

IBM Infrastructure Suite for z/VM and Linux: Introduction

IBM Wave

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Introduction:

IBM Infrastructure Suite for z/VM and Linux consists of five products for monitoring and managing your z/VM and Linux on System z environments. These products include:

- IBM Wave for z/VM
- IBM Operations Manager for z/VM
- IBM Backup and Restore Manager for z/VM
- IBM Tivoli Storage Manager Extended Edition
- IBM Tivoli OMEGAMON XE on z/VM and Linux

In this lab, you will work with IBM Wave for z/VM. Other labs are available for the remaining products in the suite. In this guide, you will learn to navigate the IBM Wave user interface to perform different z/VM and Linux administrative tasks.

Lab Environment

During this lab session you will use the TIVLP3 environment hosted on the System z server located in the IBM Austin Technical Exploration Center. This environment is shared by students running the IBM Infrastructure Suite for z/VM and Linux labs and demos running in the EXPO. In this lab you will explore many functions of the IBM Wave product; however, please limit actions to those described in this guide to avoid impacting other users.

1. z/VM system
System name: *TIVLP3*
IP address: *192.84.47.32*

There could be more z/VM systems visible in this environment. Use only *TIVLP3* during this lab.

2. IBM Wave server
System name: *waveserv.demos.ibm.com*
IP address: *172.16.38.204*

User IDs and associated resources

You will work with two different types of users in this lab: an IBM Wave User, for logging on to the Wave UI, and two linux guests, your resources to manage during the lab exercises.

Naming convention:

IBM Wave user: IC0xL01, where **x**=1-5, password is IC15WAVE (case sensitive)

Associated Linux guests: IC0xL01 (IC0xL01, linux1), IC0xL02 (IC0xL02, linux2)

Password for the Linux guests is h00terv1.

Each student will have a unique number assigned at the beginning of the session.

Note: The terms (z/VM) user, guest and (virtual) server are being used interchangeably in these lab instructions.

Accessing the IBM Wave GUI

To access the IBM Wave user interface, double click the IBM Wave icon on the desktop:



or launch IBM Wave from a browser if the desktop icon is not available: <http://192.84.47.77>

A screenshot of the IBM Wave for z/VM Login dialog box. The dialog has a title bar "IBM Wave for z/VM" and a "Login" section. It contains fields for "User Name" and "Password". Below these fields is a "Forgot Password" link. There are three radio buttons for authentication: "LDAP/Active Directory Authentication", "DB Authentication" (which is selected), and "Force Login". There is also a "Force Login" checkbox and an "Advanced Options" link. At the bottom, there is a copyright notice: "Licensed Materials - Property of IBM Corp. 5648-AE1 © Copyright 2007, 2014 IBM Corporation and other(s). All Rights Reserved. IBM, the IBM logo, and z/VM are trademarks of IBM Corporation, registered in many jurisdictions worldwide." and two buttons: "Cancel" and "Log In".

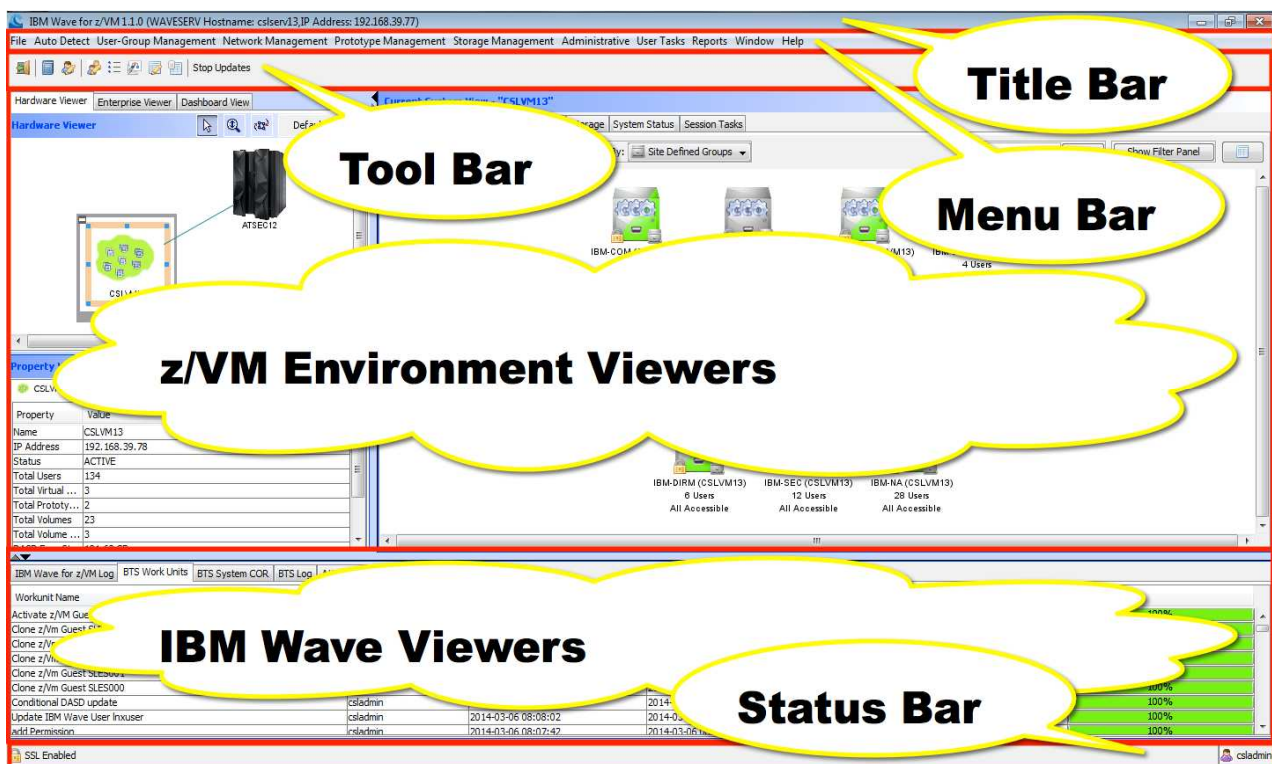
Log on using your IC0xL01 ID and the password.

Orientation to IBM Wave User Interface

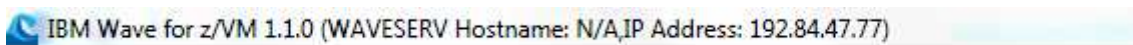
Before beginning the structured scenario, let's take a general look at the panels and menus of the IBM Wave user interface. Feel free to follow along, but avoid actually executing actions until instructed to later in the guide.

Upon initially loading IBM Wave, you find yourself in the main IBM Wave screen.

This graphic shows the six main sections of the IBM Wave interface: the Title Bar, the Menu Bar, the Tool Bar, the z/VM Environment Viewers, the IBM Wave Viewers, and the Status Bar.



The Title Bar



The Title Bar contains basic information about the IBM Wave server and buttons to manipulate the primary IBM Wave Window

From left to right, the Title Bar contains:

- The IBM Wave icon
- The version of IBM Wave
- The hostname of the server running IBM Wave
- The IP address of the server running IBM Wave
- The minimize, maximize, and close window buttons (on Mac, these are on the far left to match the look-and-feel of OS X)

The Menu Bar

File Auto Detect User-Group Management Network Management Prototype Management Storage Management Administrative User Tasks Reports Window Help






The Menu Bar contains a variety of drop-down submenus that contain a variety of functions. While the large number of submenus may look intimidating, many of these menus contain only one function. Additionally, most of these functions can be accessed through other means, such as the Tool Bar or context menus in various Viewers.



The Tool Bar



The IBM Wave Tool Bar is composed of small icons that execute a variety of actions. The functionality surrounded by a red box is only visible to IBM Wave Administrators.

