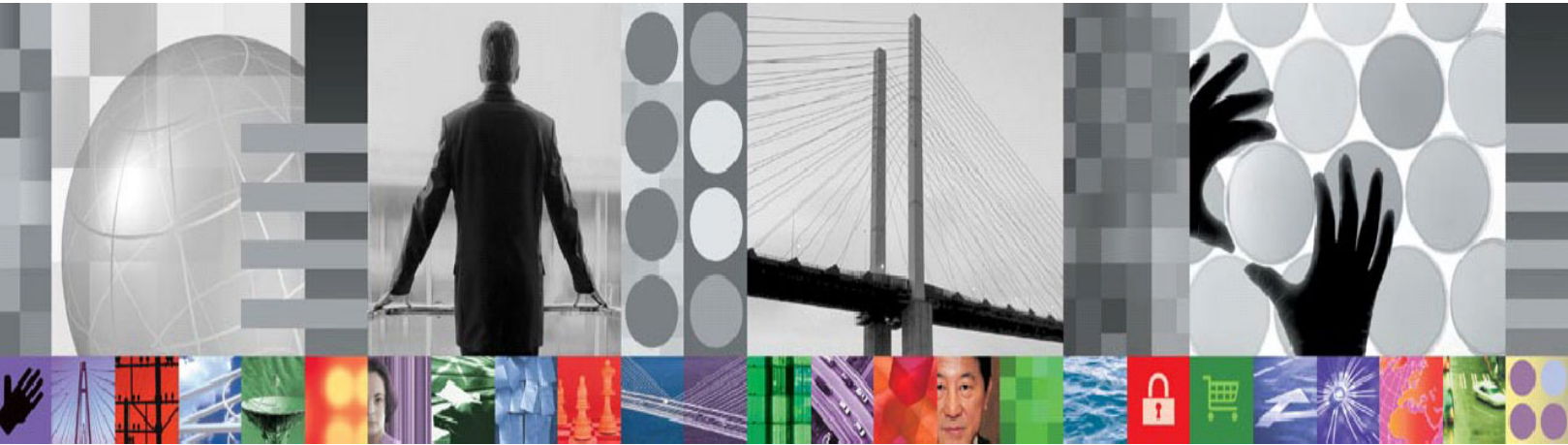




Using the Data Model to display data in TADDM

Document version 1.0

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Introduction

In order to accurately reflect the many Configuration Items (CIs) in today's complex enterprise environments, the Common Data Model (CDM) implementation used by IBM Tivoli Application Dependency Discovery Manager (TADDM) currently consists of over 750 objects, 80 relationships and 400 naming rules. The TADDM UIs (Product Console and Domain Manager) know specifically which objects and relationships to query to display information about the CIs loaded in the database tables from a discovery. CI information, however, can also be added to TADDM through the APIs or by using the bulk load program. The ability to visualize this data becomes a challenge.

This paper provides some examples of the model objects and relationships necessary to display data in the TADDM UIs. The examples use the bulk load program and the necessary IDML books to load the data. There is a Linux Computer System, a Windows Computer System, a Load Balancer, a Router, and an example to generate an Application Infrastructure Topology. For each Details Panel shown, the UI fields are displayed, the IDML is provided, and the model objects, attributes and relationships used are specified.

The intent is to continue to update this document with more examples as requested and as time allows. You can email requests to robinsda@us.ibm.com.

Linux Computer System

The following section details the relationship between the CDM model, the IDML for a LinuxUnitaryComputerSystem, and the Details Panels of the TADDM UI.

IDML

The following IDML sample can be used to create a Linux Computer System in TADDM, and viewed in the TADDM UI Details Panel.

```
<?xml version="1.0" encoding="UTF-8"?>
<idml:idml xmlns:idml="http://www.ibm.com/xmlns/swg/idml"
xmlns:cdm="http://www.ibm.com/xmlns/swg/cdm" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.ibm.com/xmlns/swg/idml idml.xsd">
  <idml:source IdMLSchemaVersion="0.6">
    <cdm:process.ManagementSoftwareSystem CDMSchemaVersion="2.1"
sourceContactInfo="http://sample.url.to.app:8080">
      <cdm:mssname>SampleComputerSystemMss</cdm:mssname>
      <cdm:productName>SampleComputerSystemProduct</cdm:productName>
      <cdm:manufacturerName>IBM</cdm:manufacturerName>
      <cdm:productVersion>1.0.0.0</cdm:productVersion>
      <cdm:hostname>computer2.austin.ibm.com</cdm:hostname>
      <cdm:adminState>Unknown</cdm:adminState>
    </cdm:process.ManagementSoftwareSystem>
  </idml:source>
  <idml:operationSet opid="1" datacontext="actual">
    <idml:refresh timestamp="2007-10-07T17:16:11Z">
      <idml:create>
        <cdm:CDM-ER-Specification>

          <cdm:sys.linux.LinuxUnitaryComputerSystem id="1" sourceToken="cs1">
            <cdm:Label>computer1.austin.ibm.com</cdm:Label>
            <cdm:SerialNumber>87BG943</cdm:SerialNumber>
            <cdm:Model>IBM eserver xSeries 230 -[86464AX]-</cdm:Model>
            <cdm:Manufacturer>IBM</cdm:Manufacturer>
            <cdm:PrimaryMACAddress>000218ZZF223</cdm:PrimaryMACAddress>
            <cdm:fqdn>tempo.us.ibm.com</cdm:fqdn>
          </cdm:sys.linux.LinuxUnitaryComputerSystem>

          <cdm:OperatingSystem id="2" sourceToken="os1">
            <cdm:OSName>Red Hat ES 6</cdm:OSName>
            <cdm:OSVersion>1.2.3.4.5</cdm:OSVersion>
          </cdm:OperatingSystem>
          <cdm:installedOn source="2" target="1"/>
          <cdm:runsOn source="2" target="1"/>

          <cdm:net.IpInterface id="3" >
            <cdm:portlist>6000,6092,4500</cdm:portlist>
          </cdm:net.IpInterface>
          <cdm:contains source="1" target="3"/>

          <cdm:net.IpV4Address id="4" >
            <cdm:DotNotation>9.18.27.163</cdm:DotNotation>
            <cdm:Label>9.18.27.163</cdm:Label>
          </cdm:net.IpV4Address>
          <cdm:bindsTo source="3" target="4"/>

          <cdm:net.Fqdn id="5">
            <cdm:fqdn>tempo.us.ibm.com</cdm:fqdn>
          </cdm:net.Fqdn>
          <cdm:assignedTo source="5" target="4"/>

        </idml:create>
      </idml:refresh>
    </idml:operationSet>
  </idml:create>
</idml:create>
```

```
<cdm:net.IpNetwork id="15">
  <cdm:subnetaddress>9.18.0.0</cdm:subnetaddress>
  <cdm:netmask>255.255.255.0</cdm:netmask>
</cdm:net.IpNetwork>

<cdm:dev.DiskDrive id="6" sourceToken="dd3">
  <cdm:Name>RAID1</cdm:Name>
</cdm:dev.DiskDrive>
<cdm:contains source="1" target="6"/>

<cdm:dev.DiskDrive id="7" sourceToken="dd11">
  <cdm:Name>RAID2</cdm:Name>
</cdm:dev.DiskDrive>
<cdm:contains source="1" target="7"/>

<cdm:sys.unix.UnixFileSystem id="8" sourceToken="ufs8">
  <cdm:Description>/dev/local</cdm:Description>
  <cdm:MountPoint>/dev/local</cdm:MountPoint>
</cdm:sys.unix.UnixFileSystem>
<cdm:contains source="1" target="8"/>

<cdm:dev.StorageVolume id="9" sourceToken="sv1">
  <cdm:Name>storage volume 1</cdm:Name>
  <cdm:IOGroup>group1</cdm:IOGroup>
  <cdm:Type>MD-RAID5</cdm:Type>
  <cdm:NumOfCylinders>5</cdm:NumOfCylinders>
  <cdm:BlockSize>2048</cdm:BlockSize>
  <cdm:NumOfBlocks>500</cdm:NumOfBlocks>
</cdm:dev.StorageVolume>
<cdm:contains source="1" target="9"/>
<cdm:storedOn source="8" target="9"/>

<cdm:sys.unix.UnixFileSystem id="10" sourceToken="ufs10">
  <cdm:Description>/var</cdm:Description>
  <cdm:MountPoint>/var</cdm:MountPoint>
</cdm:sys.unix.UnixFileSystem>
<cdm:contains source="1" target="10"/>

<cdm:dev.SCSIVolume id="11" sourceToken="scsi11">
  <cdm:Name>SCSI volume 1</cdm:Name>
  <cdm:IOGroup>SCSI group1</cdm:IOGroup>
  <cdm:Type>MD-RAID5</cdm:Type>
  <cdm:SCSILun>5</cdm:SCSILun>
  <cdm:NumOfCylinders>5</cdm:NumOfCylinders>
  <cdm:BlockSize>2048</cdm:BlockSize>
  <cdm:NumOfBlocks>500</cdm:NumOfBlocks>
</cdm:dev.SCSIVolume>
<cdm:contains source="1" target="11"/>
<cdm:storedOn source="10" target="11"/>

<cdm:dev.FCVolume id="12" sourceToken="scsi9">
  <cdm:Name>FC volume 1</cdm:Name>
  <cdm:IOGroup>FC group1</cdm:IOGroup>
  <cdm:Type>MD-RAID5</cdm:Type>
  <cdm:SCSILun>6</cdm:SCSILun>
  <cdm:NumOfCylinders>20</cdm:NumOfCylinders>
  <cdm:BlockSize>1024</cdm:BlockSize>
  <cdm:NumOfBlocks>10000</cdm:NumOfBlocks>
  <cdm:PortWWN>4050</cdm:PortWWN>
</cdm:dev.FCVolume>
<cdm:contains source="1" target="12"/>

<cdm:sys.NFSFileSystem id="13" sourceToken="nfs13">
  <cdm:Description>/mnt/nfs</cdm:Description>
```

<pre><cdm:MountPoint>/mnt/nfs</cdm:MountPoint> <cdm:exportname>thedata</cdm:exportname> <cdm:servername>sharedata.austin.ibm.com</cdm:servername> </cdm:sys.NFSFileSystem> <cdm:contains source="1" target="13"/> <cdm:dev.DiskPartition id="14" sourceToken="dp14"> <cdm:name>diskpartition 1</cdm:name> </cdm:dev.DiskPartition> <cdm:contains source="1" target="14"/> </cdm:CDM-ER-Specification> </idml:create> </idml:refresh> </idml:operationSet> </idml:idml></pre>
--

Table 1 – Sample IDML file for a Linux Computer System

Details Panel UI

The following sections show the relationship between each of the tabs for a Linux Computer System, and the IDML required to populate the fields, based on the Model.

General

Figure 1 shows the General tab which displays basic information about the computer system.

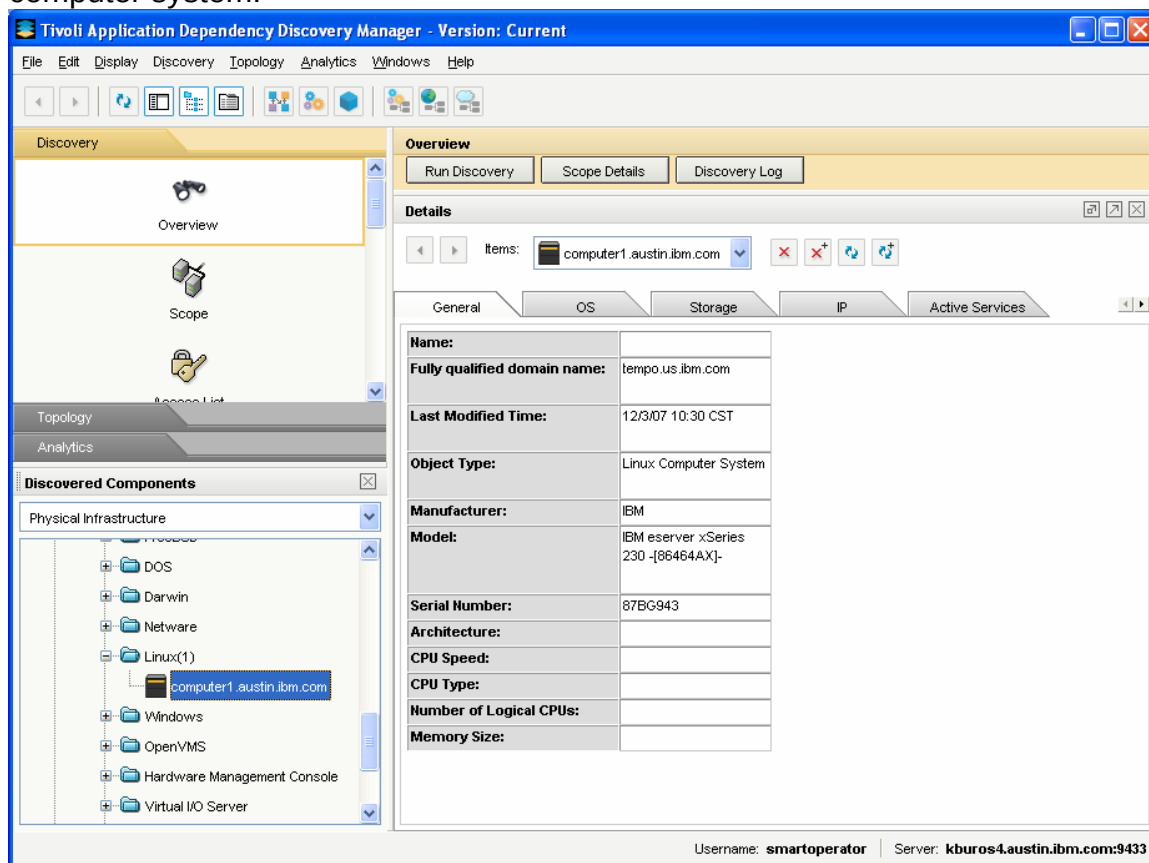


Figure 1 - Linux Computer System ->General

Table 2 shows the relationship between the UI, IDML and Model Objects for a LinuxUnitaryComputerSystem.

UI Fields	IDML	Model Objects
-Name -Fully qualified domain name -Manufacturer -Model -Serial Number -Architecture -CPU Speed -CPU type -Number of Logical CPUs -Memory Size (Bold Fields are filled in the UI)	<pre> <cdm:sys.linux.LinuxUnitaryComputerSystem id="1" sourceToken="cs1"> <cdm:Label>computer1.austin.ibm.com</cdm:Label> <cdm:SerialNumber>87BG943</cdm:SerialNumber> <cdm:Model>IBM eserver xSeries 230 -[86464AX]- </cdm:Model> <cdm:Manufacturer>IBM</cdm:Manufacturer> <cdm:PrimaryMACAddress>000218ZZF223 </cdm:PrimaryMACAddress> <cdm:fqdn>tempo.us.ibm.com</cdm:fqdn> </cdm:sys.linux.LinuxUnitaryComputerSystem> </pre>	1) Create LinuxUnitaryComputerSystem object and populate the attributes.

Table 2 - Linux Computer System -> General

OS

Figure 2 shows the OS (Operating system) tab as it relates to the Operating System IDML.

