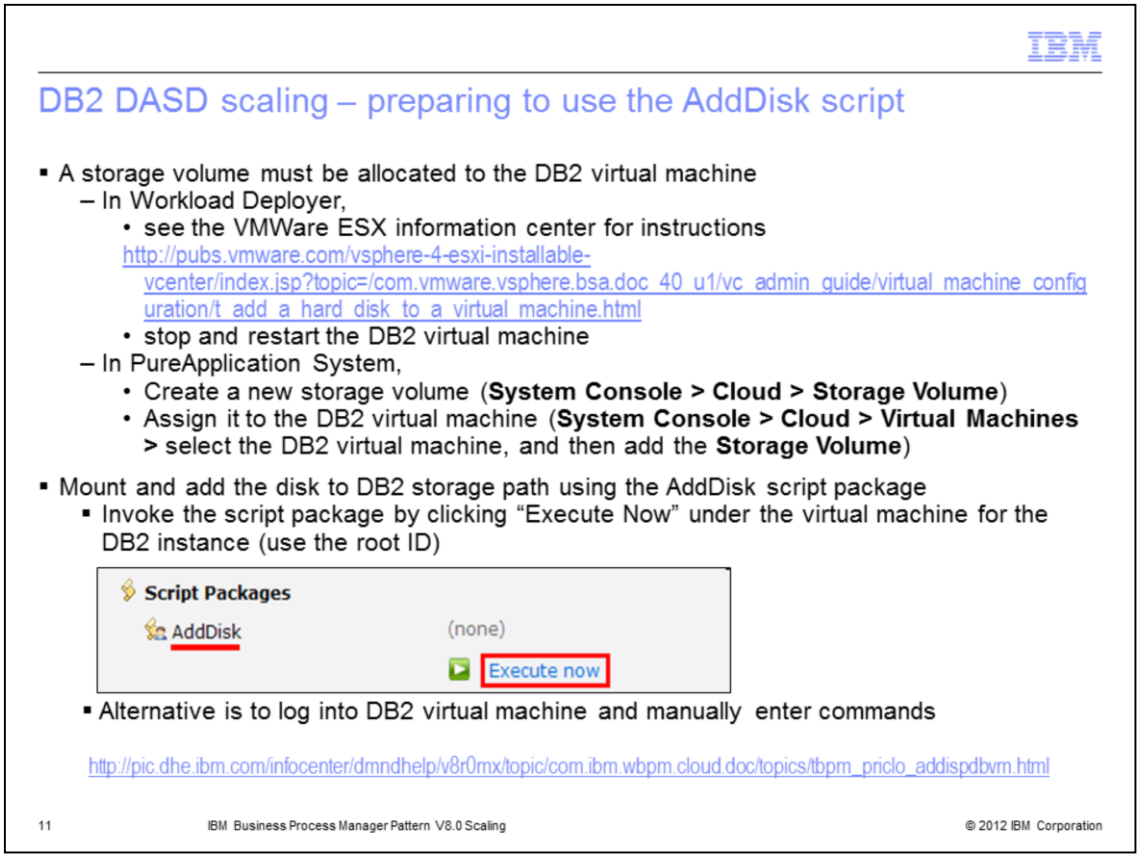


This slide summarizes the process for vertical scaling of CPU count and memory allocation for Workload Deployer. First you need to stop the virtual machine using the **Stop** icon in the **Manage** link for the virtual machine. Once the virtual machine is stopped, the **Edit** link is displayed in the **Hardware and network** section of the running virtual system instance panel, beside both the **Virtual CPU count** and **Virtual memory** fields. Clicking either of those Edit links will display a pop-up window where you can modify the virtual CPU count and the virtual memory. After you make modifications, restart the virtual machine using the **Start** icon in the **Manage** link.



The DB2 part of the Business Process Manager virtual image provides approximately 8 gigabytes of disk space for the process center or process server databases. Additionally, by default, the raw disk add-on provides an additional 30 gigabytes of disk space to each of the databases. After deployment, if you find this disk space insufficient, you can dynamically scale up the amount of disk space. However note that if, before deployment, you removed the raw disk add-on that is in the DB2 parts of the Business Process Manager patterns by default, you will not be able to scale up the disk space dynamically.

As part of the process to dynamically scale up the disk space, you need to mount a new storage volume on the DB2 virtual machine and add the space to the DB2 storage path. You can do this manually; however the AddDisk script package will do this for you. By default, the AddDisk script package is included in the DB2 parts of the Business Process Manager patterns and is configured to run only when you initiate it.