From left to right, the Tool Bar functions are as follows:

-  The Icon of a Door executes the Exit action to logoff your IBM Wave user and exit the IBM Wave program.
-  The Icon of a Book executes the View Log action to display all of the logs produced by the WAVE server.
-  The Icon of a Person with Pencil executes the Change IBM Wave User Preferences action, which configures user settings including display settings, configuration settings for an external SSH terminal, and SSH and 3270 connection settings.
-  The Icon of Two People with a Pencil executes the Manage IBM Wave Users action, which is used to create or delete IBM Wave users and assign users roles, privileges, and scope.
-  The Icon of a Flow Chart and a Triangle executes the Project Manager action, which is used to create or delete IBM Wave projects.

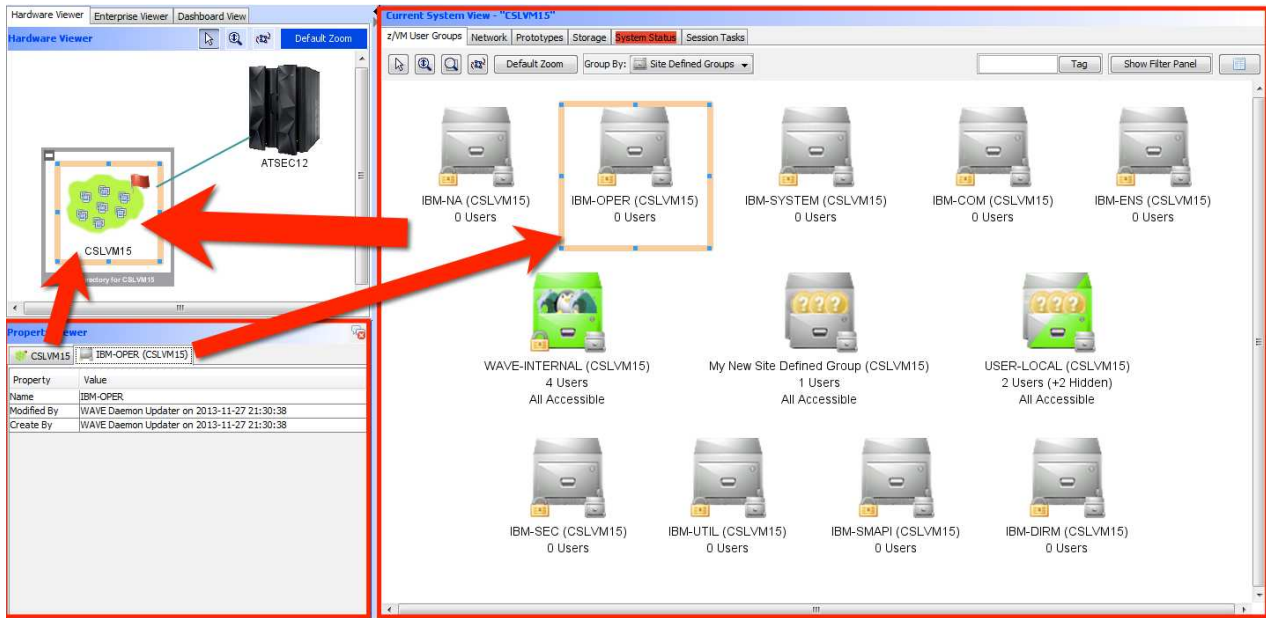
-  The Icon of a Pencil and a Spreadsheet executes the Manage Parameters action, which is used to configure a wide variety of system-wide IBM Wave settings.
-  The Icon of a Cylinder and a Spreadsheet executes the View WRS Elements action, which is used to view and clear the locks on various graphical elements in the IBM Wave GUI.
- **Stop Updates** The button labeled Stop Updates is used to halt and queue all of IBM Wave's periodic update processes to ensure that the IBM Wave metadata repository reflects the current state of the z/VM environment. Once stopped, this button is relabeled as 'Process Updates' and executes the queue of IBM Wave updates that had been halted.

The z/VM Environment Viewers

The z/VM Environment Viewers are the most important piece of the IBM Wave interface, as they enable the actual execution of systems management tasks on a z/VM environment.

There are three graphical elements related to z/VM Environment Viewers:

- The Viewer Navigator is in the top left. It is subdivided into tabs for the Hardware Viewer, the Enterprise Viewer, and the Dashboard Viewer. These three viewers are the high level organization for this portion of the GUI and are used to select and filter what IBM Wave displays in the View Area.
- The View Area is on the right. It displays the view associated with what is selected in the Viewer Navigator. The Current System View corresponds to the z/VM system selected in the Hardware Viewer. The Enterprise View corresponds to the filter criteria set in the Enterprise Viewer. The Dashboard View corresponds to the filter criteria set in the Dashboard Viewer.
- The Property Viewer displays tabs of information related to things selected in both the Viewer Navigator and the View Area.



The IBM Wave Environment Viewers

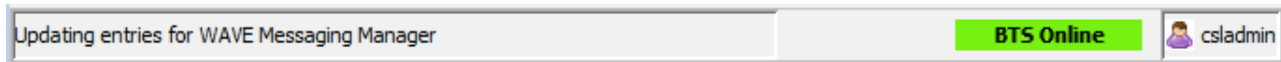
The IBM Wave Environment Viewers are focused on IBM Wave concepts, such as messages, Background Task Scheduler (BTS) work units, and lists of IBM Wave objects that require manual intervention by an IBM Wave administrator:

- The **IBM Wave Log tab** displays messages received from the Wave server or IBM Wave administrators
- The **Background Task Scheduler (BTS) Work Units tab** displays a list of the work units submitted to the BTS by all IBM Wave users. Work units can be double-clicked for more information, including a step-by-step list of what the work unit did to the system.
- The **Background Task Scheduler (BTS) System Common Output Repository (COR) tab** displays a list of output messages from the BTS logged to the current COR log. The rows in this tab cannot be double-clicked or right-clicked.
- The **Background Task Scheduler (BTS) Log tab** contains a human-readable log of the processing done by the BTS. By right-clicking on the text and selecting the Scroll to Bottom when Messages Arrive action, this log will function like a console and automatically scroll as messages arrive.
- The **Attention Required tab** displays a list of all actions that require manual administrator intervention. Right-clicking on a row opens a context menu that allows an IBM Wave administrator to ignore the issue or change the numeric severity level.

The Status Bar

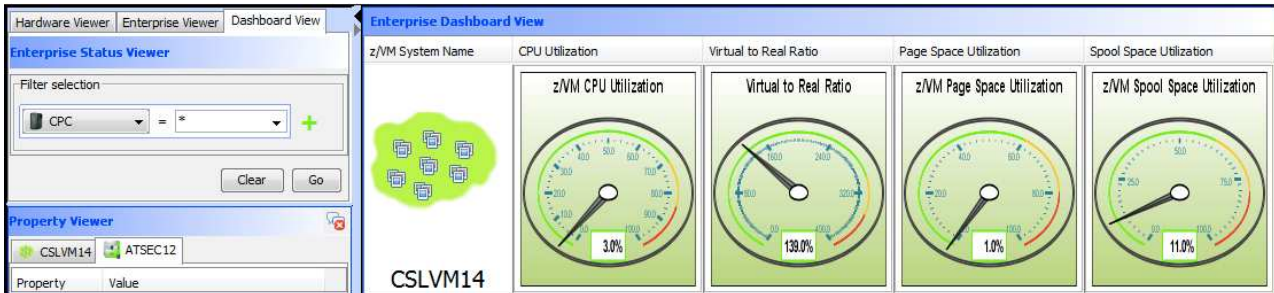
The Status Bar displays a few items. From left to right, the Status Bar has:

- A Message Area that displays messages from the IBM Wave client
- A status area that displays the status of the BTS
- A cell that shows the current IBM Wave user.