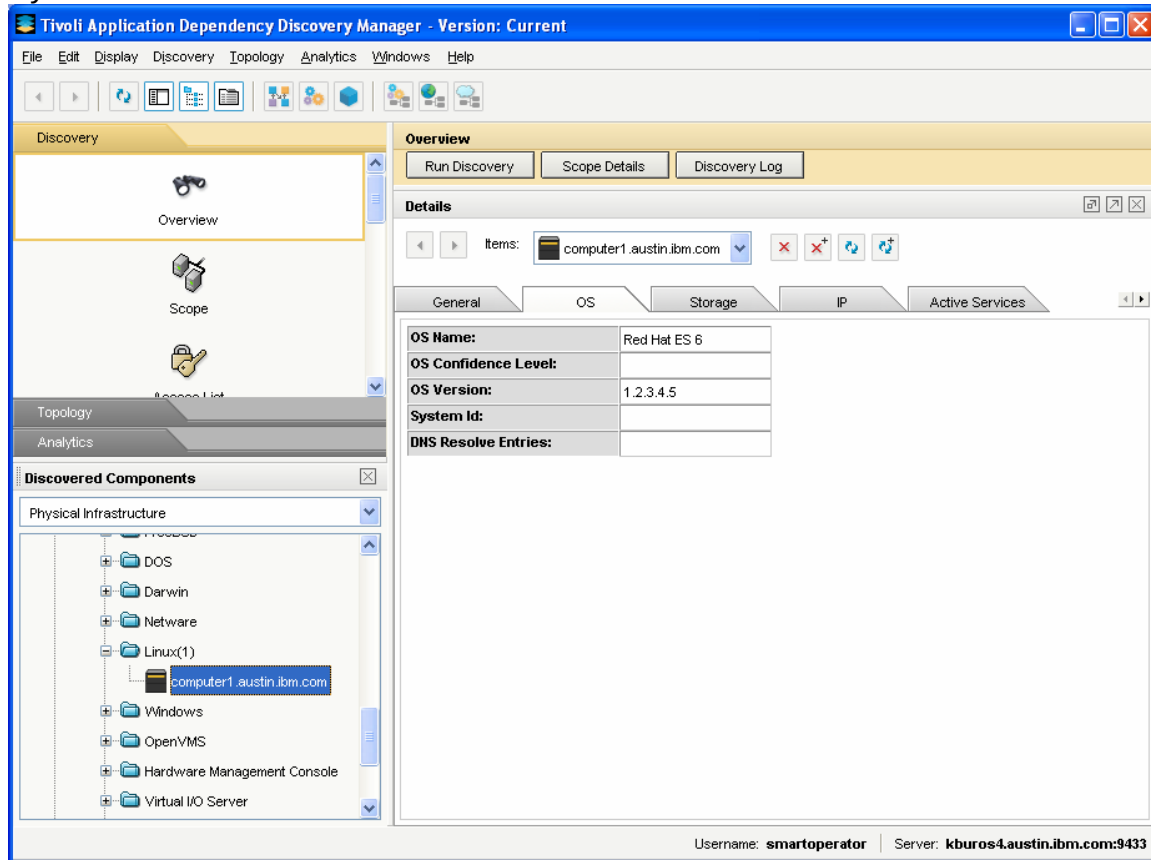


Figure 2 - Linux Computer System -> OS

Table 3 shows the relationship between the UI fields, the IDML, and the model for the OS tab.

UI Fields	IDML	Model Objects
-OS Name -OS Confidence Level -OS Version -System id -DNS Resolve Entries (Bold Fields are filled in the UI)	<pre> <cdm:OperatingSystem id="2" sourceToken="os1"> <cdm:OSName>Red Hat ES 6</cdm:OSName> <cdm:OSVersion>1.2.3.4.5</cdm:OSVersion> </cdm:OperatingSystem> <cdm:installedOn source="2" target="1"/> <cdm:runsOn source="2" target="1"/> </pre>	1) Create OperatingSystem object and populates the attributes. Populates the LinuxUnitaryComputerSystem.OSRunning object using the runsOn relationship, and the LinuxUnitaryComputerSystem.OSInstalled object using the installedOn relationship.

Table 3 – Linux Computer System -> OS

Storage

The Storage tab displays information on a variety of storage devices, including Local File Systems, Network File Systems, Disk Partitions, Storage Volumes, and Disks.

Local File Systems

Figure 3 shows the Local file systems details under the Storage tab for the Linux computer system.

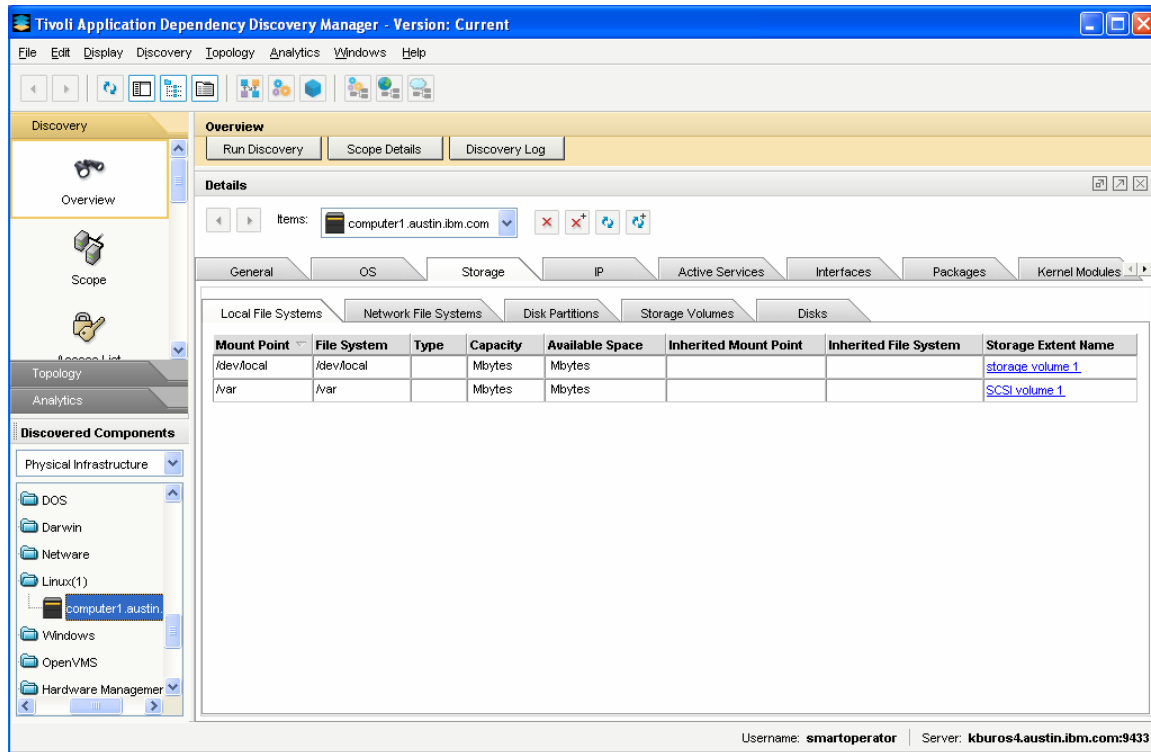


Figure 3 - Linux Computer System -> Storage -> Local File Systems

Table 4 shows the relationship between the UI fields, the IDML, and the model for Local File Systems tab.

UI Fields	IDML	Model Objects
-Mount Point -File System Type -Capacity -Available Space -Inherited Mount Point -Inherited File System -Storage Extent Name (Bold Fields are filled in the UI)	1)<cdm:sys.unix.UnixFileSystem id="8" sourceToken="ufs8"> <cdm:Description>/dev/local</cdm:Description> <cdm:MountPoint>/dev/local</cdm:MountPoint> </cdm:sys.unix.UnixFileSystem> 2)<cdm:dev.StorageVolume id="9" sourceToken="sv1"> <cdm:Name>storage volume 1</cdm:Name> <cdm:IOGroup>group1</cdm:IOGroup> <cdm:Type>MD-RAID5</cdm:Type> <cdm:NumOfCylinders>5 </cdm:NumOfCylinders>	1) Create the UnixFileSystem, and add it to the LinuxUnitaryComputerSystem.fileSystems array using the contains relationship 2) Create the StorageVolume object (child of StorageExtent), and add it to the LocalFileSystem.storageExtent object using the storedOn relationship

	<pre> <cdm:BlockSize>2048</cdm:BlockSize> <cdm:NumOfBlocks>500</cdm:NumOfBlocks> </cdm:dev.StorageVolume> <cdm:contains source="1" target="9"/> <cdm:storedOn source="8" target="9"/> 3)<cdm:sys.unix.UnixFileSystem id="10" sourceToken="ufs10"> <cdm:Description>/var</cdm:Description> <cdm:MountPoint>/var</cdm:MountPoint> </cdm:sys.unix.UnixFileSystem> <cdm:contains source="1" target="10"/> 4)<cdm:dev.SCSIVolume id="11" sourceToken="scsi11"> <cdm:Name>SCSI volume 1</cdm:Name> <cdm:IOGroup>SCSI group1</cdm:IOGroup> <cdm:Type>MD-RAID5</cdm:Type> <cdm:SCSILun>5</cdm:SCSILun> <cdm:NumOfCylinders>5 </cdm:NumOfCylinders> <cdm:BlockSize>2048</cdm:BlockSize> <cdm:NumOfBlocks>500</cdm:NumOfBlocks> </cdm:dev.SCSIVolume> <cdm:contains source="1" target="11"/> <cdm:storedOn source="10" target="11"/> </pre>	3) Create the UnixFileSystem, and add it to the LinuxUnitaryComputerSystem.fileSystems array using the contains relationship 4) Create the SCSIVolume object (child of StorageExtent), and add it to the LocalFileSystem.storageExtent object using the storedOn relationship
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Table 4- Linux Computer System -> Storage -> Local File Systems

Network File Systems

Figure 4 shows the Network file systems details under the Storage tab for the Linux computer system.

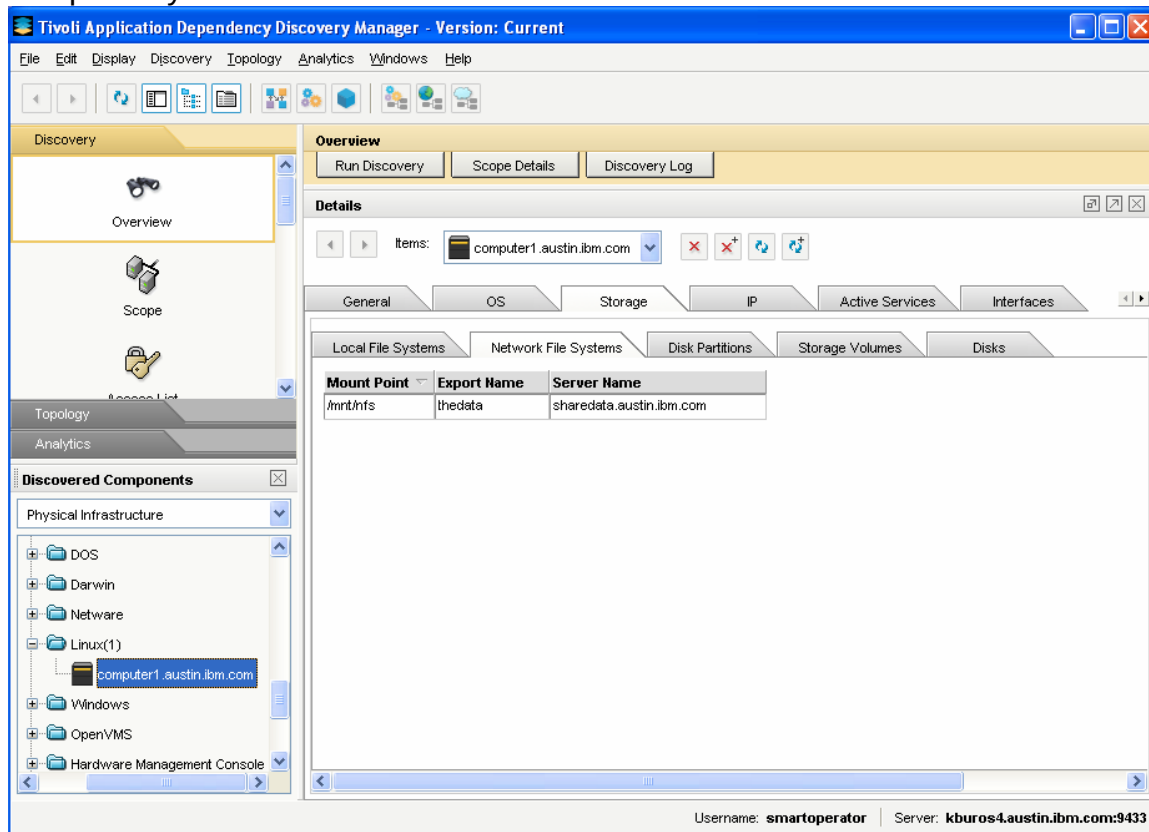


Figure 4 - Linux Computer System -> Storage -> Network File Systems

Table 5 shows the relationship between the UI fields, the IDML, and the model for Network File Systems tab.

UI Fields	IDML	Model Objects
-Mount Point -Export Name -Server Name (Bold Fields are filled in the UI)	<pre><cdm:sys.NFSFileSystem id="13" sourceToken="nfs13"> <cdm:Description>/mnt/nfs</cdm:Description> <cdm:MountPoint>/mnt/nfs</cdm:MountPoint> <cdm:exportname>thedata</cdm:exportname> <cdm:servername>sharedata.austin.ibm.com </cdm:servername> </cdm:sys.NFSFileSystem> <cdm:contains source="1" target="13"/></pre>	1) Create the NFSFileSystem object, and add it to the LinuxUnitaryComputerSystem .fileSystems array using the contains relationship.

Table 5 - Linux Computer System -> Storage -> Network File Systems

Disk Partitions

The DiskPartition represents a StorageExtent that has been formatted for use by a specific type of file system.

Figure 5 shows the DiskPartition details under the Storage tab for the Linux computer system.

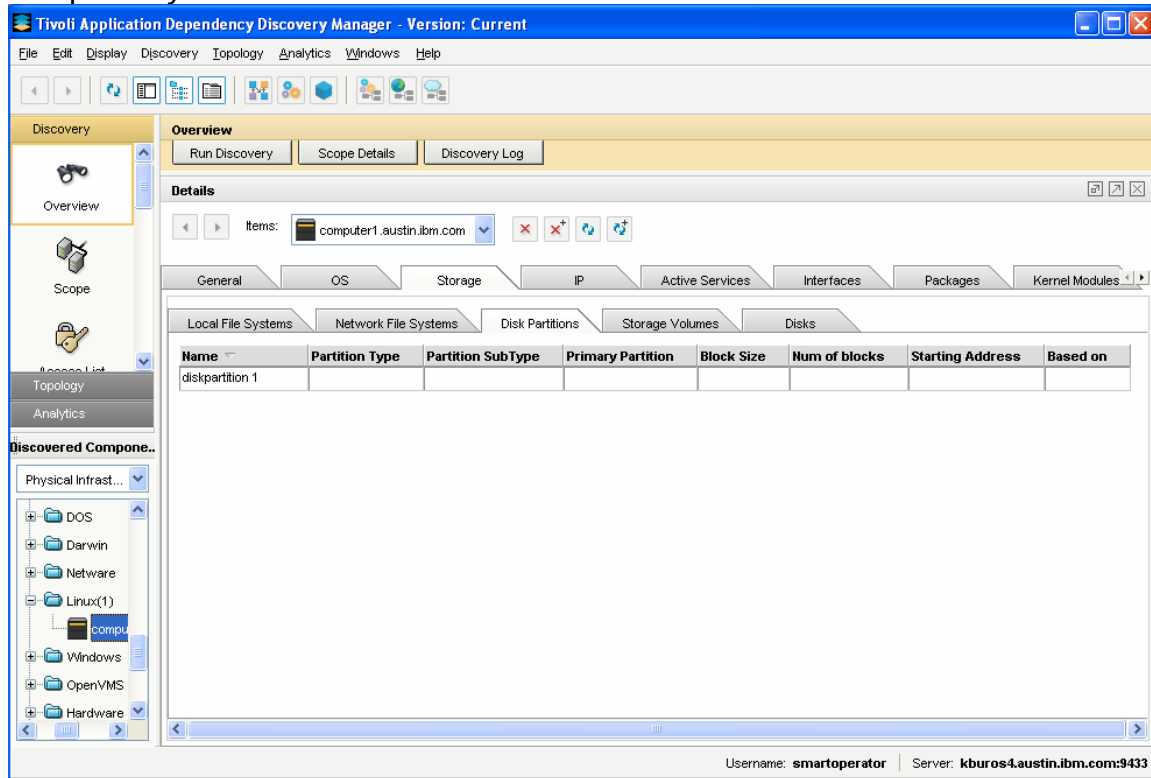


Figure 5 - Linux Computer System -> Storage -> Disk Partitions

Table 6 shows the relationship between the UI fields, the IDML, and the model for the Disk Partitions tab.

