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Dynamically Allocated Virtual Clustering Management System User's Guide

by Kelvin M Marcus

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Dynamically Allocated Virtual Clustering Management System User's Guide

by Kelvin M Marcus

Computational and Information Sciences Directorate, ARL

REPORT DOCUMENTATION PAGE

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1. Introduction

The Dynamically Allocated Virtual Clustering Management System (DAVC) is an experimentation infrastructure that provides the means to dynamically create, deploy, and manage virtual clusters of heterogeneous nodes within a cloud computing environment. The system allows researchers to create virtual clusters of nodes that can be used for experimentation, software development, and integration with existing hardware and software. This report provides usage instructions for the DAVC version 2.0 web application.

This report is separated into the following sections, which detail, via examples and step-by-step instructions, actions the user will perform when using DAVC version 2.0:

- 1) Accessing and logging into DAVC
- 2) DAVC cluster configuration
- 3) DAVC cluster instantiation
- 4) DAVC cluster and node details
- 5) DAVC virtual hard disk management
- 6) DAVC block disk/persistent storage management
- 7) Creating a new virtual hard disk from a cluster node

Each section contains slides from a PowerPoint presentation on using DAVC version 2.0. The slides are presented without change from the original version or additional comment.

2. Accessing and Logging into DAVC

The screenshot displays the DAVC web application interface. At the top, there is a navigation bar with the U.S. Army logo, RDECOM logo, and ARL logo. The text "UNCLASSIFIED" is visible in the top right corner. The main heading is "Accessing and Logging into DAVC". Below this, there are two blue callout boxes with white text:

- 1. From a web browser access the DAVC web application via the URL `http://<ip address>/davc`
- 2. Register or Login with your Username/Password

Below the callouts, there is a navigation menu with links for "Home", "About", and "Contact". To the right of the menu are input fields for "Username" and "Password", and a "Login" button. Below the navigation menu, the main content area features a large heading "Welcome To DAVC Dynamically Allocated Virtual Clustering" and a sub-heading "DAVC is an experimentation support application that allows users to create, deploy and manage virtual network clusters of heterogeneous nodes within a cloud computing environment based upon resource utilization".

On the left side of the main content area, there is a section titled "Key Capabilities" with a bulleted list:

- Auto-configuration of Multiple N-sized Clusters
 - Dynamically generates IP's, MAC's, VLAN's
 - Configure network services (DNSSMASQ, DNS, DHCP, TFTP)
- Heterogeneous Node Support
 - Support Varying Operating Systems and Application Sets
 - Fine tuning of node physical hardware attributes (ex. Hard Disk, RAM, NICs)
- Deploys Multiple Private VLANs
- Eliminates cross-talk between experiments
- Multiple experiments conducted simultaneously
- Dynamic Node To Host Server Assignment

On the right side of the main content area, there is a "Register DAVC User" form with the following fields:

- Username
- Password
- Repeat password
- First name
- Last name
- Register button

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DAVC User Dashboard



Each user has a User Dashboard with the following information:

User CPU Core and RAM Resources

Operations Menu Bar

System Messages

Create A Cluster ▾ My Clusters Virtual Hard Disk Mngt Block Disk Mngt Usage Statistics
Logout

DEMO Cluster Administration

Cluster Usage

20 of 20 CPU Cores Remaining	25600 of 25600 MB Remaining
<div style="width: 100%; height: 10px; background-color: #008000; margin-bottom: 2px;"></div> <div style="width: 100%; height: 10px; background-color: #ccc; margin-bottom: 2px;"></div> <p style="font-size: x-small; margin: 0;">20 Cores 25600 (MB)</p>	<div style="width: 100%; height: 10px; background-color: #008000; margin-bottom: 2px;"></div> <div style="width: 100%; height: 10px; background-color: #ccc; margin-bottom: 2px;"></div> <p style="font-size: x-small; margin: 0;">20 Cores 25600 (MB)</p>

+ Create A Cluster
+ Clone A Cluster

Messages

DEMO Cluster Configurations

You Don't Have Any Cluster Configurations

+ Create One

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DAVC Menu Bar Operations



The dashboard Menu Bar is for the following:

Starts the Cluster Creation or Cloning Process

Navigate User to Virtual Hard Disk Management Page

Currently Not Used

Create A Cluster ▾ My Clusters Virtual Hard Disk Mngt Block Disk Mngt Usage Statistics

Navigate User to DAVC Dashboard and Cluster List

Navigate User to Persistent Storage Creation Page

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3. DAVC Cluster Configuration

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DAVC Cluster Configuration

There are 3 ways to begin the Cluster configuration process...choose one to begin configuration.