Dashboard Viewer and View

The Dashboard Viewer and View displays a single screen that shows performance data for all of the z/VM systems managed by IBM Wave.



1. In the Viewer Navigator of z/VM Environment Viewers click on the **Dashboard View tab** to display the Enterprise Dashboard View.
When the Dashboard View tab is open, the Viewer area on the left becomes a filter that can be used to limit the report to particular z/VM system or mainframe hardware.
2. Double-click on the z/VM System Name *TIVLP3* (or select Expand All or Collapse All) to alternate the view between the analog dials shown above and the following compressed view, which is able to show more data on a single screen.

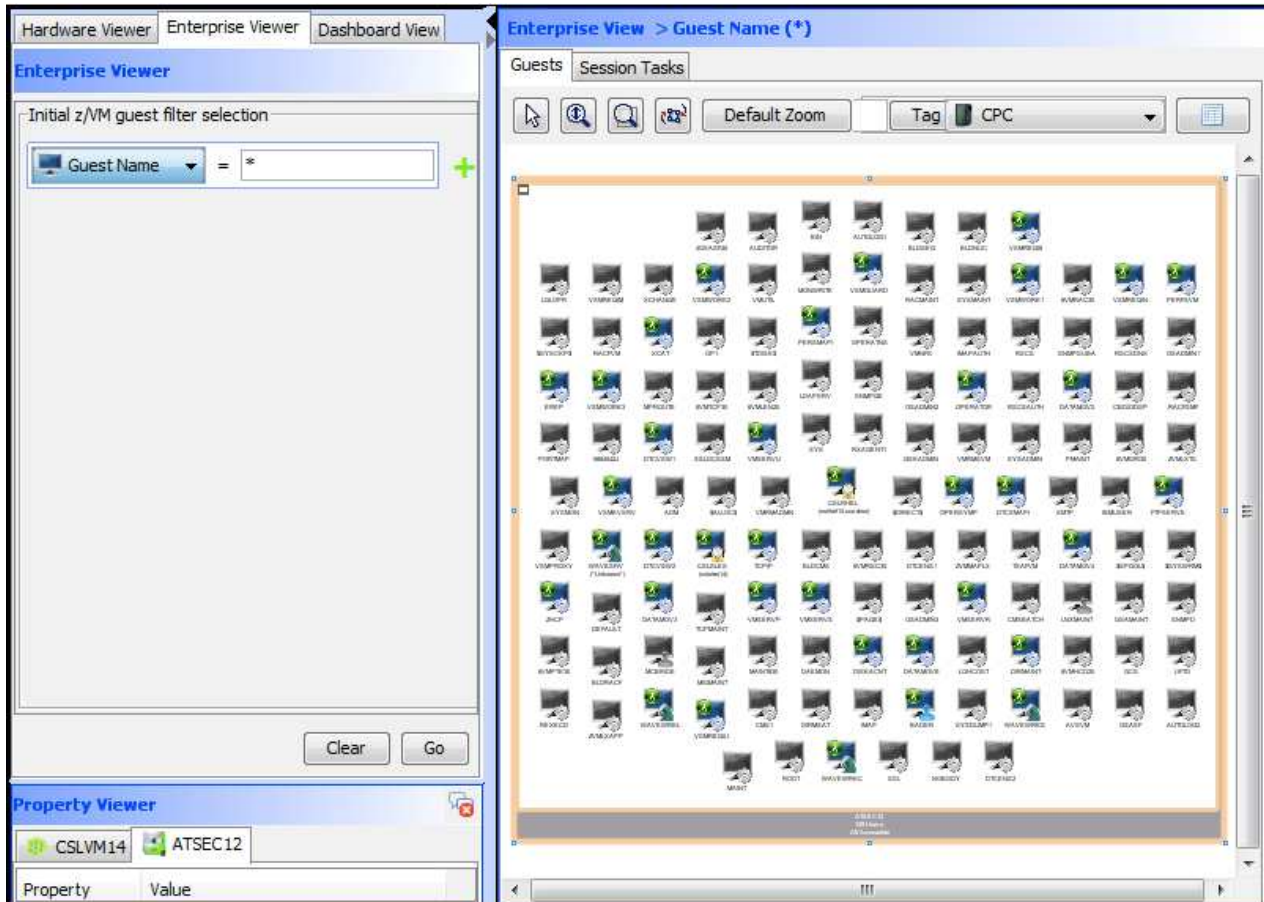
z/VM System Name	CPU Utilization	Virtual to Real Ratio	Page Space Utilization	Spool Space Utilization
CSLVM14	3%	139%	1%	11%

3. Check various utilization data:
 - a. Double-click the **z/VM CPU Utilization** analog dial to open the *CPU Utilization Statistics* panel and see the CPU utilization data.
 - b. Double-click the **Virtual to Real Ratio** analog dial to open the *Virtual to Real Utilization Statistics* panel and check the various data related to memory utilization.
 - c. Close all the panels open.
4. Modify the memory utilization related thresholds:
 - a. From the menu select **Administrative – Manage Parameters**
 - b. Change the Virtual to Real thresholds to higher values: 100 for *Warning Threshold* and 140 for *Error Threshold*.
 - c. Close the IBM Wave Parameters window.
 - d. Observe the changed color of the Virtual to Real Ratio analog dial.
5. Close all the panels opened.

End of exercise

Enterprise Viewer and View

The Enterprise Viewer and View displays information across all instances of the z/VM hypervisor. This enables an enterprise-wide view of z/VM.



The left-side Enterprise Viewer area consists of an area that allows for one or more filter criteria to be applied to the view in the Guests tab on the right. This is an ideal way to visualize virtual resources across z/VM systems by project, account, or other such attribute.

1. Use the filter to see only the virtual machines related to this hands-on session:
 - a. In **Enterprise Viewer**, under *Initial z/VM guest filter selection*, select **Guest Name** value from the list box on the left.
 - b. Specify *IC** value in the right field
 - c. Click on the **Go** button to activate the filter. On Enterprise View on the right side, on the **Guests** tab, the number of guests visible was reduced.

2. Group guests by different criteria:

- a. In **Enterprise View** on the right side, on the **Guests** tab, select **Group By z/VM System**. Two systems managed by this IBM Wave server, TIVLP32 and TIVLP3, will be displayed. Double-click both groups to see the users (virtual machines) defined on the particular server. Keep in mind the filter defined in previous steps is still active.
- b. Now group by *Site Defined Group*. Several groups are displayed.
- c. Open the **IC-Student (TIVLP3)** group, the one of the few with users accessible. You should see all the *IC0xL01* users related to this Lab.

3. Deactivate the filter to see all the users again:

- a. In **Enterprise Viewer**, click on the **Clear** button. As the result, you see the same groups as in the step 2b, but all of them with accessible users now.
- b. Open for example the **IBM-SMAPI (TIVLP3)** group and check the status of the virtual machines related to z/VM System Management API on the TIVLP3 z/VM system.

