oVirt

Utilizing oVirt's extensibility to fit your needs

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Infrastructure.Next
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Agenda

oVirt

- Part 1 – Consuming oVirt
  - oVirt API
  - oVirt SDK
  - SNMP (New in 3.4!)

- Part 2 – Extending oVirt
  - VDSM hooks
  - Scheduling API
  - UI Plugins

oVirt API

What can I do via API?

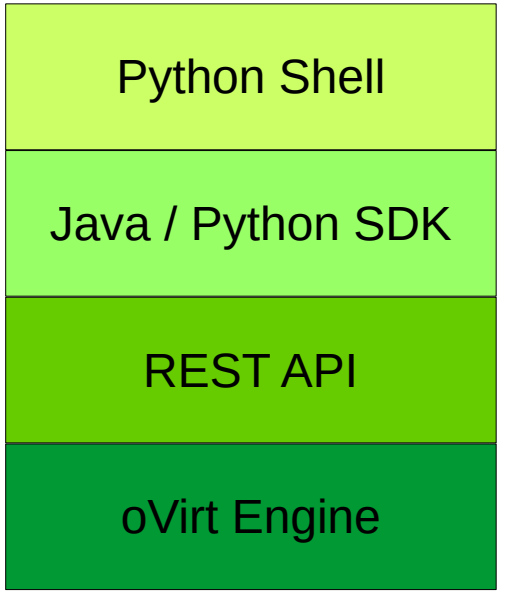
oVirt

- Access via REST/SDK/Shell
- Infrastructure configuration
- Virtual machine (VM) configuration and management
  - Networking for the Guest, Virtual disks, VM properties
- User permissions management
- Advanced operations not available in the GUI

API Concepts

oVirt

- All APIs integrate through the oVirt engine
- All types of APIs are based on web services interface
- Backward and forward compatibility
- Secure access
- Session-based access



API methods

oVirt

REST

`https://host:port/api/vms`

Returns:

- XML/JSON/...

```
<vm id="aee0dbce-1591-44d4-9052-c2209b3e45b8" href="/api/vms/aee0dbce-1591-44d4-9052-c2209b3e45b8">
     <name>Austin</name><actions>
     <link rel="shutdown" href="/api/vms/aee0dbce-1591-44d4-9052-c2209b3e45b8/shutdown"/>
      <link rel="start" href="/api/vms/aee0dbce-1591-44d4-9052-c2209b3e45b8/start"/>
.....................
```

SDK (Python/Java)

`api.vms.list()`

Returns:

- list of VM objects

Shell

list vms

Returns:

- Formatted text

```
id                    : 18df94a7-048f-4306-9cfd-a74e8ea3b907
name                  : Boston
description           : Main service for Boston
cluster-id            : 99408929-82cf-4dc7-a532-9d998063fa95
cpu-topology-cores    : 2
cpu-topology-sockets  : 1
```

oVirt SDK

oVirt SDK

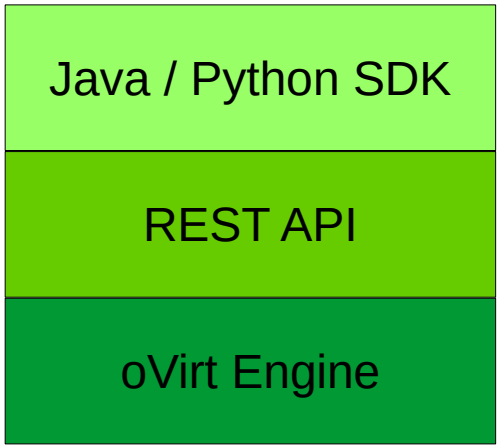
oVirt

- Mainly used for integration or advanced automation
- Object oriented
- Current bindings
  - Java - http://www.ovirt.org/Java-sdk
  - Python - http://www.ovirt.org/Python-sdk
  - libgovirt (GObject wrapper for the oVirt REST API) - https://github.com/GNOME/libgovirt
  - rbovirt: ruby binding for the oVirt REST API- https://github.com/abenari/rbovirt

oVirt SDK - Concepts

oVirt

- Complete protocol abstraction
- Full compliance with the oVirt API architecture
- Self descriptive, intuitive and easy to use
- Auto-generated
- Auto-completion*



* On supported environments

oVirt SDK – Example: Basics

```
from ovirtsdk.api import API

api = API(url='http://localhost:8080',
          username='user@domain',
          password='password')
```

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api.v
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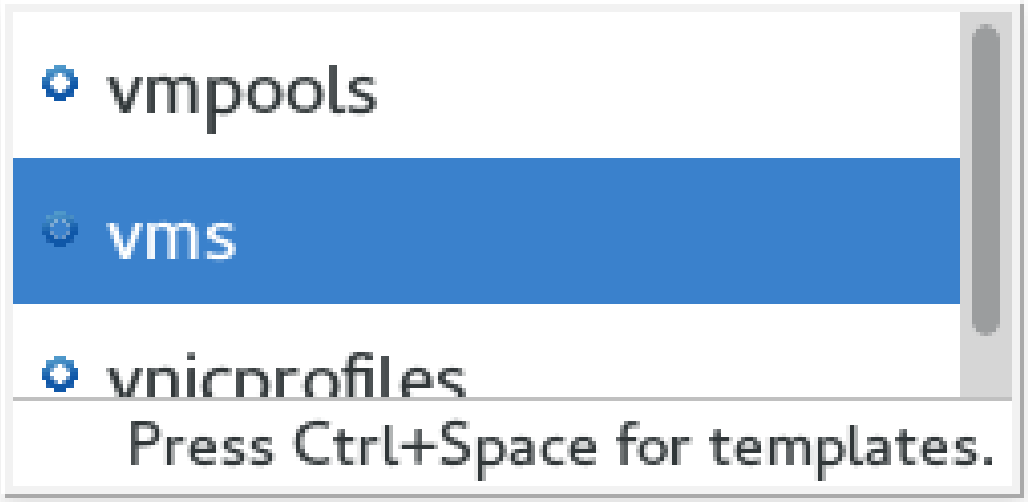

oVirt SDK – Example: Basics

oVirt

```
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api = API(url='http://localhost:8080',
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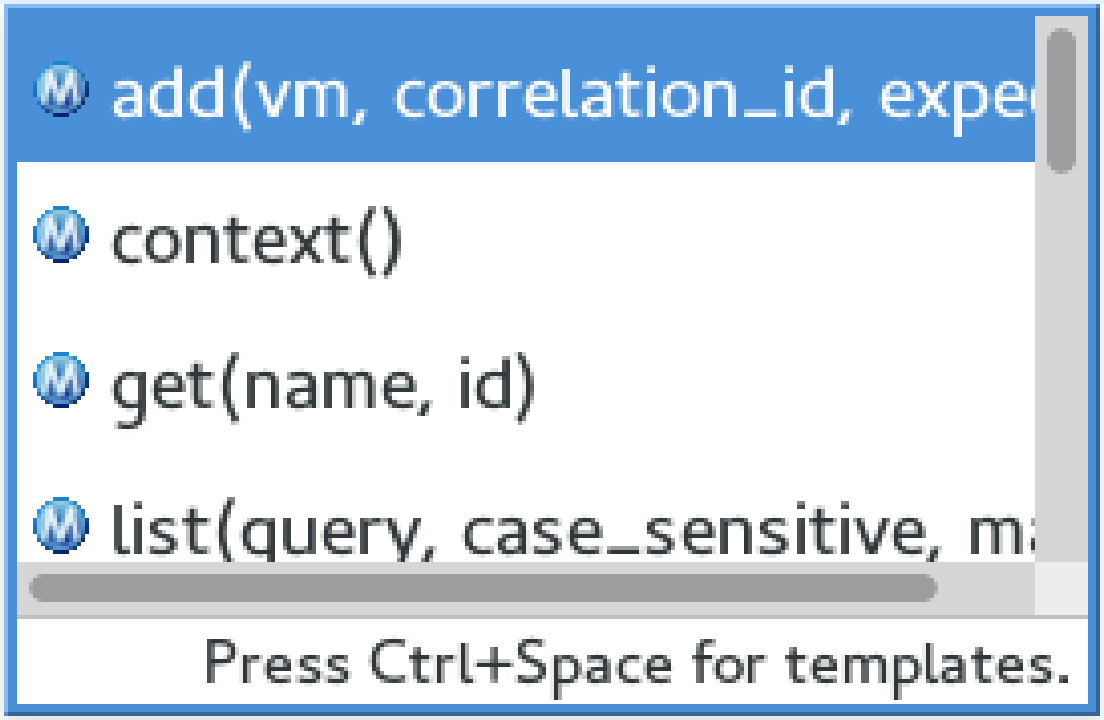
          password='password')

api.vms.
```