Create A ClusterMy ClustersVirtual Hard Disk MngtBlock Disk MngtUsage StatisticsLogout

DEMO Cluster Administration

Cluster Usage

20 of 20 CPU Cores Remaining	25600 of 25600 MB Remaining
<div style="background-color: #2e8b57; color: white; padding: 2px; font-size: 8px;">20 Cores</div>	<div style="background-color: #2e8b57; color: white; padding: 2px; font-size: 8px;">25600 (MB)</div>

[↕ Create A Cluster](#)

[↕ Clone A Cluster](#)

Messages

DEMO Cluster Configurations

You Don't Have Any Cluster Configurations

↕ Create One

UNCLASSIFIED
DAVC Cluster Configuration:
Cluster Info Tab

1. Replace the random hash with a suitable Cluster Name

2. Input a short description of the Cluster

3. Indicate if the Cluster will be Private (unclonable by other users)

4. Proceed to creating the Cluster networks

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DAVC Cluster Configuration:
Networks Tab

The Networks tab lists all of the networks currently added to the cluster.

1. Click 'Add Cluster Networks' to add a new network

2. Input network in CIDR format

3. Click 'Add Network' to add it to the Cluster

More Networks can be added or deleted from this tab.

Click 'Delete' to remove a network

Create New DAVC Cluster

Cluster Info Networks Nodes

ID	Name	Subnet	
1	Exp1	192.168.1.0/24	Delete

+ Add More Networks Add Nodes →

Click 'Add More Networks' to add additional networks

Click 'Add Nodes' to begin adding nodes to the Cluster

The Nodes tab lists all of the nodes currently associated with the cluster.

Create New DAVC Cluster

Cluster Info Networks Nodes

ID	Controller	OS/Image	Disk Space (GB)	RAM (MB)	Cores	VNIC	Networks
1							

Add More Nodes Create Cluster

Click 'Add More Nodes' to begin adding Nodes

The Add Cluster Nodes dialog is used to set the attributes of the nodes that will be added to the cluster.

Add Cluster Nodes ✕

Controller (optional)

Ostype

Cores

1

Non-Persistent Block Storage Size (GB) (/log)

Non-Persistent Block Storage Size (GB) (/log)

RAM (MB)

RAM (MB)

Virtual Network Driver

virtio

Networks

Quantity

1

1. Click the Ostype/Virtual Machine template dropdown box

The Operating System/VM dropdown lists all of the public Virtual Machines loaded into DAVC

Add Cluster Nodes

Controller (optional)

Ostype

✓ -----

- Algolink_Satellite
- Exp_Framework_Base
- A3E_node
- Android_x86
- Ubuntu_14.04_6G
- glusterfs_node
- Route_Planning_Agent
- Source_Selection
- Algolink_Master_v2
- AlgoLink_EF
- EMANE_9.2_16G
- EMANE_9.2_20G
- EMANE_9.2_6G
- CentOS-7_x86_64_base
- ubuntu-14.04_25G
- ubuntu-14.04_15G
- Android_x86_MediaScope
- IOT_Compression
- Tomography
- XCN_Framework
- XCN_EF
- D3JS_IP_Data_Server
- Elicit_pre-installed_v2
- IBM_Exp_Facility_v2
- Elicit_pre_installed_OLSR
- Fusion_2016

Select a Virtual Machine

UNCLASSIFIED
DAVC Cluster Configuration:
Add Cluster Nodes





Add Cluster Nodes

Controller (optional)

Ostype: Ubuntu_14.04_6G

Cores: 1

Non-Persistent Block Storage Size (GB) (/log):

RAM (MB): 2048

Virtual Network Driver: virtio

Networks:

192.168.1.0/24

Quantity: 3

Add Nodes Close

1. The default values for the CPU Cores, Non-Persistent Block Storage Size, RAM, and Virtual Network Driver are automatically populated. Update if necessary.

2. Select the networks the node will be apart of

3. Select how many instances of this Virtual Machine should be added to the Cluster

4. Click 'Add Nodes' to add the nodes to the Cluster

UNCLASSIFIED
DAVC Cluster Configuration:
Nodes Tab





Create New DAVC Cluster

Cluster Info Networks Nodes

ID	Controller	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VNIC	Networks	
1	False	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 172.15.0.0/24	Delete Edit
2	False	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 172.15.0.0/24	Delete Edit
3	False	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 172.15.0.0/24	Delete Edit

1

Add More Nodes Create Cluster

Each node is automatically added to the system's control (blue) network in addition to the networks the user selected.

1. Delete or edit nodes as necessary

2. Click 'Add More Nodes' to add more nodes

3. Click 'Create Cluster' when done.

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DAVC Cluster Configuration

The Cluster is now configured and ready to be launched and instantiated.