UI Fields	IDML	Model Objects
-Name -Partition Type -Partition Subtype -Primary Partition -Block Size -Num of Blocks -Starting Address -Based on (Bold Fields are filled in the UI)	<pre> <cdm:dev.DiskPartition id="14" sourceToken="dp14"> <cdm:name>diskpartition 1</cdm:name> </cdm:dev.DiskPartition> <cdm:contains source="1" target="14"/> </pre>	1) Create the DiskPartition object and populate its attributes. Add it to the LinuxUnitaryComputerSystem storageExtent object using the contains relationship.

Table 6 - Linux Computer System -> Storage -> Disk Partition

Storage Volumes

The Storage volumes for a Linux Computer System consist of Storage Volumes, SCSI Volumes, and FC (Fiber Channel) Volumes.

Figure 6 shows the Storage Volumes details under the Storage tab for the Linux computer system.

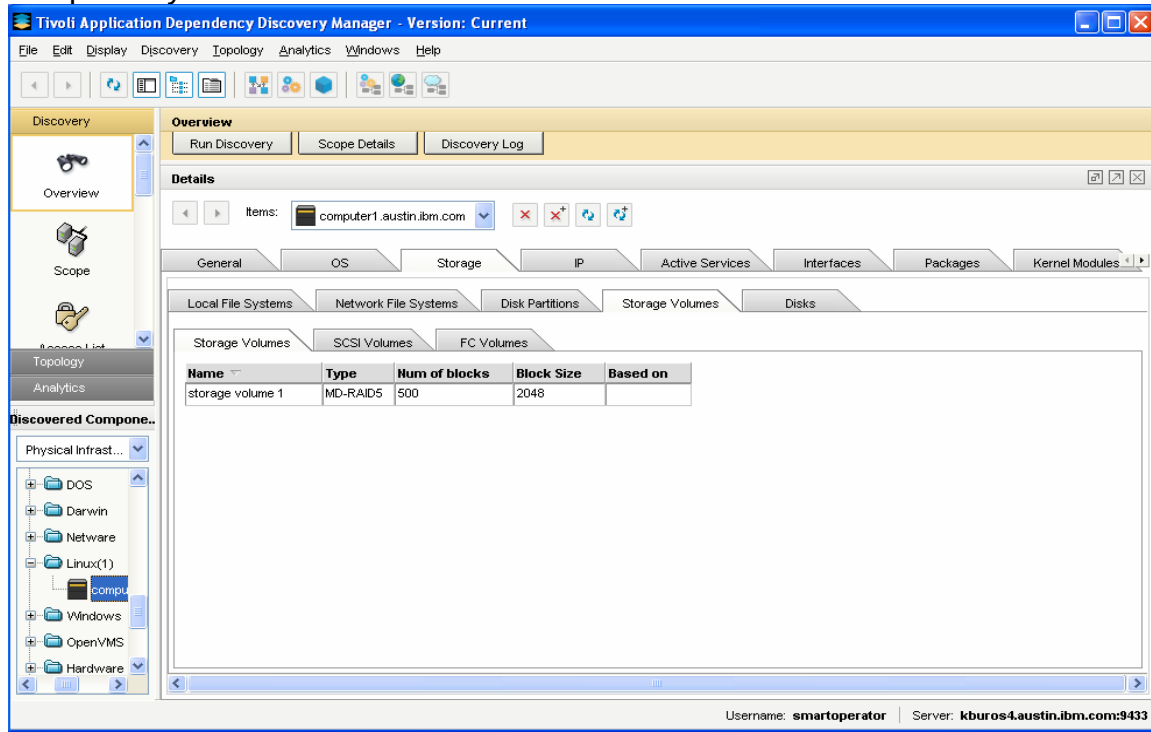


Figure 6- Linux Computer System -> Storage -> Storage Volumes -> Storage Volumes

Table 7 shows the relationship between the UI fields, the IDML, and the model for the Storage Volumes tab.

UI Fields	IDML	Model Objects
-Name -Type -Num of blocks -Block Size -Based on (Bold Fields are filled in the UI)	<pre> 1) <cdm:sys.unix.UnixFileSystem id="8" sourceToken="ufs8"> <cdm:Description>/dev/local</cdm:Description> <cdm:MountPoint>/dev/local</cdm:MountPoint> </cdm:sys.unix.UnixFileSystem> <cdm:contains source="1" target="8"/> 2) <cdm:dev.StorageVolume id="9" sourceToken="sv1"> <cdm:Name>storage volume 1</cdm:Name> <cdm:IOGroup>group1</cdm:IOGroup> <cdm:Type>MD-RAID5</cdm:Type> <cdm:NumOfCylinders>5</cdm:NumOfCylinders> <cdm:BlockSize>2048</cdm:BlockSize> <cdm:NumOfBlocks>500</cdm:NumOfBlocks> </cdm:dev.StorageVolume> <cdm:contains source="1" target="9"/> <cdm:storedOn source="8" target="9"/> </pre>	<pre> 1) 1) Create the UnixFileSystem and add it to the LinuxUnitaryComputerSystem .fileSystems array using the contains relationship 2) Create the StorageVolume object, and add it to the UnixFileSystem.storageExtent object using the storedOn relationship </pre>

Table 7 - Linux Computer System -> Storage -> Storage Volumes -> Storage Volumes

SCSI Volumes

A SCSI volume is attached to the host through a Small Computer System Interface (SCSI) bus.

Figure 7 shows the SCSI Volumes details for the Storage Volumes under the Storage tab for the Linux computer system.

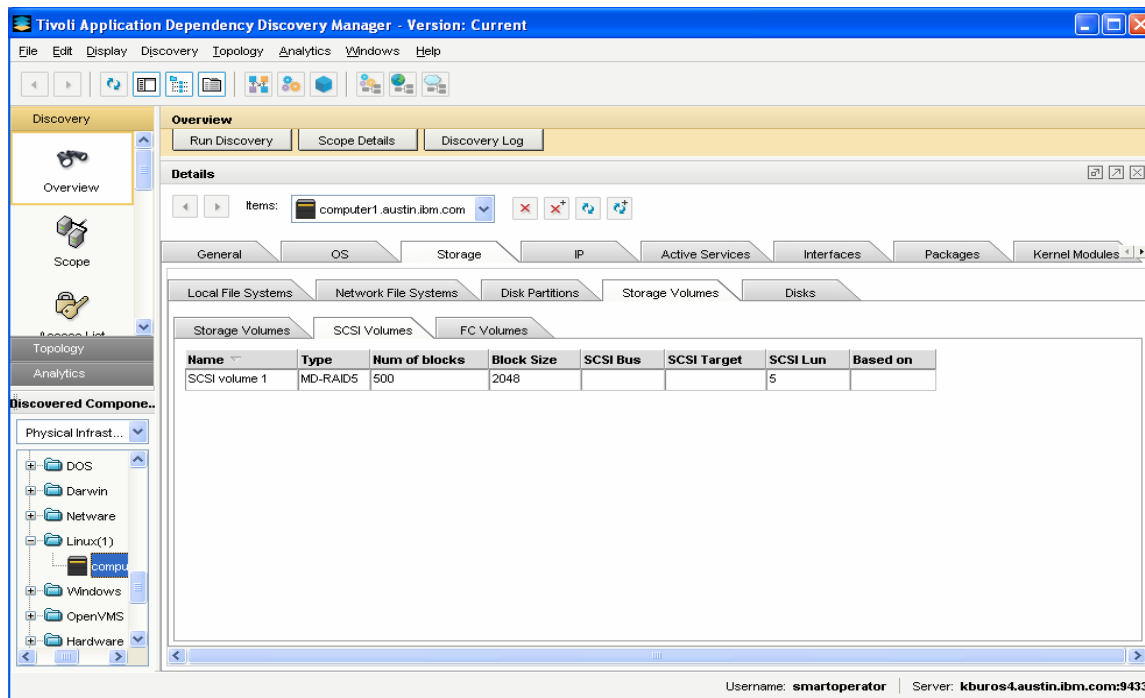


Figure 7- Linux Computer System -> Storage -> Storage Volumes -> SCSI Volumes

Table 8 shows the relationship between the UI fields, the IDML, and the model for the SCSI Volumes tab.

UI Fields	IDML	Model Objects
-Name -Type -Num of blocks -Block Size -SCSI Bus -SCSI Target -SCSI Lun -Based on (Bold Fields are filled in the UI)	<pre> 1) <cdm:sys.unix.UnixFileSystem id="10" sourceToken="ufs10"> <cdm:Description>/var</cdm:Description> <cdm:MountPoint>/var</cdm:MountPoint> </cdm:sys.unix.UnixFileSystem> <cdm:contains source="1" target="10"/> 2) <cdm:dev.SCSIVolume id="11" sourceToken="scsi11"> <cdm:Name>SCSI volume 1</cdm:Name> <cdm:IOGroup>SCSI group1</cdm:IOGroup> <cdm:Type>MD-RAID5</cdm:Type> <cdm:SCSILun>5</cdm:SCSILun> <cdm:NumOfCylinders>5 </cdm:NumOfCylinders> <cdm:BlockSize>2048</cdm:BlockSize> <cdm:NumOfBlocks>500 </cdm:NumOfBlocks> </cdm:dev.SCSIVolume> <cdm:contains source="1" target="11"/> <cdm:storedOn source="10" target="11"/> </pre>	1) Create the UnixFileSystem, and add it to the LinuxUnitaryComputerSystem.fileSystems array using the contains relationship. 2) Create the SCSIVolume object, and add it to the UnixFileSystem.storageExtent object using the storedOn relationship

Table 8 - Linux Computer System Storage -> Storage Volumes -> SCSI Volumes

FC Volumes

An FC volume is attached to the host via a Fibre Channel (FC) storage area network (SAN).

Figure 8 shows the FC Volumes details for the Storage Volumes under the Storage tab for the Linux computer system.

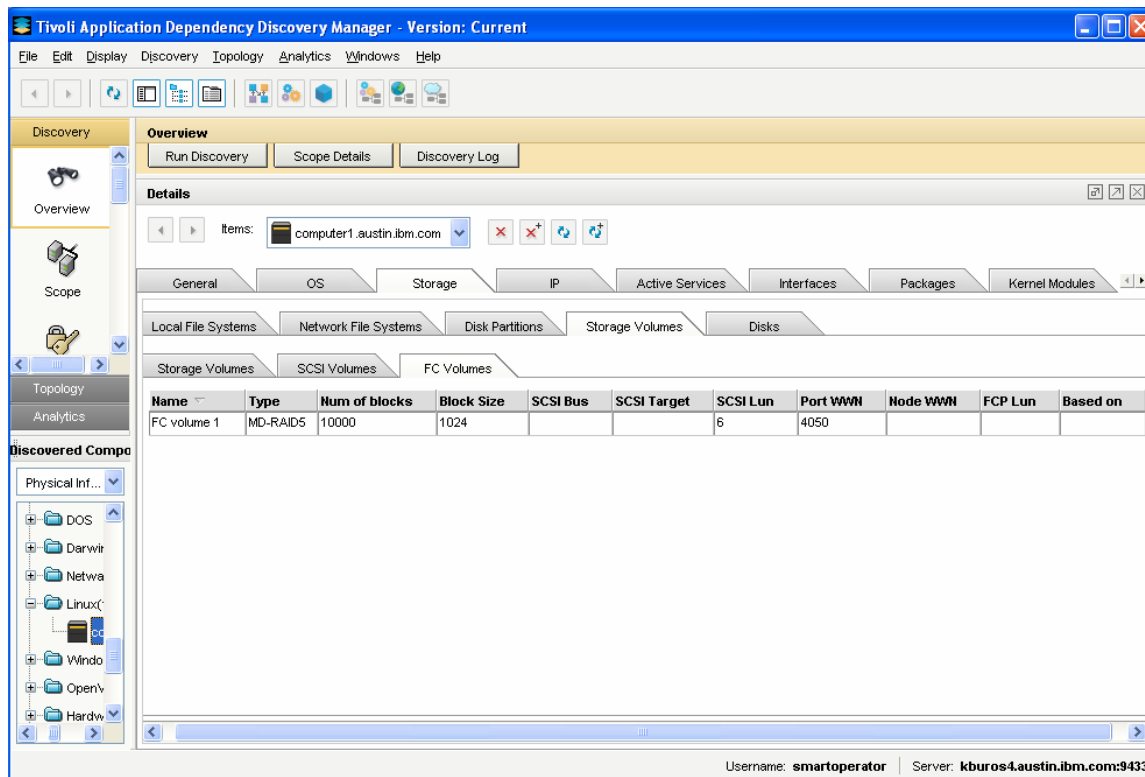


Figure 8 - Linux Computer System -> Storage -> Storage Volumes -> FC Volumes

Table 9 shows the relationship between the UI fields, the IDML, and the model for the FC Volumes tab.

UI Fields	IDML	Model Objects
-Name -Type -Num of Blocks -Block Size -SCSI Bus -SCSI Target -SCSI Lun -Port WWN -Node WWN -FCP Lun -Based on (Bold Fields are filled in the UI)	<pre> <cdm:dev.FCVolume id="12" sourceToken="scsi9"> <cdm:Name>FC volume 1</cdm:Name> <cdm:IOGroup>FC group1</cdm:IOGroup> <cdm:Type>MD-RAID5</cdm:Type> <cdm:SCSILun>6</cdm:SCSILun> <cdm:NumOfCylinders>20 </cdm:NumOfCylinders> <cdm:BlockSize>1024</cdm:BlockSize> <cdm:NumOfBlocks>10000 </cdm:NumOfBlocks> <cdm:PortWWN>4050</cdm:PortWWN> </cdm:dev.FCVolume> <cdm:contains source="1" target="12"/> </pre>	1) Create the FCVolume object and populate its attributes. Add it to the LinuxUnitaryComputerSystem storageExtent object using the contains relationship.

Table 9 - Linux Computer System -> Storage -> Storage Volumes -> FC Volumes

Disks

DiskDrives include all hard disk drives, non-removable and removable.

Figure 9 shows the Disks details under the Storage tab for the Linux computer system.

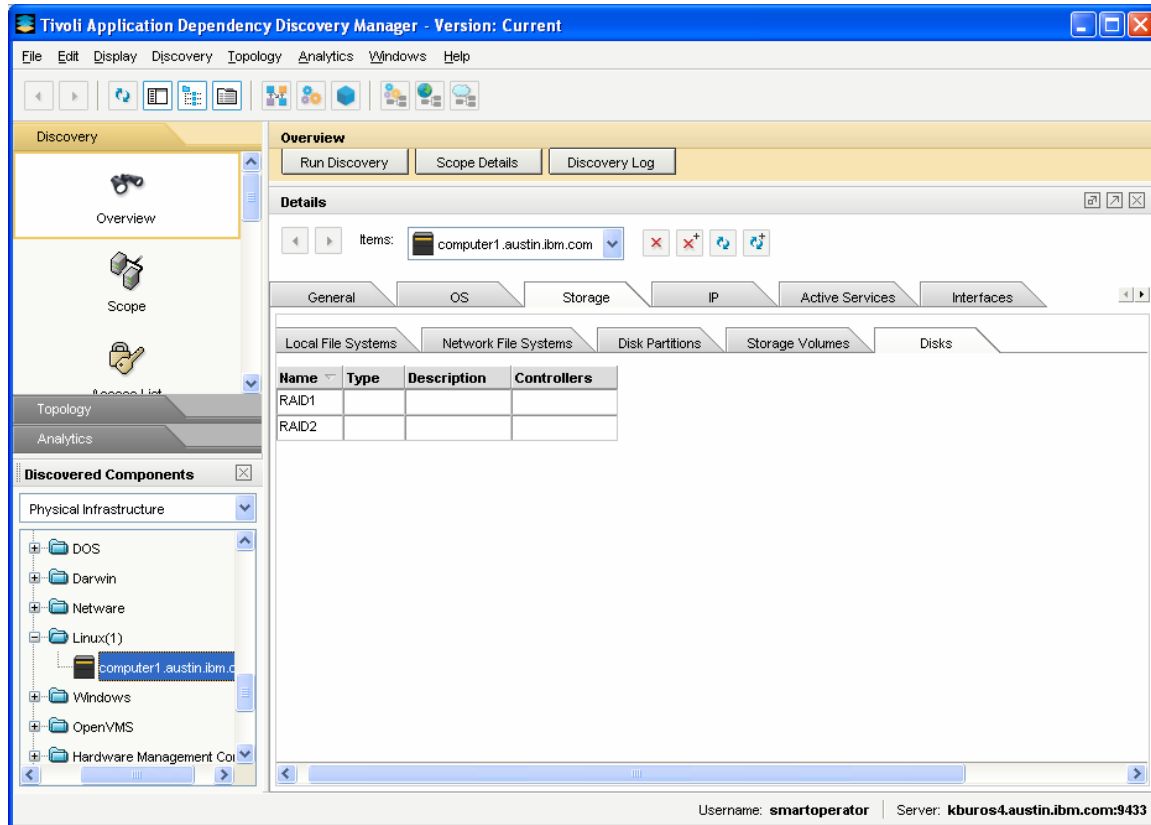


Figure 9 - Linux Computer System -> Storage ->Disks

Table 10 shows the relationship between the UI fields, the IDML, and the model for the Disks tab.