Hint: Use the tools in the Guest tab to zoom in on objects in the Guest tab:



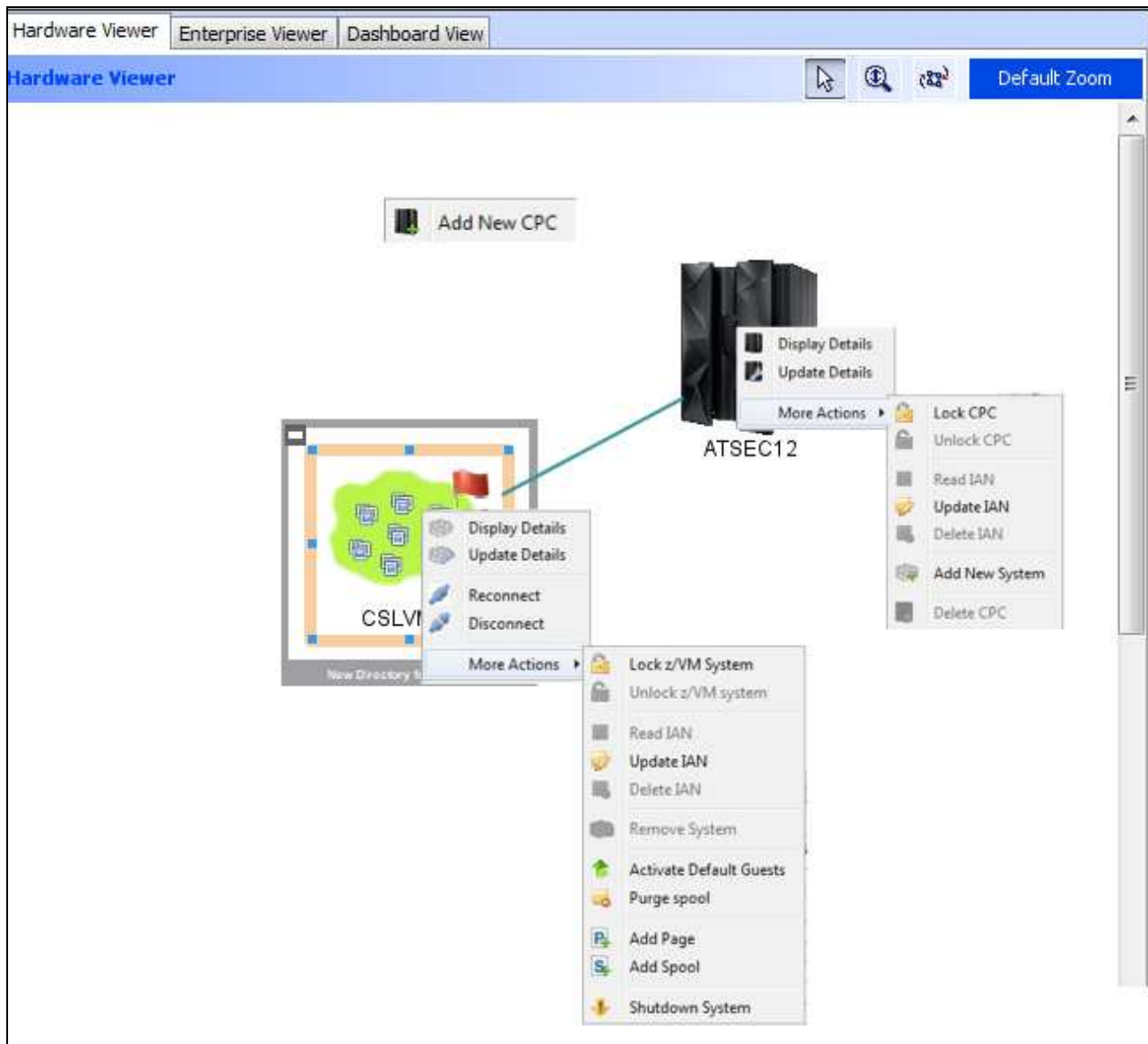
- c. Repeat the previous step for other groups of your interest.

4. Close all the panels opened.

End of exercise

Hardware Viewer and Working with Objects

The **Hardware Viewer** visualizes mainframe Central Processor Complexes (CPCs), instances of the z/VM hypervisor, and Single System Image (SSI) clusters.



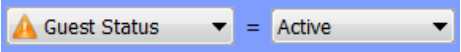




Right clicking on white space in this area opens a context menu that allows an IBM Wave administrator to add a new mainframe server through the **Add New CPC** task.

Right clicking on a mainframe CPC opens a context menu that allows an IBM Wave administrator to **Delete CPC**, **Display Details** or **Update Details** of the CPC (such as model and CPUID), and **Add New System** (z/VM) to IBM Wave management.

Right clicking on a z/VM system opens a context menu that allows a IBM Wave administrator to **Display Details** or **Update Details** related to the z/VM system, **Remove System** (z/VM) from IBM Wave management, **Activate Default Guests** set to run on this z/VM system by default, **Purge Spool** to clear the spool volumes of this z/VM system, **Add Page** volumes to the z/VM system, **Add Spool** volumes to the z/VM system, and **Shutdown System** to shutdown or restart the z/VM system entirely.

Left clicking on any element in this view opens a property tab for that element in the Property Viewer. Additionally, left clicking on z/VM systems opens a Current System View of that z/VM system in the View Area.

1. Switch to the Hardware Viewer
2. Hover over *TIVLP32* and *TIVLP3* objects to see the brief information about them.
3. Double click on *P00EA43D* server to display the CPC information, then close the **Display CPC P00EA43D** window.
4. Left click on *TIVLP3* z/VM system. The **Current System View** is created with several tabs displayed across the top of the view window. Focus on the **z/VM User Groups** tab, which is filled with users organized in groups.
5. Switch to the list view:
 - a. Push on the  button in the right upper corner.
 - b. In the list view see the different columns and the relation between the color of the line and the value of the **Status** column.
6. Activate a filter to see only active users:
 - a. Click on the  button to show the filter fields below the list of users.
 - b. Filter only active users .
 - c. Click on the **Go** button.
 - d. Realize the  semi transparent bar, the indicator of active filtering.
 - e. Switch back to graphical view by pushing the  button in the right upper corner.

7. Locate your Linux virtual server:

- a. Specify the name of your server *IC0xL01* (where *x* is the number assigned to you)

in the tag field.

- b. Press the button.

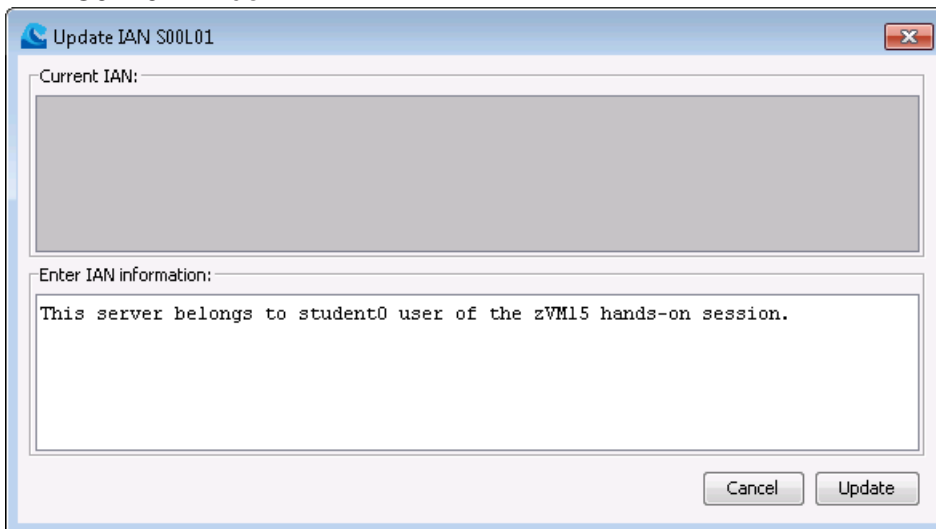
- c. Your linux server was located in the **IC-Student (TIVLP3)** group, which was open automatically.