oVirt SDK Example: Adding a VM

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```
from ovirtsdk.api import API
from ovirtsdk.xml import params

api = API(url='http://localhost:8080',
          username='user@domain',
          password='password')

cluster = api.clusters.get(name='Default')
template = api.templates.get(name='RHEL7_0')
param = params.VM(name='RHEL_VM1',
                  cluster=cluster,
                  template=template,
                  memory=4*1024**3)
vm1 = api.vms.add(param)
```

SNMP support

oVirt SNMP

oVirt

- Coming in oVirt 3.4
- oVirt generated events may be sent as traps

  Allows integration with monitoring systems such as Nagios, BMC Patrol, HP OpenView, etc.
- Raw example

```
SNMPv2-MIB::snmpTrapOID.0 = OID: SNMPv2-SMI::enterprises.2312.13.1.0.30
SNMPv2-SMI::enterprises.2312.13.1.0.30.0 = STRING: "User admin@internal logged in."  SNMPv2-SMI::enterprises.2312.13.1.0.30.1 = STRING: "NORMAL" SNMPv2-SMI::enterprises.2312.13.1.0.30.2 = STRING: "alertMessage"   SNMPv2-SMI::enterprises.2312.13.1.0.30.3 = STRING: "2014-01-12 07:14:22.576"
```

oVirt SNMP

oVirt

Trap structure

OID	Type	Value
SNMPv2-MIB::snmpTrapOID.0	STRING	event message
SNMPv2-MIB::snmpTrapOID.1	STRING	Severity (NORMAL, WARNING or ERROR)
SNMPv2-MIB::snmpTrapOID.2	STRING	Type (ALERT_MESSAGE or RESOLVED_MESSAGE)
SNMPv2-MIB::snmpTrapOID.3	STRING	Log time

oVirt SNMP

oVirt

- Every event type will have '**Up**'
  - VM_MIGRATION_START
- Some have '**Down**'
  - VM_MIGRATION_DONE

More: http://www.ovirt.org/Features/engine-snmp

Agenda

oVirt

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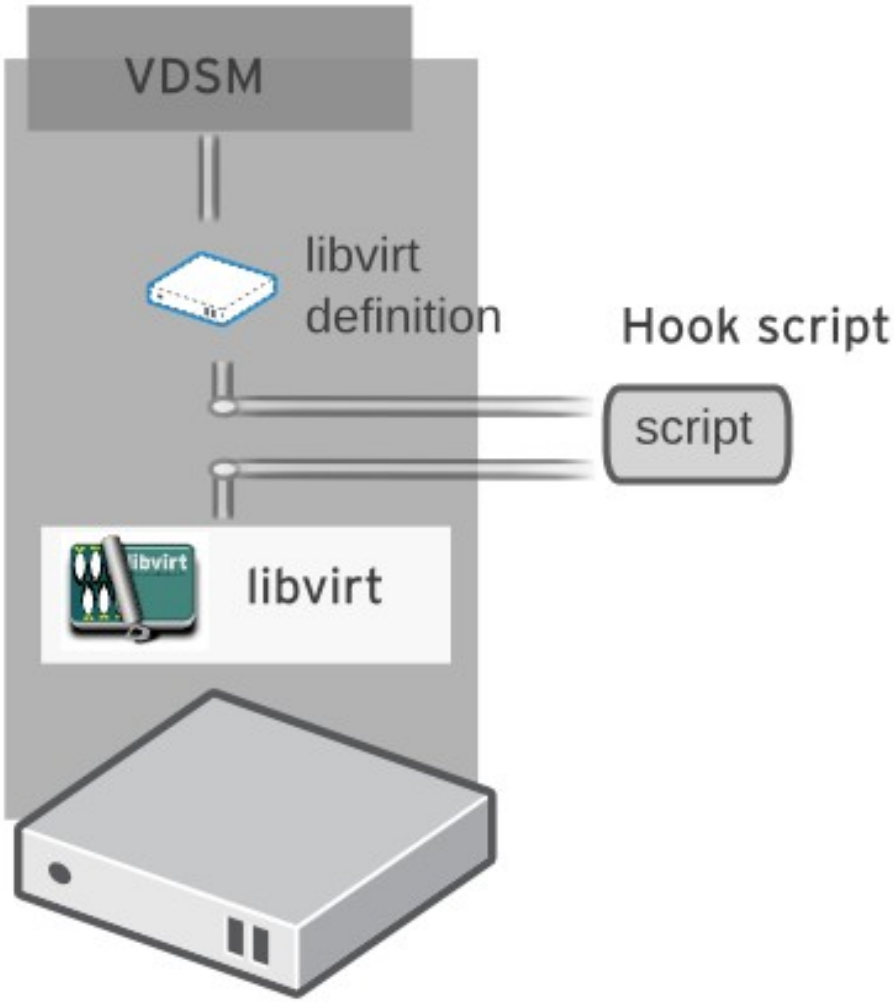
  - Scheduling API
  - UI Plugins

VDSM Hooks

Hooks

oVirt

- VDSM manages a hypervisor
- “Hook” mechanism for customization
  - Allows administrator to define scripts to modify VM/VDSM operation
    - Extend or modify VM configuration
    - Run different system scripts



Hooks

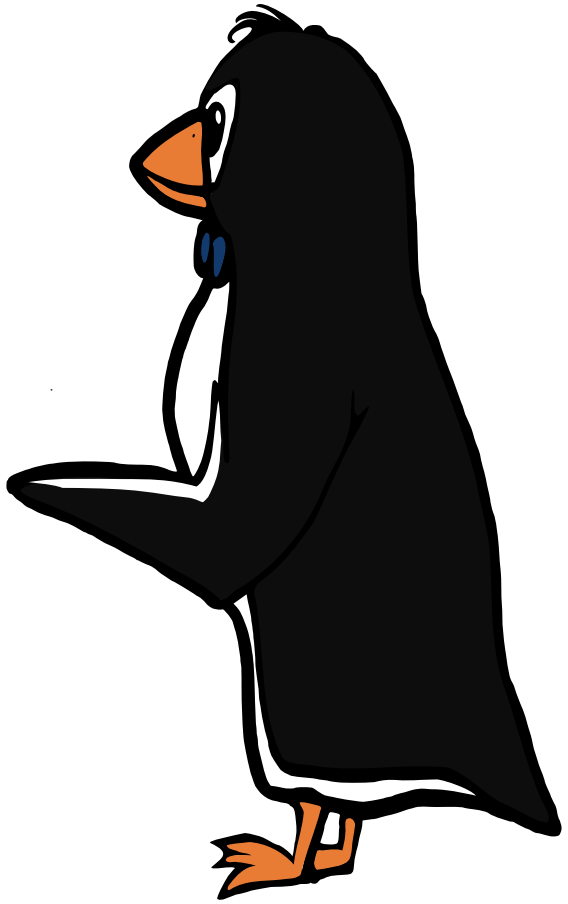
oVirt

- Hook scripts are called at specific events
- Hooks can modify a virtual machines XML definition before VM start
- Hooks can run system commands – eg. Apply firewall rule to VM
- More info:
  - **http://www.ovirt.org/Vdsm_Hooks**
  - **http://www.ovirt.org/VDSM-Hooks_Catalogue**

Hook Entry Points

oVirt

- Lifecycle events where you can apply hooks
  - VDSM (management agent) start
  - VDSM stop
  - VM start
  - VM stop
  - VM migration in/out
  - VM Pause
  - VM Continue
  - VM Hibernate
  - VM resume from hibernate
  - VM set ticket
  - NIC hotplug / hotunplug
  - On host networking configuration change



Hook Example

oVirt