Cluster Details: DEMO

Cluster Controls

Launch demo Edit

Networks

Name	Net
Exp1	192.168.1.0/24

Messages

Core Allocation Policy: No Core Sharing

Cluster demo created successfully

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VNIC	IP Addresses	Node Options
demo-1	INACTIVE	None	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 192.168.1.0/24	Node Options
demo-2	INACTIVE	None	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 192.168.1.0/24	Node Options
demo-3	INACTIVE	None	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 192.168.1.0/24	Node Options

4. DAVC Cluster Instantiation

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DAVC Cluster Instantiation: Cluster Details Page

The Cluster details page list is separated into the following areas (continued on the next page):

Launch Cluster Button

Cluster Name

System Messages

Cluster Details: DEMO

Cluster Controls

Launch demo Edit

Networks

Name	Net
Exp1	192.168.1.0/24

Messages

Core Allocation Policy: No Core Sharing

Cluster demo created successfully

Edit Cluster Info Button

Cluster Networks

Core Allocation Policy

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DAVC Cluster Instantiation:
Cluster Details Page

Add Nodes Button
Temp Block Disk Space
Node Options Button

Node Status
Assigned Host Server
Node Cores

Node Name	Status	Host Server	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VNIC	IP Addresses	
demo-1	INACTIVE	None	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 192.168.1.0/24	Node Options -
demo-2	INACTIVE	None	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 192.168.1.0/24	Node Options -
demo-3	INACTIVE	None	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1: 192.168.1.0/24	Node Options -

Node Names
OS/VMM Image Type
Node RAM
Node IP Addresses

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DAVC Cluster Instantiation:
Node Options (Inactive Cluster)

Node Options ▾

↻ Restart

⊗ Delete

✎ Edit

The 'Restart' Button Is Disabled

The 'Delete' Node Button removes the Node from the Cluster

The 'Edit' Node Button for updating the Node's configurations

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DAVC Cluster Instantiation:
From Cluster Configuration List

A Cluster can be launched from the user dashboard's Cluster Configuration List or from the Cluster Details page. The Cluster Configuration List option is shown below:

DEMO Cluster Administration

Cluster Usage

20 of 20 CPU Cores Remaining 25600 of 25600 MB Remaining

20 Cores

25600 (MB)

↕ Create A Cluster
↕ Clone A Cluster

Messages

1. Click the 'Launch' button in the 'Cluster Options' dropdown menu

Cluster Configurations (1)

Cluster Name	Status	Description	Nodes	Total Cores	Total RAM (MB)	Private	
demo	INACTIVE	Demo Cluster	3	3	6144	True	Cluster Options ▾
				1			<div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Details</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Edit</div> <div style="border: 2px solid red; padding: 2px; margin-bottom: 2px;">↕ Launch</div> <div style="border: 1px solid #ccc; padding: 2px; margin-bottom: 2px;">Delete</div>

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DAVC Cluster Instantiation

During cluster instantiation the Cluster status updates to 'INITIALIZING' then to 'ACTIVE'

Cluster Configurations (1)

Cluster Name	Status	Description
demo	INITIALIZING	Demo Cluster

➡

Cluster Configurations (1)

Cluster Name	Status	Description
demo	ACTIVE	Demo Cluster

And the users CPU Cores and Ram is decreased according to the amount allocated to the Cluster nodes.

DEMO Cluster Administration

Cluster Usage

17 of 20 CPU Cores Remaining 19456 of 25600 MB Remaining

17 Cores

19456 (MB)

↕ Create A Cluster
↕ Clone A Cluster

- A Cluster can also be launched from the Cluster Details page as shown below:

1. Click the 'Launch' button

Cluster Details: DEMO

Cluster Controls

Launch demo

Edit

Networks

Name	Net
Exp1	192.168.1.0/24

Messages

Core Allocation Policy: No Core Sharing

During cluster instantiation each node's status updates to 'INITIALIZING', to 'CHECKING IN', then 'ACTIVE'

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image
demo-1	INITIALIZING	None	Ubuntu_14.04_6G

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image
demo-1	CHECKING IN	d10	Ubuntu_14.04_6G

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VNIC	IP Addresses
demo-1	ACTIVE	d10	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.0.26 eth1.314: 192.168.1.1 rate: 1000000 (Kbps) Set Rate



The Cluster is active once all of the nodes are in the 'ACTIVE' state.

Cluster Details: DEMO

Cluster Controls

[Kill demo](#)

Networks

Name	Net
Exp1	192.168.1.0/24

Messages

Core Allocation Policy: No Core Sharing

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VNIC	IP Addresses	
demo-1	ACTIVE	d10	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1.314:192.168.1.0/24	Node Options -
demo-2	ACTIVE	d11	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1.314:192.168.1.0/24	Node Options -
demo-3	ACTIVE	d9	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1.314:192.168.1.0/24	Node Options -

5. DAVC Cluster and Node Details

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DAVC Cluster Details (Active Cluster)



This section highlights the details of an active cluster and its nodes.