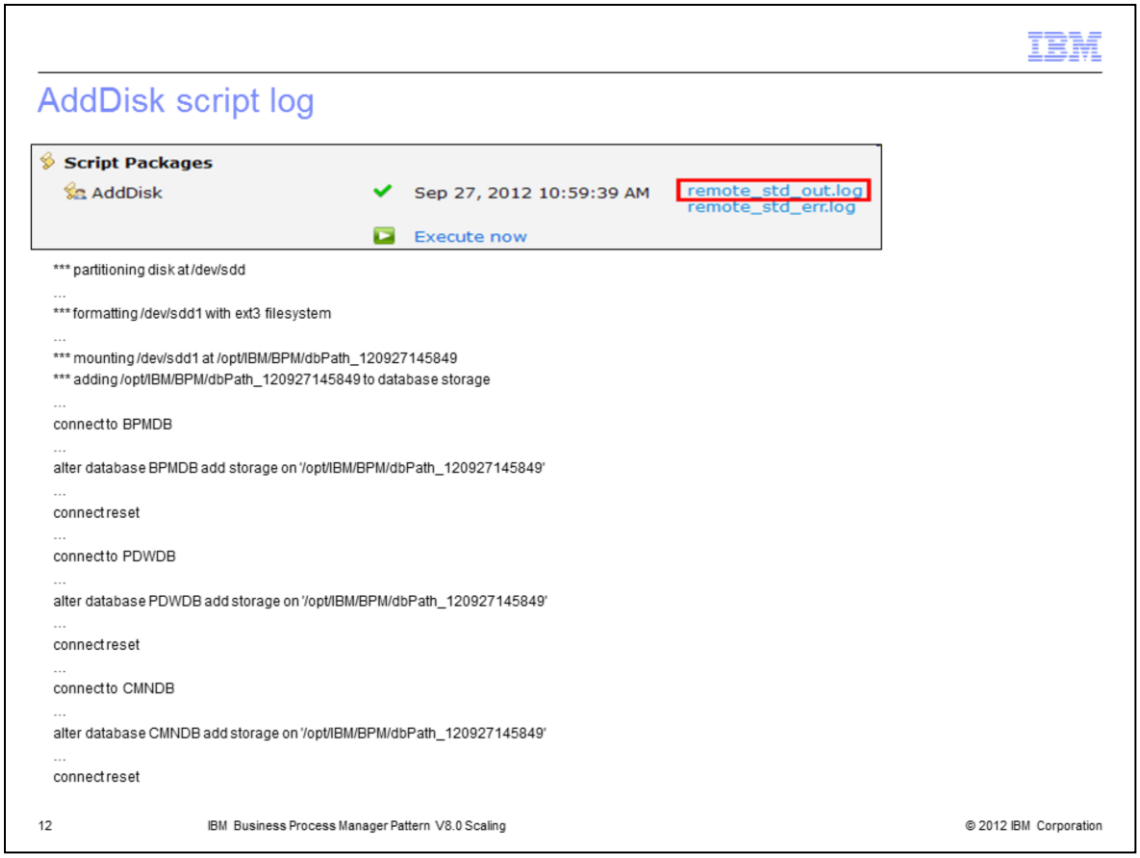
The first step in the process of adding DASD space to either the process center or process server set of databases is to add a storage volume to the affected DB2 virtual machine. The process for adding a storage volume is different between Workload Deployer and PureApplication System.

For Workload Deployer, you must use the VMware VSphere client to add a hard disk to the DB2 virtual machine. This slide provides an information center link to the documentation detailing how to add the hard disk to the virtual machine. Note that the virtual machine must be stopped and restarted for the hard disk addition to become effective.