```
import os
import hooking

def removeMacSpoofingFilter(interface):
    for filterElement in interface.getElementsByTagName('filterref'):
        if isMacSpoofingFilter(filterElement):
            interface.removeChild(filterElement)

def isMacSpoofingFilter(filterElement):
    """
    Accept a filter DOM element
    and checks if it's a mac spoofing filter
    """
    filterValue = filterElement.getAttribute('filter')
    return filterValue == 'vdsm-no-mac-spoofing'

if __name__ == '__main__':
    if hooking.tobool(os.environ.get('ifacemacspoof')):
        domxml = hooking.read_domxml()
        interface, = domxml.getElementsByTagName('interface')
        removeMacSpoofingFilter(interface)
        hooking.write_domxml(domxml)
```

Scheduling API

Scheduling API

oVirt

The need - **construct user-defined scheduling policy**

Re: [Users] How to define max number of running VMs on a host?

....

I have 4 graphic workstations with 3 graphic cards on each. I wanna passthrough graphic cards to the VMs one by one, since one workstation has only 3 cards, I must limit the number of running VM on a host to 3.

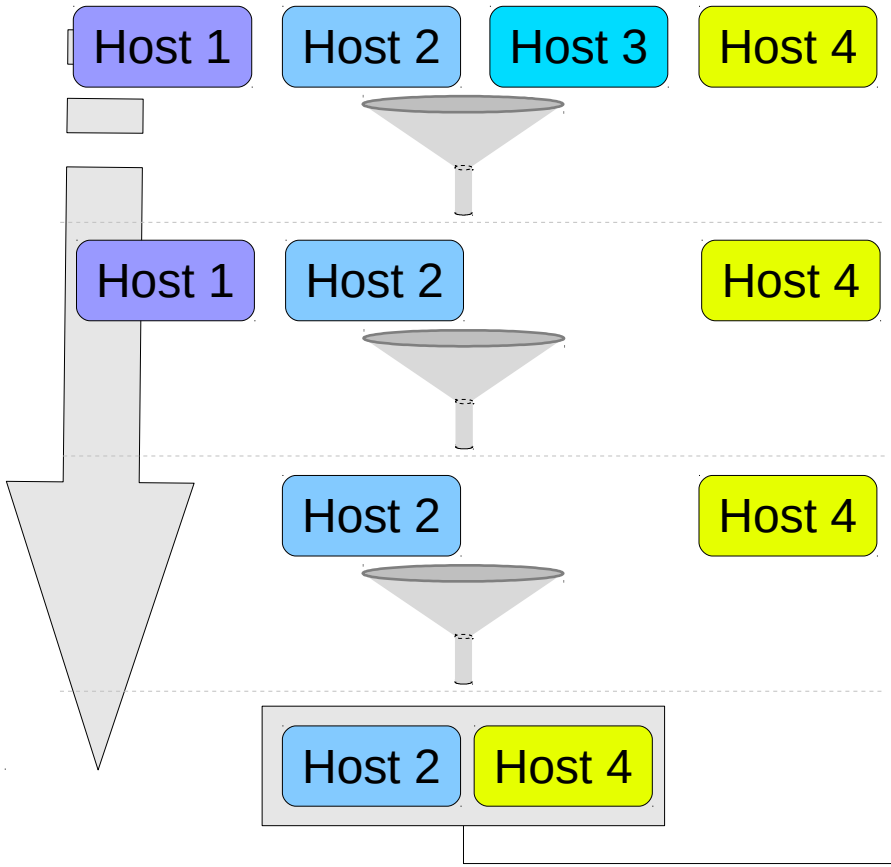
Scheduling Mechanism

oVirt

- Scheduling policy consists of
  - Filter(s)