8. Work with the Intelligent Active Notes:

Intelligent Active Notes (IANs) allow free form text to be associated with an object and displayed during a mouse hover. Initiating an action on the object causes the IAN to pop up:

- a. Right click on your *IC0xL01* user and choose **More Actions – Update IAN** from the menu.

- b. Define a new IAN by entering the text in the **Enter IAN Information:** section of the **Update IAN IC0xL01** window.

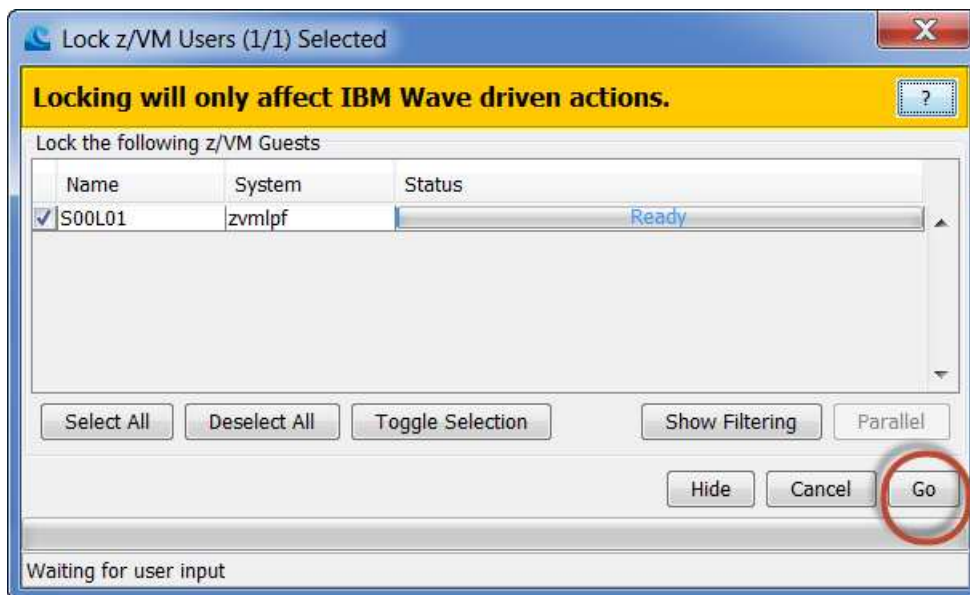


- c. Click on the **Update** button, click **OK** in the Submit Workunit dialog.

- d. Note the updated icon representing *IC0xL01* user, now containing the 'yellow paper' with IAN. It's an example of an *intelligent icon*, which helps the user understand the status of the system and its resources. Place the mouse pointer over *IC0xL01* user and verify the IAN is shown.

9. Use **Lock z/VM User** or **Unlock z/VM User** to prevent/allow changes to the selected guest via the IBM Wave client.

- a. Right click your guest and choose **More Actions – Lock z/VM User** from the menu. Your new IAN pop up, press the **Ignore** button, then press **Go** button and confirm your choice with one more **Go**.



- b. Click **OK** on any warnings and close all the panels open.
- c. Your user is now locked, as indicated by the small lock visible on the updated icon.



- d. Right click on the user and note the reduced menu, avoiding any changes cause of the lock in place.

10. Display the details of your *IC0xL01* guest:

- a. Double click the *IC0xL01* user to open the **Display Details** window.
- b. See the different values on the **Data** tab.
- c. Choose the **z/VM View** tab and see the complete directory entry of your guest.
- d. Choose the **Linux View** tab to see the information from the linux perspective.

Note: If your guest is shutdown, you will not see data for this view or the Performance View.

- e. Choose the **Performance View** tab to see the z/VM and Linux performance data.
- f. Close all the panels open.
- g. Unlock your server: right click on it and select **More Actions – Unlock z/VM User** from the menu. Reply to all the dialogs as you did in step 8.

11. Close all the windows/panels open.

End of exercise

Projects

A unique capability of IBM Wave is its ability to create Projects, a set of virtual resources consisting of any combination of servers, networks, and storage across the enterprise. The definition of Projects can enable different constituencies, such as operations, systems programming, application development, project management or end users to exercise their authority to manage appropriate aspects of the z/VM environment.

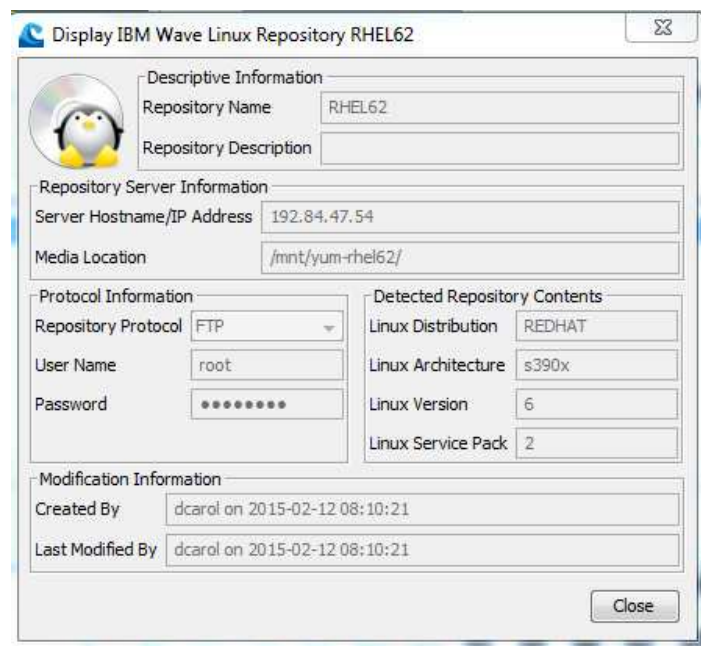
The scope and permissions a Linux administrator (also called a regular IBM Wave user) has within a Project can be uniquely assigned. Scope refers to what a Linux administrator can view or see. Permissions refer to what actions a Linux administrator can take within the assigned scope. A Linux administrator may have different scopes and permissions for different projects. Likewise, different Linux administrators may have different scopes and permissions for the same project.

Bare Metal Installation

The Bare Metal Installation (BMI) makes it possible to use the graphical interface for the manual creation of Linux guests from scratch. This functionality offers the possibility of building Linux Golden Images by Linux Administrators without the use of 3270 interfaces.

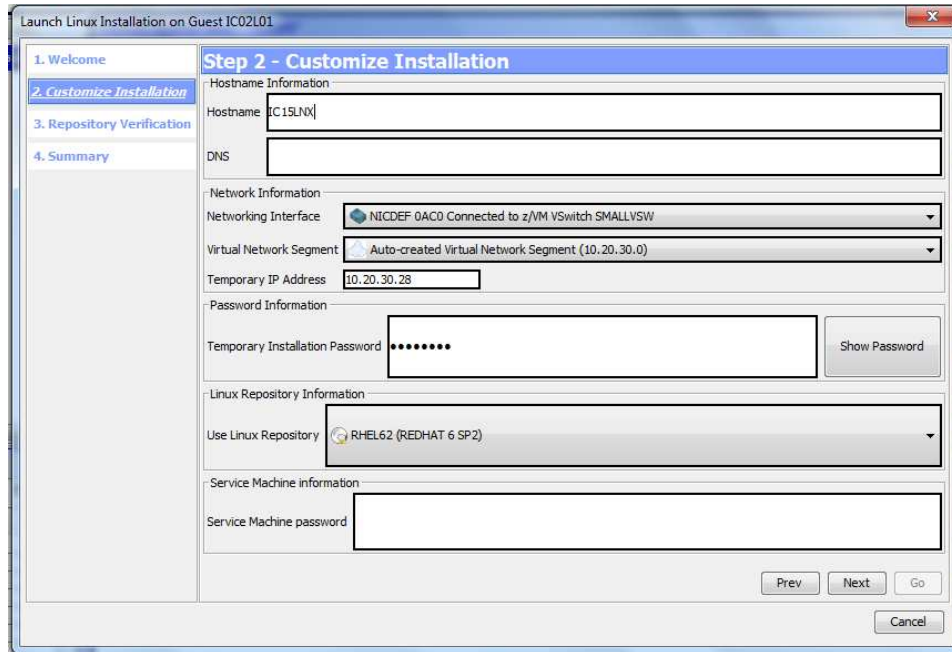
To be able to execute the Bare Metal Installation action, you need to add a file server with Linux installation media to your IBM Wave Linux Installation Repository Manager. In our environment this was already done in advance.