Cluster Details: DEMO

Cluster Controls

Kill demo

Networks

Name	Net
Exp1	192.168.1.0/24

Messages

Core Allocation Policy: No Core Sharing

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VNIC	IP Addresses	
demo-1	ACTIVE	d10	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1.314: 192.168.1.0/24	Node Options -
demo-2	ACTIVE	d11	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1.314: 192.168.1.0/24	Node Options -
demo-3	ACTIVE	d9	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.20.0/15 eth1.314: 192.168.1.0/24	Node Options -

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DAVC Cluster Details



Cluster Name
Cluster Networks

Create A Cluster
My Clusters
Virtual Hard Disk Mngt
Block Disk Mngt
Usage Statistics
Logout

Cluster Details: DEMO

Cluster Controls

Kill demo

Networks

Name	Net	
Exp1	192.168.1.0/24	Set Rate

Messages

Core Allocation Policy: No Core Sharing

Kill Cluster Button

Set Network Rate Button.
Used to set rate limits of
all Nodes on that
network.

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DAVC Cluster Details (Active Cluster)



Node Status
Temp Block Disk Space
Node Options Button

Assigned Host Server
Node Cores

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VNIC	IP Addresses	
demo-1	ACTIVE	d10	Ubuntu_14.04_6G	1	2048	1	virtio	<div style="background-color: #e9ecef; padding: 2px;">eth0: 10.0.0.26</div> <div style="background-color: #f8d7da; padding: 2px;">eth1.314: 192.168.1.1</div> <div style="background-color: #f8d7da; padding: 2px;">rate: 1000000 (Kbps)</div> <div style="text-align: right; font-size: x-small;">Set Rate</div>	<div style="background-color: #007bff; color: white; padding: 2px; border-radius: 3px;">Node Options ▾</div> <div style="background-color: #28a745; color: white; padding: 2px; border-radius: 3px; margin-bottom: 2px;">Restart</div> <div style="background-color: #007bff; color: white; padding: 2px; border-radius: 3px; margin-bottom: 2px;">Open VNC</div> <div style="background-color: #dc3545; color: white; padding: 2px; border-radius: 3px;">Refresh</div>
demo-2	ACTIVE	d11	Ubuntu_14.04_6G	1	2048	1	virtio	<div style="background-color: #e9ecef; padding: 2px;">eth0: 10.0.0.27</div> <div style="background-color: #f8d7da; padding: 2px;">eth1.314: 192.168.1.2</div> <div style="background-color: #f8d7da; padding: 2px;">rate: 1000000 (Kbps)</div> <div style="text-align: right; font-size: x-small;">Set Rate</div>	<div style="background-color: #007bff; color: white; padding: 2px; border-radius: 3px;">Node Options ▾</div>
demo-3	ACTIVE	d9	Ubuntu_14.04_6G	1	2048	1	virtio	<div style="background-color: #e9ecef; padding: 2px;">eth0: 10.0.0.28</div> <div style="background-color: #f8d7da; padding: 2px;">eth1.314: 192.168.1.3</div> <div style="background-color: #f8d7da; padding: 2px;">rate: 1000000 (Kbps)</div> <div style="text-align: right; font-size: x-small;">Set Rate</div>	<div style="background-color: #007bff; color: white; padding: 2px; border-radius: 3px;">Node Options ▾</div>

Node Names

OS/VM Image Type

Node RAM

Node IP Addresses

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DAVC Cluster Details (Active Cluster)



Below is the list of a node's network interfaces and IP addresses. User can also set the data rate of all the non-control network interfaces of active nodes.

Node Control
Network IP Address

eth0: 10.0.0.26

eth1.314: 192.168.1.1

rate: 1000000 (Kbps)

Set Rate

Experiment Network
IP Address and
Current Data Rate

Sets the Experiment
Network's Data Rate

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DAVC Cluster Details: Node Options (Active)



The options under the Node Options drop down allows user to restart the node (all data will be lost) or interact with the node via its VNC terminal

Node Options ▾

↻ Restart

🔗 Open VNC

↻ Refresh

Restart/Redeploy
Node

Refreshes Node
VNC Process If
The 'Open VNC'
Fails

Open Node
VNC Client In
Web Browser

Connected (unencrypted) to: QEMU (demo-1)

```

Ubuntu 14.04.2 LTS demo-1 tty1
demo-1 login:

```

6. DAVC Virtual Hard Disk Management

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DAVC VHD Management

Users can upload their own VHD as templates for DAVC clusters on the 'Virtual Hard Disk Mngt' page shown below. This section summarizes this process.