  - Weight(s)
  - Load balancing module
- Python supported external modules
- Assign the desired policy for a cluster
- More info:
  - http://goo.gl/senjQA - Sample policy units catalog
  - http://www.ovirt.org/External_Scheduler_Samples

Scheduling Mechanism

oVirt

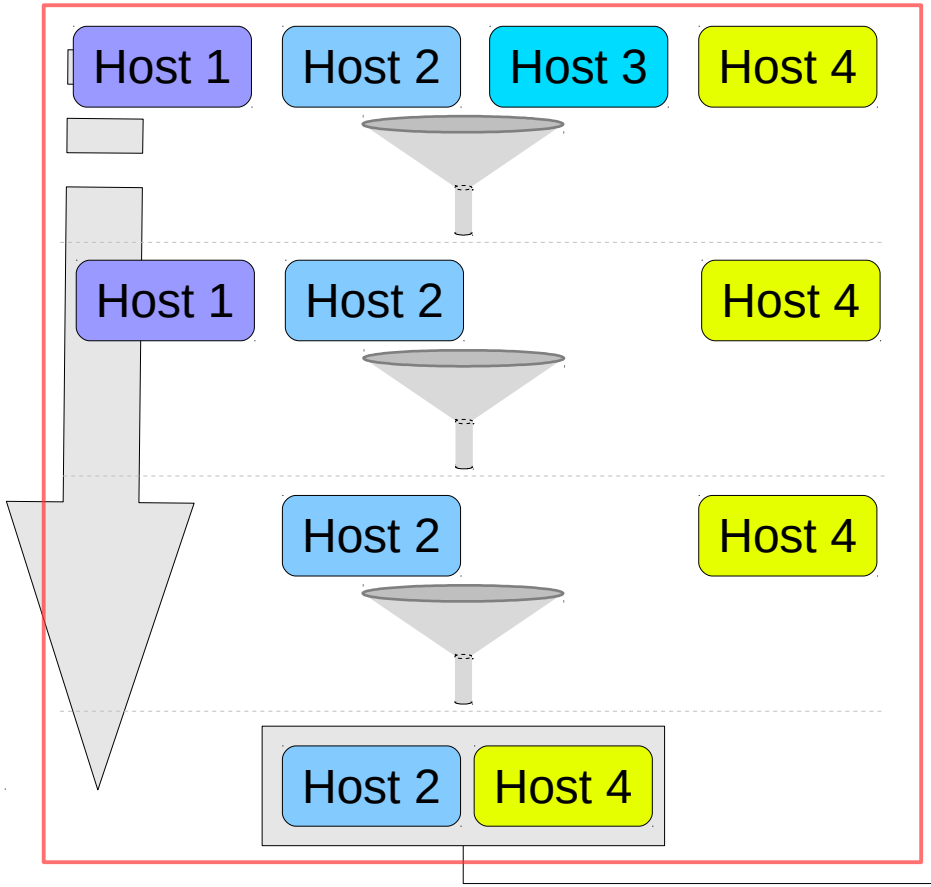


	func 1	func 2	sum
Factor	5	2	
Host 2	10	2	54
Host 4	3	12	**39***

***Host 4 sum: 3*5+12*2 = 39**

Filter Module

oVirt



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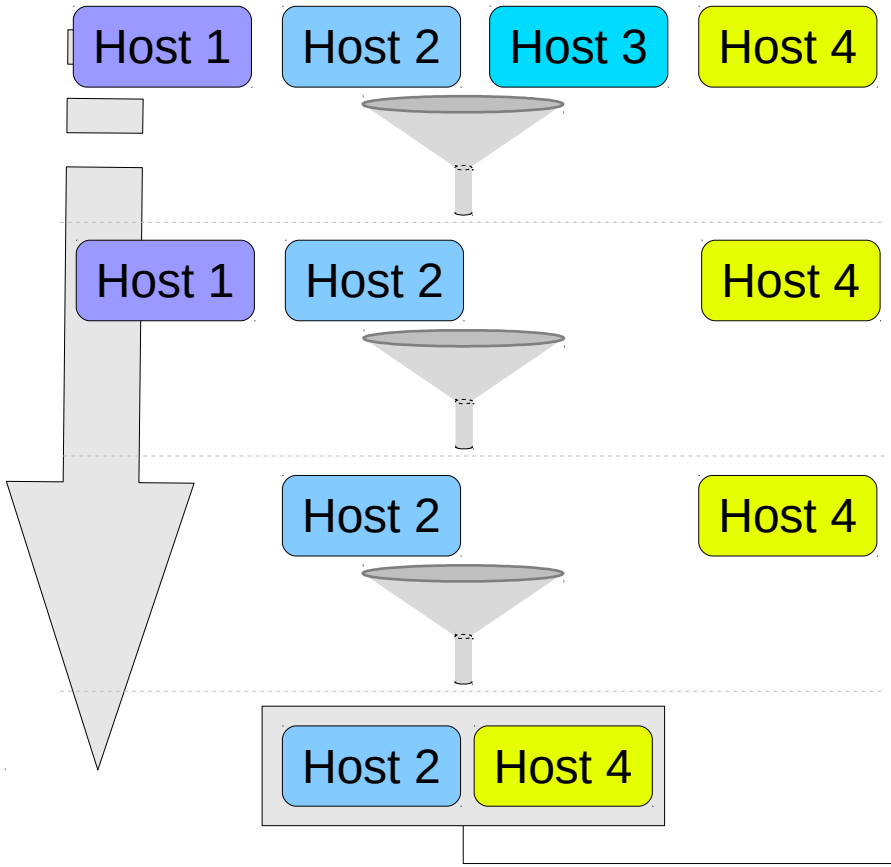
Weight Module

oVirt



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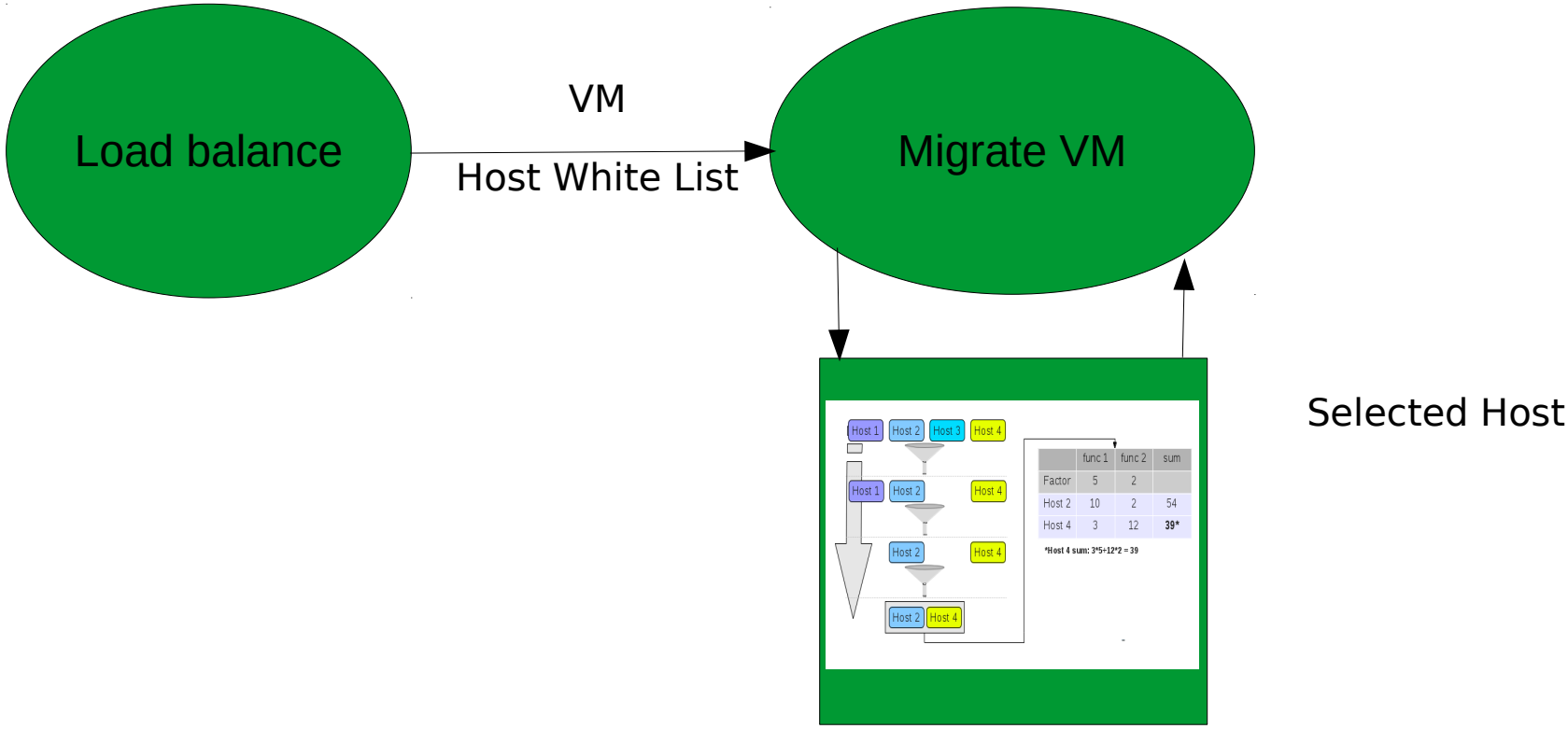
Load Balancing

oVirt

- Triggers a scheduled task to determine which VM needs to be migrated
- A single load balancing logic is allowed per cluster



Let's go back to the example

oVirt

Re: [Users] How to define max number of running VMs on a host?

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I have 4 graphic workstations with 3 graphic cards on each. I wanna
passthrough graphic cards to the VMs one by one, since one workstation
has only 3 cards, I must limit the number of running VM on a host to 3.

Filter: filters out hosts with number running of vms > 3

Filter Example

oVirt

