

User Workspace Management

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Access the User Workspace Management Interface

After you have started the Cisco Modeling Labs server, you can access the **User Workspace Management** interface to manage user accounts, projects, licenses, and virtual machine images on the Cisco Modeling Labs server.

To access the User Workspace Management interface, complete the following steps:

Step 1 In a web browser, enter the IP address or hostname in the format, http://<IP address | hostname>.

The CML Server main menu page is displayed.

Figure 1: CML Server Main Menu

ດປາປາ cisco	
CML Server	
System Operations	Documentation
User Workspace Management	API Documentation
CML GUI Clients	
	Cisco Trademark

- **Step 2** Click User Workspace Management to access the User Workspace Management interface.
- Step 3Log in to the User Workspace Management interface using the username uwmadmin and the password password.NoteYou can log in to the User Workspace Management as either an administrator or as a non-administrative user.Uwmadmin is an administrative user.

The application opens on the Overview page.

My simulations Project simulations Users CML Server Connectivity VM Control Licenses Node resources Cocumentation	CPU RAM (MB) Disk usage (CB)	AutoNetkit 0.10.29.12 0.23.5	AutoNetkit-Cisco 0.23.9 5.13%	Topology Visualization Engine Image: Imag	Live Network Collection Engine 0.11.6 tel(R) Xeon(R) CPU E5-2680 v3 @ 2.50GHz 6,533.32 / 46,914.96 12.29 / 69.80
Derojects Jsers CML Server Connectivity /M Control Licenses Node resources	System tools cml RAM (MB) Disk usage (GB)		5.13%	8×ini	tel(R) Xeon(R) CPU E5-2680 v3 @ 2.50GH; 6,533.32 / 46,914.96
DML Server Connectivity MI Control Licenses Hode resources	CPU			13.93%	6,533.32 / 46,914.90
/M Control icenses lode resources	RAM (MB) Disk usage (GB)			13.93%	6,533.32 / 46,914.9
icenses ode resources	Disk usage (GB)		1:		
ode resources				17 61%	12 20 / 60 8
odd resources				17.01%	12.237 03.0
	Resource usa	age of simulations	i Resource usage by proj	Jeds	
	Instances / recomme	nended capacity		0.00%	0 / 24
	VCPUs / recommend	nded capacity		0.00%	0 / 24
	VRAM (MB) / recomm	nmended capacity		0.00%	0 / 9370
	Simulations				

Figure 2: User Workspace Management Overview

The task bar on the left enables the following functions:

- **Projects**—Allows you to import and export projects. You can also add new projects, enable, disable, modify, and delete current projects.
- Users-Allows you add new user accounts, enable, disable, modify, and delete current user accounts.
- CML Server—Available options are:
 - System Configuration—Allows you to control system configuration. You can set configuration parameters for the System, Networks, VIRL Services, Infrastructure, and Resources.
 - System Tools—Allows you to collect, view and download system status information. Display Statistics reports historical system operation data such as the number simulations that have been run, the mix of nodes in the simulations, and so on. Download System Logs Collection gathers log files from the system which are invaluable when troubleshooting and diagnosing issues; delivered as a .ZIP file. Check Health Status performs a system check and generates a report on same.
 - Download
- Connectivity—Allows you to add L2 FLAT IP addresses, L3 SNAT IP addresses, and Project Management IP Addresses.
- VM Control—Allows system administrators to stop specific components of an active simulation. Available options are:

- Nodes
- Networks
- Ports and Floating IPs
- Hosts
- Allocated Ports
- Licenses—Allows you to manage product licenses on the system.
- Node Resources—Available options are:
 - ° Flavors-Allows you add and delete virtual machine flavors.
 - **Images**—Allows you add new virtual machine images, modify, and delete current images. You can also modify and delete image snapshots.
 - ° Containers-Allows you to manage and add new LXC images and templates.
 - ° Subtypes-Allows you to import, export, and duplicate subtypes.
- Repositories—Allows you add, delete, and refresh files from Git repositories.
- Documentation—Available options are:
 - STD API-Allows you to access STD API documentation.
 - UWM API-Allows you to access to UWM API documentation.
 - Simulation Concepts—Allows you to access Cisco Modeling Labs simulation concepts documentation.

User Management Workspace User Types

Within the User Management Workspace interface there are two types of users available. These are administrator and non-administrator user. The following tables describe the different functions available for each user type.

Function	Description
Overview	Allows you to view current system version information, physical resource usage, and a list of all deployed simulations. You can stop all or selected simulations.
Projects	Allows you to import and export projects. You can also add new projects, enable, disable, modify, and delete current projects.
Users	Allows you add new users, enable, disable, modify, and delete current users.

Table 1: Available Functions for Administrator Users

Function	Description
CML Server	Under System Configuration, you can set configuration parameters. Under System Status, you can collect, view and download system status information.
Connectivity	Allows you to add and delete L2 Flat IP, L3 Snat IP, and Management IP allocations for projects.
VM Control	Allows you to delete nodes, networks, ports and IP allocations, as well as disable some host services when problems are encountered.
Licenses	Allows you to manage product licenses on the system.
Node Resources	Allows you add new images, modify, and delete current images. You can also modify and delete image snapshots. You can add and delete flavors and import and export subtypes. You can also create a new subtype based on one of the available built in subtypes. You can manage and add new LXC images and templates.
Repositories	Allows you to add, delete, and refresh files from Git repositories.
Documentation	Allows you to access STD and UWM API documentation.

Table 2: Available Functions for Non-Administrator Users

Function	Description
My Simulations	Review and operate a user's own simulations.
Project Simulations	Review simulations in a user's own project.
Connectivity	Review a user's own IP address allocations.
Node Resources	Review details for flavors and subtypes. Review and add new images, LXC images and templates for use by the user's own project.
Repositories	Allows you to add, delete, and refresh files from Git repositories.
Documentation	Allows you to access STD and UWM API documentation.

Projects (Admin User)

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Within the **User Workspace Management** interface, a project represents a set of resources that are available to all users of that project. It has the following characteristics:

• By default, each project is created with one user account that has the same name as the project.

- Each user belongs to exactly one project. Users should typically each have a project of their own, hence creating a new project is the preferred and efficient process for adding new users.
- Additional users can be assigned to a project as required.
- If a user is added to a project, the username of the user is prefixed with the project name.
- Deleting a user account does not delete a project that the user is assigned to.
- Deleting a project deletes all users of the project.

In the **Projects** page, you can perform a number of operations for projects. These operations are:

Operation	Description
Import	Imports a project and its users from a JavaScript Object Notation (JSON) or tab-Separated values (TSV) file.
Export	Exports a project and its users as a JSON or TSV file.
Add	Creates a new project and its default user.
Enable	Enables a selected project.
Disable	Disables a selected project.
Modify	Modifies details for a selected project.
Delete	Deletes a selected project and its users.

Create a Project

To create a new project, and a user for the project complete the following steps:

Step 1 In the User Workspace Management interface, click Projects.

The **Projects** page, which lists all of the current projects, appears.

Step 2 Click Add to create a new project.

The Create Project page appears.

Overview		Create Project		
My simulations		Projects / Create		
Project simulations				
Projects		General Settings		
Users		Name	Name	
CML Server	~			
Connectivity		Description	Description	
VM Control	~			
Licenses		Expires	never	
Node resources	~	Enabled	$\overline{\mathbf{v}}$	
Repositories		Project Quotas		
Documentation	~	Instances	100	
		RAM (MB)	512000	
		VCPUS	200	
			✓ Create ★ Cancel	

Figure 3: Create a New Project

- **Step 3** Under **General Settings**, add a name and a description for the project. In the **Expires** field, you can either add an expiry date for the project or accept the default, which is **Never**, meaning the project will never expire. Leave the **Enabled** check box checked to enable the project for use.
- **Step 4** Under **Project Quotas**, you can either accept the default values for the system quotas or increase or decrease them based on your project requirements:
 - **Instances** quota is the maximum number of virtual machines of any type that can be operational at any given time within the project per user or for all users associated with that project.
 - **RAM (MB)** is the maximum RAM that can be consumed by virtual machines running in the project per user or for all users associated with that project.
 - VCPUS is the maximum number of virtual cores consumed by the virtual machines running in the project.
- Step 5 Click Create.

The Edit User page appears.

Figure 4: Edit the Project User

My simulations		Project "Cisco CML" created				
Project simulations		Created user "Cisco CML" for project	Created user "Cisco CML" for project "Cisco CML", Login="Cisco CML" password="28COb7". Please update the default user's password as soon as possible			
Projects						
Users		Password	Password			
CML Server	~	Password again	Password again			
Connectivity		Email	unset			
VM Control	~	Role	_member_			
Licenses Node resources	~	Expires	never			
Repositories		Enabled	W.			
Documentation	~	SSH public key	unset			
		SSH host key	unset			
		SSH jumphost forward port	Number in range 20000 - 65535	410632		
			✓ Save X Cancel	410		

Using this window, you can add details for the new user created when the project is created.

- **Step 6** In the **Password** and **Password Again** fields, enter a new password for the user.
 - **Note** The default password can be used or a more meaningful password can be entered. This password can also be changed at a later time.
- Step 7 In the Email field, add a valid email address for the user. By default, the user is assigned a member role, which means the user is a non-admin account. Set Role to admin if the user needs to perform the same administrative functions as the uwmadmin user.
- **Step 8** In the **Expires** field, you can add an expiry date for the user or accept the default **Never**. Leave the **Enabled** check box checked to enable the project for immediate use. Alternatively, you can set up a project and users, but you cannot enable them to be configured and available at a later time.
- **Step 9** Click **Save** to save the changes for the user.
- **Step 10** (Optional) To confirm that the project has been added, click **Projects** to view the newly added project, and click **Users** to view the newly added user.