Create A Cluster - My Clusters **Virtual Hard Disk Mngt** Block Disk Mngt Usage Statistics Logout

Virtual Hard Disk Management

Add Virtual Hard Disk

Messages

Add Virtual Hard Disk Button

VHD Options Dropdown Menu for editing or deleting a VHD

VHD List

Private

ID	Name	OS	Hypervisor	Size (GB)	Synced	
1	Android_x86_MediaScope	android_x86	kvm	3.0	True	VHD Options ▾
2	ubuntu-14_04_25G	ubuntu-14.04-25G.qcow2	kvm	26.0	True	VHD Options ▾ ⊙ Edit ⊙ Delete



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DAVC VHD Management: Prepping Your VHD For Upload



A VHD template must be preinstalled with the DAVC Node Provisioning Client Python script. Thus Python is a prerequisite for the operating system on the VHD.

The DAVC Node Provisioning Client is located in the following location in the DAVC distribution along with a wrapper start script:

- /davic2.0/davic/scripts/provisioning/rmprovisionclientvhd_v2.py
- /davic2.0/davic/scripts/provisioning/provision_startup.sh

1. Copy the client and startup script to the VHD's /opt directory and add an entry to the /etc/rc.local, as shown, so the script will launch at boot time.

```
#!/bin/sh -e
#
# rc.local
#
# This script is executed at the end of each multiuser runlevel.
# Make sure that the script will "exit 0" on success or any other
# value on error.
#
# In order to enable or disable this script just change the execution
# bits.
#
# By default this script does nothing.
/opt/provision_startup.sh
exit 0
```



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DAVC VHD Management: Prepping Your VHD For Upload



The DAVC Node Provisioning Client expects the interfaces 'lo' and 'eth0' to be active and configured for DHCP on bootup. This can be achieved with the edits shown below.

2. Edit the network interfaces configuration file (Debian-based), as shown to the right.

```
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

#control network interface
auto eth0
iface eth0 inet dhcp
```

3. Ensure the persistent network labeling rules file is empty so that interfaces provisioned by DAVC will be labeled starting with eth0. The file is located at:

- /etc/udev/rules.d/70-persistent-net.rules



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DAVC VHD Management: Prepping Your VHD For Upload



DAVC provides each node with a hostname and provides DHCP services as well as a Block Disk storage service for nodes. Perform the steps below in your VHD to ensure these services will function correctly.

4. Clear the hostname file on the VHD by editing the file:

- `/etc/hostname`

5. Remove the DHCP leases file on the VHD by running the command

- `rm /var/lib/dhcp/dhclient.eth0*`

6. Execute the following commands to add 'Hotplug Support' to the VHD. This is required so that DAVC Block Disks can be attached and detached to and from a running instance of the virtual machine:

- `echo 'acpiphp' >> /etc/modules`
- `echo 'pci_hotplug' >> /etc/modules`

The VHD is now ready to be uploaded to DAVC. This process is shown next.



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DAVC VHD Management: Prepping Your VHD For Upload



A VHD template must be in the qcow2 format with backwards capability before uploading to DAVC.

The `qemu-img convert` command can be used to convert a VHD to qcow2 format. The syntax of the command is shown below:

- `qemu-img convert -o compat=0.10 -f <current format> <image file> -O qcow2 <new image file>.qcow2`
- `-o compat=0.10` - Ensures the new virtual machine image will be backwards compatible
- `<current format>` - The current format of your virtual machine (raw, vdi, qcow, cow, vmdk)
- `<image file>` - The name of your virtual machine image file
- `-O qcow2` - Specifies qcow2 as the output format
- `<new image file>` - The name of the new converted virtual machine image file.
 - **Do not use spaces in the file name**
- Example:
 - `qemu-img convert -o compat=0.10 -f vmdk ubuntu14.04.vmdk -O qcow2 ubuntu14.04.qcow2`

Refer to <https://linux.die.net/man/1/qemu-img> for more information on the `qemu-img` command

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DAVC VHD Management: Uploading a VHD





Virtual Hard Disk Management

Add Virtual Hard Disk

1. Click 'Add Virtual Hard Disk Button'

2. Input a descriptive name

3. Input the VHD OS

4. Input the minimum Core and RAM requirements

5. Indicate if the VHD can be shared with other users

6. Browse for the VHD file (qcow2 format)

Add a Virtual Hard Disk

Virtual Hard Disk Name: EMANE_TEST_NODE

OS: Ubuntu14.04

Boot Type: d

Hyper Visor Type: kvm

Minimum Required Cores: 2

Minimum Required Non-Persistent Block Disk Size (GB): 5

Minimum Required RAM (MB): 2048

Virtual Network Driver: virtio

File: Choose file: EMANE_TEST...tu14.qcow2

7. Click 'Upload VHD' when complete

Boot Type, Hyper Visor Type and VNIC can be left at their defaults.

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DAVC VHD Management





A system message will indicate the success or failure of the VHD upload.

Messages

Virtual Hard Disk EMANE_TEST_NODE uploaded successfully.

The VHD will not be available during cluster configuration until it has 'Synced' (copied) onto all host servers. This can take a while depending on the size of the VHD.