UI Fields	IDML	Model Objects
-Name -Type -Description -Controllers (Bold Fields are filled in the UI)	<pre> <cdm:dev.DiskDrive id="6" sourceToken="dd3"> <cdm:Name>RAID1</cdm:Name> </cdm:dev.DiskDrive> <cdm:contains source="1" target="6"/> <cdm:dev.DiskDrive id="7" sourceToken="dd11"> <cdm:Name>RAID2</cdm:Name> </cdm:dev.DiskDrive> <cdm:contains source="1" target="7"/> </pre>	1) Create the DiskDrive object, and add it to the LinuxUnitaryComputerSystem.devices object using the contains relationship.

Table 10 - Linux Computer System -> Storage -> Disks

IP

The IP tab displays the IP addresses associated with this Computer system.

Figure 10 represents a Layer 3 IP endpoint which is the Organization of Standardization (OSI) Network

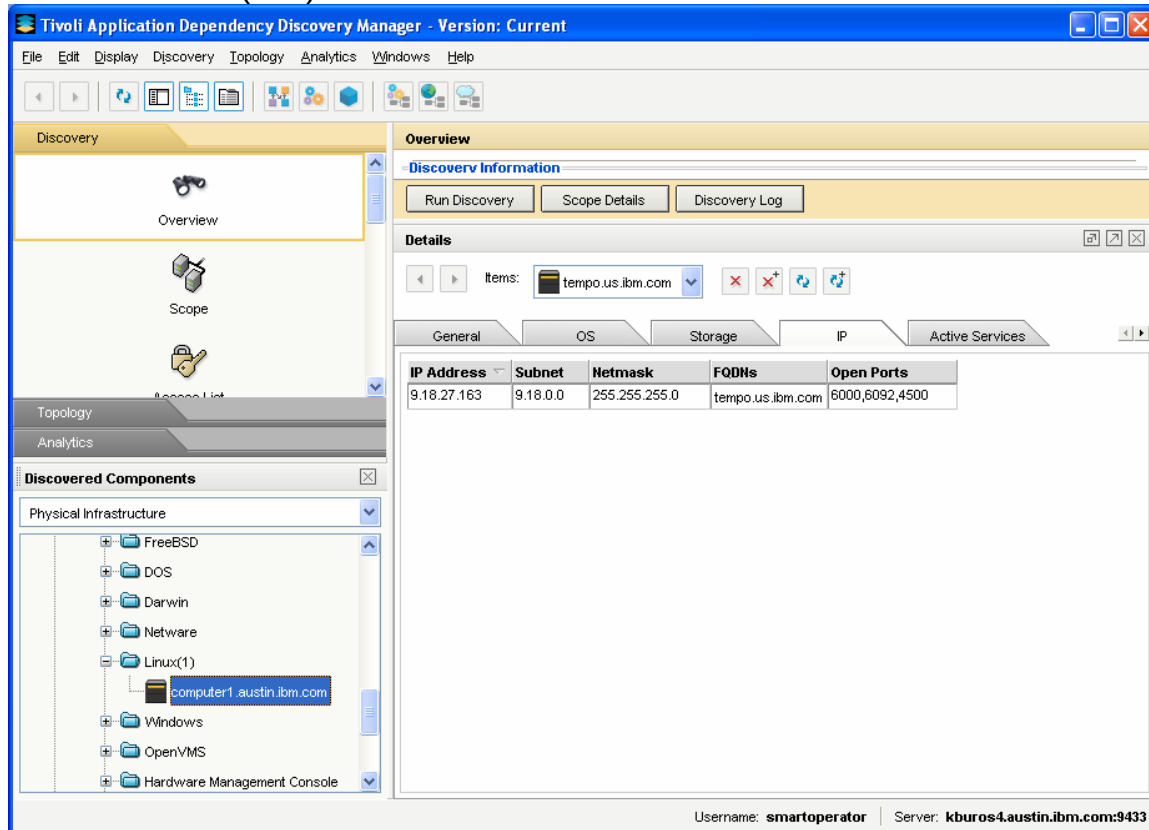


Figure 10 - Linux Computer System -> IP

Table 11 shows the relationship between the UI fields, the IDML, and the model for the IP tab.

UI Fields	IDML	Model Objects
-IP Address -Subnet -Netmask -FQDNs -Open Ports	1) <cdm:net.IpInterface id="3" > <cdm:portlist> 6000,6092,4500 </cdm:portlist> </cdm:net.IpInterface> <cdm:contains source="1" target="3"/> 2) <cdm:net.IpV4Address id="4" > <cdm:DotNotation> 9.18.27.163 </cdm:DotNotation> <cdm:Label>9.18.27.163</cdm:Label> </cdm:net.IpV4Address> <cdm:bindsTo source="3" target="4"/> 3) <cdm:net.Fqdn id="5"> <cdm:fqdn> tempo.us.ibm.com </cdm:fqdn> </cdm:net.Fqdn> <cdm:assignedTo source="5" target="4"/>	1) Create the IPInterface object, and add it to the LinuxUnitaryComputerSystem .ipInterfaces array using the contains relationship. Set the portlist (Open Ports) attribute. 2) Create the IpV4Address object, and add it to the IpInterface.ipAddress object using the bindsTo relationship 3) Create the Fqdn object, and add it to the IpV4Address.fqdns array using the assignedTo relationship

	<pre>4) <cdm:net.IpNetwork id="15"> <cdm:subnetaddress>9.18.0.0</cdm:subnetaddress> <cdm:netmask>255.255.255.0</cdm:netmask> </cdm:net.IpNetwork> <cdm:networks source="15" target="3"/></pre>	4) Create the IpNetwork object, and add it to the IpInterface.IpNetwork object using the networks relationship.
--	--	---

Table 11 - Linux Computer System -> IP

Interfaces

Figure 11 shows the Interfaces tab which is populated with the IDML data to show the IP Interfaces.

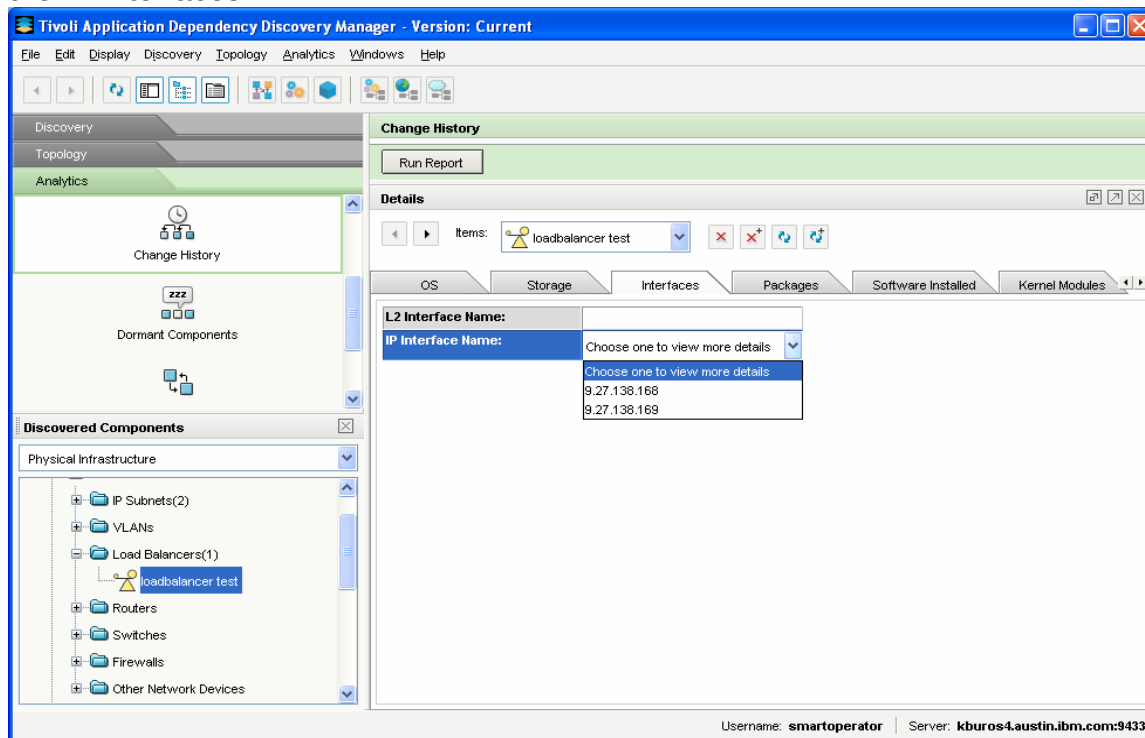


Figure 11 – Linux Computer System -> Interfaces

Table 12 shows the relationship between the UI fields, the IDML, and the model for the Interfaces tab.

UI Fields	IDML	Model Objects
IP Interface Name	<pre> 1) <cdm:net.IpInterface id="2"> </cdm:net.IpInterface> <cdm:contains source="1" target="2"/> <cdm:net.IpInterface id="3"> </cdm:net.IpInterface> <cdm:contains source="1" target="3"/> 2) <cdm:net.IpV4Address id="4"> <cdm:Label>9.27.128.168</cdm:Label> <cdm:DotNotation>9.27.138.168</cdm:DotNotation> </cdm:net.IpV4Address> <cdm:bindsTo source="2" target="4"/> <cdm:net.IpV4Address id="5"> <cdm:Label>9.27.128.169</cdm:Label> <cdm:DotNotation>9.27.138.169</cdm:DotNotation> </cdm:net.IpV4Address> <cdm:bindsTo source="3" target="5"/> </pre>	1) Populate the ComputerSystem.IpInterfaces array with the IpInterface object using the contains relationship 2) Populate the IpInterface.IpAddress object with the IpV4Address object using the bindsTo relationship

Table 12- Linux Computer System -> Interfaces

Windows Computer System

The following section details the relationship between the CDM model, the IDML for a WindowsComputerSystem, and the Details Panels of the TADDM UI.

IDML

Table 13 shows an IDML sample file that can be used to create a Windows System in TADDM, and viewed in the TADDM UI Details Panel.

```
<?xml version="1.0" encoding="UTF-8"?>
<idml:idml xmlns:idml="http://www.ibm.com/xmlns/swg/idml"
xmlns:cdm="http://www.ibm.com/xmlns/swg/cdm" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.ibm.com/xmlns/swg/idml idml.xsd">
  <idml:source IdMLSchemaVersion="0.6">
    <cdm:process.ManagementSoftwareSystem CDMSchemaVersion="2.7"
sourceContactInfo="http://sample5.ibm.com:8080">
      <cdm:mssname>SampleMss5</cdm:mssname>
      <cdm:productName>SampleProduct5</cdm:productName>
      <cdm:manufacturerName>IBM</cdm:manufacturerName>
      <cdm:productVersion>5.0.0</cdm:productVersion>
      <cdm:hostName>sample5.austin.ibm.com</cdm:hostName>
      <cdm:adminState>Unknown</cdm:adminState>
    </cdm:process.ManagementSoftwareSystem>
  </idml:source>
  <idml:operationSet opid="1" datacontext="actual">
    <idml:refresh timestamp="2007-12-06T09:00:02Z">
      <idml:create>
        <cdm:CDM-ER-Specification>

          <cdm:sys.windows.WindowsComputerSystem id="1" sourceToken="cs1">
            <cdm:Label>zetaone.austin.ibm.com</cdm:Label>
            <cdm:SerialNumber>78AR855</cdm:SerialNumber>
            <cdm:Model>IBM eserver xSeries 220 -[86464AX]-</cdm:Model>
            <cdm:Manufacturer>IBM</cdm:Manufacturer>
            <cdm:PrimaryMACAddress>000255AAF554</cdm:PrimaryMACAddress>
            <cdm:fqdn>zetaone.austin.ibm.com</cdm:fqdn>
          </cdm:sys.windows.WindowsComputerSystem>

          <cdm:sys.windows.WindowsOperatingSystem id="2" sourceToken="os2">
            <cdm:OSName>Microsoft Windows 2003</cdm:OSName>
            <cdm:OSVersion>1.2.3.4.5</cdm:OSVersion>
            <cdm:OSType>Windows2003</cdm:OSType>
          </cdm:sys.windows.WindowsOperatingSystem>
          <cdm:installedOn source="2" target="1"/>
          <cdm:runsOn source="2" target="1"/>

          <cdm:net.IpInterface id="3" >
            <cdm:portlist>6000,6092,4500</cdm:portlist>
          </cdm:net.IpInterface>
          <cdm:contains source="1" target="3"/>

          <cdm:net.IpV4Address id="4" >
            <cdm:DotNotation>9.18.24.163</cdm:DotNotation>
            <cdm:Label>9.18.24.163</cdm:Label>
          </cdm:net.IpV4Address>
          <cdm:bindsTo source="3" target="4"/>

          <cdm:net.Fqdn id="5">
            <cdm:fqdn>zetaone.austin.ibm.com</cdm:fqdn>
          </cdm:net.Fqdn>
          <cdm:assignedTo source="5" target="4"/>

        </cdm:create>
      </idml:refresh>
    </idml:operationSet>
  </idml:>
</idml>
```

```
<cdm:net.IpNetwork id="6">
  <cdm:subnetaddress>9.0.0.0</cdm:subnetaddress>
  <cdm:netmask>255.255.255.0</cdm:netmask>
</cdm:net.IpNetwork>
<cdm:networks source="6" target="3"/>

<cdm:sys.SoftwareComponent id="7">
  <cdm:name>software package 1</cdm:name>
  <cdm:softwareVersion>1.2.3.4</cdm:softwareVersion>
  <cdm:description>test package 1</cdm:description>
</cdm:sys.SoftwareComponent>
<cdm:installedOn source="7" target="2"/>

<cdm:sys.SoftwareComponent id="8">
  <cdm:name>software package 2</cdm:name>
  <cdm:softwareVersion>5.6.7.8</cdm:softwareVersion>
  <cdm:description>test package 2</cdm:description>
</cdm:sys.SoftwareComponent>
<cdm:installedOn source="8" target="2"/>

<cdm:sys.windows.WindowsFileSystem id="9" sourceToken="wfs9">
  <cdm:Description>c:</cdm:Description>
  <cdm:mountpoint>c:</cdm:mountpoint>
</cdm:sys.windows.WindowsFileSystem>
<cdm:contains source="1" target="9"/>

</cdm:CDM-ER-Specification>
</idml:create>
</idml:refresh>
</idml:operationSet>
</idml:idml>
```

Table 13- IDML sample file for a Windows System

Details Panel UI

The following sections show the relationship between each of the tabs for a Windows Computer System, and the IDML required to populate the fields, based on the Model.

General

Figure 12 shows the General tab which displays basic information for the Windows Computer System.