Export a Project

Export allows you to export selected projects and all their users to a JSON or TSV file.

To export a project and all its users, complete the following steps:

- **Step 1** Check the check box beside the project or projects for export.
- **Step 2** Click **Export** to export the selected projects and all their users.
- **Step 3** From the drop-down list, choose the type of file to export to, JSON or TSV.

The Open dialog box appears.

Step 4Click the Save File radio button and click OK to save the file.The exported file is saved to the specified location.

Import a Project

Files for import must be in the JSON or TSV format and must have previously been exported from the User Workspace Management interface.



The uwmadmin project and user are not modified by this function when imported data contains it.

To import a project and its users, complete the following steps:

 Step 1 Click Import to import a new project and its associated users. The Import Projects and Users page appears.
 Step 2 Click Browse to locate the applicable JSON or TSV file for import. Note If you import projects and users that already exist, they will be updated.

Step 3 Click Import.

The newly imported project is listed on the **Projects** page.

Users (Admin User)

Within the User Workspace Management interface, you can manage user accounts from the Users page. User accounts permit access to the Cisco Modeling Cisco Modeling Labs server from the Cisco Modeling Labs client.

Operation	Description
Add	Creates a new user account.
Enable	Enables a selected user account.
Disable	Disables a selected user account.
Modify	Modifies details for a selected user account.
Delete	Deletes a selected user account.

In the **Users** page, you can perform a number of operations for users. These operations are:

Create a User

To create an additional user under an existing project, complete the following steps:

Note

It is preferred for each user to have their own project.

Step 1In the User Workspace Management interface, log in as admin and click Users.
The Users page, which lists all the users, appears.

Step 2 Click Add to create a new user.

The Create User page appears.

Figure 5: Create a New User

	Create user		
	Users / Create		
	Username	uwmadmin- Username	٥
	Password	Password	
~	Password again	Password again	
	r assword again		
~	Email	unset	
	Project	uwmadmin	-
~		NOTE: This project has no management network, t will not be able to run simulations.	herefore its users
	Role	_member_	•
~	Expires	never	#
	Enabled		
		✓ Create X Cancel	
	*	Users / Create Username Password again Email Project Role	Users / Create Username uwmadmin-Username Password Password Password again Password again Email unset Project uwmadmin NOTE: This project has no management network, 1 will not be able to run simulations. Role member_ Expires never Enabled

Step 3	In the	Username field, enter a username for the new user.
	Noto	To create multiple users click the $\mathbf{A}\mathbf{d}\mathbf{d}$ (+) icon to the right

- **Note** To create multiple users, click the **Add** (+) icon to the right of the **Username** field.
- **Step 4** In the **Password** and **Password Again** fields, enter a password for the new user.
- **Step 5** In the **Email** field, enter a valid email address for the user.
- **Step 6** From the **Project** drop-down list, choose the applicable project for the user.
- **Step 7** From the **Role** drop-down list, choose the applicable role for the user.

Step 8	In the Expires field, you can either add an expiry date for the user or accept the default, which is Never .
Step 9	Leave the Enabled check box checked.
Step 10	Click Create. The User < <i>Project Name>-</i> < <i>Username></i> page appears.
	This page presents details and project quotas for the user.
Step 11	(Optional) Click Modify User to amend the details for a user, or click Delete User to delete the user.
Step 12	Click Users to view the newly created user.

CML Server (Admin User)

Within the User Workspace Management interface, under CML Server, you are able to make changes to your Cisco Modeling Labs server configuration under the System Configuration option.

Under the System Status option, you can review system operational statuses and download log files.

Figure 6: CML Server Options

Overview	
My simulations	
Project simulations	
Projects	
Users	
CML Server	*
System Configuration	
System Tools	
Download	
Connectivity	
VM Control	~
Licenses	
Node resources	~
Documentation	~

System Configuration

Within the User Workspace Management interface, under CML Server > System ConfigurationCML Server, you are able to make changes to your Cisco Modeling Labs server configuration.

You can update the following system control parameters.

- System
- Networks
- Services
- Infrastructure
- Resources

System Configuration Controls

To update system configuration controls, complete the following steps:

Step 1 In the User Workspace Management interface, click CML Server > System Configuration.

The System Configuration Controls page appears.

Figure 7: System Configuration Controls

Overview	ç	Syste	m Configu	ration Cor	ntrols
My simulations					
Project simulations			CONFIG	SET MAINTENAN	ICE MODE
Projects		System	Networks Ser	vices Infrastructu	ire Resources
Users			Hostname	cml	
CML Server	~				
System Configuration			Domain Name	cml.info	
System Tools			NTP Server	ntp.esl.cisco.com	
Download		F	Ramdisk enabled		
Connectivity			VNC enabled		
VM Control	~		VNC password	letmein	
Licenses		Prima	ary Ethernet port	eth0	
Node resources	~	Use I	DHCP on primary		
Documentation	~		Ethernet port?		
		-	Static IP address	172.23.81.102	
		Prim	ary port network	172.23.81.64	418001

Step 2 Update the fields as required.

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Table 3: System Configuration Parameters

Parameter	Description
Hostname	Enter the server hostname.
Domain Name	Enter the domain name.
NTP Server	Enter the DNS name or IP address for the NTP server. If you are behind a firewall/proxy, ensure that your NTP server is reachable from this location.
Ramdisk enabled	This option must be enabled to speed up I/O operations.

Parameter	Description
VNC enabled	Use this option to start the VNC server on the host. It operates on TCP port 5901.
VNC Password	Enter the password for the VNC server.
Primary Ethernet Port	Enter the primary ethernet port.
Use DHCP on Primary Ethernet port?	Use this option to enable DHCP on the primary ethernet port.
Static IP address	Enter the static IP address.
Primary port network	Enter the primary port network.
Primary port netmask	Enter the primary port netmask.
Primary port gateway	Enter the primary port gateway.
Primary DNS server IP address	Enter the primary DNS server IP address.
Secondary DNS server IP address	Enter the secondary DNS server IP address. Ensure you do not set the same address as you set for the primary DNS server IP address.
Is your system behind a proxy?	Use this option if your system is behind a proxy.
HTTP/HTTPS Proxy	Enter the URL of your internal access proxy in the following format "http:// <proxy ip="" name="" or="">:<port number="">/".</port></proxy>

Step 3 Click **Apply Changes** when you are finished to save your changes.

Networks Configuration

To update the Networks configuration, complete the following steps:

Step 1 In the User Workspace Management interface, click CML Server > System Configuration.

The System Configuration Controls page appears. Click the Networks tab to access the network parameters.

Figure 8: Networks Configuration

Overview	System Configuration Control	ols
My simulations		
Project simulations	CONFIG SET MAINTENANCE N	IODE
Projects	System Networks Services Infrastructure	Resources
Users	Flat Network port eth1	
CML Server		
System Configuration	Flat Network address 172.16.1.254/24	
System Tools	Flat Network address/mask 172.16.1.0/24	
Download	Flat Network netmask 255.255.255.0	
Connectivity	Flat Network Gateway IP 172.16.1.2	
VM Control	address	
Licenses	Flat Address pool start address 172.16.1.50	
Node resources	Flat Address pool end 172.16.1.253	
Documentation	address	
Documentation	Flat primary DNS server IP 8.8.8.8 address	
	Flat secondary DNS server 8.8.4.4	

Step 2 Update the fields as required.

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Table 4: Networks Configuration Parameters

Parameter	Description
Flat Network Port	Enter the Flat network port.
Flat Network Address	Enter the Flat network address.
Flat Network Address/Mask	Enter the Flat network address/mask.
Flat Network Netmask	Enter the Flat network netmask.

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Parameter	Description
Flat Network Gateway IP Address	Enter the Flat network gateway IP address.
Flat Address Pool Start Address	Enter the Flat address pool start address.
Flat Address Pool End Address	Enter the Flat address pool end address.
Flat Primary DNS server IP address	Enter the Flat primary DNS server IP address.
Flat Secondary DNS server IP address	Enter the Flat secondary DNS server IP address. Ensure you do not set the same address as you set for the primary DNS server IP address.
2nd Flat Network Enabled	Use this option if a second Flat network, Flat1, is to be enabled.
2nd Flat Network Port	Enter the name of the host's physical port used for the L2 Flat network, Flat1.
2nd Flat Network Address	Enter the IP address for the second Flat network, Flat1.
2nd Flat Network Address/Mask	Enter the Flat network address/mask for Flat1.
2nd Flat Network Netmask	Enter the Flat network netmask for Flat1.
2nd Flat Network Gateway IP Address	Enter the Flat network gateway IP address for Flat1.
2nd Flat Address Pool Start Address	Enter the Flat address pool start address for Flat1.
2nd Flat Address Pool End Address	Enter the Flat address pool end address for Flat1.
2nd Flat Primary DNS server IP address	Enter the Flat primary DNS server IP address for Flat1.
2nd Flat Secondary DNS server IP address	Enter the Flat secondary DNS server IP address for Flat1. Ensure you do not set the same address as you set for the primary DNS server IP address.
Snat Network Port	Enter the name of the host's physical port used for L3 Snat network, ext-net.
Snat Network Address	Enter the IP address for the CML host in the L3 Snat network.
Snat Network Address/Mask	Enter the Snat network address/mask.
Snat Network Netmask	Enter the Snat network netmask.
Snat Network Gateway IP Address	Enter the Snat network gateway IP address.
Snat Address Pool Start Address	Enter the Snat address pool start address.
Snat Address Pool End Address	Enter the Snat address pool end address.