ID	Name	Owner	OS	Hypervisor	Size(GB)	Synced	
1	EMANE_TEST_NODE	demo	Ubuntu14.04	kvm	26.0	False	VHD Options -

↓

↓

↓

ID	Name	Owner	OS	Hypervisor	Size(GB)	Synced	
1	EMANE_TEST_NODE	demo	Ubuntu14.04	kvm	26.0	True	VHD Options -

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DAVC VHD Management



After the VHD has Synced, it is now available during Cluster Configuration as an 'Ostype'

Add Cluster Nodes

Controller (optional)

Ostype

- AlgoLink_Satellite
- Exp_Framework_Base
- A3E_node
- Android_x86
- Ubuntu_14.04_6G
- glusterfs_node
- Route_Planning_Agent
- Source_Selection
- AlgoLink_Master_v2
- AlgoLink_EF
- EMANE_9.2_16G
- EMANE_9.2_20G
- EMANE_9.2_6G
- CentOS-7_x86_64_base
- ubuntu-14_04_25G
- ubuntu-14_04_15G
- Android_x86_MediaScope
- IOT_Compression
- Tomography
- XCN_Framework
- XCN_EF
- D3JS_IP_Data_Server
- Elicit_pre-installed_v2
- IBM_Exp_Facility_v2
- Elicit_pre_installed_OLSR
- EMANE_TEST_NODE

7. DAVC Block Disk/Persistent Storage Management

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DAVC Block Disk Management



Users can allocate blocks of persistent storage and attach them to any of their cluster nodes for logging etc. This is done in the Block Disk Mngt page.

Create A Cluster - My Clusters - Virtual Hard Disk Mngt - **Block Disk Mngt** - Usage Statistics - Logout

Block Disk Management

Total Block Disk Space	100GB
Remaining Block Disk Space	100GB

Messages

DEMO Block Disks (0)

Size	Format	Attached	UUID	Node
1				

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DAVC Block Disk Management



Block Disk Space Usage

System Messages

Create A Cluster - My Clusters Virtual Hard Disk Mngt **Block Disk Mngt** Usage Statistics
Logout

Block Disk Management

Total Block Disk Space	100GB
Remaining Block Disk Space	100GB

Create A Block Disk

Messages

Block Disk List

DEMO Block Disks (0)

Size	Format	Attached	UUID	Node
1				

Create Block Disk Button

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DAVC Block Disk Management:
Creating A Block Disk



1. Click the 'Create A Block Disk Button'

2. Input the Block Size in GB

3. Select a File System format

Block Disk Management

Total Block Disk Space	100GB
Remaining Block Disk Space	100GB

Create A Block Disk

Create A Block Disk ×

Size (GB)

Format

Create

Close

4. Click Create

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DAVC Block Disk Management: Creating A Block Disk





User Block Disk Space is Updated

Block Disk Added to List

'Block Disk Options' Dropdown Button

Block Disk Management

Total Block Disk Space 100GB

Remaining Block Disk Space 90GB

[Create A Block Disk](#)

Messages

Block Disk Controller: Block Disk Created And Saved Successfully ✕

DEMO Block Disks (1)

Size	Format	Attached	UUID	Node
10(GB)	ext4	False	651196da-76f1-43e5-ad5e-7bc65ede09d6	Block Disk Options -

1

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DAVC Block Disk Management: Attaching a Block Disk to a Node





1. Ensure Block Disk is not Attached

2. Click the 'Attach' Button in the 'Block Disk Options' dropdown menu

DEMO Block Disks (1)

Size	Format	Attached	UUID	Node
10(GB)	ext4	False	651196da-76f1-43e5-ad5e-7bc65ede09d6	Block Disk Options -



Block Disk: 651196da-76f1-43e5-ad5e-7bc65ede09d6 ✕

Block Size:
10(GB)

demo-1

Attach
Close

3. Select the node the Block Disk will be attached to.

4. Click 'Attach' to attach

System message will indicate success or failure

Messages

Attaching Block Disk To demo-1...

Block Disk Controller: Block Disk 651196da-76f1-43e5-ad5e-7bc65ede09d6 attached successfully to node demo-1

Block Disk is now attached

Block Disk has associated Node

DEMO Block Disks (1)

Size	Format	Attached	UUID	Node
10(GB)	ext4	True	651196da-76f1-43e5-ad5e-7bc65ede09d6	demo-1

Although the Block Disk has been attached, the user has to mount it from within the node. This process is shown below:

5. Execute 'blkid' command to list the block attributes

```

Connected (unencrypted) to: QEMU (demo-1)
root@demo-1:~# blkid
/dev/sda1: UUID="28757865-1a3d-45ee-8d6e-f379cbf146e0" TYPE="ext4"
/dev/sda5: UUID="ada9d957-8b6f-4c5d-a09f-4337a428cdd6" TYPE="swap"
/dev/sdb1: UUID="8e979bd4-d101-490c-9692-d84c66127275" TYPE="ext4"
/dev/vda: UUID="651196da-76f1-43e5-ad5e-7bc65ede09d6" TYPE="ext4"
    
```