```
class max_vms():
    '''returns only hosts with less running vms then the maximum'''

    #What are the values this module will accept, used to present
    #the user with options
    properties_validation = 'maximum_vm_count=[0-9]*'

    def do_filter(self, hosts_ids, vm_id, args_map):
        #open a connection to the rest api
        try:
            connection = API(url='http://host:port',
                             username='user@domain', password='')
        except BaseException as ex:
            #letting the external proxy know there was an error
            print >> sys.stderr, ex
            return

        #get our parameters from the map
        maximum_vm_count = int(args_map.get('maximum_vm_count', 100))

        #get all the hosts with the given ids
        engine_hosts = \
            connection.hosts.list(
                query=" or ".join(["id=%s" % u for u in hosts_ids]))

        #iterate over them and decide which to accept
        accepted_host_ids = []
        for engine_host in engine_hosts:
            if(engine_host and
                    engine_host.summary.active < maximum_vm_count):
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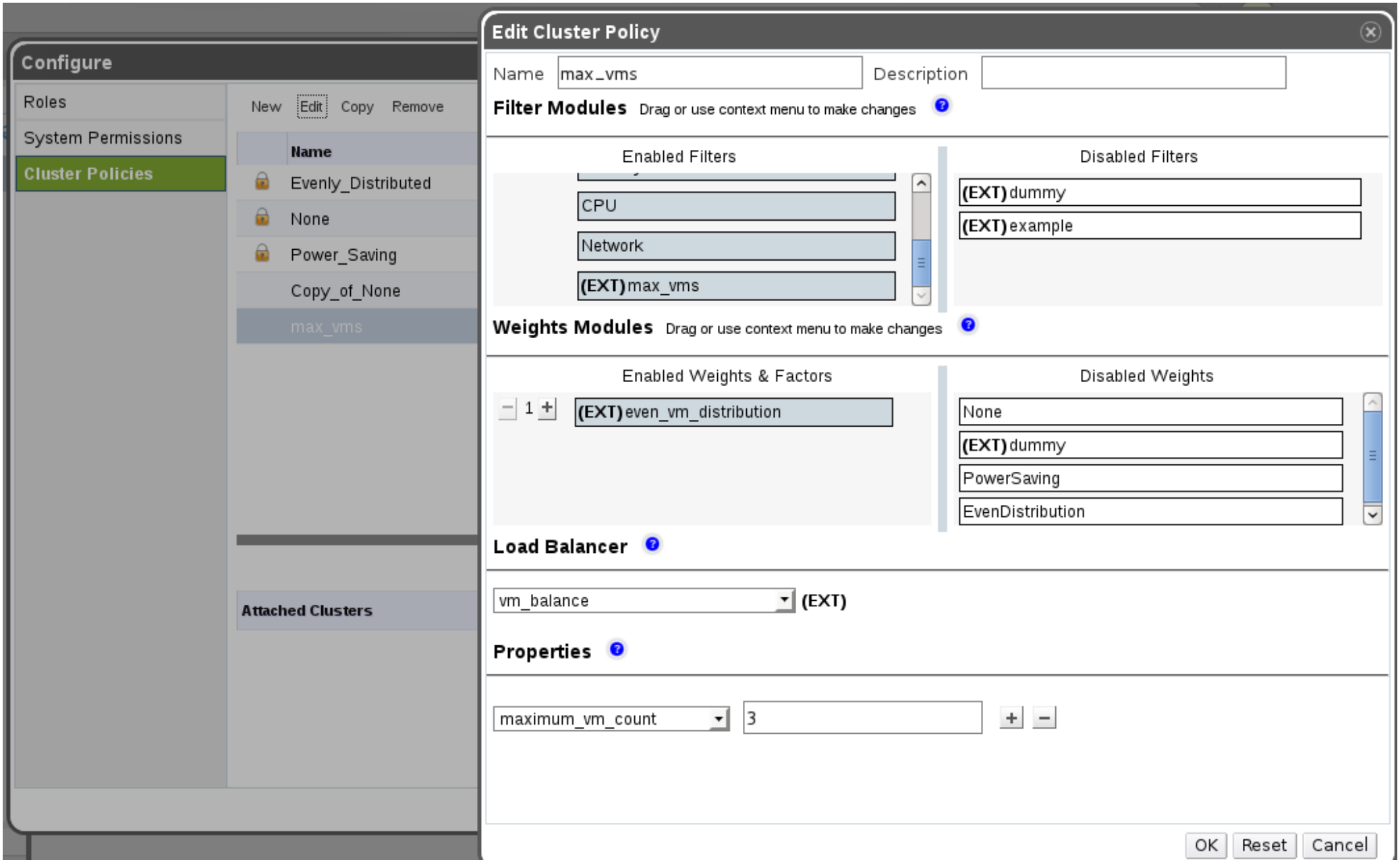
External Policy Units

oVirt

- Scheduler proxy is scanning directory /usr/share/ovirt-scheduler-proxy/plugins for python source files
- Analyze for filter / weight / balance functions
- Cache results
- Expose source files as external policy units

Cluster Policy Management

oVirt



Cluster Policy Management

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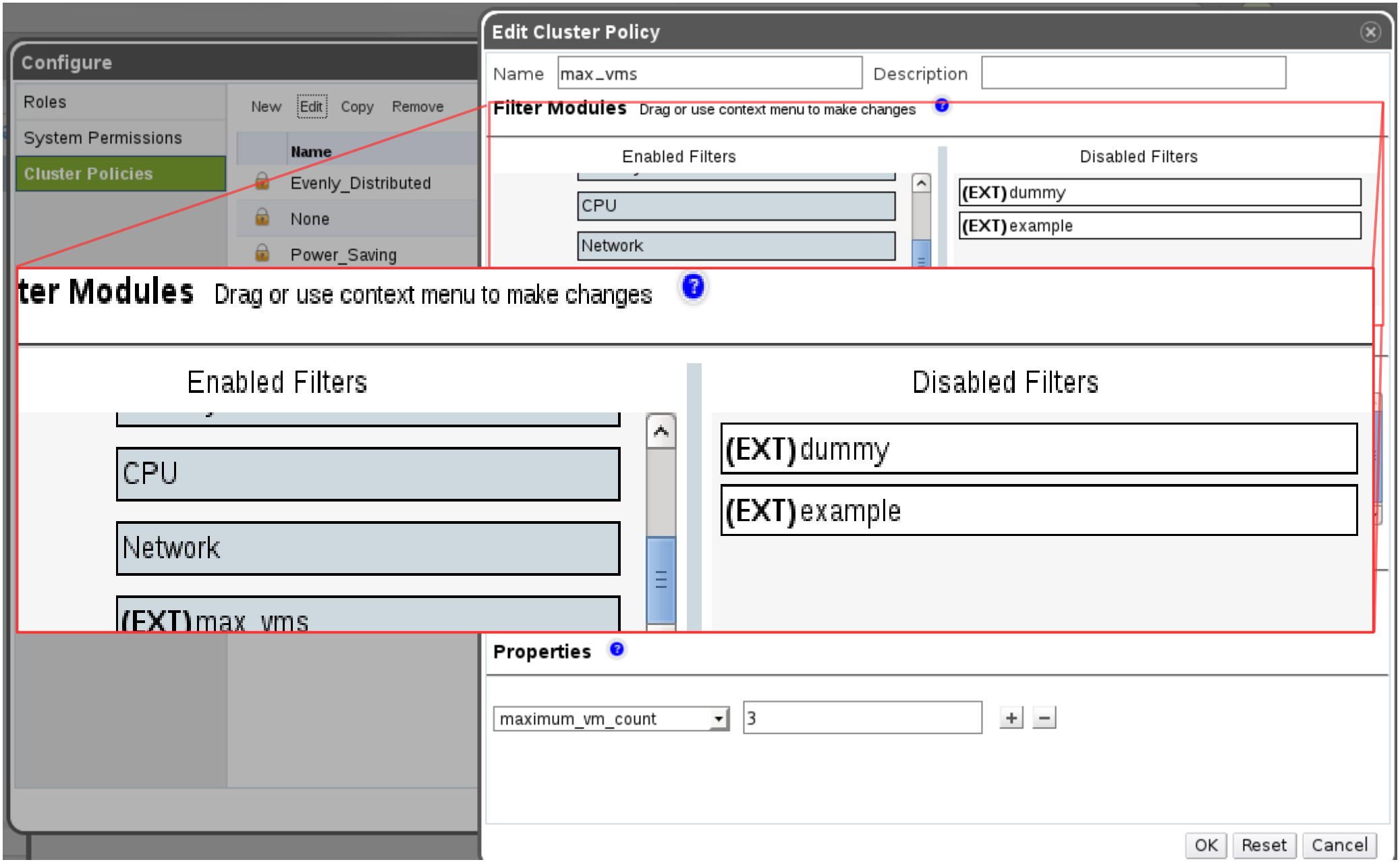