Parameter	Description
Snat Primary DNS server IP address	Enter the Snat primary DNS server IP address.
Snat Secondary DNS server IP address	Enter the Snat secondary DNS server IP address. Ensure you do not set the same address as you set for the primary DNS server IP address.

Step 3 Click **Apply Changes** when you are finished to save your changes.

Services Configuration

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To update the services configuration, complete the following steps:

Step 1 In the User Workspace Management interface, click CML Server > System Configuration.

The System Configuration Controls page appears. Click the Services tab to access the services parameters.

Overview		Syste	m Con	fiau	ratio	on Contr	ols
My simulations		0,010		gui			
Project simulations			CONFIG		SET	MAINTENANCE	MODE
Projects		System	Networks		/ices	Infrastructure	Resources
Users		Apa	ache server p	ort	80		
CML Server	~					201	
System Configuration		Start h	ost-granted 1 F	ort	10000		
System Tools		End host-g	granted TCP p	ort	170	00	
Download		First VM Serial Console			17000		
Connectivity			TCP p	ort	_		
VM Control	~	Last VI	M Serial Cons TCP p		180	00	
Licenses		We	eb Services p	ort	193	99	
Node resources	~	UWM port		19400			
Documentation	~	AutoNetkit	webserver p	ort	194	01	
		L	ive Visualizat	ion	194	02	

Figure 9: Services Configuration

Step 2 Update the fields as required.

Table 5: Services Configuration Parameters

Parameter	Description
Apache Server Port	Enter the number for the Apache server port.
Start Host-granted TCP Port	Host grants TCP ports to the simulations starting from this value.
End Host-granted TCP Port	Host grants TCP ports to the simulations ending with this value.
First VM Serial Console TCP Port	Simulated VMs with serial consoles use TCP ports starting from this value.
Last VM Serial Console TCP Port	Simulated VMs with serial consoles use TCP ports ending with this value.

Parameter	Description
Web Services Port	Enter the TCP port number for the simulation engine services.
UWM Port	Enter the TCP port number for the User Workspace Management interface.
AutoNetkit Webserver Port	Enter the TCP port number for the configuration engine preview interface.
Live Visualization Webserver Port	Enter the TCP port number for the Live Visualization interface.
UWM Web-SSH Port	Enter the TCP port number for the User Workspace Management SSH web interface.
Nova Websocket Serial Port	Enter the TCP port number for the websocket-based serial console connections.
Disable Serial Timeout	Disable timeout of serial consoles after 15 minutes of inactivity.
Nova Websocket VNC Port	Enter the TCP port number for the websocket-based VNC console connections.
Docker Registry Port	Enter the port number for the docker registry.

Step 3 Click **Apply Changes** when you are finished to save your changes.

Infrastructure Configuration

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To update the Infrastructure configuration, complete the following steps:

Step 1 In the User Workspace Management interface, click CML Server > System Configuration.

The System Configuration Controls page appears. Click the Infrastructure tab to access the infrastructure parameters.

Overview		Syste	m Confi	ourati	on Contre	ols
My simulations		Oyoto		garaa		010
Project simulations			CONFIG	SE	T MAINTENANCE	MODE
Projects		System	Networks	Services	Infrastructure	Resources
Users		Ope	nStack passwo	rd pas	ssword	4
CML Server	~		MySQL passwo	rd pa	ssword	
System Configuration			MySQL passwo		ssword	
System Tools		Guest a	account presen	t? 🔍		
Download						
Connectivity						
VM Control	~					
Licenses						
Node resources	~					
Documentation	~					

Figure 10: Infrastructure Configuration

Step 2 Update the fields as required.

Table 6: Infrastructure Configuration Parameters

Parameter	Description
OpenStack Password	Enter the password for administrator access to OpenStack operations.
MySQL Password	Enter the password for OpenStack database access.
Guest Account Present?	Use this option to create a default guest account.

Step 3 Click **Apply Changes** when you are finished to save your changes.

Resources Configuration

To update the Resources configuration, complete the following steps:

Step 1 In the User Workspace Management interface, click CML Server > System Configuration.

The System Configuration Controls page appears. Click the Resources tab to access the resources parameters.

Overview		Syste	m Con	figurati	ion Contro	als
My simulations		e yete		ngarat		
Project simulations			CONFIG	SE	T MAINTENANCE	MODE
Projects		System	Networks	Services	Infrastructure	Resources
Users			Download p	roxy		
CML Server	*		Developed a			
System Configuration			Download p authentica			
System Tools			Download p except	-		
Download		Allow	insecure Do			
Connectivity		Allow		istry		
VM Control	~					
Licenses						
Node resources	~					
Documentation	*					418005

Figure 11: Resources Configuration

Step 2 Update the fields as required.

Table 7: Resources Configuration Parameters

Parameter	Description					
Download Proxy	Enter the proxy server for downloading files, such as images and external git repositories, from outside the local network. Leave blank if the use of a proxy is not required.					

Parameter	Description
Download Proxy Authentication	Enter download proxy credentials in the format " <username>:<password>".</password></username>
Download Proxy Exceptions	Provide a list all host names and/or IP addresses for image and git repository sources where the download proxy shall not be used, such as servers, on the local network.

Step 3 Click **Apply Changes** when you are finished to save your changes.

System Tools

Within the User Workspace Management interface, under CML Server > System Tools, you can view various statistics concerning the usage and operation of your system and check on server status and system services. You also have the ability to download system log files.

Overview System Tools My simulat Project simula **Display statistics** Check health status System operation Do vnload system check logs CML Serve System Configuration Downl Connectivity VM Cor Node re 420566 Repositor Documentat

Figure 12: System Tools Options

To download the system log files, click **Download System Logs**. A dialog box is displayed where you can opt to open or save the system log file.

System Statistics

You can view various statistics concerning the usage and operation of your Cisco Modeling Labs system. System statistics are available from the User Workspace Management interface under CML Server > System Tools > Display Statistics.

The following areas are covered:

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Table 8: System Statistics

Area	Description						
Statistics	Lists the memory usage history per day, week and month and their average and maximum usage stats.						
	Statistics						
	System / Statistic	S					
	Memory usage hi	story Average	Max				
	Last month	50.77%	99.77%				
	Last week	65.39%	99.77%				
	Last day	71.50%	85.09%	9 M M			
Projects and Users	Lists the numb	per of curr	ent proje	ects and users.			
	Projects and users						
	Number of projects 11						
	Number o	ofusers 13		17 Mar.			
Simulations				ctive simulations and nodes for the last week, ours, and those currently running.			
	Simulation	IS					
	Active	Simulations	Nodes				
	In last month	253	1687				
	In last week	94	821				
	In last day	42	565				
	Now	2	76	8 8			

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Area	Description							
Subtype Usage in Simulations	Lists the subtypes and their average and maximum usage stats.							
	Subtype usage in simula	tions						
	Subtype	Average	Max					
	ASAv	0.26	2					
	CSR1000v	0.47	15					
	IOS XRV	0.50	8					
	IOSv	3.03	73					
	IOSvL2	0.61	12					
	jumphost	0.04	1					
	lxc	0.03	2					
	lxc-iperf	0.33	20					
	lxc-ostinato	0.05	3					
	mgmt-lxc	0.64	1					
	NX-OSv	0.33	3					
	server	0.26	3					
	all (nodes ran in a simulation)	6.54	81	410642				
Simulation/node Operation Failures	Lists the number of sim and the previous 24 hou Simulation/node operation failure	ırs.	node failu	res for the	e last week, the last month,			
	Simulation launch Sir	nulation termin	ation Node sta	rt Node stop				
	In last month 60	5	64	111				
	In last week 6	0	0	0				
	In last day 1	0	0	0	410033			

Area	Description						
AutoNetkit	month, and the pro- encountered. The	evious catego	ber of configurations generated in the last week, the la 24 hours, including the number of invalid topologies bry Subtype Usage in Configured Topologies lists the aration requests along with their average and maximu				
	AutoNetkit						
	Configs in last month 128 (3 invalid topologies) Configs in last week 23 (0 invalid topologies) Configs in last day 6 (0 invalid topologies)						
	Subtype usage i	n config	gured topologies				
	Subtype	Average	e Max				
	ASAv	0.40	2				
	CSR1000v	0.91	15				
	IOS XRv	0.48	8				
	IOSv	4.42	73				
	IOSvL2	0.93	12				
	lxc	0.09	2				
	lxc-iperf	0.46	20				
	lxc-ostinato	0.20	3				
	NX-OSv	0.42	2				
	server	0.40	2				
	all (topology size)	8.70	80 				

System Health Status

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You can check on server status and system services that are running using the **Check Health Status** option. It performs a system check and generates a report. It is available from the **User Workspace Management** interface under **CML Server** > **System Tools** > **Check Health Status**.