6. Find the block device (/dev/vda) with the UUID that matches the Block Disk that was just attached

DEMO Block Disks (1)

Size	Format	Attached	UUID	Node
10(GB)	ext4	True	651196da-76f1-43e5-ad5e-7bc65ede09d6	demo-1



7. Create a mount point/directory for the block

8. Mount the block device to the mount point/directory

```

Connected (unencrypted) to: QEMU (demo-1)
root@demo-1:~# mkdir /davic_block
root@demo-1:~# mount /dev/vda /davic_block/
root@demo-1:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda1       4.8G  1.8G  2.8G  40% /
none            4.0K   0  4.0K   0% /sys/fs/cgroup
udev            991M  8.0K  991M   1% /dev
tmpfs           201M  384K  200M   1% /run
none            5.0M   0   5.0M   0% /run/lock
none           1001M   0 1001M   0% /run/shm
none            100M   0   100M   0% /run/user
/dev/sdb1       990M  1.3M  922M   1% /log
/dev/vda        9.8G   23M  9.2G   1% /davic_block

```

9. The Block Disk can now be used to store data.



The process to Detach a Block Disk from a node is shown below:

1. Execute the 'umount' command on the node

2. Click the 'Detach' Button

```

Connected (unencrypted) to: QEMU (demo-1)
root@demo-1:~# df -h
Filesystem      Size  Used Avail Use% Mounted on
/dev/sda1       4.8G  1.8G  2.8G  40% /
none            4.0K   0  4.0K   0% /sys/fs/cgroup
udev            991M  8.0K  991M   1% /dev
tmpfs           201M  384K  200M   1% /run
none            5.0M   0   5.0M   0% /run/lock
none           1001M   0 1001M   0% /run/shm
none            100M   0   100M   0% /run/user
/dev/sdb1       990M  1.3M  922M   1% /log
/dev/vda        9.8G   23M  9.2G   1% /davic_block
root@demo-1:~# umount /dev/vda

```

DEMO Block Disks (1)

Size	Format	Attached	UUID	Node	Block Disk Options
10(GB)	ext4	True	651196da-76f1-43e5-ad5e-7bc65ede09db	demo-1	<ul style="list-style-type: none"> Attach Detach Delete

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**DAVC Block Disk Management:
Detaching a Block Disk from a Node**

System message reports success or failure

Block Disk is now detached

Size	Format	Attached	UUID	Node
10(GB)	ext4	False	651196da-76f1-43e5-ad5e-7bc65ede09d6	

Block Disk Options -

- Attach
- Detach
- Delete

8. Creating a New Virtual Hard Disk from a Cluster Node

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Creating A New Virtual Hard Disk

Changes made to a node can be preserved by creating a new VHD from the node's image. This process is shown below.

Nodes cannot be saved into new VHDs while active. The following process will render the cluster inactive.

1. Click the 'Cluster Options' dropdown

2. Click the 'Save' button

Cluster Name	Status	Description	Nodes	Total Cores	Total RAM (MB)	Private
demo	ACTIVE	Demo Cluster	3	3	6144	True

Cluster Options -

- Details
- Edit
- Save
- Kill
- Delete

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Creating A New Virtual Hard Disk


User resource replenished

Cluster saved successfully

[Create A Cluster](#) - [My Clusters](#) - [Virtual Hard Disk Mngt](#) - [Block Disk Mngt](#) - [Usage Statistics](#) [Logout](#)

DEMO Cluster Administration

Cluster Usage

20 of 20 CPU Cores Remaining

25600 of 25600 MB Remaining

20 Cores

25600 (MB)

Create A Cluster
Clone A Cluster

Messages

Cluster Controller: Cluster demo saved ✕

Cluster Configurations (1)

Cluster Name	Status	Description	Nodes	Total Cores	Total RAM (MB)	Private	Cluster Options
demo	SAVED	Demo Cluster	3	3	6144	True	Cluster Options -

Cluster status updated

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Creating A New Virtual Hard Disk



Cluster node's status updated to 'SAVED'

Cluster Details: DEMO

Cluster Controls

Delete demo

Name	Net
Exp1	192.168.1.0/24

Messages

Cluster Nodes (3)

Node Name	Status	Host Server	OS/Image	Non-Persistent Block Space (GB)	RAM (MB)	Cores	VMNIC	IP Addresses	Node Options
demo-1	SAVED	d10	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.0.26 eth1.314: 192.168.1.1 rate: 1000000 (Kbps)	<ul style="list-style-type: none"> Node Options - Restart Open VHD Flush Save Image
demo-2	SAVED	d11	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.0.27 eth1.314: 192.168.1.2 rate: 1000000 (Kbps)	<ul style="list-style-type: none"> Node Options -
demo-3	SAVED	d9	Ubuntu_14.04_6G	1	2048	1	virtio	eth0: 10.0.0.28 eth1.314: 192.168.1.3 rate: 1000000 (Kbps)	<ul style="list-style-type: none"> Node Options -

3. Click 'Node Options' dropdown menu of the node that will be saved to a new VHD.

4. Click 'Save Image'

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Creating A New Virtual Hard Disk



4. Enter a name for the new Virtual Hard Disk

Save Image

New Image Name

New Image OS

Save Image
Cancel

5. Update the name of the OS if necessary

6. Click 'Save Image'

Saving Image....