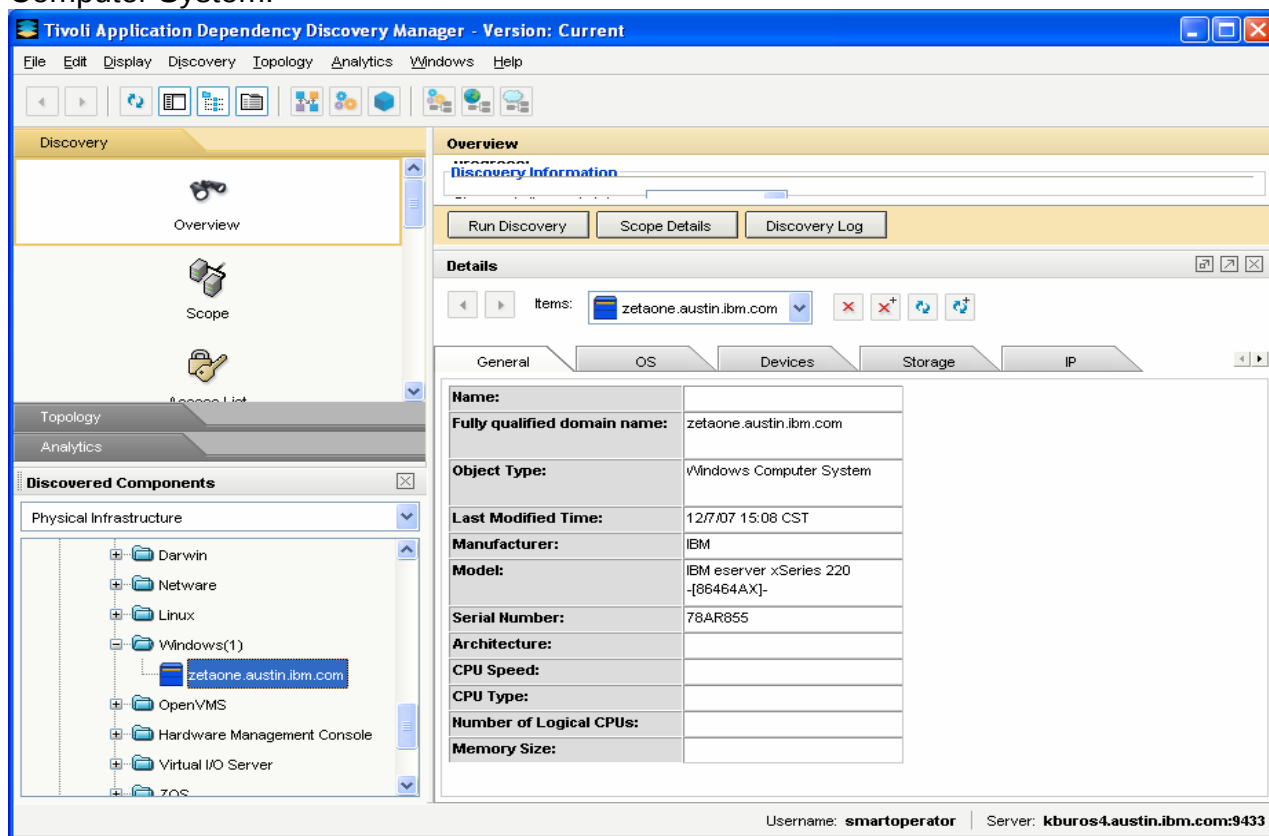


Figure 12 - Windows Computer System -> General

Table 14 shows the relationship between the UI, IDLM and Model Objects for a WindowsComputerSystem.

UI Fields	IDML	Model Objects
-Name -Fully qualified domain name -Manufacturer -Model -Serial Number -Architecture -CPU Speed -CPU Type -Number of Logical CPUs -Memory Size Bold Fields are filled in the UI)	<pre> <cdm:sys.windows.WindowsComputerSystem id="1" sourceToken="cs1"> <cdm:Label>zetaone.austin.ibm.com</cdm:Label> <cdm:SerialNumber>78AR855</cdm:SerialNumber> <cdm:Model>IBM eserver xSeries 220 -[86464AX]- </cdm:Model> <cdm:Manufacturer>IBM</cdm:Manufacturer> <cdm:PrimaryMACAddress>000255AAF554 </cdm:PrimaryMACAddress> <cdm:fqdn>zetaone.austin.ibm.com</cdm:fqdn> </cdm:sys.windows.WindowsComputerSystem> </pre>	Create WindowsComputerSystem object and populates the attributes.

Table 14- Windows Computer System -> General

OS

Figure 13 shows the OS (Operating system) tab as it relates to the Operating System IDML.

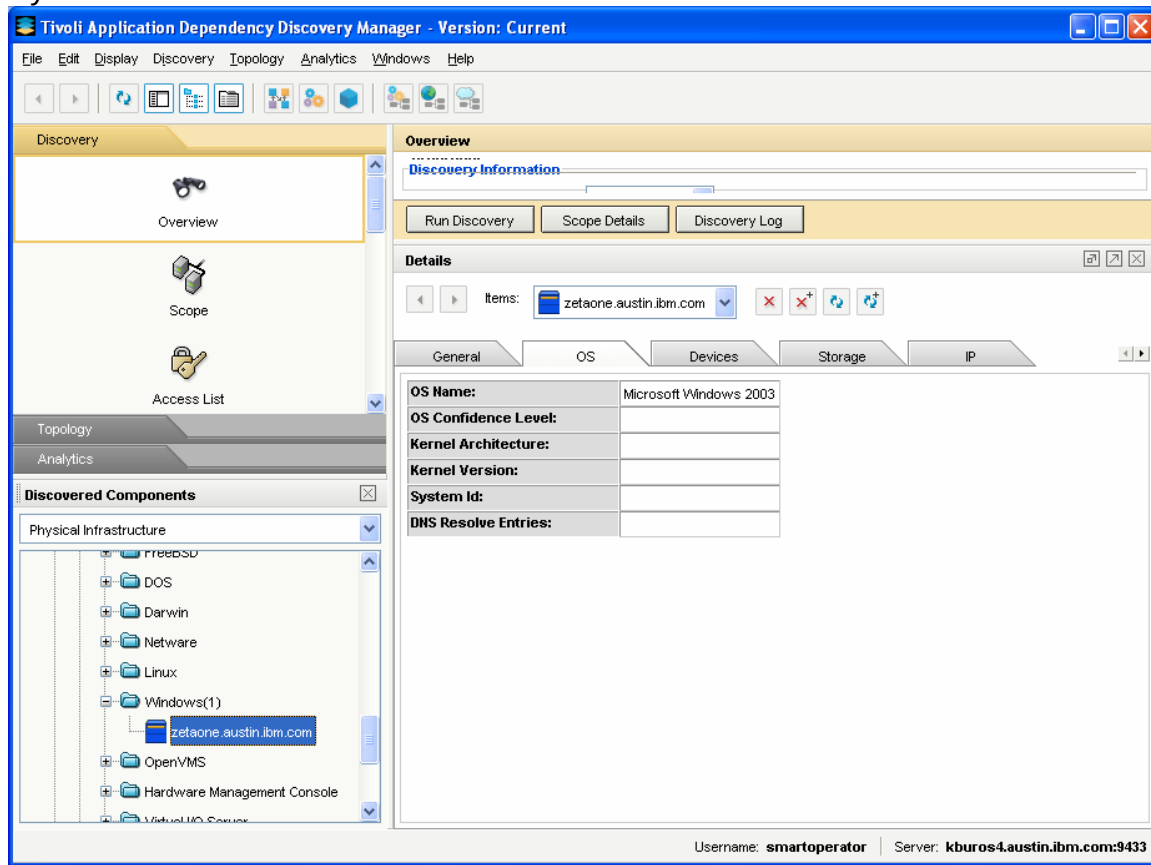


Figure 13 - Windows Computer System -> OS

Table 15 shows the relationship between the UI fields, the IDML, and the model for the OS tab.

UI Fields	IDML	Model Objects
-OS Name -OS Confidence Level -Kernel Architecture -Kernel Version -System Id -DNS Resolve Entries (Bold Fields are filled in the UI)	<pre> <cdm:sys.windows.WindowsOperatingSystem id="2" sourceToken="os2"> <cdm:OSName>Microsoft Windows 2003</cdm:OSName> <cdm:OSVersion>1.2.3.4.5</cdm:OSVersion> <cdm:OSType>Windows2003</cdm:OSType> </cdm:sys.windows.WindowsOperatingSystem> <cdm:installedOn source="2" target="1"/> <cdm:runsOn source="2" target="1"/> </pre>	Create WindowsOperatingSystem object and populates the attributes. Populates the ComputerSystem.OSInstalled using the installedOn relationship. Populates the ComputerSystem.OSRunning using the runsOn relationship

Table 15 - Windows Computer System -> OS

Devices

Devices are of type MediaAccessDevice, which includes DiskDrive and TapeDrive objects.

Figure 14 shows the Devices tab and it's details as it relates specifically to the MediaAccessDevice IDML.

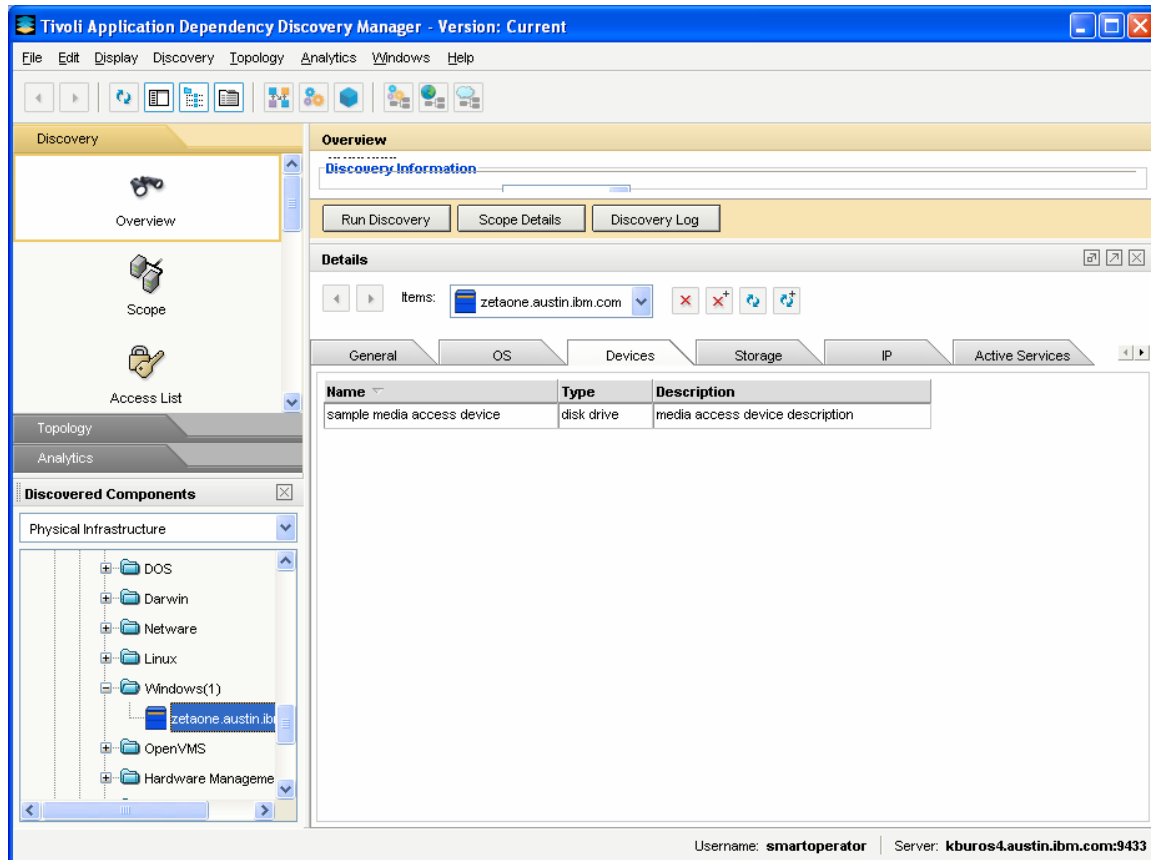


Figure 14 - Windows Computer System -> Devices

Table 16 shows the relationship between the UI fields, the IDML, and the model for the Devices tab.

UI Fields	IDML	Model Objects
-Name -Type -Description (Bold Fields are filled in the UI)	<pre><cdm:dev.MediaAccessDevice id="10" sourceToken="mad10"> <cdm:name>sample media access device</cdm:name> <cdm:description>media access device description </cdm:description> <cdm:type>disk drive</cdm:type> </cdm:dev.MediaAccessDevice> <cdm:contains source="1" target="10"/></pre>	Create MediaAccessDevice object and populates the attributes. Populates the WindowsComputerSystem.devices object using the contains relationship.

Table 16 - Windows Computer System -> Devices

Storage

Figure 15 shows the Storage tab details for the Windows computer system.

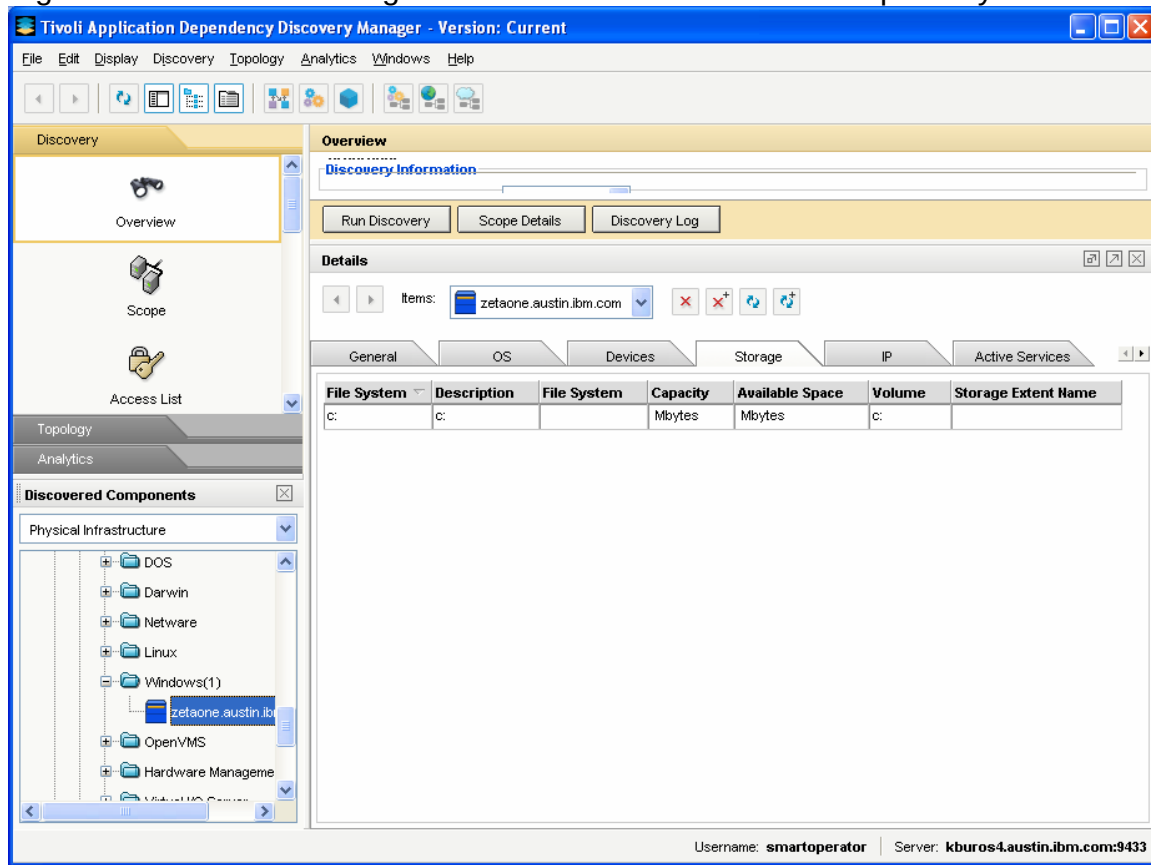


Figure 15 - Windows Computer System -> Storage

Table 17 shows the relationship between the UI fields, the IDML, and the model for the Storage tab.