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Area	Services Checked
Server Status	Click each entry to view further details.
	• Disk space
	• RAM
	• CPU
	Network interfaces
	• Proxy
	• Hypervisor
	• NTP
	Bridge patch applied
	OpenStack cluster infrastructure
System Services	Click each entry to view further details.
	• MySQL
	• RabbitMQ
	OpenStack cluster host information
	OpenStack system services
	OpenStack endpoint URLs
	OpenStack system response
	AutoNetkit services
	CML-CORE services
	STD configuration

Table 9: Health Status Check

Figure 13: Health Status Page

UWM		Styles + 🛓 guest	•
Overview My simulations Project simulations Projects		Health Status System / Health Cocheck again ADwinicad Display RAW report	
Users		Server status	
CML Server System Configuration	*	✓ Disk space ✓ RAM	
System Tools		■ Contraction of the second secon	
Connectivity		Network interfaces Prony	
VM Control	*	✓ Hypervisor	
Node resources Repositories	*	TTP Ridge patch applied	
Documentation	~	Chan Stark pluster infrastructure	



When an issue is discovered, a red x is displayed next to the entry. Click the entry to view further details.

Available options on the Health Status page are:

- Check Again: Allows you to run the health status check again.
- Download: Allows you to open or download the health status log file.
- Display RAW Report: Displays the health status log file to screen.

System Operation Check

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The System Operation Check performs a series of tests to ensure that your system is in a fully functional state. These tests include checking all of the core services as well as starting up a small simulation. The results will confirm if your system is performing as expected or if there are problems, and if so, in which area(s) the

problems lie. The tests will take ~5 minutes to complete. the system operation check is available from the User Workspace Management interface under CML Server > System Tools > System Operation Check.

Figure 14: System Operation Check

WM				Styles - 🛔 g	guest (
Overview		System	n operation	check	
My simulations Project simulations		System / S	System operation check		
Projects				is a series of tests to ensure that your system is in functional state. This includes checking all of the core services as well as starting up a small simulation. T g as expected or if there are problems, and if so, in which area(s) the problems lie. The tests will take ~5 minutes to complete.	The results
Users		& Download n	esults C Rerun tests	• finished	
CML Server	~	✓ Service	tests		finished ●
System Configuration	n		I service tests	r i i i i i i i i i i i i i i i i i i i	finished 🔵
System Tools		✓ Simulation	on tests	·	finished 🔵
Connectivity		Summar	у		
/M Control	~	Туре	Count		
licenses		pass	15		
lode resources	~	fail	0		
Repositories		skip	1		
Documentation	~	N/A	0		

The following areas are tested:

Table 10: System Operation Check Tests

Area	Description	
Service	Click each e	entry to view further details of the tests run.
	Overview Mysmulators Project simulators Projects	System operation check System : System correction check The System coentron check system is in functional state. This excludes checking at of the core services as well as starting up a small simulation. The re- with continin fly-up system is profering excluded of these are process, and if so, in which area(s) the problems ise. The tests will take -4 minutes to comprese. A coverage of the core services are used as starting up a small simulation.
	Users	✓ Service tests finishe
	CML Server System Configuration	✓ OpenStack authentication test finished €
	System Tools	✓ OpenStack compute service test
	Download	✓ OpenStack identity service test
	Connectivity VM Control	✓ OpenStack image service test
	Ukenses	✓ OpenStack network service test
	Node resources 🗸	OpenStack volume service test finished Volume service feature a diabled
	Repositories	✓ Docker Registry test finished 4
	Documentation 🗸	Cluster multicast test Anders received int ressage

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Area	Description				
VIRL API Service	Click each entry to view further details of the tests run.				
	Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surver Surv	finished e finished e finished e finished e finished e			
Simulation	Click each entry to view further details of the tests run.				
Simulation	Overview System operation check Vry simulations System System operation check Vry simulations				
Simulation	Overview System operation check Overview Bystem : System operation check My servications Project servications Project servications The System operation check / performs a series of tests to ensure that your system is in functional state. This includes checking all of the core services as well as latering up as at at codim in your system is in functional state. This includes checking all of the core services as well as latering up as at at codim in your system is in functional state. This includes checking all of the core services as well as latering up as at at codim in your system is operation. At the area (your system is the tests will have 4 minutes to complete.	nal simulation. The results			
Simulation	System operation check Overvee System 1 System coparation check My smutations System 1 System coparation check Project simulations The System coparation check performs a veries of tests to ensure that your system is in functional state. This includes checking op a single checking op a single checking op a single checking operation check performs a series of tests to ensure that your system is in functional state. This includes checking op a single checking op a single checking operation chec	_			
Simulation	Overview System operation check My smutations System i System operation check Project smutations The System operation check performs a verse of tests to ensure that your system is in functional value. This includes checking all of the core services as well as starting or a start of the my trans service of tests to ensure that your system is in functional value. This includes checking all of the core services as well as starting or a start of the my trans service of tests to ensure that your system is in functional value. The tests will be ensure that your system is in functional value. The tests will be ensure that the mode service is the ensure of the mutues to complete. Projects I Downtoal result; I minutes to complete. Call, Berver Vite: 40 monore tests	finished (
Simulation	Cvervee System operation check My sinulation System operation check performs a series of tests to ensure that your system is functional value. This is not desc interview as well as starting op as a starting op as an account of them are performed as expected of them are performed. The performance well operation check performs a series of tests to ensure that your system is functional value. This includes interview as well as starting op as a starting as a starting op as a starting op as a starting op as	finished (
Simulation	Circurear System operation check My simulations System operation check Project simulations The System operation check Project simulations The System operation check Project simulations The System operation check Project simulations Charantee (Check and State) is ensure that your system is in functional state. The instrudes the core services as and as starting up as a starting up as an expected or f here are problems, and if up, in which area(s) the problems lie. The tests wit lake Projects Charantee (Check and State) System Configuration Finance	finished (
Simulation	Overvoer My struktions Project answators Project answators Overvoer My struktions Project answators Overvoer Overvoer System Overgroups Overvoer System Configuration Overvoer System Configuration S	fnished (fnished (
Simulation	Overview System coperation check My structions Fight in system coperation check Project simulations Fight in system coperation check if the core services as well as definition as acrief of table to searce that your system is in fractional data. This includes the core services as well as definition as acrief of table to searce that your system is in fractional data. This includes the core services as well as definition as acrief of table to searce that your system is in fractional data. This includes the core services as well as definition as acrief of table to searce that your system is in fractional data. This includes the core services as well as definition as acrief of table to searce that your system is in fractional data. This includes the core services as well as definition as acrief of table to searce that your system is in fractional data. This includes the core services as well as definition as acrief of table to searce that your system is in fractional data. This includes that the -9 mendees to complete. Vision Visional well Visional	finished finished finished finished			
Simulation	Overview My structuros Project sinutations Project sinutations lists Project si	finished (finished (finished (finished (finished (
Simulation	Surver Surver Maxemations Project simulation System Configuration System Configuration <td>frished e frished e frished e frished e frished e</td>	frished e frished e frished e frished e frished e			
Simulation	Curver System coperation check My structure System coperation check performs average field to core services as well a starting op at a storting service of these are proteines, in structure stru	finished e finished e finished e finished e finished e finished e			

The Summary table provides details of tests passed, failed, skipped or not applicable.

Available options on the System Operation Check page are:

- Download Results: Allows you to open or download the system operation check log file.
- Rerun Tests: Allows you to run the tests again.

Download

Within the User Workspace Management interface, under CML Server > Download, you are able to download various Cisco Modeling Labs client versions and Python libraries as shown.

Figure 15: Files Available for Download

Overview		Download	
My simulations		CML-1.3.0-39-setup_32.exe	168.7 MB
Project simulations		CML-1.3.0-39-setup_64 exe	171.9 MB
Projects		CML-1.3.0-39.dmg	297.8 MB
Users		VIRL_CLIENTS-0.10.28.7-py2-none-any.rev_92f08dc.bin.whi	25.9 MB
CML Server	~		
System Configuration			
System Tools			
Download			
Connectivity			
VM Control	~		
Licenses			
Node resources	~		1
Documentation	~		

Double-click on the applicable file(s) to download it.

Connectivity

Within the User Workspace Management interface, the Connectivity page provides details on all OpenStack ports available on the external (FLAT and SNAT) and project management networks.

- L2 FLAT IP address allocations—Create an externally reachable fixed IP address for a project.
- L3 SNAT IP address allocations—Create a floating IP address for a project. Floating IPs are externally reachable and are mapped to an internal fixed IP address.
- Project Management IP address allocations—Create a fixed IP address on the management network of the selected project. This IP address can be statically assigned to the nodes.

Create a Port Connection

To create a new port connection, complete the following steps:

Step 1 In the User Workspace Management interface, click Connectivity.

The **Outside Connections** page, which lists all current port connections appears.

Step 2 Connections are grouped into three areas: L2 FLAT, L3 SNAT, and Project Management. Click Add in the applicable group to create the required port connection for that type.

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The corresponding Add IP Allocation page appears.