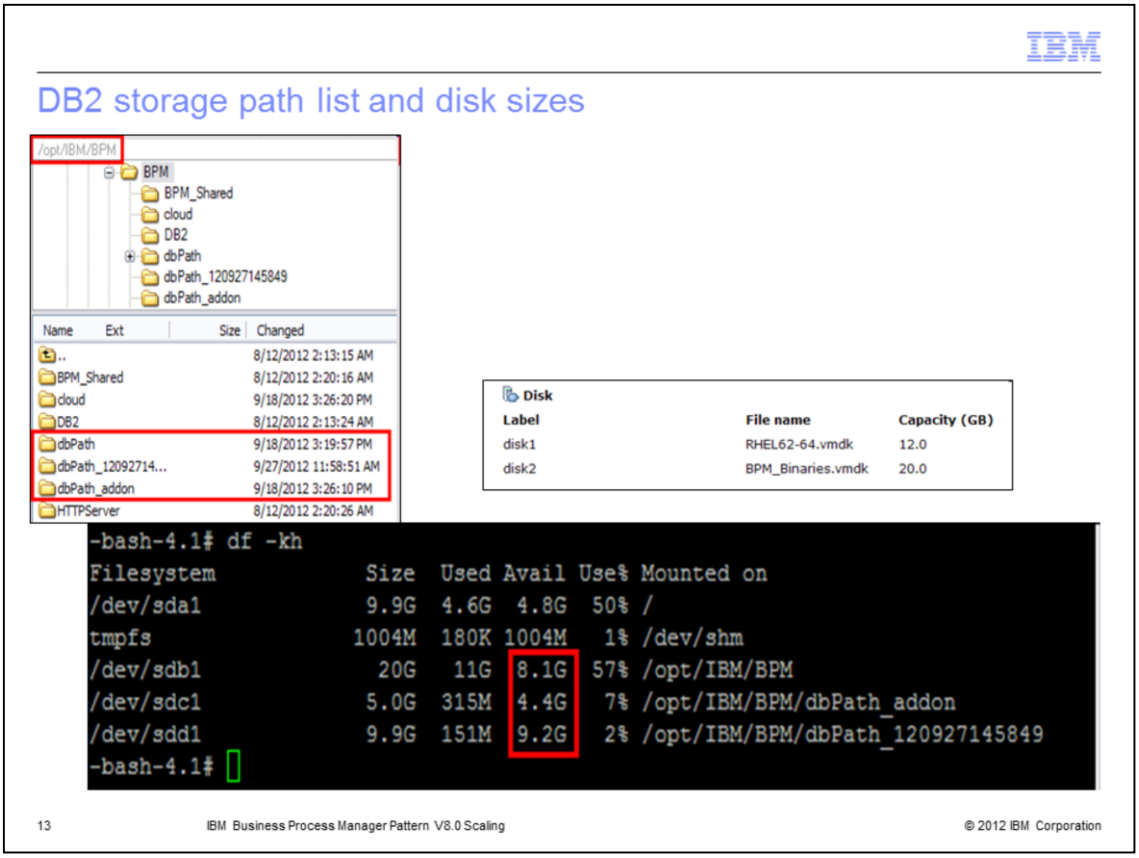
For PureApplication System on ESX, you can dynamically add the storage volume. First create a new storage volume by navigating to System Console > Cloud > Storage Volume and creating the storage volume. Second, go to the DB2 virtual machine by navigating to System Console > Cloud > Virtual Machines and selecting the DB2 virtual machine. Then select the storage volume you just added in the Storage volumes property in order to assign it to the DB2 virtual machine.

After this step is completed, in either Workload Deployer or PureApplication System, go to the Instances view for the Virtual System instance for Business Process Manager. Select the DB2 virtual machine in the Virtual machines section and find the AddDisk script package. Click the Execute now link and provide the root ID and password. The script will mount the disk and add it to the DB2 storage path for you.

The slide provides an information center link detailing the steps for adding disk space to a DB2 virtual machine.



Once the AddDisk script completes, click the remote standard out log to see the log from the script package. The slide shows some of the highlights of the log. It first shows some messages related to partitioning the disk, then formatting it and then mounting it. Then there are various messages related to adding the DASD to the DB2 storage path.



In the DB2 virtual machine, under the /opt/IBM/BPM directory are the DB2 storage directories, all beginning with “dbpath.” The one called “dbpath” correlates to the DASD provided with the virtual image itself. The one called “dbPath_addon” correlates to the DASD added with the raw disk add-on in the pattern. Then the one suffixed with the date and time stamp is the one added with the AddDisk script package.

The “df –kh” command provides some further information about the DASD allocated to the virtual machine, and to the database paths. The file system named /opt/IBM/BPM has a size of 20 gigabytes, and correlates to the “disk2” seen in the Disk section of the Business Process Manager virtual image. As you can see in the picture, approximately 8.1 gigabytes of that 20 gigabytes is available to be used by the databases and any other files. The file system named /opt/IBM/BPM/dbPath_addon correlates to the disk added with the raw disk add-on before deployment. In this case, 5 gigabytes were added with the add-on, and 4.4 gigabytes remains after overhead is subtracted. The last file system shown correlates to a 10-gigabyte storage volume that was added after deployment; and 9.2 gigabytes remains after overhead is subtracted. Therefore in total, 21.7 gigabytes is available for this virtual machine’s DB2 databases.

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