1. Display the IBM Wave Linux Repository:
 - a. From the main menu select **User Tasks - Display IBM Wave Linux Repositories**.
 - b. Double click any of the repositories available in the **Display IBM Wave Linux Repositories** window to see the details.



- c. Close the details panel then close the **Display IBM Wave Linux Repositories** window.
2. Start the Linux installation:
 - a. Reset all the filters and locate the *IC15LNX* virtual machine.
 - b. Right click *IC15LNX* and select **Install... - Launch Linux Installation** from the menu. The **Launch Linux Installation** window show up.
 - c. Click **Next** on the *Step 1 – Welcome* panel which leads to the *Step 2 – Customize Installation*.

- d. Note the different parameters available for the customization and list available Linux repositories in the **Use Linux Repository** list box. You should see the same list as in the step 1a.



- e. Let's stop here and press the **Cancel** button, we will not go through the full BMI installation in this exercise.

3. Close all the windows/panels open.

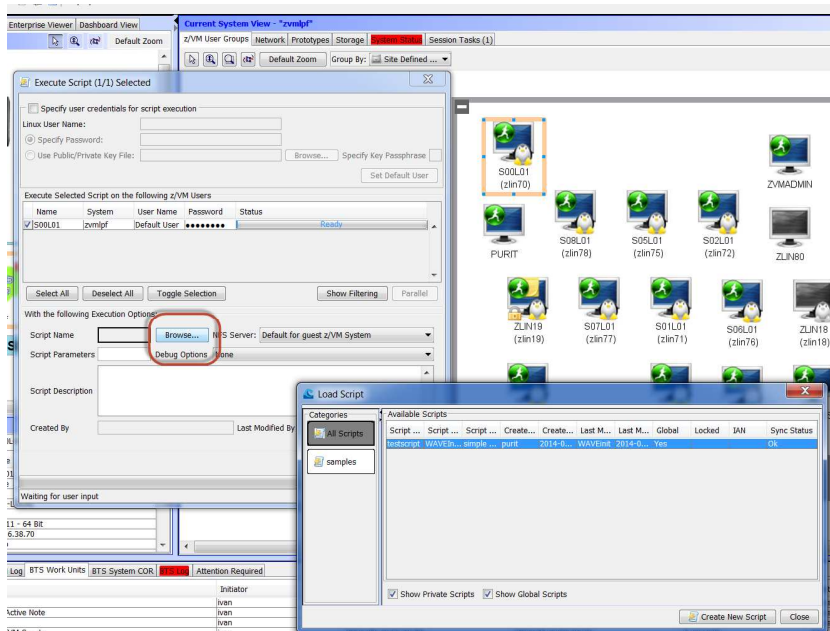
End of exercise

Running shell scripts

IBM Wave allows the IBM Wave users to create, edit and save Linux shell scripts with the IBM Wave User Scripts Manager. These scripts can then be executed on servers using the **Execute Script** function. The Execute script function is a multiple task action, and therefore can be executed on one or many virtual servers.

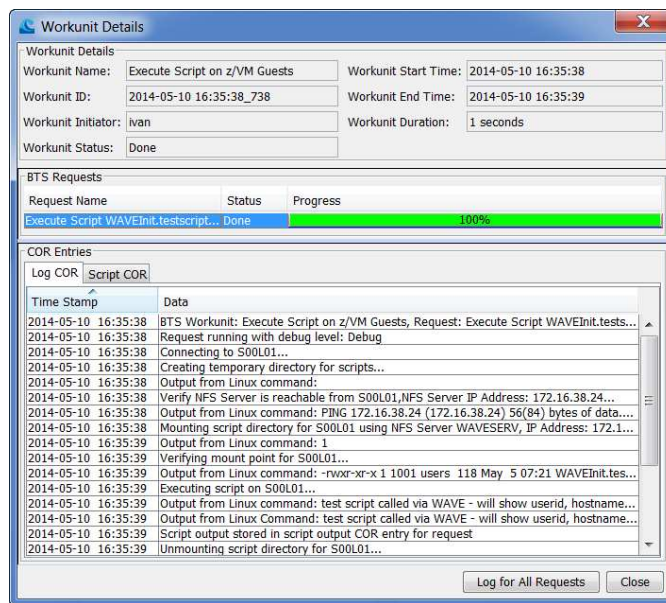
In this exercise we will run a simple test script, pre-prepared for this session.

1. Display the scripts available:
 - a. From the main menu select **User Tasks – IBM Wave User Script Manager**.
 - b. Double click the *testscript* to display its details. Note that the *testscript* is a global script, available for all the IBM Wave users defined.
 - c. Close the **Edit IBM Wave User Script** window.
2. Run the script against your server:
 - a. Locate the *IC15BASE* guest.
 - b. Right click it and select **Execute Script** option from the menu.
 - c. In the **Execute Script** window click the Browse button to see all the scripts available for you.
 - d. Double click the *testscript* in the **Load Script** window and return to the **Execute Script** window.



- e. Press the **Go** button to run the script.
- f. Press **OK** to accept the **Workunit submitted to BTS** message.

- g. Close the **Execute Script** window.
3. Display the output of the script executed:
 - a. In the IBM Wave Environment Viewers select the **BTS Work Units** tab to display a list of the work units submitted to the BTS by all IBM Wave users.
 - b. Locate the line with *Execute Script on z/VM Guests* value in the **Workunit Name** column initiated by you - your user name specified in the **Initiator** column and double-click it. The **Workunit Details** window shows up.
 - c. In the BTS Requests section click on the *Execute Script WAVEInit.testscript on guest IC15BASE (TIVLP3)*, the only entry available and the related COR entries are shown in the COR Entries section below.



- d. The **Log COR** displays all the activity of a specific BTS Request, it's a log of activities performed by BTS – connecting to a server, locating the NFS server, mounting the directory containing the script, executing the script etc.

The **Script COR** displays the real output of the script performed against your linux server – user id, hostname and IP address in the case of our *testscript* script.

4. Close all the windows/panels open.

End of exercise

Network management

The **Network** tab of the **Current System View** displays the end-to-end virtual network topology of the selected z/VM system, including virtual LANs, network device pools, virtual switches, virtual network segments, and guests with TCP/IP stacks and IP addresses. Through the panel on the left, you can select predefined views, manually create a view, and pick a particular layout.