Step 3 Complete the fields as required for the applicable port connection.

	on Type	Field	Description		
Layer 2 F	LAT IP Address Allocations	Owning Project	Choose a project from the drop-down list.		
Overview					
My simulations	Add L2 Flat IP allocation				
Project simulations	Connectivity / Create L2 flat connection				
Projects	Create a named externally reachable fixed IP address for a project.				
Users CML Server	Owning project Select a project				
ConnectMty	Flat network Select a fait network -				
VM Control	Fixed IP Address				
Licenses	Flat network prefix:				
Node resources 👻	V Create X Cancel				
Documentation Y	41000				
		FLAT Network	Choose a FLAT network from the drop-down list.		
		Name	Enter a name for the new port connection.		
		Fixed IP address	Enter a custom IP address from the		
			or to have an address automatically assigned, leave this field blank.		
Layer 3 S	NAT IP Address Allocations	Owning Project	or to have an address automatically assigned, leave this field blank.		
Layer 3 S		Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Overview Ny simulations	NAT IP Address Allocations Add L3 Snat IP allocation	Owning Project	assigned, leave this field blank. Choose a project from the drop-down		
Overview My simulations Project simulations	Add L3 Snat IP allocation Covering Cover L3 and coversion	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Overview Ny simulations	Add L3 Snat IP allocation Correctly Credit L3 and connector Credit C and connector Credit C and connector Credit C and C	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Cverves My simulations Project simulations Projects Users Ctill, Server	Add L3 Snat IP allocation Connectivy Credit L3 and connection Connectivy Credit L3 and connection Costate a samed facility of address for a project. (Floating Pis are externally restricted and are nagged to an	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Overview My simulations Projects Users CUIL Server V	Add L3 Snat IP allocation Correctly Credit L3 and connector Credit C and connector Credit C and connector Credit C and C	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Cverves My simulations Project simulations Projects Users Ctill, Server	Add L3 Snat IP allocation Correctly Create L3 and convectors Oradic stream Charlop & address for a speech Flasting Pa are elemanly reachable and are napped to an Correctly Co	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Overview My simulations Project simulations Projects Users CLL Server Connectively VM Control	Add L3 Snat IP allocation Control to Control to an opport of the same data part and control to an opport of the same data part of th	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Overview My simulations Project simulations Projects Users CLL Server Connectively VM Control	Add L3 Snat IP allocation Correctly Call L3 and constants Conservery Call L3 and constants Conservery Call L3 and constants Call L3 and	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Overview My simulations Project simulations Projects Users CLL Server Connectively VM Control	Add L3 Snat IP allocation Control Cont	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		
Overview My simulations Project simulations Projects Users Connectively VM Control	Add L3 Snat IP allocation Control Cont		or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down list.		
Overview My simulations Project simulations Projects Users Connectively VM Control	Add L3 Snat IP allocation Control Cont	Owning Project	or to have an address automatically assigned, leave this field blank. Choose a project from the drop-down		

Connection Type		Field	Description
		Floating IP Address	Enter a custom IP address from the range defined by the prefix displayed, or to have an address automatically assigned, leave this field blank.
Project Management		Name	Enter a name for the new port connection.
overview Add Managamani	t IP allocation for project <i>cml</i>		
My simulations			
Project simulations			
Projects Create a named fixed IP address nodes.	on this project's management network, that will be statically assignable to VM		
CML Server V	Name		
Connectivity Fixed IP Address			
VM Control 👻	Project management network prefix: 10.255.0.0/16		
Licenses	COMP A CARLEY		
Node resources 👻			
Repositories	102018		
	÷		
		Fixed IP Address	Enter a custom IP address from the range defined by the prefix displayed, or to have an address automatically assigned, leave this field blank.

Step 4 Click Create.

The new connection is created and its details are displayed in the Connectivity page.

Using the VM Control Tool (Admin User)

The VM Control tool is available to aid system administrators with troubleshooting issues encountered in the User Workspace Management interface. The tool enables system administrators to stop specific

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components of an active session. In circumstances where components of a session fail to be deleted through the normal shutdown methods, this tool enables system administrators to remove blocked components.

Figure 16: VM Control Tool

Overview						
My simulations						
Project simulations						
Projects						
Users						
CML Server	~					
Connectivity						
VM Control	~					
Nodes						
Networks						
Ports and Floating IPs						
Hosts						
Allocated ports						
Licenses						
Node resources	~					
Documentation	× 1					

VM Control Nodes

The **Nodes** page lists all the nodes for all the currently running projects for all users. You can delete a specific node or all the nodes for a specific project or projects.

Figure 17: Nodes Page

Overview My simulations		No	des			
		WAF	RNING: The VM Control panels are meant for troubleshooting purposes only and should not be used in normal workflow	s. Removing important resources may break yo	our system.	
Project simulations Projects		Nod	es of project guest			Delete selected
Users			Name	Node host name	Status	1 Options
CML Server	~		- <controls-fzw1bi>-<iondon></iondon></controls-fzw1bi>	cmi	ACTIVE	۵
Connectivity			- <controls-fzw1bi>-<new-york></new-york></controls-fzw1bi>	cmi	ACTIVE	ŵ
VM Control	~		- <controls-fzw1bi>-<paris></paris></controls-fzw1bi>	cml	ACTIVE	ŵ
Nodes			- <controls-fzw1bi>-<san-francisco></san-francisco></controls-fzw1bi>	cml	ACTIVE	8
Networks		Nod	es of project hyerra			Delete selected
Ports and Floating IP	s		Name AL	Node host name	Status	0ptions
Hosts			-<70_nodes_topology-9defLa>- <losv-1></losv-1>	cmi	ACTIVE	۵

Step 1 To delete a specific node:

- a) In the node list for the applicable project, check the corresponding check box.
- b) Click **Delete** in the **Options** column. The node is deleted.
- **Step 2** To delete all the nodes for a specific project:
 - a) In the node list for the applicable project, check the corresponding Name check box.
 - **Note** When you check the **Name** check box for a particular project, the check boxes for all the nodes in the project are automatically checked. You cannot uncheck individual nodes within a project; either all the nodes or no nodes are checked.
 - b) Click Delete Selected.

All nodes for the particular project are deleted.

VM Control Networks

The **Networks** page lists all the networks for all the currently running projects for all the users. You can delete a specific network or all the networks for a specific project or projects.

Figure 18: Networks Page

Overview		Networks			
My simulations		WARNING: The VM Control panels are meant for troubleshooting purposes only and should not be used in normal workflows. Removing important	resources may break y	our system.	
Project simulations		Networks of project Cisco CML			Delete selected
Projects		Show 10 • entries		Filter:	
Users		III Name	Num. of ports	Status 💵	Options
CML Server	~		2	ACTIVE	8
Connectivity		Cisco CML_snat 🖲	2	ACTIVE	
VM Control	~	Showing 1 to 2 of 2 entries		Previou	s 1 Next
Nodes	_	Networks of project MarkS			Delete selected
Networks		Show 10 ventries		Filter:	
Ports and Floating IPs		III Name III	Num. of ports	Status 💵	Options
Hosts			o o		options

Step 1 To delete a specific network:

- a) In the network list for the applicable project, check the corresponding Name check box.
- b) Click **Delete** in the **Options** column. The network is deleted.
- **Step 2** To delete all the networks for a specific project:
 - a) In the network list for the applicable project, check the corresponding **Name** check box.
 - **Caution** When you check the **Name** check box, the check boxes for all the networks in the project are automatically checked. In the **Networks** page, for each user project, two networks are listed in blue with an information icon. These two networks are specifically created for use by all users of the project when the project is created. These networks cannot be recreated automatically; the project would need to be deleted and recreated as a whole. We recommend that you do not delete these networks. Uncheck the check boxes for these two networks before clicking **Delete Selected**.
 - b) Click **Delete Selected**.

All the networks for the particular project are deleted.

VM Control Ports and Floating IPs

The **Ports and Floating IPs** page lists all the ports and floating IPs for all the currently running projects for all the users. You can delete a specific port or floating IP or all the ports and floating IPs for a specific project or projects.

Figure 19: Ports and Floating IPs Page

Overview		Ports and Floating IPs					
My simulations		WARNING: The VM Control panels are meant for troubleshooting purposes only and should not be used in normal workflows. Removin	g importa	int resources may	v break your system.		
Project simulations		Ports of network - <controls-fzw1bi>-<london-to-new-york></london-to-new-york></controls-fzw1bi>				Delete selected	
Projects Users		Name	1E	Status 👫	Fixed IP Address	11 Options	È
CML Server	~			ACTIVE	10.255.255.2	Û	1
Connectivity		- <controls-fzw1bi>-<new-york>-<london-to-new-york></london-to-new-york></new-york></controls-fzw1bi>		ACTIVE	10.255.255.1	۵	
VM Control	*	Ports of network - <controls-fzw1bi>-<london-to-paris></london-to-paris></controls-fzw1bi>				Delete selected	
Nodes		I Name	ŧ	Status 👫	Fixed IP Address	11 Options	
Networks				ACTIVE	10.255.255.1	ŵ	1
Ports and Floating IPs				ACTIVE	10.255.255.2	۵	Dere
Hosts		Ports of network - <controls-fzw1b></controls-fzw1b> - <london-to-san-francisco></london-to-san-francisco>				Delete selected	

Step 1 To delete a specific port or floating IP:

- a) In the port or floating IP list for the applicable project, check the corresponding check box.
- b) Click **Delete** in the **Options** column. The port or floating IP is deleted.
- **Step 2** To delete all the ports or floating IPs for a specific project:
 - a) In the port or floating IP list for the applicable project, check the Name check box.
 - **Note** When you check the **Name** check box for a particular project, the check boxes for all the ports or floating IPs in the project are automatically checked. You can uncheck individual ports or floating IPs within the project as required.
 - b) Click Delete Selected. All ports or all floating IPs for the particular project are deleted.

VM Control Hosts

The **Hosts** page lists all the compute services and network agents. Maintenance mode on a host disables the compute service on that node. It prevents new virtual machines from being deployed on that host.