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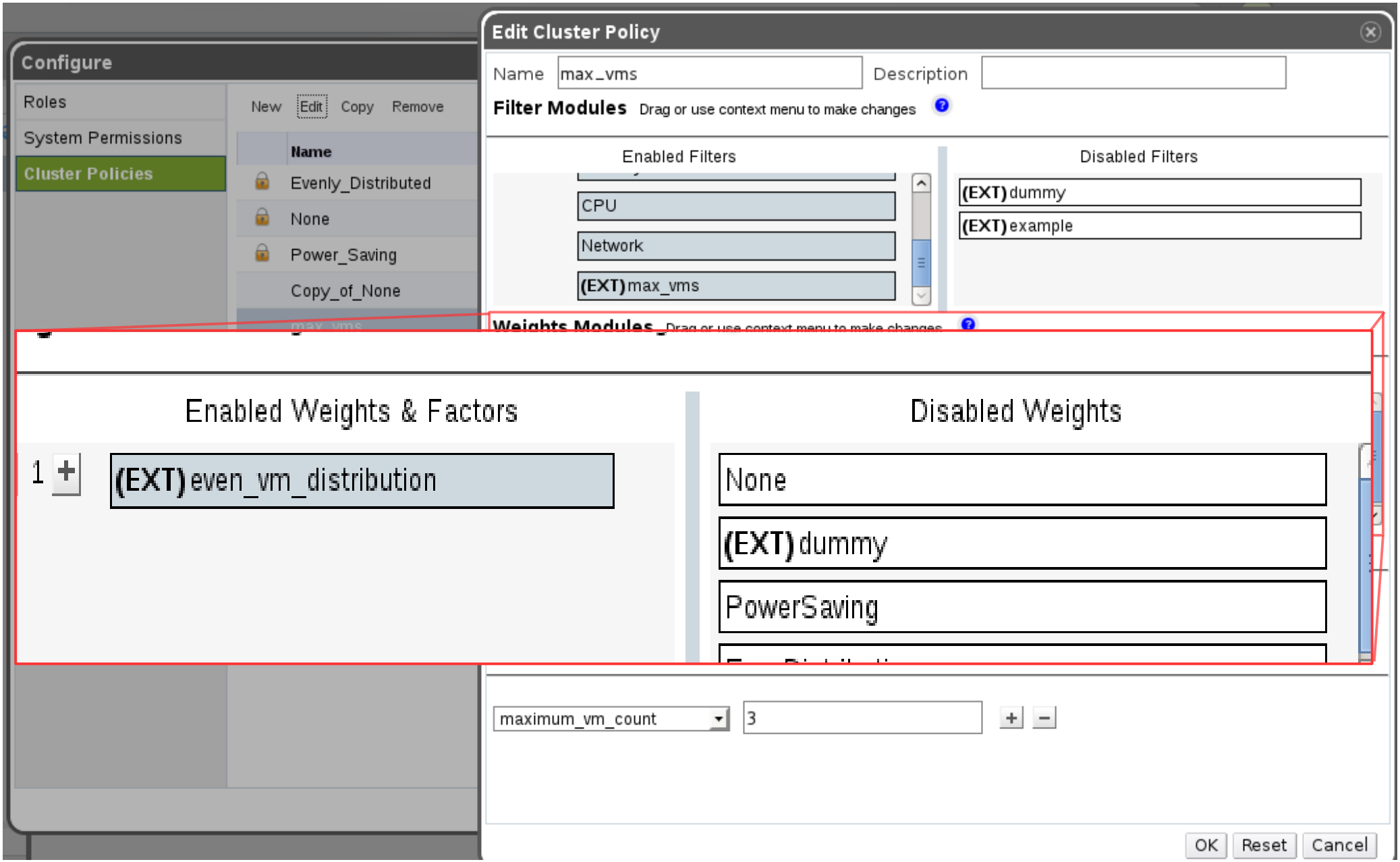

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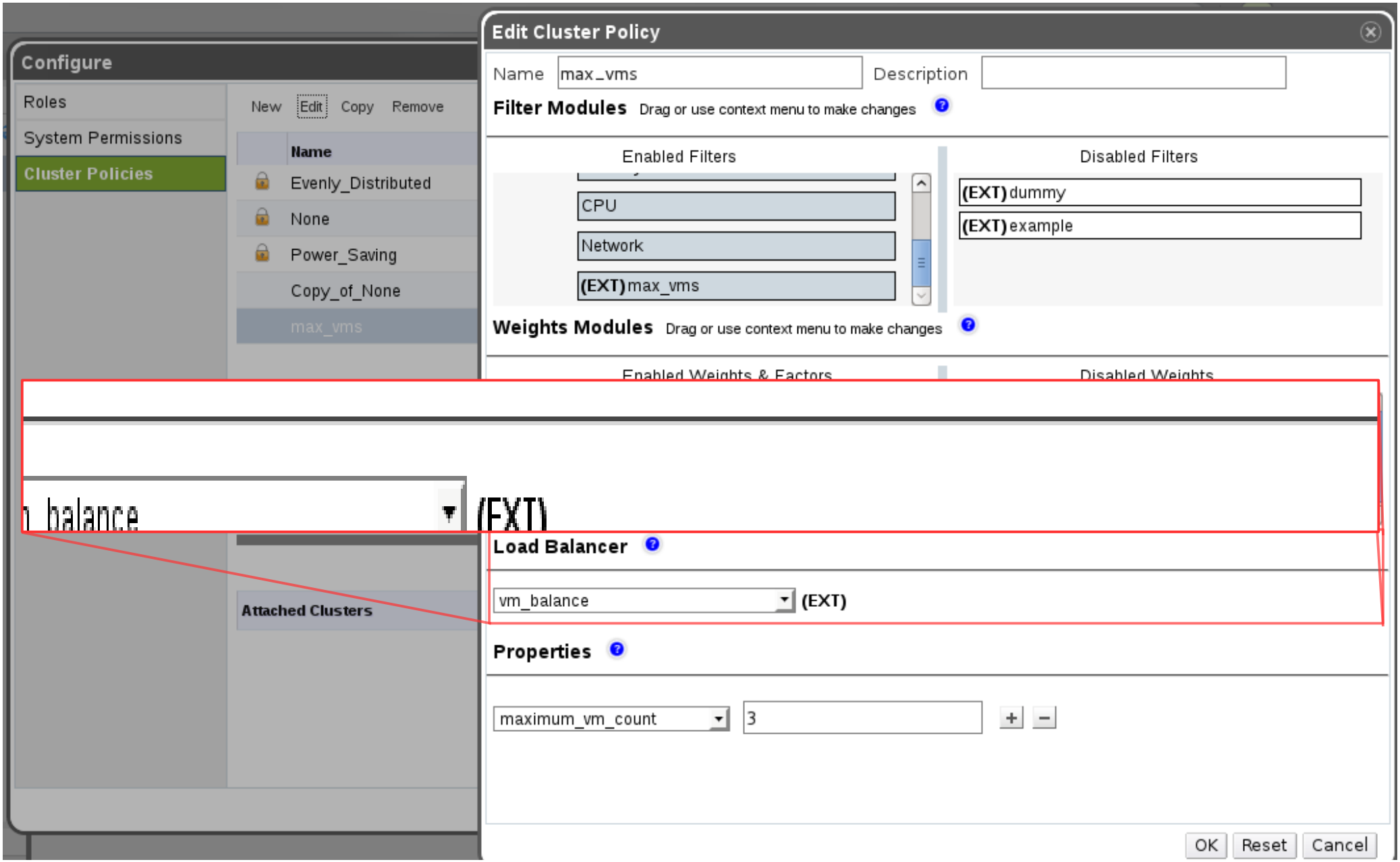