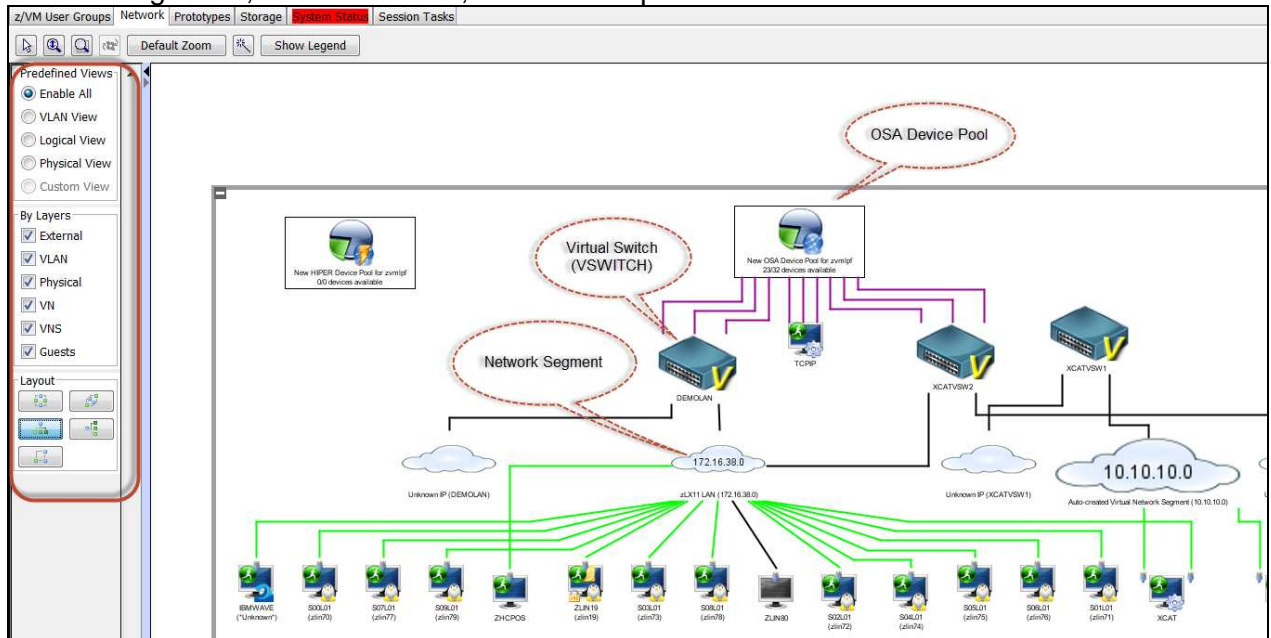
Double-clicking any of the depicted elements brings up a detailed view of that element. Right clicking on any of the elements allows an IBM Wave user to lock or unlock the selected element.

The behavior of guests in this view is identical to their behavior in the z/VM User Groups panel.

Right clicking on white space in the panel brings up a detailed context menu that allows an IBM Wave user to define a new guest LAN or virtual switch and configures the display of the network view.

In this exercise we will navigate through the lab network, but will not modify the network settings.

1. Display the lab network topology:
 - a. In the **Current System View** switch to the **Network** tab.
 - b. The topology of the lab network is displayed with objects of different types: guests, virtual network segments, virtual switches, OSA device pools and connections between them.

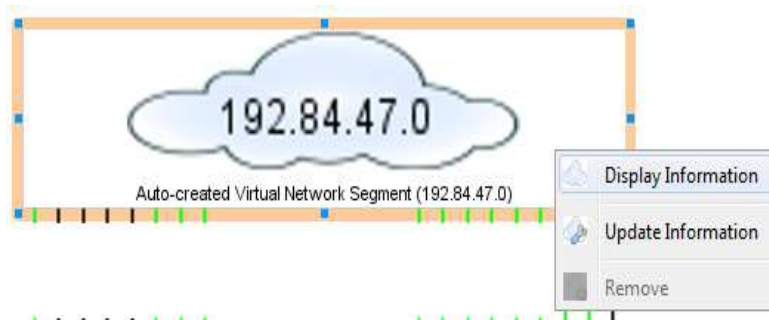


- c. Choose different layout options, find the one of your preference.

Note: The term Virtual Network Segment (VNS) refers to a logical definition within IBM Wave which defines an IP Network segment. The VNS definitions are used by IBM Wave in order to connect z/VM Guests to Virtual Networks (Virtual Switches, Guest LANs), as we will do in the Cloning exercise.

2. Display a Virtual Network Segment:

- a. Double click on the VNS auto-generated for 192.84.47.0.
- b. Check the information related to IP addressing on the **IP Information** tab.



c. See the list of Virtual Networks this VNS is connected to on the **Connected Virtual Networks** tab.

- d. Close the panel.

3. Display the *SMALLVSW* virtual switch:

- a. Double click on the *SMALLVSW* virtual switch.
- b. In the **Display Virtual Network** window see the value of the **Default NIC** parameter – *OAC0*. In the Cloning exercise, IBM Wave will take this value and use it to define a NIC in your cloned guest's directory entry.
- c. Switch to the **Connected Segments** tab. Verify this virtual switch is connected to the *VPN-LAN* Virtual Network Segment.
- d. Switch to the **VSwitch Specific** tab to see the list of OSA devices this virtual switch is connected to.
- e. Close the **Display Virtual Network** window.

4. Work with OSA devices:

- a. Double click the *New OSA Device Pool for TIVLP3* Device Pool. This may take a while till the **Device Pool Details** window pop up.
- b. Switch to the **Devices** tab to see the list of the OSA devices and their status on *TIVLP3*.
- c. Close the **Device Pool Details** window.

End of exercise

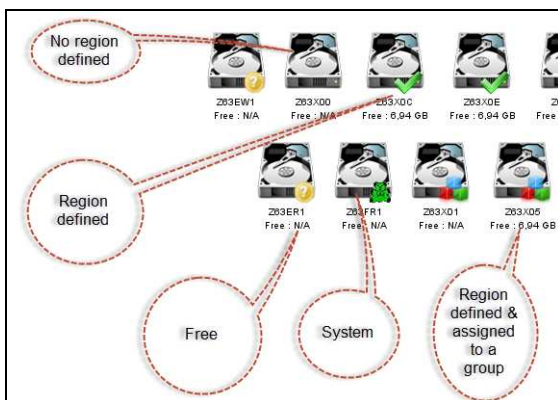
Storage Management


IBM Wave simplifies the mechanism of storage assigning and storage management in general. IBM Wave allows the IBM Wave User to interact with:

- DASD Volumes
- DIRMAINT Regions and DASD Group
- Subpools and extents in the z/VM System
- FCP attached storage to z/Linux Guests.

In this exercise we will navigate through the storage devices and groups available in our lab environment, but we will not change it.

1. See the overall storage allocation and utilization:
 - a. In the **Current System View** switch to the **Storage** tab.
 - b. Choose the **Distribution** tab on the left side to display the *z/VM Storage Distribution* pie chart.
 - c. Double-click on the **System** (black) part of the pie chart, this will switch you to the **Volumes** tab with appropriate filter (Volume Status = SYS) enabled. The teddy bear icon indicates these are the z/VM system volumes.
2. Work with DASD Volumes:
 - a. Change the filter to *Volume Name = **.
 - b. All the DASD volumes were displayed, different icon styles representing their status.



- c. Push on the  button in the right upper corner to switch to the list view.
- d. Check the **Assigned To** column to see the allocation of the volumes to different DASD Groups.

Note: DASD Group is a pool of DASD volumes (devices). During the Cloning exercise we will specify the *SCOLIST* DASD Group (and not the particular DASD Volume) to use and the minidisks of the cloned servers will be allocated on a DASD Volume belonging to the *SCOLIST* group. It is easy to extend the DASD Group in IBM Wave interface by assigning another DASD Volume to the group.

3. Work with DASD Groups:
 - a. Switch to the **Groups** tab on the left to see all the DASD Groups defined.
 - b. Switch to the list view and see the parameters of the DASD Groups, including the **Size** (the total size of the group) and **Free** (the available space).
 - c. Double click the *SCOLIST* group to switch back to the **Volumes** tab where the filter was automatically generated to display only the volumes belonging to the *SCOLIST* group.