UI Fields	IDML	Model Objects
-File System -Description -File System -Capacity -Available Space -Volume -Storage Extent Name (Bold Fields are filled in the UI)	<pre> <cdm:sys.windows.WindowsFileSystem id="9" sourceToken="wfs9"> <cdm:Description>c:</cdm:Description> <cdm:mountpoint>c:</cdm:mountpoint> </cdm:sys.windows.WindowsFileSystem> <cdm:contains source="1" target="9"/> </pre>	Creates WindowsFileSystem object and populates the attributes. Populates the WindowsComputerSystem.file Systems object using the contains relationship.

Table 17 – Windows Computer System -> Storage

IP

The IP tab displays the IP addresses associated with this Computer system.

Figure 16 represents a Layer 3 IP endpoint which is the Organization of Standardization (OSI) Network Layer.

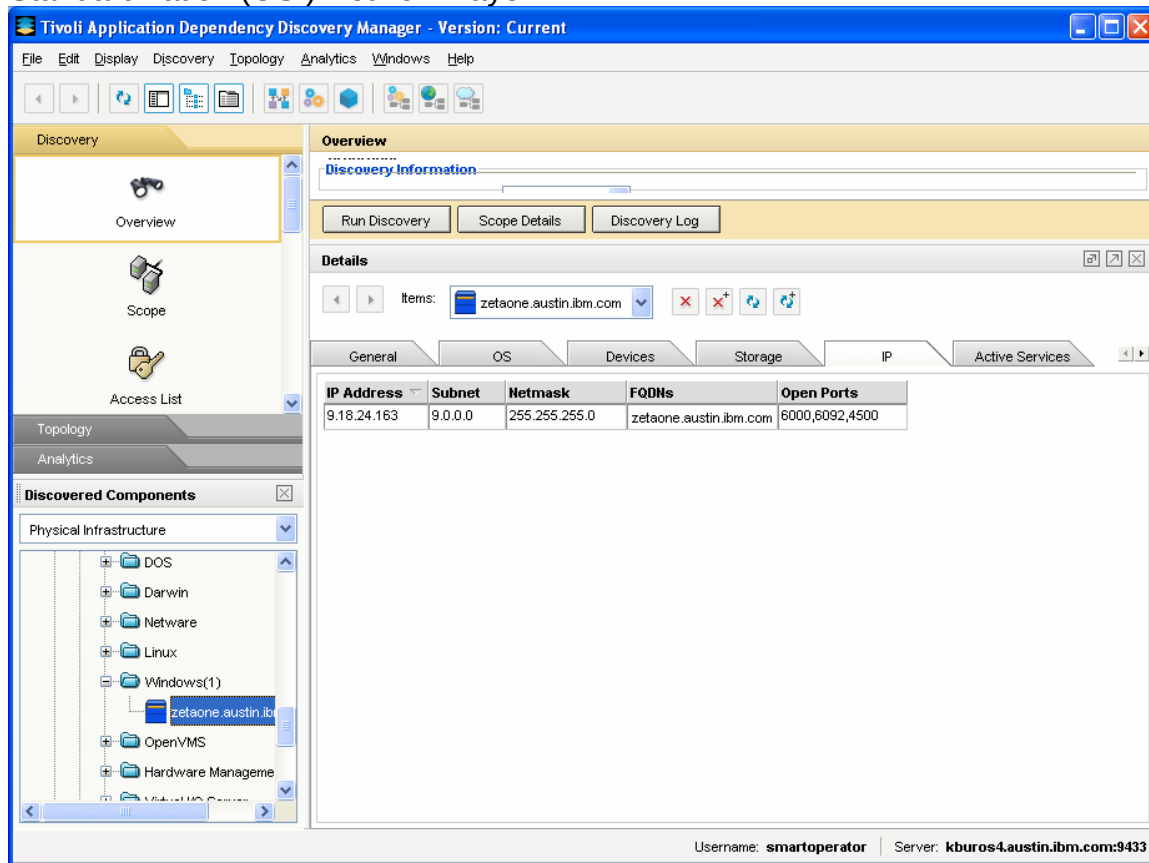


Figure 16 – Windows Computer System -> IP

Table 18 shows the relationship between the UI fields, the IDML, and the model for the IP tab.

UI Fields	IDML	Model Objects
-IP Address -Subnet -Netmask -FQDNs -Open Ports	1) <cdm:net.IpInterface id="3" > <cdm:portlist> 6000,6092,4500 </cdm:portlist> </cdm:net.IpInterface> <cdm:contains source="1" target="3"/> 2) <cdm:net.IpV4Address id="4" > <cdm:DotNotation> 9.18.24.163 </cdm:DotNotation> <cdm:Label>9.18.24.163</cdm:Label> </cdm:net.IpV4Address> <cdm:bindsTo source="3" target="4"/> 3) <cdm:net.Fqdn id="5"> <cdm:fqdn> zetaone.austin.ibm.com </cdm:fqdn> </cdm:net.Fqdn> <cdm:assignedTo source="5" target="4"/>	1) Create the IPInterface object, and add it to the WindowsComputerSystem.ipl nterfaces array using the contains relationship. Set the portlist (Open Ports) attribute. 2) Create the IpV4Address object, and add it to the IpInterface.ipAddress object using the bindsTo relationship 3) Create the Fqdn object, and add it to the IpV4Address.fqdns array using the assignedTo

	4) <cdm:net.IpNetwork id="6"> <cdm:subnetaddress>9.0.0.0</cdm:subnetaddress> <cdm:netmask>255.255.255.0</cdm:netmask> </cdm:net.IpNetwork> <cdm:networks source="6" target="3"/>	relationship 4) Create the IpNetwork object, and add it to the IpInterface.IpNetwork object using the networks relationship.
--	--	---

Table 18 - Windows Computer System -> IP

Software Components

A Software component is a component of an active (or could be active) software system.

Figure 17 shows the Software component details for a Windows computer system.

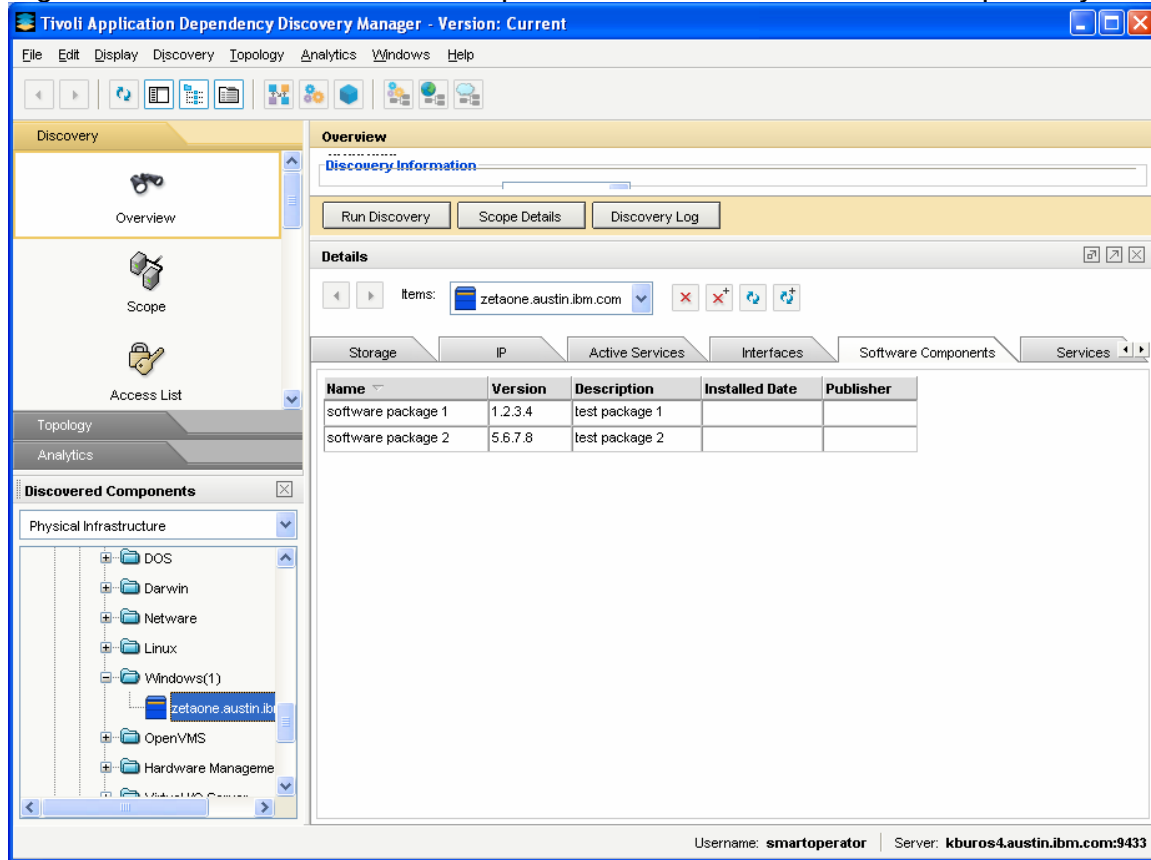


Figure 17 - Windows Computer System -> Software Components

Table 19 shows the relationship between the UI fields, the IDML, and the model for the Software Components tab.

UI Fields	IDML	Model Objects
-Name -Version -Description -Installed Date -Publisher (Bold Fields are filled in the UI)	<pre> <cdm:sys.SoftwareComponent id="7"> <cdm:name>software package 1</cdm:name> <cdm:softwareVersion>1.2.3.4</cdm:softwareVersion> <cdm:description>test package 1</cdm:description> </cdm:sys.SoftwareComponent> <cdm:sys.SoftwareComponent id="8"> <cdm:name>software package 2</cdm:name> <cdm:softwareVersion>5.6.7.8</cdm:softwareVersion> <cdm:description>test package 2</cdm:description> </cdm:sys.SoftwareComponent> </pre>	Creates SoftwareComponent object and populates the attributes. Creates the installedOn relationship to the WindowsOperatingSystem

Table 19 - Windows Computer System -> Software Components

Routers

A router is a connector between layer 3 networks (IPNetworks). This is a function, not a system. A system can contain router functions. Layer 3 is the Organization of Standardization (OSI) Network Layer.

IDML

Table 19 is an IDML sample file that can be used to create a Router in TADDM, and viewed in the TADDM UI Details Panels.

```
<?xml version="1.0" encoding="UTF-8"?>
<idml:idml xmlns:idml="http://www.ibm.com/xmlns/swg/idml"
xmlns:cdm="http://www.ibm.com/xmlns/swg/cdm" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.ibm.com/xmlns/swg/idml idml.xsd">
  <idml:source IdMLSchemaVersion="0.6">
    <cdm:process.ManagementSoftwareSystem CDMSchemaVersion="2.7"
sourceContactInfo="http://sample5.ibm.com:8080">
      <cdm:mssname>SampleMss5</cdm:mssname>
      <cdm:productName>SampleProduct5</cdm:productName>
      <cdm:manufacturerName>IBM</cdm:manufacturerName>
      <cdm:productVersion>5.0.0</cdm:productVersion>
      <cdm:hostName>sample5.austin.ibm.com</cdm:hostName>
      <cdm:adminState>Unknown</cdm:adminState>
    </cdm:process.ManagementSoftwareSystem>
  </idml:source>
  <idml:operationSet opid="1" datacontext="actual">
    <idml:refresh timestamp="2007-12-06T09:00:02Z">
      <idml:create>
        <cdm:CDM-ER-Specification>

          <cdm:ComputerSystem id="0" sourceToken="cs1">
            <cdm:signature>9.33.44.155</cdm:signature>
            <cdm:type>Router</cdm:type>
            <cdm:fqdn>tango.austin.ibm.com</cdm:fqdn>
          </cdm:ComputerSystem>

          <cdm:net.Router id="1" sourceToken="rt1">
            <cdm:Name>Router</cdm:Name>
            <cdm:Description>hardware: x86</cdm:Description>
            <cdm:Forwarding>true</cdm:Forwarding>
          </cdm:net.Router>
          <cdm:provides source="0" target="1"/>

          <cdm:OperatingSystem id="2" sourceToken="os1">
            <cdm:OSName>Red Hat ES 6</cdm:OSName>
            <cdm:OSVersion>1.2.3.4.5</cdm:OSVersion>
          </cdm:OperatingSystem>
          <cdm:installedOn source="2" target="0"/>
          <cdm:runsOn source="2" target="0"/>

          <cdm:admin.AdminInfo id="4">
            <cdm:AdminState>Enabled</cdm:AdminState>
            <cdm:EscalationContact>IT Hot Line Support</cdm:EscalationContact>
            <cdm:name>admin information</cdm:name>
            <cdm:note>sample administrative information</cdm:note>
            <cdm:ObjGuid>D36713D0168834B69B7684E1D3970604</cdm:ObjGuid>
          </cdm:admin.AdminInfo>

          <cdm:sys.SoftwareComponent id="5">
            <cdm:name>Semantic Anti-Virus</cdm:name>
            <cdm:softwareVersion>1.2.3.4</cdm:softwareVersion>
            <cdm:description>Anti-Virus Software</cdm:description>
```

```
</cdm:sys.SoftwareComponent>
<cdm:installedOn source="5" target="2"/>

<cdm:net.IpRoute id="6">
  <cdm:Label>IpRoute 1</cdm:Label>
</cdm:net.IpRoute>
<cdm:manages source="1" target="6"/>

<cdm:net.IpV4Address id="7" >
  <cdm:DotNotation>9.18.24.163</cdm:DotNotation>
  <cdm:Label>9.18.24.163</cdm:Label>
</cdm:net.IpV4Address>
<cdm:routesTo source="6" target="7"/>

<cdm:net.IpV4Address id="8" >
  <cdm:DotNotation>9.18.24.175</cdm:DotNotation>
  <cdm:Label>9.18.24.175</cdm:Label>
</cdm:net.IpV4Address>
<cdm:routesVia source="6" target="8"/>

<cdm:net.IpV4Address id="9" >
  <cdm:DotNotation>255.255.255.0</cdm:DotNotation>
  <cdm:Label>9.18.24.163</cdm:Label>
</cdm:net.IpV4Address>
<cdm:uses source="6" target="9"/>

<cdm:net.L2Interface id="10" sourceToken="l2i2">
  <cdm:managedSystemName>L2 for vlan</cdm:managedSystemName>
  <cdm:name>L2 interface</cdm:name>
  <cdm:HwAddress>4543657245</cdm:HwAddress>
  <cdm:speed>2000000000</cdm:speed>
</cdm:net.L2Interface>
<cdm:forwardsVia source="6" target="10"/>

</cdm:CDM-ER-Specification>
</idml:create>
</idml:refresh>
</idml:operationSet>
</idml:idml>
```

Table 20 – Sample IDML file for a Router

Details Panel UI

For Computer Systems with a specific type, such as Router, the standard Computer System tabs are shown, as detailed above in the Linux Computer System section. In addition, specific tabs are added to the details for the type defined.

Router Details

Figure 18 shows that a Router Details tab is inserted after the General tab.