System message indicates the new VHD has been created.

The new VHD will then be synced (copied) to all host servers. This may take a while to complete.

Messages

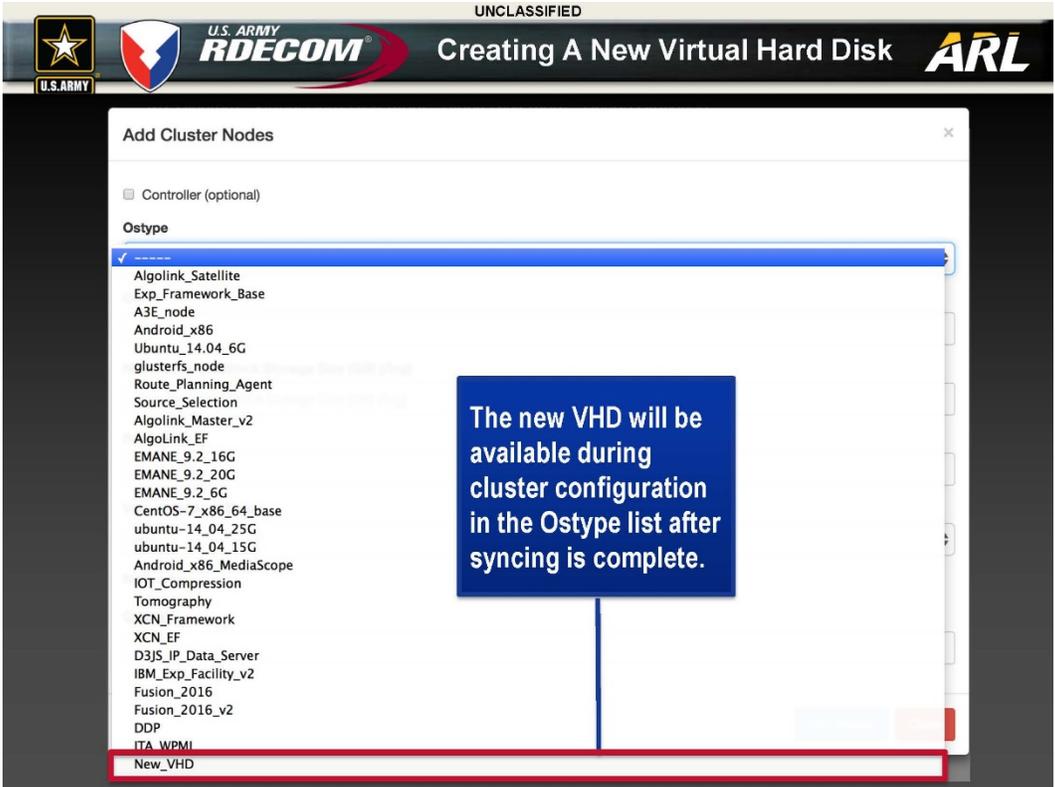
Core Allocation Policy: No Core Sharing

Creating Image New_VHD From demo-1 ✕

Image New_VHD Created From demo-1 ✕

The new VHD will be listed in the Virtual Hard Disk list

ID	Name	Owner	OS	Hypervisor	Size(GB)	Synced	
1	New_VHD	demo	Ubuntu_14.04	kvm	6.0	True	VHD Options -
2	AlgoLink_EF	ef	AlgoLink_EF	kvm	20.0	True	VHD Options -
3	Fusion_2016	fusion	ubuntu-14.04-25G.qcow2	kvm	26.0	True	VHD Options -
4	Fusion_2016_v2	fusion	ubuntu-14.04-25G.qcow2	kvm	26.0	True	VHD Options -
5	Android_x86	kmarcus	android_x86	kvm	3.0	True	VHD Options -
6	DDP	kmarcus	DDP_Ubuntu_14.04	kvm	3.19226074219	True	VHD Options -
7	EMANE_9.2_16G	kmarcus	Ubuntu_14.04	kvm	16.0	True	VHD Options -



9. Conclusion

This report displayed the step-by-step instructions to perform common DAVC version 2.0 operations to access DAVC and manage DAVC clusters, nodes, virtual hard disks, and persistent block storage.

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