Figure 20: Hosts Page

Overview My simulations		OpenStack Com	npute services and I	Network agents		
Project simulations		WARNING: The VM Control pane	els are meant for troubleshooting purpose	es only and should not be used in	normal workflows. Removing important resources	may break your system.
Projects		Host cml				P Enable maintenance mode
Users		Name	📙 Enabled	li Alive	Last update	U Options
CML Server	~	cert	✓ True	✓ True	2016-03-01 16:36:36	0
Connectivity		compute	✓ True	✓ True	2016-03-01 16:36:38	0
	~	conductor	✓ True	✓ True	2016-03-01 16:36:42	0
VM Control	*	consoleauth	✓ True	✓ True	2016-03-01 16:36:40	0
Nodes		dhcp-agent	✓ True	✓ True	2016-03-01 16:36:26	0
Networks		I3-agent	✓ True	✓ True	2016-03-01 16:36:27	0
Ports and Floating IP	s	linuxbridge-agent	✓ True	✓ True	2016-03-01 16:36:24	0
Hosts		metadata-agent	✓ True	✓ True	2016-03-01 16:36:26	0
Licenses		scheduler	✓ True	✓ True	2016-03-01 16:36:39	0

VM Control Allocated Ports

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The **Allocated ports** page lists details for all of the currently allocated ports on the system.

Overview	*	Allocated	ports					
My simulations		IP Address	L Port	Protocol	Username Lt	Simulation	t Node It	Task
Project simulations		0.0.0.0	10000	tcp	guest	~jumphost	jumphost	tcp-forward
Projects		0.0.0.0	10000	tcp	testing	3_node_test-jQRP6F	~mgmt-lxc	Ixc-management
Users		0.0.0.0				mixed-Vwe8r6		
CML Server	~		10002	tcp	testing		~mgmt-lxc	Ixc-management
		0.0.0.0	10003	tcp	guest	mixed_4_nodes-x8YY09	~mgmt-lxc	lxc-management
Connectivity	~ =	0.0.0.0	10004	tcp	guest	40_nodes_mixed_topology-SIUQ29-jLu_HP	~mgmt-lxc	lxc-management
Nodes Networks								
Ports and Floating IPs								
Hosts								
Allocated ports								
Licenses								
Node resources	~							
Documentation	· ·							

Figure 21: Allocated Ports Page

Cisco Modeling Labs Licenses (Admin User)

Within the User Workspace Management interface, you can manage Cisco Modeling Labs licenses. A license specifies the options that are enabled for Cisco Modeling Labs.

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The **Licenses** page provides details on all the licenses that are currently installed on the CML server. These include the license ID, type of license, number of nodes per license, and the expiry date.

Figure 22: Licenses Page

Overview		Licenses				
My simulations		Literises				
Project simulations						Register licenses
Projects		License ID	Feature name	Node count	Expiry date 💷	Remove license
Users		20160224034240575	CML_CORPORATE	22	31-Mar-2016	Remove
CML Server	~		CML_CISCO_VM_CAPACITY	15	31-Mar-2016	
Connectivity		20160224035659761	CML_CISCO_VM_CAPACITY	200	31-Mar-2016	t Remove
VM Control	~	Active node capacity (will drop on)		215	31-Mar-2016	
Licenses		License verification results:				
Node resources	~	Product licensing status is licensed as CML_CORPORATE. Product license expires				
Repositories		in 30 days.				
Documentation	~	Licensed Cisco VM capacity is 215 nodes.				
		In case of unexpected license verification results, please consult	the latest entries in the verification log below.			

Register a Cisco Modeling Labs License

To register a license, complete the following steps:

- **Step 1** Open the email containing your Cisco Modeling Labs license key.
- **Step 2** Using a text editor, open the attached .lic file.
- Step 3In the User Workspace Management interface, click Licenses.The Licenses page, which lists all valid licenses, appears.
- **Step 4** Click **Register License** to register a valid license.

The **Register licenses** page appears.

Figure 23: Register Licenses

Overview	Register licenses
My simulations	Licenses / Register
Project simulations	
Projects	Licenses are required for enabling functionality on the Cisco Modeling Labs server.
Users	The license is bound to this server instance, therefore you will need to provide the Host Name and MAC Address information when obtaining a license.
CML Server	✓ Host Name cml
Connectivity	005056a65932
VM Control	Paste the license key text into the area below and press register.
Licenses	Licenses
Node resources	✓ Licenses
Repositories	
Documentation	▲

- **Step 5** Copy and paste the license key from the .lic file into the Licenses text area.
- Step 6 Click Register.

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- The license is applied.
- **Step 7** Return to the Licenses page to view the newly registered license.

Node Resources

Within the User Workspace Management interface, under Node Resources, you can manage virtual machine run-time parameters and virtual machine images. You can also manage LXC container images and templates.

Figure 24: Available Node Resources

Overview	
My simulations	
Project simulations	
Projects	
Users	
CML Server	~
Connectivity	
VM Control	~
Licenses	
No. do ano anti-	
Node resources	~
Flavors	~
Flavors	· · · · · · · · · · · · · · · · · · ·
Flavors	·
Flavors Images Containers	•

Virtual Machine Flavors

Within the **User Workspace Management** interface, as part of the creation process for virtual machine images, a virtual machine flavor is created. Flavors are used in each virtual machine to define the CPU, memory (RAM) allocation, disk space, the number of cores, and so on.

In the Flavors page, you can perform two operations for flavors. These operations are:

Operation	Description
Add	Creates a new flavor.
Delete	Deletes a selected flavor.

Create a Virtual Machine Flavor

To create a new virtual machine flavor, complete the following steps:

Step 1 In the User Workspace Management interface, in admin mode, click Flavors.

The Flavors page, which lists all of the available flavors, appears.

Step 2 Click Add to create a new flavor.

The Create Flavor page appears.

Figure 25: Create a Flavor

Create Flavor Overview Flavors / Create flavor My simulations Project simulations Name Name Projects • 256 RAM (MB) Users • Virtual CPUs 1 CML Server × Cancel ✓ Create Connectivity VM Control **Recommended Values** Licenses LE RAM (MB) Subtype Virtual CPUs Node resources ASAv 2048 1 CSR1000v 3072 1 Images CSR1000v-1 3072 1 Containers generic 256 1 Subtypes IOS XRv 3072 1 Repositories IOS XRv 9000 4 16384 Documentation IOSV 512 1

- **Step 3** In the **Name** field, enter a name for the flavor.
- **Step 4** From the **RAM** drop-down list, choose the amount of memory allocation for the flavor.
- **Step 5** From the Virtual CPUs drop-down list, choose the number of virtual CPUs for the flavor.
- **Step 6** Click **Create** to create your virtual machine flavor.

The **Flavors** page appears with the newly created flavor listed.

Step 7 Under the **Options** column, use the **Delete** option to delete a virtual machine flavor.

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Images

Within the **User Workspace Management** interface, you can add new images, update details for existing images, or delete images from the system. Additionally, you can take a snapshot of the disk content of a virtual machine image. This newly created user-specific disk image can be used in other simulated sessions.

Cisco Modeling Labs 1.3 includes the following images built into the Cisco Modeling Labs client:

- Cisco IOSv Software Release 15.6(2)T
- Cisco IOSv Layer 2 Switch Software Release 15.2 (03.2017)
- Cisco IOS XRv Software Release 6.1.3 CCO
- Linux server (Ubuntu 16.04.1 Cloud-init)
- · Unmanaged switch
- Cisco ASAv Software Release 9.7.1

For the most up-to-date list of virtual images, see Release Notes for Cisco Modeling Labs 1.3.

The following demo images are available from the FileExchange:

- Cisco IOS XRv 9000 Software Release 6.0.1 demo image
- Cisco CSR1000v Software Release 16.5.1b XE-based demo image
- Cisco NX-OSv 9000 Software Release 7.0.3.16.1 demo image

In the **Images** page, you can perform a number of operations for images. These operations are:

Operation	Description
Add	Creates a new virtual machine image.
Modify	Modifies details for a selected virtual machine image.
Delete	Deletes a selected virtual machine image.

Create a Virtual Machine Image

To create a new virtual machine image, complete the following steps:

 Step 1
 In the User Workspace Management interface, log in as admin and click Images.

The Images page, which lists all of the available registered images, appears.

Step 2 Click Add to create a new image.

The Create VM Image page appears.

Figure 26: Create VM Image

Overview		Create VM Image	
My simulations		Images / Create image	
Project simulations		Disk usage (GB)	
Projects			55.03% 38.54 / 70.04
Users			_
CML Server	~	Owning project	uwmadmin
Connectivity		Project specific	
VM Control	~	Subtype	ASAv
Licenses		Name/Version	ASAv Name/Version
Node resources	~	Release	Release
Flavors		Source	File on server
Images			○ URL ○ Local image file
Containers			
Subtypes		Image Path	/home/virl/
Repositories		The required default values will be know that the image does not match	supplied by the subtype. Please, DO NOT edit Properties, unless you h known defaults.
Documentation	~	Meaningful properties to define her	e are nw_vii_model and nw_disk_bus

- **Step 3** From the **Owning Project** drop-down list, choose the appropriate project for the new image.
- Step 4 Click the Project Specific check box if you want the new image to be private and only available to the owning project.
- **Step 5** From the **Subtype** drop-down list, choose the appropriate subtype for the new image.
- **Step 6** In the Name/Version field, enter a name or version number for the image.
- **Step 7** In the **Release** field, enter the release number for the image.
- **Step 8** Click the appropriate **Image Source**: File on Server, URL, or Local Image File.
- **Step 9** In the **Image Path** field, enter a path on the server/virtual machine (an HTTP, FTP or TFTP URL) or choose a file to upload.
- **Step 10** To upload an image from your own device, click **Browse** to navigate to the image file.
- **Step 11** Click Create to create your virtual machine image.
 - **Note** The creation process can take a while depending on where the image file is located relative to the Cisco Modeling Labs server. Both virtual machine disk (VMDK) and QEMU copy-on-write 2 (QCOW2) image formats are supported. As part of the creation process for images, a default flavor is also created if missing, which contains information on the CPU and memory allocation for the virtual machine image.