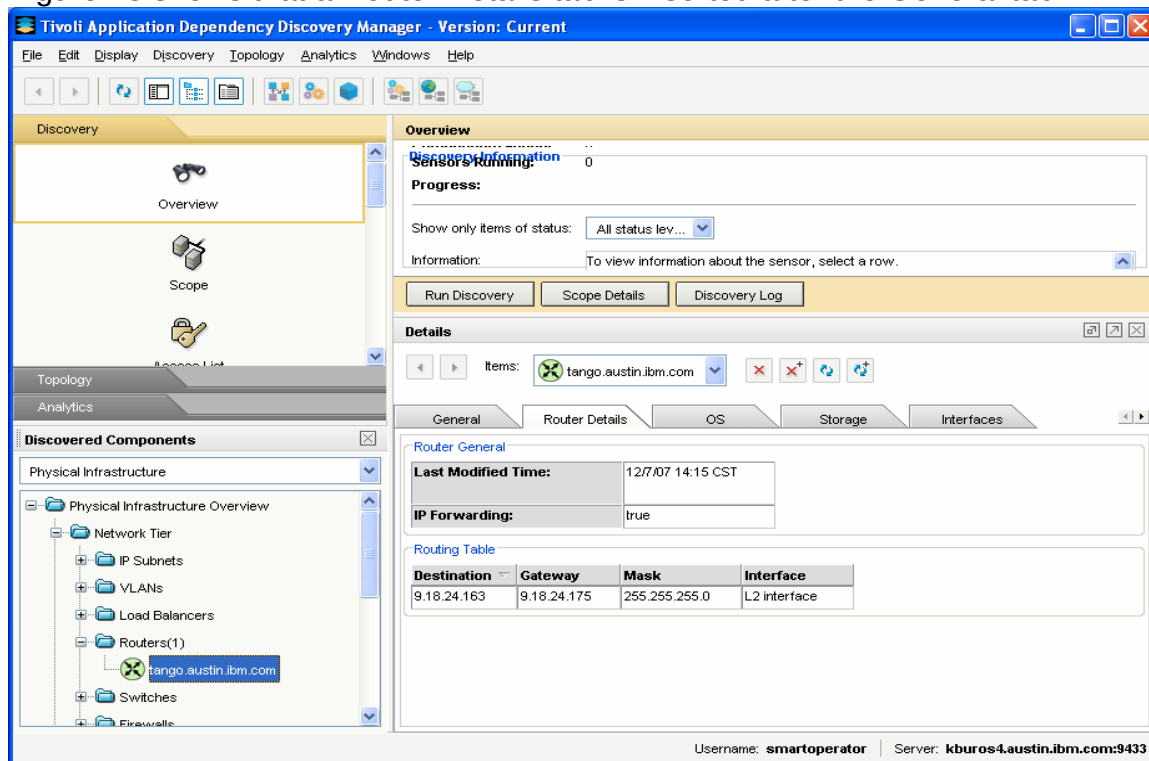


Figure 18 – Router -> Router Details

Table 21 shows the relationship between the UI fields, the IDML, and the model for the Router Details tab.

UI Fields	IDML	Model Objects
-IP Forwarding -Destination -Gateway -Mask -Interface (Bold Fields are filled in the UI)	<pre> 1) <cdm:ComputerSystem id="0" sourceToken="cs1"> <cdm:signature>9.33.44.155</cdm:signature> <cdm:type>Router</cdm:type> <cdm:fqdn>tango.austin.ibm.com</cdm:fqdn> </cdm:ComputerSystem> 2) <cdm:net.Router id="1" sourceToken="rt1"> <cdm:Name>Router</cdm:Name> <cdm:Description>hardware: x86</cdm:Description> <cdm:Forwarding>true</cdm:Forwarding> </cdm:net.Router> <cdm:provides source="0" target="1"/> 3) <cdm:net.IpRoute id="6"> <cdm:Label>IpRoute </cdm:Label> </cdm:net.IpRoute> </pre>	<pre> 1) Create the Computer System 2) Create a Router, and populate the Forwarding attribute, and the ComputerSystem.Functions array with this Router, using the provides relationship 3) Create the IpRoute object, and populate the Router .routingTable attribute using </pre>

	<pre> <cdm:manages source="1" target="6"/> 4) <cdm:net.IpV4Address id="7" > <cdm:DotNotation>9.18.24.163</cdm:DotNotation> <cdm:Label>9.18.24.163</cdm:Label> </cdm:net.IpV4Address> <cdm:routesTo source="6" target="7"/> 5) <cdm:net.IpV4Address id="8" > <cdm:DotNotation>9.18.24.175</cdm:DotNotation> <cdm:Label>9.18.24.175</cdm:Label> </cdm:net.IpV4Address> <cdm:routesVia source="6" target="8"/> 6) <cdm:net.IpV4Address id="9" > <cdm:DotNotation>255.255.255.0</cdm:DotNotation> <cdm:Label>9.18.24.163</cdm:Label> </cdm:net.IpV4Address> <cdm:uses source="6" target="9"/> 7) <cdm:net.L2Interface id="10" sourceToken="I2i2"> <cdm:managedSystemName>L2 for vlan </cdm:managedSystemName> <cdm:name>L2 interface</cdm:name> <cdm:HwAddress>4543657245</cdm:HwAddress> <cdm:speed>2000000000</cdm:speed> </cdm:net.L2Interface> <cdm:forwardsVia source="6" target="10"/> </pre>	the manages relationship 4) Create an IPv4Address object, and populate the IPRoute.destination attribute using the routesTo relationship 5) Create an IPv4Address object, and populate the IPRoute.nextHop attribute using the routesVia relationship. 6) Create an IPv4Address object, and populate the IPRoute.mask attribute using the uses relationship. 7) Create an L2Interface object, and populate the IPRoute.interface attribute using the forwardsVia relationship.
--	---	---

Table 21 - Router -> Router Details

Admin Info

The Admin Info information can be added for any top level object.

Figure 19 shows the details in the Router Admin info tab.

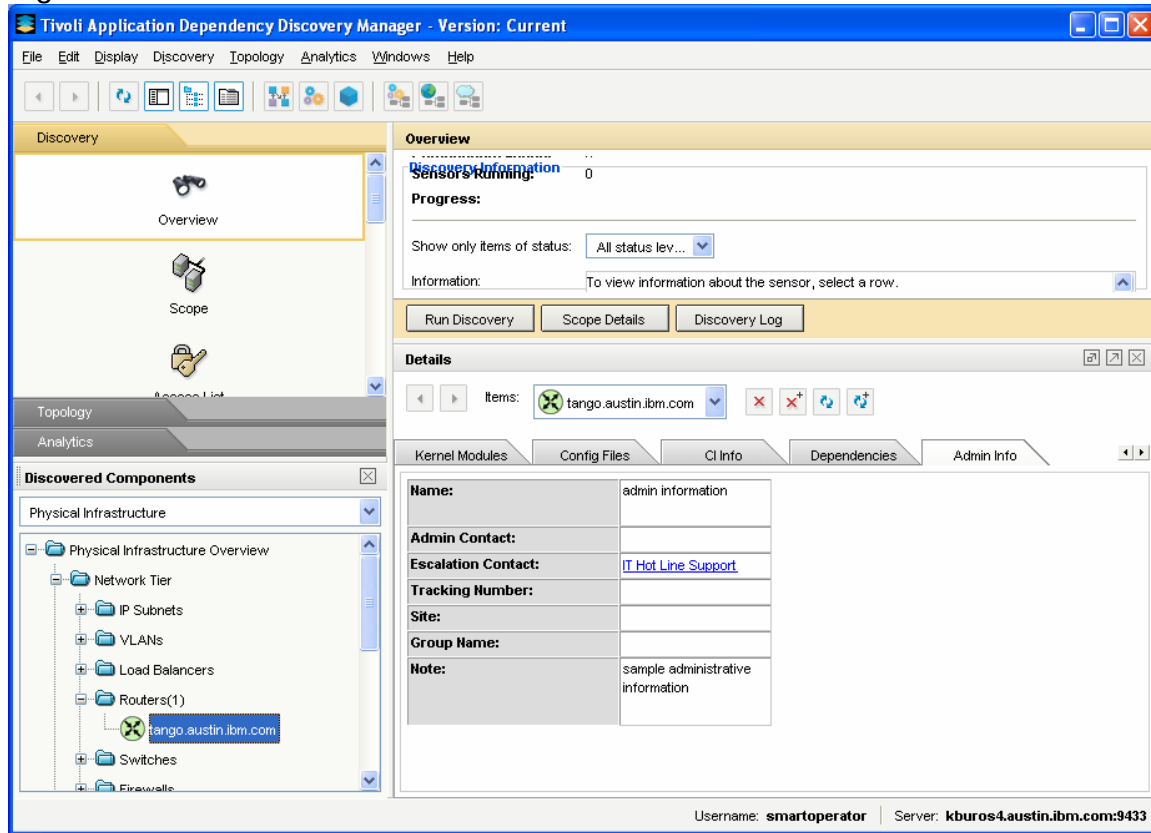


Figure 19 – Router -> Admin Info

Table 22 shows the relationship between the UI fields, the IDML, and the model for the Admin Info tab.

UI Fields	IDML	Model Objects
-Name -Admin Contact -Escalation Contact -Tracking Number -Site -Group Name -Note (Bold Fields are filled in the UI)	<pre> 1) <cdm:admin.AdminInfo id="4"> <cdm:AdminState>Enabled</cdm:AdminState> <cdm:EscalationContact>IT Hot Line Support</cdm:EscalationContact> <cdm:name>admin information</cdm:name> <cdm:note>sample administrative information</cdm:note> <cdm:ObjGuid>D36713D0168834B69B7684E1D3970604</cdm:ObjGuid> </cdm:admin.AdminInfo> </pre>	1) Creates an AdminInfo object . The GUID for the parent object must be included as the <cdm:ObjGuid> tag.

Table 22 – Router -> Admin Info

Load Balancers

IDML

Table 23 shows an IDML sample file that can be used to create a Load Balancer in TADDM, and viewed in the TADDM UI Details Panels.

```
<?xml version="1.0" encoding="UTF-8"?>
<idml:idml xmlns:idml="http://www.ibm.com/xmlns/swg/idml"
xmlns:cdm="http://www.ibm.com/xmlns/swg/cdm" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.ibm.com/xmlns/swg/idml idml.xsd">
  <idml:source IdMLSchemaVersion="0.6">
    <cdm:process.ManagementSoftwareSystem CDMSchemaVersion="2.7"
sourceContactInfo="http://vanguard.com:w:8080">
      <cdm:mssname>Vanguard01</cdm:mssname>
      <cdm:productName>VanguardDla</cdm:productName>
      <cdm:manufacturerName>VanguardIT</cdm:manufacturerName>
      <cdm:productVersion>1.0</cdm:productVersion>
      <cdm:hostname>vanguard1.penn.van.com</cdm:hostname>
      <cdm:adminState>Unknown</cdm:adminState>
    </cdm:process.ManagementSoftwareSystem>
  </idml:source>
  <idml:operationSet opid="1" datacontext="actual">
    <idml:refresh timestamp="2007-11-02T17:16:11Z">
      <idml:create>
        <cdm:CDM-ER-Specification>

          <cdm:sys.ComputerSystem id="1" sourceToken="cs1">
            <cdm:Label>loadbalancer test</cdm:Label>
            <cdm:SerialNumber>1111111</cdm:SerialNumber>
            <cdm:Model>IBM eserver xSeries 220 -[86464AX]-</cdm:Model>
            <cdm:Manufacturer>IBM</cdm:Manufacturer>
            <cdm:Type>LoadBalancer</cdm:Type>
          </cdm:sys.ComputerSystem>

          <cdm:OperatingSystem id="9">
            <cdm:OSName>f5os</cdm:OSName>
            <cdm:OSVersion>4.5</cdm:OSVersion>
            <cdm:OsId>1</cdm:OsId>
          </cdm:OperatingSystem>
          <cdm:installedOn source="9" target="1"/>
          <cdm:runsOn source="9" target="1"/>

          <cdm:net.vip.VipFunction id="6">
            <cdm:Name>VipFunction</cdm:Name>
          </cdm:net.vip.VipFunction>
          <cdm:provides source="1" target="6"/>

          <cdm:net.vip.Vip id="7">
          </cdm:net.vip.Vip>
          <cdm:provides source="6" target="7"/>

          <cdm:net.IpV4Address id="8">
            <cdm:Label>127.187.128.169</cdm:Label>
            <cdm:DotNotation>127.18.138.169</cdm:DotNotation>
          </cdm:net.IpV4Address>
          <cdm:exposes source="7" target="8"/>

          <cdm:net.Vip.VirtualService id="10">
            <cdm:VirtualPortType>TCP</cdm:VirtualPortType>
```

```
<cdm:VirtualPort>9027</cdm:VirtualPort>
</cdm:net.Vip.VirtualService>
<cdm:contains source="7" target="10"/>

<cdm:net.Vip.RealServerGroup id="11">
  <cdm:Name>SampleName1</cdm:Name>
  <cdm:LoadBalancingAlgorithm>1</cdm:LoadBalancingAlgorithm>
</cdm:net.Vip.RealServerGroup>
<cdm:contains source="6" target="11"/>
<cdm:provides source="11" target="10"/>

<cdm:net.Vip.RealServer id="12">
  <cdm:Description>BigIpLoadBalancerRealServer</cdm:Description>
  <cdm:RealPort>8000</cdm:RealPort>
</cdm:net.Vip.RealServer>
<cdm:contains source="6" target="12"/>
<cdm:federates source="11" target="12"/>
<cdm:virtualizes source="12" target="13"/>

<cdm:net.IpV4Address id="13">
  <cdm:Label>127.000.134.169</cdm:Label>
  <cdm:DotNotation>127.000.134.169</cdm:DotNotation>
</cdm:net.IpV4Address>
<cdm:virtualizes source="12" target="13"/>

</cdm:CDM-ER-Specification>
</idml:create>
</idml:refresh>
</idml:operationSet>
</idml:idml>
```

Table 23 – Sample IDML file for a Load Balancer

Details Panel UI

For Computer Systems with a specific type, such as Load Balancer, the standard Computer System tabs are shown, as detailed above in the Linux Computer System section. In addition, specific tabs are added to the details for the type defined.

Configuration

Figure 20 shows that for Load Balancers, a Configuration tab is inserted after the General tab.

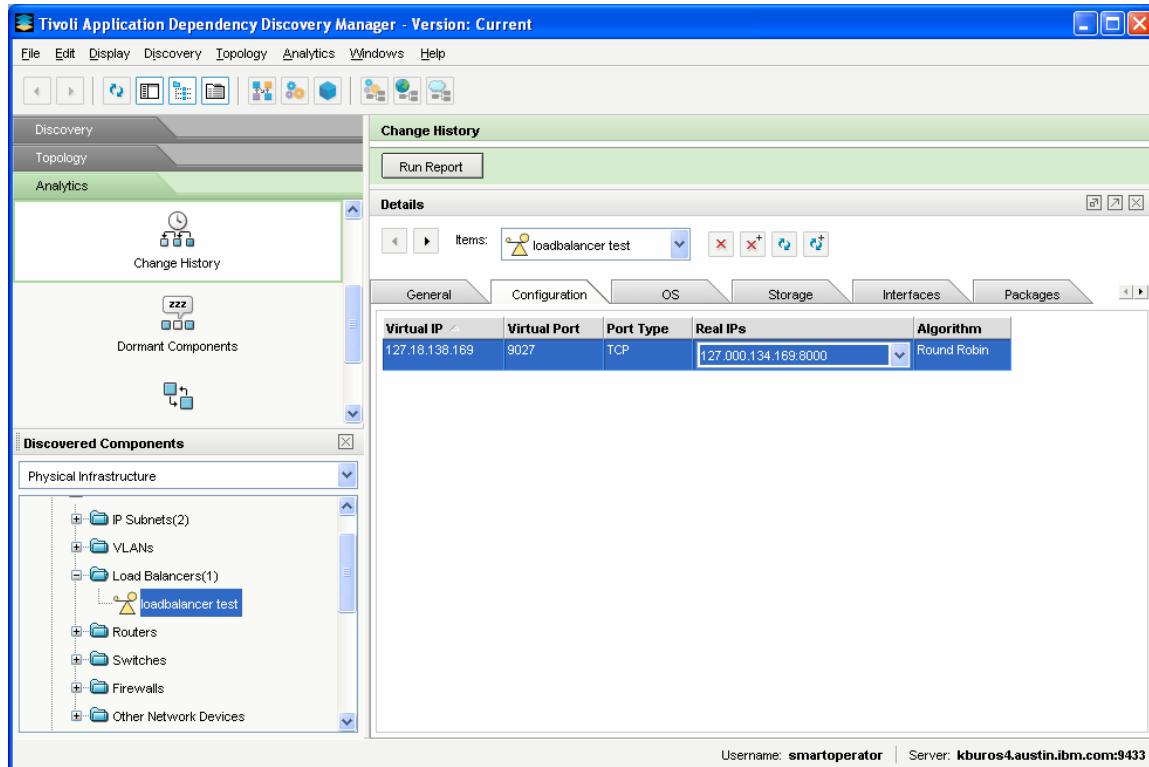


Figure 20 - Load Balancer -> Configuration

Table 24 shows the relationship between the UI fields, the IDML, and the model for the Load balancer Configuration tab.