Apply Cluster Policy

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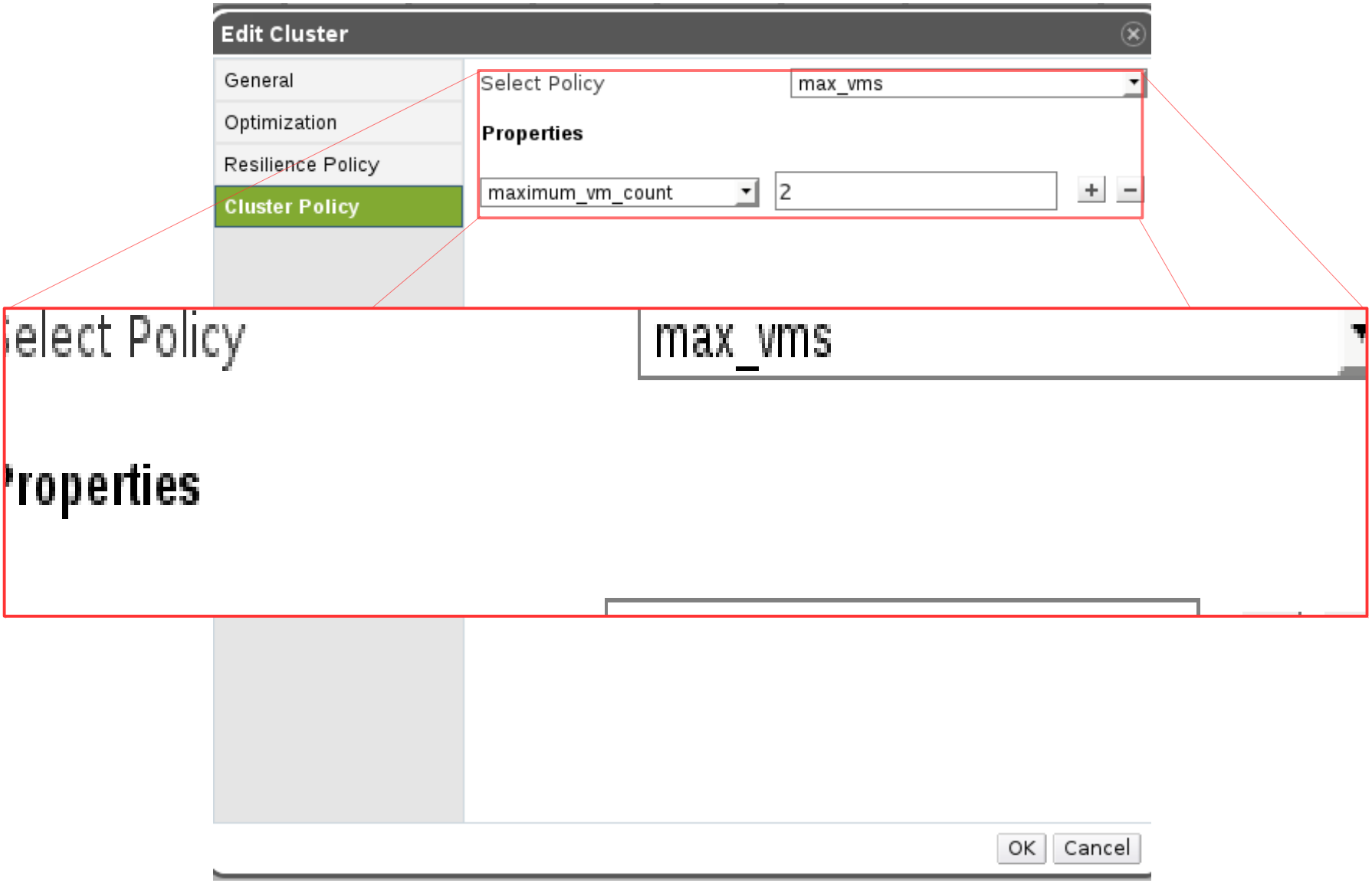
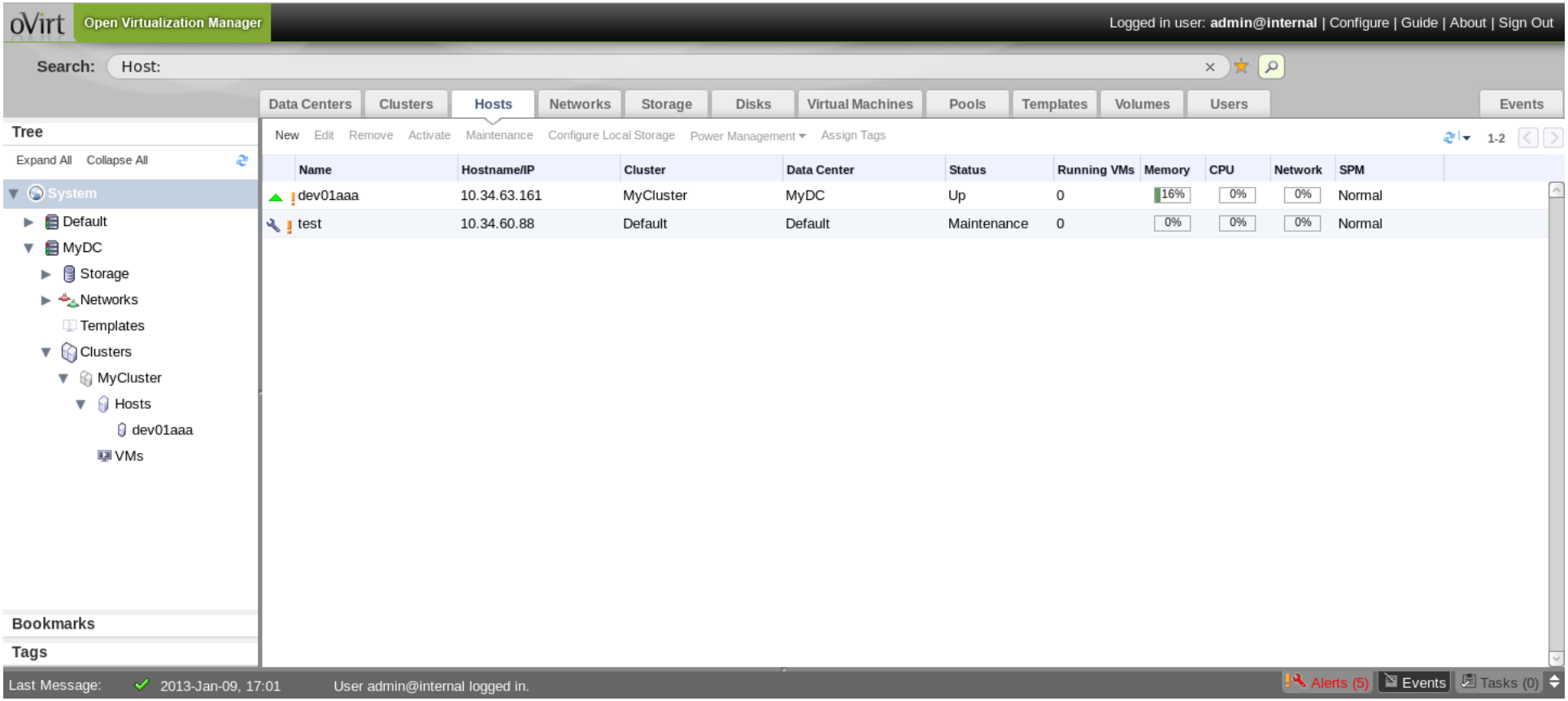