The Image <Image Name> page, which contains the details and properties of the virtual machine image, appears.

- **Step 12** Click **Images** to view the newly added image.
- **Step 13** Under the **Options** column, use the **Modify** or **Delete** options to amend the details for the virtual machine or to delete a virtual machine image. After the image is installed, it is available for users to select for their topology simulation.
- Step 14In the Cisco Modeling Labs client, click File > Preferences > Node Subtypes.The Node Subtypes dialog box is displayed.

Figure 27: Available Node Subtypes

filter text	Node Subtypes						▼
eneral elp	Note: this list will grow autom	atically when new subt	types are autodete	cted.			
ode Subtypes	Name	Icon	Show in Palette	Interface name format	Min interface	Max interface	Segment Sizes
acket Capture	ASAv	asav asav	true	GigabitEthernet0/{0}	0	26	0
mulation Launch eam	CSR1000v	csr1000v	true	GigabitEthernet{0}	2	15	0
erminal	EXT-ROUTER	access_point	false	link{0}	0	1	0
opology Editor	FLAT	Cloud	false	link{0}	0	1	0
/eb Services	IOS XRv	ios_xrv	true	GigabitEthernet0/0/0/{0}	0	26	0
	IOSv	iosv	true	GigabitEthernet0/{0}	1	14	0
	IOSvL2	iosvl2	true	GigabitEthernet{1}/{0}	1	15	4
	lxc	www.VSS	true	eth{0}	1	25	0
	NX-OSv	nx_osv	true	Ethernet2/{0}	1	27	0
	server	app_server	true	eth{0}	1	25	0
	SNAT	Cloud	false	link{0}	0	1	0
	Unmanaged Switch	switch	true	link{0}	1	15	0
				Fet	ch from Server	Restore <u>D</u> efault	ts Apply
						ОК	Cancel

Step 15In the Node Subtypes dialog box, click Fetch from Server.The Confirm dialog box is displayed.

Step 16 Click OK to update the list of node subtypes based on the currently configured Cisco Modeling Labs server.

Create an Image Snapshot

When a Linux server is present in a running simulation, you can take a snapshot of the disk content of the server. This newly created user-specific disk image can be used in other simulated sessions.

To take a snapshot of the server's disk content, complete the following steps.

Step 1	Log in to the User Workspace Management interface.
	Note You must log in as a user other than the uwmadmin user, for example,
	guest.
Step 2	On the Overview page, under Sessions , choose the applicable running session.

A list of active virtual machines is displayed.

Step 3 Choose the applicable virtual machine image, and under the **Options** column, click the **Create Snapshot** icon.

Figure 28: Create Snapshot Icon

ly simulations		Sin	nulation I	ive visua	lization-v.l;	zUTM details				
roject simulations			ulations / live vis							
connectivity		Jim	aladona / live_via	0201201011-¥32011W						
ode resources	~	C R	efresh					E Live Visualization	Stop simulation	✓ Download original virl fi
epositories		User		1	Project	Status	Started		1	Expires
ocumentation	~	gues	t-cml-12	9	guest	ACTIVE	2016-03-08 20:23:28		1	never
		Show	10 • entries		It State It	Management IPs	External Connections	_		Filter:
			iosv-1	IOSV	ACTIVE	10.255.0.2	telnet://172.23.81.101:17292 telnet://172.23.81.101:17293		\sim	
			iosv-2	IOSv	 ACTIVE 	10.255.0.3	telnet://172.23.81.101:17294 telnet://172.23.81.101:17295		Ø	Create snapshot
			losv-3	IOSV	 ACTIVE 	10.255.0.4	telnet://172.23.81.101:17296 telnet://172.23.81.101:17297		۵	@ ^{c0} @ ^{c1} 😕
			iosvl2-1	IOSvL2	 ACTIVE 	10.255.0.5	teinet://172.23.81.101:17298 teinet://172.23.81.101:17299		Ø	e°° ≘°1 🗶
			iosvl2-2	IOSvL2	ACTIVE	10.255.0.6	teinet://172.23.81.101:17300 teinet://172.23.81.101:17301		٥	œ ^{c0} œ ^{c1} ⊯

Project details for the newly created snapshot are displayed.

Figure 29: Newly Created Image Snapshot

I

UWM			Styles - 🎍 guest-cml-12
My simulations Project simulations		Project image snapshot guest-IOSv-iosv-1 details	
Connectivity		Images / 46a8647d-cbee-40f3-8fa7-e520ff57531b	
Node resources	~	Saving snapshot of node "iosv-1" as image "guest-IOSv-iosv-1"	×
Flavors		Name	
Images		guest-IOSv-losv-1 OpenStack ID	
Containers		46a8647d-cbee-40f3-8fa7-e520ff57531b Project	
Subtypes		a3d9b4c352584cfc959879e09cebcc9c Updated	
Repositories		2016-03-08 20:39:22.000000 Status	
Documentation	~	queued Size 0.00 B (0) Minimum Disk Size	
		2 GB Converted qoov2 image checksum None (every image is forced through conversion, even qcow2)	

The new image snapshot is listed under the Image Snapshot section on the Images page.

Figure 30: Available Image Snapshots

UWM							Styles -	🛔 guest-cmi-12 🛛 🖲
My simulations Project simulations		Images						
Connectivity		Saving snapshot of node "ios	v-1" as image "guest-l	OSv-iosv-1"				×
Node resources	~	Disk usage (GB)						
Flavors					57.71%			40.42 / 70.04
Images		Images in this proje	ect					🖬 Add
Containers		Image 👫 Re	lease	11 Status	11 Created	Updated	Size	Options
Subtypes		No images are owned by the cu	irrent project					
Repositories	~	Image snapshots ir	this project					
		Image	🏨 Release	Lî Status	11 Created	Updated	11 Size	11 Options
		guest-IOSv-iosv-1	-	 active 	2016-03-08 20:39:22	2016-03-08 20:39:41	122.12 MiB	/ 0
		guest-server-server-1	14.04.2	 active 	2016-02-08 07:56:17	2016-02-08 07:56:34	1.01 GiB	e 🖄

The image snapshot can be reused in the Cisco Modeling Labs client under **Properties** > **Node** > **VM Image.** See Cisco Modeling Labs Corporate Edition User Guide, Release 1.3 for more information.

Containers

In the **User Workspace Management** interface, the **Containers** page provides a list of LXC images and templates. Here you can manage LXC container images and templates.

In the **Containers** page, you can perform a number of operations for LXC images and templates. These operations are:

Operation	Description
Add	Create a new LXC image and/or LXC template.
Modify	Modify details for LXC images
Delete	Delete LXC images and templates as required.

Create an LXC Image

To create a new LXC image, complete the following steps:

Step 1 Click Node Resources > Containers in the User Workspace Management interface.

The Containers page, which lists all of the available LXC images and templates, appears.

Step 2 Click Add to create a new LXC image.

The Create LXC Image page appears.

Figure 31: Create an LXC Image

Overview				
My simulations		Create LXC image		
Project simulations		Container settings / Image / Creat	e	
Projects		Disk usage (GB)		
Users			55.58%	38.93 / 70.04
CML Server	~			
Connectivity		Project specific		
VM Control	~	Subtype	IXC	•
Licenses		Name/Version	Ixc Name/Version	
Node resources	~	Release	Release	
Flavors		Image source (".tar.gz" and	I File on server	
Images		".tgz" only)	 ○ URL ○ Local LXC image file 	
Containers		Image Path	/home/virl/	
Subtypes		magerau		
Repositories			✓ Create ★ Cancel	2
Documentation	~	Ψ		410627

- Step 3 Click the Project Specific check box if you want the new image to be private and only available to the owning project.
- **Step 4** Choose the appropriate subtype for the new LXC image from the **Subtype** drop-down list.
- **Step 5** Enter a name or version number for the image in the Name/Version field.
- **Step 6** Enter the release number for the image in the **Release** field.
- **Step 7** Click the appropriate **Image Source**: File on Server, URL, or Local Image File.
- **Step 8** Enter a path on the server/virtual machine (an HTTP, FTP or TFTP URL) or choose a file to upload in the **Image Path** field.
- **Step 9** Click **Browse** to navigate to the LXC image file to upload an image from your own device.
- **Step 10** Click **Create** to create your LXC image.
- **Step 11** Click **Images** to view the newly added image.
- **Step 12** Under the **Options** column, use the **Modify** or **Delete** options to amend the details for the LXC image or to delete an LXC image. After the LXC image is installed, it is available for users to select for their topology simulation.

Create an LXC Template

To create a new LXC template, complete the following steps:

Step 1 Click Node Resources > Containers in the User Workspace Management interface.

The Containers page, which lists all of the available LXC images and templates, appears.

Step 2 Click Add to create a new LXC template.

The Create LXC Template page appears.