UI Fields	IDML	Model Objects
-Virtual IP -Virtual Port -Port Type -Real IPs -Algorithms	<pre> 1) <cdm:sys.ComputerSystem id="1" sourceToken="cs1"> <cdm:Label>loadbalancer test</cdm:Label> <cdm:SerialNumber>1111111</cdm:SerialNumber> <cdm:Model>IBM eserver xSeries 220 -[86464AX] - </cdm:Model> <cdm:Manufacturer>IBM</cdm:Manufacturer> <cdm:Type>LoadBalancer</cdm:Type> </cdm:sys.ComputerSystem> 2) <cdm:net.vip.VipFunction id="6"> <cdm:Name>VipFunction</cdm:Name> </cdm:net.vip.VipFunction> <cdm:provides source="1" target="6"/> 3) <cdm:net.vip.Vip id="7"> </cdm:net.vip.Vip> <cdm:provides source="6" target="7"/> 4) <cdm:net.IpV4Address id="8"> <cdm:Label>127.187.128.169</cdm:Label> <cdm:DotNotation>127.18.138.169</cdm:DotNotation> </cdm:net.IpV4Address> <cdm:exposes source="7" target="8"/> 5) <cdm:net.Vip.VirtualService id="10"> <cdm:VirtualPortType>TCP</cdm:VirtualPortType> <cdm:VirtualPort>9027</cdm:VirtualPort> </cdm:net.Vip.VirtualService> <cdm:contains source="7" target="10"/> 6) <cdm:net.Vip.RealServer id="12"> <cdm:Description>BigIpLoadBalacerRealServer </cdm:Description> <cdm:RealPort>8000</cdm:RealPort> </cdm:net.Vip.RealServer> <cdm:contains source="6" target="12"/> <cdm:federates source="11" target="12"/> <cdm:virtualizes source="12" target="13"/> 7) <cdm:net.IpV4Address id="13"> <cdm:Label>127.000.134.169</cdm:Label> <cdm:DotNotation>127.000.134.169</cdm:DotNotation> </cdm:net.IpV4Address> <cdm:virtualizes source="12" target="13"/> 8) <cdm:net.Vip.RealServerGroup id="11"> <cdm:Name>SampleName1</cdm:Name> <cdm:LoadBalancingAlgorithm>1 </cdm:LoadBalancingAlgorithm> </cdm:net.Vip.RealServerGroup> <cdm:contains source="6" target="11"/> <cdm:provides source="11" target="10"/> </pre>	<pre> 1) Create ComputerSystem object 2) Populate ComputerSystem.functions array with the VipFunction element using the provides relationship 3) Populate VipFunction.vips array with Vip element using the provide relationship 4) Populate Vip element with VipAddress object using the exposes relationship 5) Populate the Vip.VirtualServices array with a VirtualService object using the contains relationship. 6) Populate the VipFunction.RealServers array with RealServer object using the contains relationship. 7) 7) Populate the RealServer.MappedIpAddress object with the Ip Address using the virtualizes relationship 8) Populate the VipFunction.RealServerGroup object using the contains relationship. See the LoadBalancingAlgorithm Enum in Table 25 for the values. </pre>

Table 24 - Load Balancer -> Configuration

Table 25 shows the Load Balancing Algorithm values.

Numeric Value	Description	Numeric Value	Description
0	No Balancing	9	Observed Member
1	Round Robin	10	Predictive Member
2	Weighted Round Robin	11	Radio Node Address
3	Least Connections	12	Least Connection Node Address
4	Weighted Least Connections	13	Fastest Node Address
5	Minimum Misses	14	Observed Node Address
6	Hash	15	Dynamic Ratio
7	Ratio Member	16	Fastest Application Response
8	Least Connection Member		

Table 25 - Load Balancing Algorithm values

Application Infrastructure Topology

IDML

The IDML file in Table 26 can be used to load a topology showing the applications, and the relationships between them. It loads 2 computer systems, and 4 Application servers

```
<?xml version="1.0" encoding="UTF-8"?>
<idml:idml xmlns:idml="http://www.ibm.com/xmlns/swg/idml"
xmlns:cdm="http://www.ibm.com/xmlns/swg/cdm" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://www.ibm.com/xmlns/swg/idml idml.xsd">
  <idml:source IdMLSchemaVersion="0.6">
    <cdm:process.ManagementSoftwareSystem CDMSchemaVersion="2.1"
sourceContactInfo="http://sample.url.to.app:8080">
      <cdm:mssname>SampleMss4444</cdm:mssname>
      <cdm:productName>SampleMssProduct</cdm:productName>
      <cdm:manufacturerName>International Business Machines</cdm:manufacturerName>
      <cdm:productVersion>1.0.0.0</cdm:productVersion>
      <cdm:hostname>computer1.paris.ibm.com</cdm:hostname>
      <cdm:adminState>Unknown</cdm:adminState>
    </cdm:process.ManagementSoftwareSystem>
  </idml:source>
  <idml:operationSet opid="1" datacontext="actual">
    <idml:refresh timestamp="2005-10-07T17:16:11Z">
      <idml:create>
        <cdm:CDM-ER-Specification>

          <cdm:sys.ComputerSystem id="1" sourceToken="cs1">
            <cdm:Label>computerone.paris.ibm.com</cdm:Label>
            <cdm:SerialNumber>78AR111</cdm:SerialNumber>
            <cdm:Model>IBM eserver xSeries 220 -[86464AX]-</cdm:Model>
            <cdm:Manufacturer>IBM</cdm:Manufacturer>
            <cdm:PrimaryMACAddress>000255AAF554</cdm:PrimaryMACAddress>
          </cdm:sys.ComputerSystem>

          <cdm:OperatingSystem id="3" sourceToken="os1">
            <cdm:OSName>Microsoft Windows 2000</cdm:OSName>
            <cdm:OSVersion>1.2.3.4.5</cdm:OSVersion>
          </cdm:OperatingSystem>
          <cdm:installedOn source="3" target="1"/>
          <cdm:runsOn source="3" target="1"/>

          <cdm:app.web.apache.ApacheServer id="4" sourceToken="as1">
            <cdm:Name>AppServer</cdm:Name>
            <cdm:label>Sample Apache Server</cdm:label>
            <cdm:objecttype>Java Server</cdm:objecttype>
            <cdm:ManagedSystemName>Apache:WebServer:00001</cdm:ManagedSystemName>
          </cdm:app.web.apache.ApacheServer>
          <cdm:runsOn source="4" target="3"/>

          <cdm:app.db.db2.Db2Instance id="5" sourceToken="db21">
            <cdm:label>DB2v8.1.0.96</cdm:label>
            <cdm:Name>DB2</cdm:Name>
            <cdm:ManagedSystemName>DB2:UniversalDatabase:00001</cdm:ManagedSystemName>
          </cdm:app.db.db2.Db2Instance>
          <cdm:transactionaldependency source="4" target="5"/>
          <cdm:contains source="4" target="5"/>
          <cdm:runsOn source="5" target="3"/>

          <cdm:net.Router id="7" sourceToken="rt1">
            <cdm:Name>sample router 1</cdm:Name>
```

```
<cdm:Label>router one</cdm:Label>
</cdm:net.Router>
<cdm:contains source="1" target="7"/>

<cdm:app.db.oracle.OracleInstance id="8" sourceToken="oi1">
  <cdm:Name>Oracle</cdm:Name>
  <cdm:Label>Oracle 10G</cdm:Label>
  <cdm:ManagedSystemName>Oracle:Oracle 10G:00001</cdm:ManagedSystemName>
  <cdm:Sid>1521</cdm:Sid>
</cdm:app.db.oracle.OracleInstance>
<cdm:transactionaldependency source="4" target="8"/>

<cdm:net.IpInterface id="9" sourceToken="ip1">
</cdm:net.IpInterface>
<cdm:contains source="1" target="9"/>
<cdm:routes source="7" target="9"/>

<cdm:net.IpV4Address id="10" sourceToken="ipa1">
  <cdm:DotNotation>9.16.12.53</cdm:DotNotation>
  <cdm:Label>9.16.12.53</cdm:Label>
</cdm:net.IpV4Address>
<cdm:bindsTo source="9" target="10"/>

<cdm:app.j2ee.websphere.WebSphereServer id="12" sourceToken="ws1">
  <cdm:label>WebSphere Application Server 5.1</cdm:label>
  <cdm:Name>WebSphere</cdm:Name>
  <cdm:ManagedSystemName>WAS:WebSphere Server:00001</cdm:ManagedSystemName>
</cdm:app.j2ee.websphere.WebSphereServer>
<cdm:transactionaldependency source="12" target="8"/>

<cdm:sys.ComputerSystem id="13" sourceToken="cs2">
  <cdm:Label>computertwo.paris.ibm.com</cdm:Label>
  <cdm:SerialNumber>87BX245</cdm:SerialNumber>
  <cdm:Model>IBM eserver xSeries 220 -[86464AX]-</cdm:Model>
  <cdm:Manufacturer>IBM</cdm:Manufacturer>
  <cdm:PrimaryMACAddress>000377AAF664</cdm:PrimaryMACAddress>
</cdm:sys.ComputerSystem>

<cdm:net.IpInterface id="14" sourceToken="ip2">
</cdm:net.IpInterface>
<cdm:contains source="13" target="14"/>

<cdm:net.IpV4Address id="15" sourceToken="ipa2">
  <cdm:DotNotation>129.16.13.88</cdm:DotNotation>
  <cdm:Label>129.16.13.88</cdm:Label>
</cdm:net.IpV4Address>
<cdm:bindsTo source="14" target="15"/>

<cdm:net.Router id="16" sourceToken="rt2">
  <cdm:Name>sample router 2</cdm:Name>
  <cdm:Label>router two</cdm:Label>
</cdm:net.Router>
<cdm:routes source="16" target="14"/>

<cdm:OperatingSystem id="17" sourceToken="os2">
  <cdm:OSName>Microsoft Windows 2000</cdm:OSName>
  <cdm:OSVersion>5.2.3.4.5</cdm:OSVersion>
</cdm:OperatingSystem>
<cdm:installedOn source="17" target="13"/>
<cdm:runsOn source="17" target="13"/>

</cdm:CDM-ER-Specification>
</idml:create>
</idml:refresh>
```

<pre></idml:operationSet> </idml:idml></pre>
--

Table 26 - IDML to display an application topology

Topology UI

Figure 21 shows the Application infrastructure loaded by the IDML file (Table 25) above.

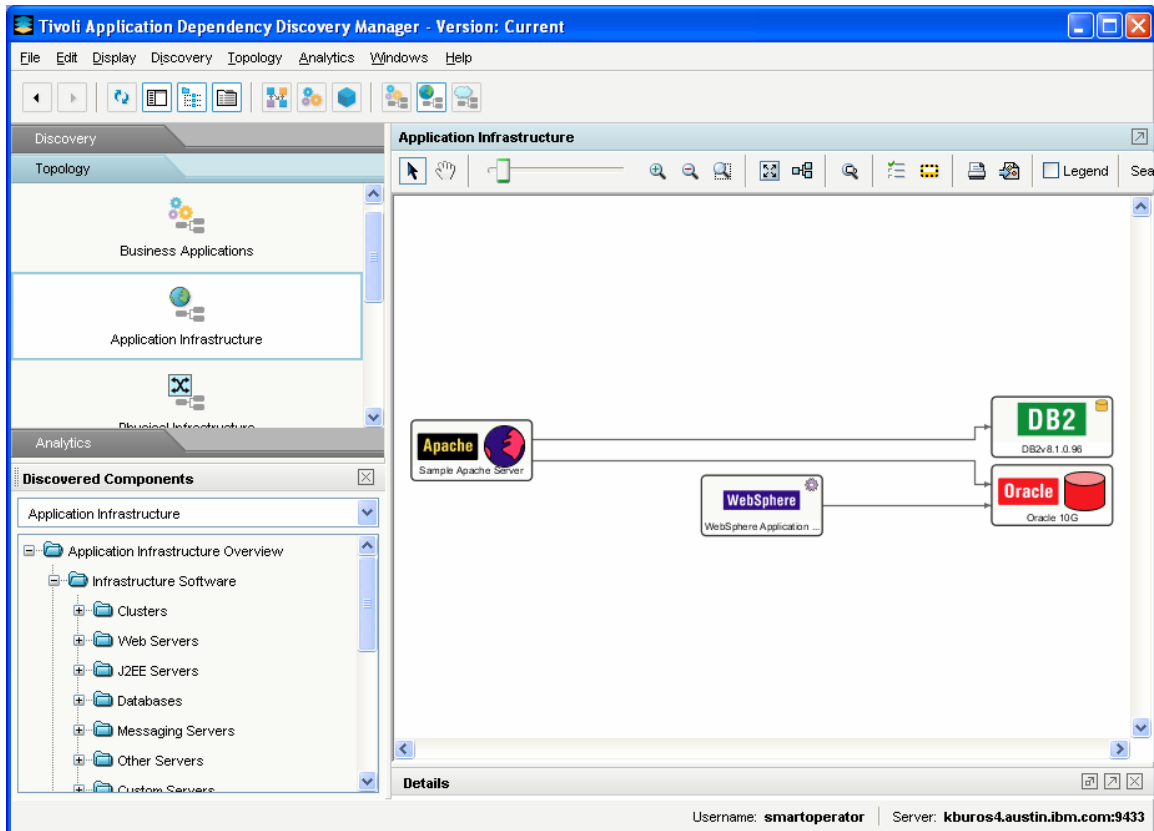


Figure 21 - Application Infrastructure Topology

Table 27 shows the Application infrastructure topology relationships.

Source	Relationship	Target
 <pre> <cdm:app.web.apache.ApacheServer id="4" sourceToken="as1"> <cdm:Name>AppServer</cdm:Name> <cdm:label>Sample Apache Server</cdm:label> <cdm:objecttype>Java Server</cdm:objecttype> <cdm:ManagedSystemName>Apache:Web Server:00001</cdm:ManagedSystemName> </cdm:app.web.apache.ApacheServer> </pre>	<pre> <cdm:transactionalde pendency source="4" target="5"/> </pre>	 <pre> <cdm:app.db.db2.Db2Instance id="5" sourceToken="db21"> <cdm:label>DB2v8.1.0.96 </cdm:label> <cdm:Name>DB2</cdm:Name> <cdm:ManagedSystemName> DB2:UniversalDatabase:00001 </cdm:ManagedSystemName> </cdm:app.db.db2.Db2Instance> </pre>
 <pre> <cdm:app.web.apache.ApacheServer id="4" sourceToken="as1"> <cdm:Name>AppServer</cdm:Name> <cdm:label>Sample Apache Server</cdm:label> <cdm:objecttype>Java Server</cdm:objecttype> <cdm:ManagedSystemName>Apache:Web Server:00001</cdm:ManagedSystemName> </cdm:app.web.apache.ApacheServer> </pre>	<pre> <cdm:transactionalde pendency source="4" target="8"/> </pre>	 <pre> <cdm:app.db.oracle.OracleInstance id="8" sourceToken="oi1"> <cdm:Name>Oracle</cdm:Name> <cdm:Label>Oracle 10G </cdm:Label> <cdm:ManagedSystemName> Oracle:Oracle10G:00001 </cdm:ManagedSystemName> <cdm:Sid>1521</cdm:Sid> </cdm:app.db.oracle.OracleInstance> </pre>
 <pre> <cdm:app.j2ee.websphere.WebSphereServer id="12" sourceToken="ws1"> <cdm:label>WebSphere Application Server 5.1</cdm:label> <cdm:Name>WebSphere</cdm:Name> <cdm:ManagedSystemName>WAS: WebSphere Server:00001 </cdm:ManagedSystemName> </cdm:app.j2ee.websphere.WebSphereServer> </pre>	<pre> <cdm:transactionalde pendency source="12" target="8"/> </pre>	 <pre> <cdm:app.db.oracle.OracleInstance id="8" sourceToken="oi1"> <cdm:Name>Oracle</cdm:Name> <cdm:Label>Oracle 10G </cdm:Label> <cdm:ManagedSystemName> Oracle:Oracle10G:00001 </cdm:ManagedSystemName> <cdm:Sid>1521</cdm:Sid> </cdm:app.db.oracle.OracleInstance> </pre>

Table 27 - Application Infrastructure Topology Relationships



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