End of exercise

Cloning

z/VM Directory Manager (DIRMAINT) provides the concept of a prototype. A prototype is essentially a complete z/VM User Directory entry used to automate the process of defining new guests in the z/VM user directory. Rather than manually identifying free DASD space and typing out a complete directory entry for each guest, z/VM systems programmers could predefine prototypes that identify the virtual resources needed for each type of guest and run a simple command to provision each instance (DIRM ADD [userid] LIKE [prototype]).

Upon provisioning this new guest, a z/VM systems programmer could boot (IPL) this guest and start the CMS operating system to configure the guest for use as a CMS guest or prepare the guest to boot Linux installation media via the virtual reader and punch.

In Linux on System z environments it's a common practice to implement the concept of cloning from the golden master.

A golden master is a template used to rapidly provision virtual guests with preinstalled operating systems and middleware software. Usually, highly virtualized environments provision guest systems by cloning from a golden master and configuring the clone through custom scripts. Using IBM Wave, it is possible to automate much of the process of cloning from a golden master by using a feature called an "Associated Prototype."

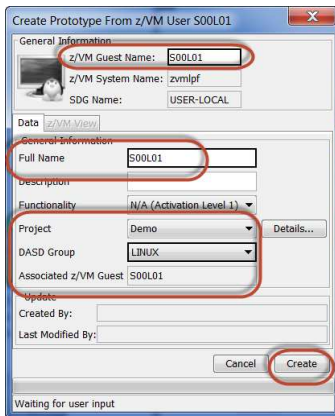
An IBM Wave Associated Prototype combines the concept of a prototype with a z/VM guest that has been preinstalled with an operating system and preconfigured for middleware products. This associated prototype allows a systems programmer to automate the entire process of provisioning a new guest, including the creation of a new z/VM directory entry and the cloning of a golden master. When combined with the functionality of the *IBM Wave Script Manager*, IBM Wave users can even automate the post-cloning customization of the new guest.

In this exercise, you will create a prototype from your *IC0xL01* user, associate it with *IC0xL01* and clone from it a new guest, *IC0xL02*.

1. Deactivate your *IC0xL01* guest:
 - a. Switch to the **z/VM User Groups** tab.
 - b. Locate your *IC0xL01* guest, right click on it and select **Deactivate** from the menu.
 - c. In the **Deactivate z/VM Users** window ensure that the *IC0xL01* user and the standard *shutdown -h* option is selected.
 - d. Press the **Go** button and confirm with **OK** the **Workunit submitted to BTS** message.
 - e. Observe the changing shape of the icon representing your guest, status changing from Active (running man), through Shutting Down (arrow with the exclamation mark) to Inactive (grey).
 - f. Observe also the **Progress** column in the **BTS Work Units** log.
 - g. Hover over the icon with mouse to check the status of the guest and ensure it is *Inactive*.

2. Create the *IC0xL01* prototype:

- a. Right click the *IC0xL01* user and select **Cloning... - Convert VM User to prototype** from the menu.
- b. In the **Create Prototype From z/VM User** window ensure the Project *InterConnect 2015* and DASD Group *SCOLIST* were chosen.
- c. Note the value of *Associated z/VM Guest* field – the new prototype will be associated with your *IC0xL01* guest.



- d. Leave the other fields untouched and press the **Create** button.
- e. Click OK to accept the **Workunit submitted to BTS** message.
- f. In the **Current System View** view select the **Prototypes** tab. You will see several prototypes with different icon styles.



- g. Locate the prototype you created. The penguin on the icon means the prototype is associated with the linux guest and ready to be used for cloning.



3. Clone from *IC0xL01* prototype to *IC0xL02* user:

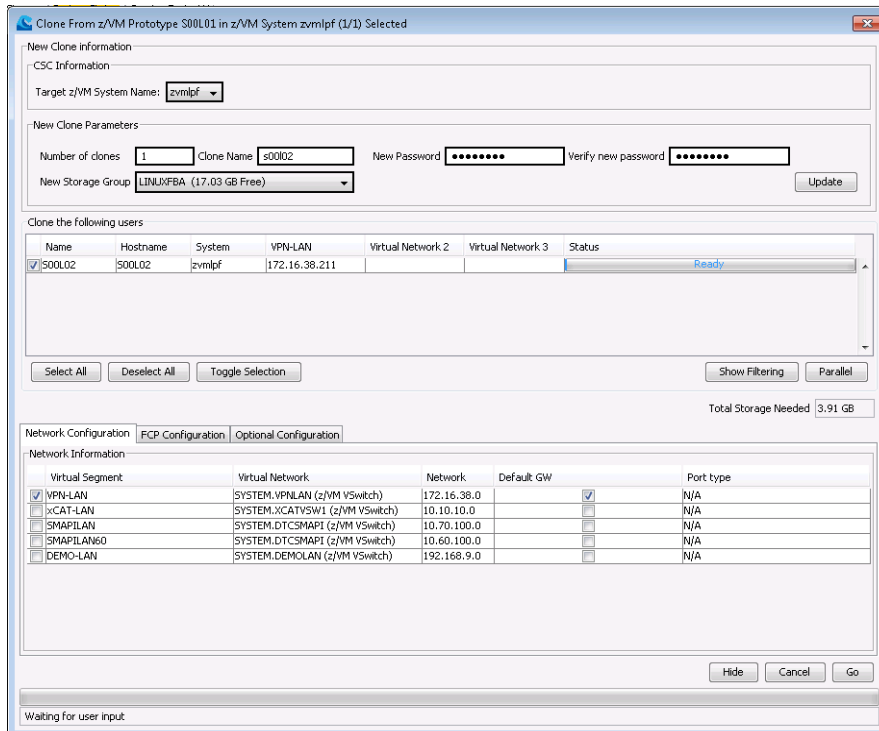
- a. Right click the *IC0xL01* prototype and select **Clone From This Prototype** option.
- b. In the **Clone From z/VM Prototype** window, **New Clone Parameters** section, specify:

Number of clones: 1
Clone Name: *IC0xL02*

New Password: *IC15WAVE*
New Storage Group: *SCOLIST*

- c. Click on the **Update** button to update the **Clone the following users** section, one line for *IC0xL02* user was generated, update it manually with these values:

Name: *IC0xL02*
Hostname: *IC0xL02*
Be sure the 10.20.30.0 network is selected.



- d. Press the **Go** button to start the cloning process.
- e. Close the **Clone From z/VM Prototype** window and observe the progress of the cloning on the **BTS Work Units** tab of IBM Wave Viewers below.

4. Activate the *IC0xL02* server:

- a. In the **Current System View – “TIVLP3”** select the **z/VM User Groups** tab. Locate your *IC0xL02* user.
- b. Right click it and select **Activate** from the menu.
- c. Press the **Go** button in the **z/VM User Activation** window.
- d. Press **OK** to accept the **Workunit submitted to BTS** message. Close the window.
- e. Observe the changing style of the icon reflecting the status changes.

Inactive



S00L02
(zlin80)

Starting



S00L02
(zlin80)

Active – no connectivity



S00L02
(zlin80)

Active – connectivity OK



S00L02
(zlin80)

5. Verify the IC0xL02 server:

- a. Double-click the *IC0xL02* server to see its details.
- b. On the **z/VM View** tab see the user definition as defined in the user directory. Check the value of the virtual NIC address created – it is *0AC0*, the default NIC of the *SMALLVSW* virtual switch, which was shown in the Network Management exercise.
- c. Go to the **Linux View** tab and check the live data provided by linux OS.
- d. Close the **Display Details** window.

End of exercise

Lab review and wrap-up

In this Lab session we introduced the IBM Wave GUI to you. You became familiar with the IBM Wave features for managing virtual servers, networks and storage including cloning of the server from the golden master.