Figure 32: Create a LXC Template

Overview		Â	Create LXC templa	te
My simulations			Container settings / Template / Cre	
Project simulations			Container settings / Template / Cre	aic
Projects			Disk usage (GB)	
Users				55.59% 38.93 / 70.04
CML Server	~			
Connectivity			Project specific	
VM Control	~	ш	Subtype	İxc 💌
Licenses			Name/Version	Ixc Name/Version
Node resources	~		Release	Release
Flavors			Template source	File on server
Images				 ○ URL ○ Local template file
Containers			Template Path	/home/virl/
Subtypes				✓ Create ★ Cancel
Repositories				
Documentation	~	-		

Step 3	Click the Project Specific check box if you want the new image to be private and only available to the owning project.
Step 4	Choose the appropriate subtype for the new LXC image from the Subtype drop-down list.
Step 5	Enter a name or version number for the image in the Name/Version field.
Step 6	Enter the release number for the image in the Release field.
Step 7	Click the appropriate Template Source: File on Server, URL, or Local Image File.
Step 8	Enter a path on the server/virtual machine (an HTTP, FTP or TFTP URL) or choose a file to upload in the Template Path field.
Step 9	Click Browse to navigate to the LXC image file to upload from your own device.
Step 10	Click Create to create your LXC template.
Step 11	Click Images to view the newly added LXC template

Subtypes

In the **User Workspace Management** interface, the **Subtypes** page provides a list of integrated subtypes, which users can use as templates to create their own custom subtypes. Using the **Specialize** option for a subtype, a user can duplicate the subtype template and make the necessary updates to create a new custom subtype. Subtypes can be imported and exported, which allows users to apply their custom subtypes to other Cisco Modeling Labs server installations.

In the **Subtypes** page, you can perform a number of operations for subtypes. These operations are:

Operation	Description
Import	Imports a subtype from a JSON file.
Export	Exports a subtype to a JSON file.
Specialize	Duplicates an available subtype to create a custom subtype.

Import a Subtype

Subtypes for import must be available in a JSON file.

To import a subtype, complete the following steps:

Step 1	Click Import to import a ne	ew subtype.
--------	------------------------------------	-------------

- The **Import Subtypes** page appears.
- **Step 2** Paste the subtype details from the JSON file into the text area.
- Step 3 Click Import.

The newly imported subtype is listed on the Subtypes page.

Step 4 (Optional) Click **Specialize** to create a custom subtype based on the newly imported subtype, click **Modify** to amend the details for the subtype, or click **Delete** to delete the subtype.

Create a Custom Subtype

To create a custom subtype, complete the following steps:

- Step 1For the applicable subtype, under the Options column and click the Specialize icon.
The Specialize Subtype page appears.
- **Step 2** Update the subtype fields as required.
 - **Note** You can use the default values on the **Subtypes** page; however, you must provide a new name for the new subtype.

Field	Description
Name of new subtype	Enter a name for the new subtype.
Description of plugin	Provide a description of the plug-in to be created.
Name of management interface	Enter a name for the management interface.
Names of dummy interfaces	Enter names for dummy interfaces, inserted between management interface and first data interface.
Pattern for data interface names	Provide the interface name format, for example, GigabitEthernet0/{0}.
First data interface number	Enter a valid integer for the first interface.
Max count of data interfaces	Enter the maximum allowed number of interfaces.
Number of interfaces per LC	Enter the permitted number of interfaces per line card (LC) allowed.
Number of serial interfaces	Choose the number of interfaces allowed. Options are 0, 1, 2, 3, and 4.
Protocol for network CLI	Choose the type of console connection. Options are Telnet or SSH .
Make VNC access available	Allow VNC access. Enabled when the check box is checked.
Name of icon for GUI	Enter a name for the subtype icon that is displayed in the Cisco Modeling Labs client.

Table 11: New Subtype Fields

Field	Description
Show subtype on GUI palette	Allow the subtype icon to be displayed in the Cisco Modeling Labs client. Enabled when the check box is checked.
Configuration disk type	Choose the type of configuration disk. Options are cdrom , disk , cloud-init , iso9660 , and vfat . For LXC subtypes, set to lxc .
ISO 9660 Level in cdrom Disk	Choose the ISO 9660 level in cdrom disk. Options are 2 , 3 , and 4 .
Name of file for config drive	Enter a name for the configuration drive file.
Virtual interface model	Choose a virtual interface model. Options are e1000, virtio, and rtl8139.
Main disk bus model	Choose a main disk bus model. Options are ide, virtio, and scsi.
RAM (MB) allocated per node	Specify the amount of RAM (MB) to use for each node.
Number of CPUs allocated per node	Choose the number of CPUs to allocate per node. Value range is 1 to 16.
Extra comma-separated image properties	Enter any additional image properties, set on all images added for that subtype through the Create New Image page.
Name of default image	Enter a name for the default image.
Name of default flavor	Enter a name for the default flavor for VM-based subtypes and a default template name for LXC subtypes.

- **Note** You can choose to go with the default values on the Subtypes page; though you must provide a name for the new subtype.
- **Step 3** When completed, click **Create** to create the new custom subtype.

The new subtype is created and its details are displayed in the Subtypes page for the new subtype.

- **Note** For a newly created subtype, the value in the **Dynamic** column is **Yes**, which indicates that the subtype is not built into the server, and therefore may be modified or deleted.
- Step 4(Optional) On this page, you can click Specialize to create a custom subtype based on the newly created subtype, click
Modify to amend the details for the subtype, or click Delete to delete the subtype.
- **Step 5** Click the **Subtypes** tab to see the custom subtype listed on the page.

Documentation

Within the User Workspace Management interface, you can access STD API and User Workspace Management API documentation. It is available from User Workspace Management > Documentation.

Figure 33: Documentation Options

Overview		
My simulations		
Project simulations		
Projects		
Users		
CML Server	~	
Connectivity		
VM Control	~	
Licenses		
Node resources	~	
Documentation	~	
STD API		
UWM API		
Simulation concepts		
		ŧ

To access the STD API, click STD API. The STD API page is displayed.

Overview My simulations		Other documentation on topologies and features of the CML backend systems can be found at http://172.23.81.102/doc VIRL STD API				
Project simulations		admin	Show/Hide List Oper	ations E	Expand Operations	
Projects		autonetkit	Show/Hide List Oper	ations E	Expand Operations	
Users		catalog	Show/Hide List Oper			
-	~	GFT /	List all supported URL rules	and their a:	ssociated methods	
CML Server	×	health check	Show/Hide List Oper	ations E	Expand Operations	
	~	interfaces	Show/Hide List Oper	ations E	Expand Operations	
VM Control		links	Show/Hide List Oper	ations E	Expand Operations	
Licenses		node resources	Show/Hide List Oper	ations E	Expand Operations	
Node resources	~	roster	Show/Hide List Oper	ations E	Expand Operations	
Documentation	~	simengine	Show/Hide List Oper	ations E	Expand Operations	
STD API		snapshot	Show/Hide List Oper	ations E	Expand Operations	
UWM API		subtypes	Show/Hide List Oper	ations E	Expand Operations	
Simulation concepts		traffic capture	Show/Hide List Oper	ations E	Expand Operations	
		traffic control	Show/Hide Ust Oper	ations E	Expand Operations	18011
		traffic counters	Show/Hide List Oper	ations E	Expand Operations	418(

Figure 34: Standard API

From this page, you are able to browse the available REST calls and see examples of the call structures for the STD API.

To access the User Workspace Management API, click UWM API. The UWM API page is displayed.

Overview		Other documentation on topologies and features of the CML backend systems can be found at http://172.23.81.102/doc	
My simulations		VIRL UWM API	
Project simulations		admin	Show/Hide List Operations Expand Operations
Projects		catalog	Show/Hide List Operations Expand Operations
Users		GET /	List all supported URL rules and their associated methods
	~	createiolimage	Show/Hide List Operations Expand Operations
CML Server	*	POST /rest/createiolimage	Creates new IOL image with specified parameters.
Connectivity		dockerimages	Show/Hide List Operations Expand Operations
VM Control	*	cer /rest/dockerimages	List info about all Docker images.
Licenses		rost /rest/dockerimages	Creates new image with specified parameters.
Node resources	~	DELTEE /rest/dockerimages/ <image_id></image_id>	Deletes image with specified ID
Documentation	~	GET /rest/dockerimages/ <image_id></image_id>	List info about specified image.
STD API		flavor	Show/Hide List Operations Expand Operations
UWM API		Images	Show/Hide List Operations Expand Operations
Simulation concepts		licensing	Show/Hide List Operations Expand Operations
		lxcimages	Show/Hide List Operations Expand Operations
		Ixctemplates	Show/Hide List Operations Expand Operations

Figure 35: UWM API

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From this page, you are able to browse the available REST calls and see examples of the call structures for the UWM API.

1

To access the Cisco Modeling Labs simulation concepts' pages, click **Simulation concepts**. The **Simulation concepts** main page is display. Click **1. README** to access the documentation.

Figure 36: Simulation Concepts Documentation

VIRL 0.10.29.12 documentation »		previous next inde
Previous topic Virk. Next topic 1.1. introduction This Page Show Source Quick search Go Enter search terms or a module,	1. README 1.1. Introduction 1.2. Terminology and Overview 1.3. VIRL-CLIENTS package 1.4. Projects, Users and Special Networks 1.5. VIRL Nodes 1.5. VIRL Nodes 1.6. Configuration 1.7. Installation 1.8. OpenStack Client 1.9. VIRL User Workspace Management Server 1.10. VIRL Service Topology Director Server 1.10. VIRL Service Topolo	
class or function name. VIRL 0.10.29.12 documentation »	1.11. Troubleshooting @Copyright 2016. Claso Systems. Inc. All rights reserved. Created using Sphinx 1.2.3.	previous next ind