UI Plugins

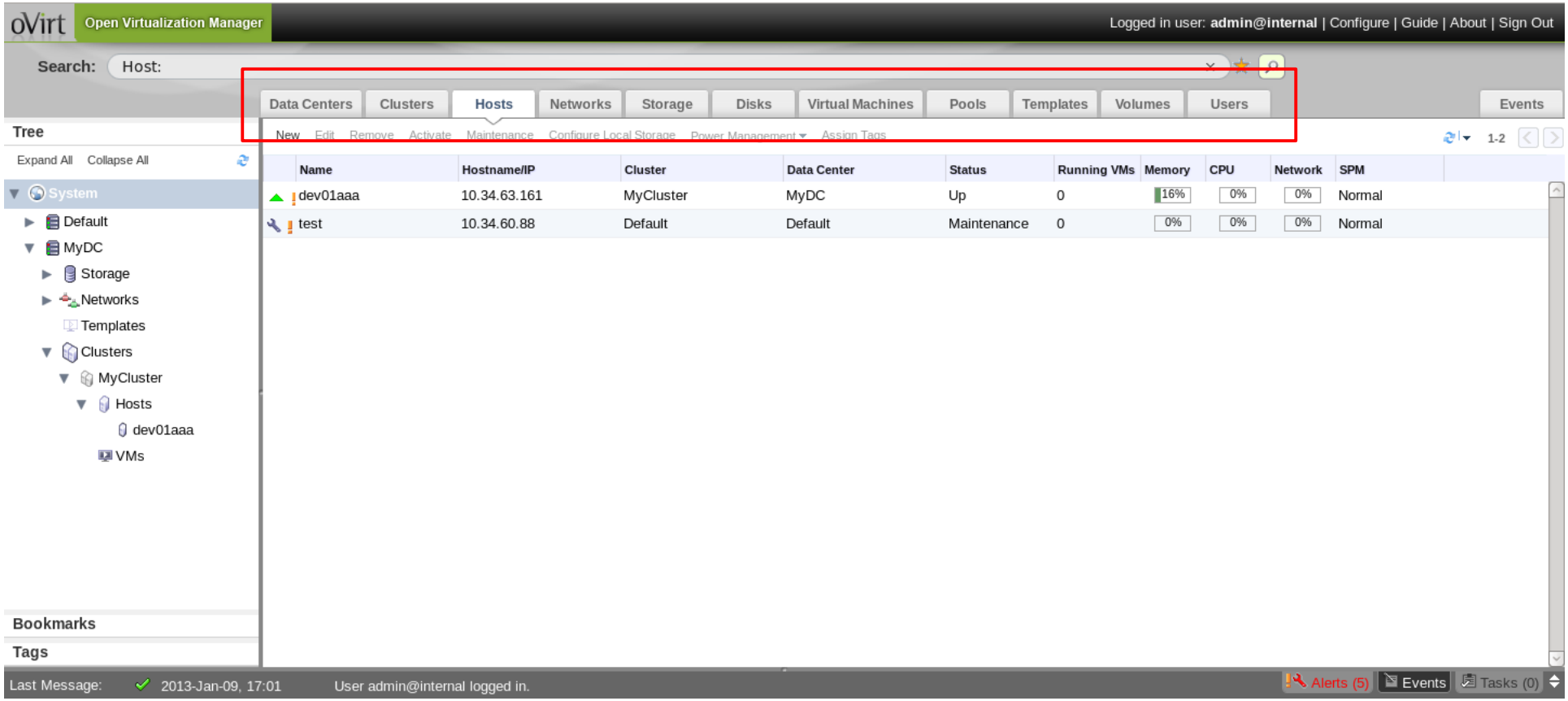
Web Admin user interface

oVirt

Extend oVirt Web Admin user interface



Web Admin user interface



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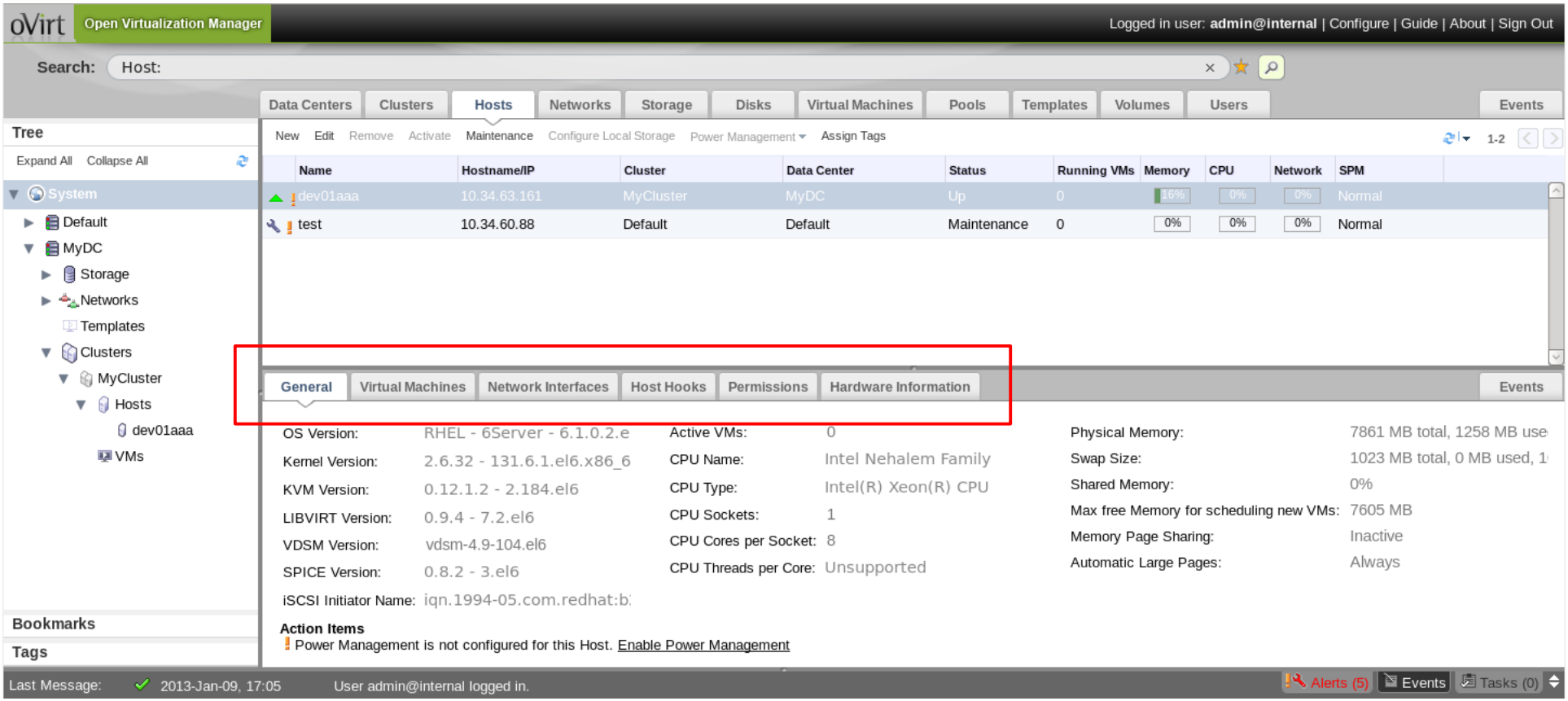

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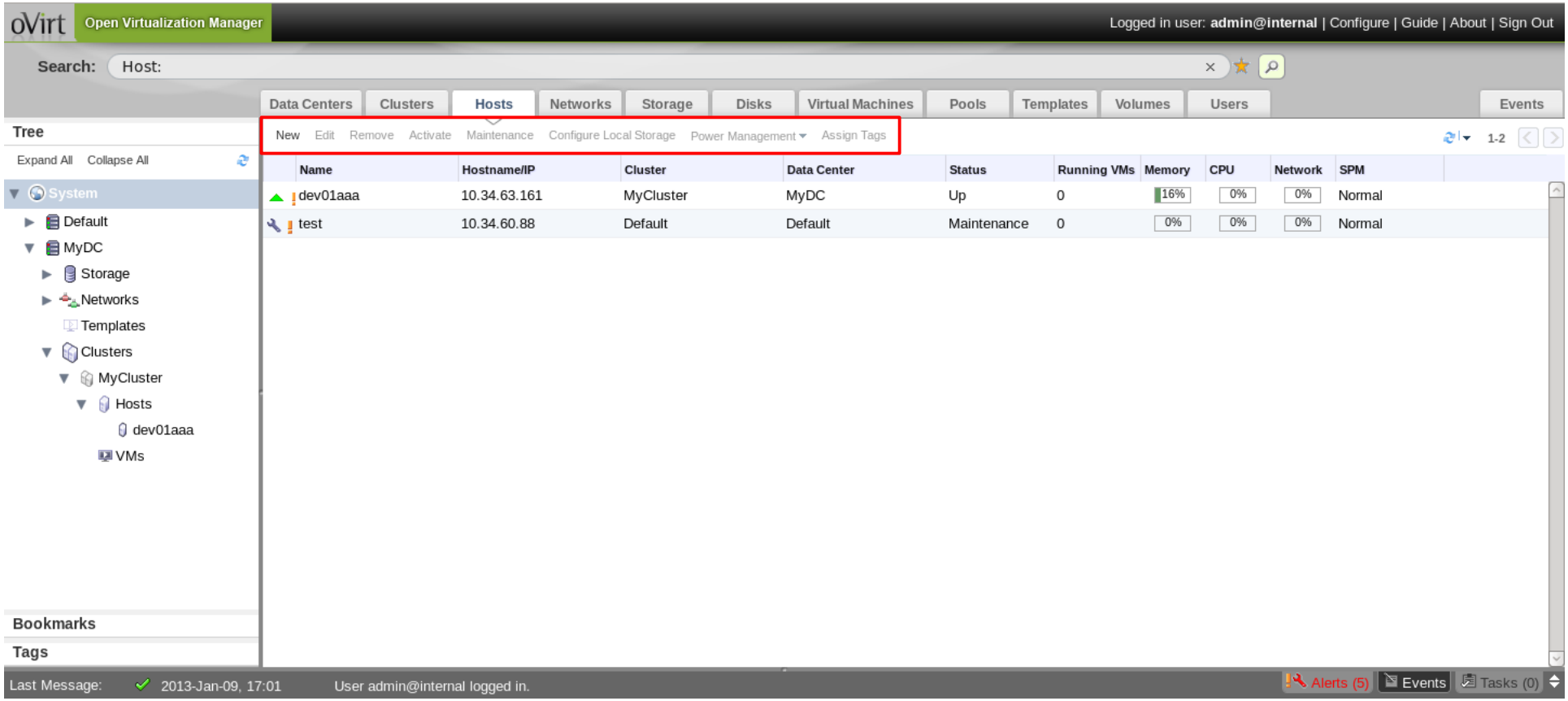

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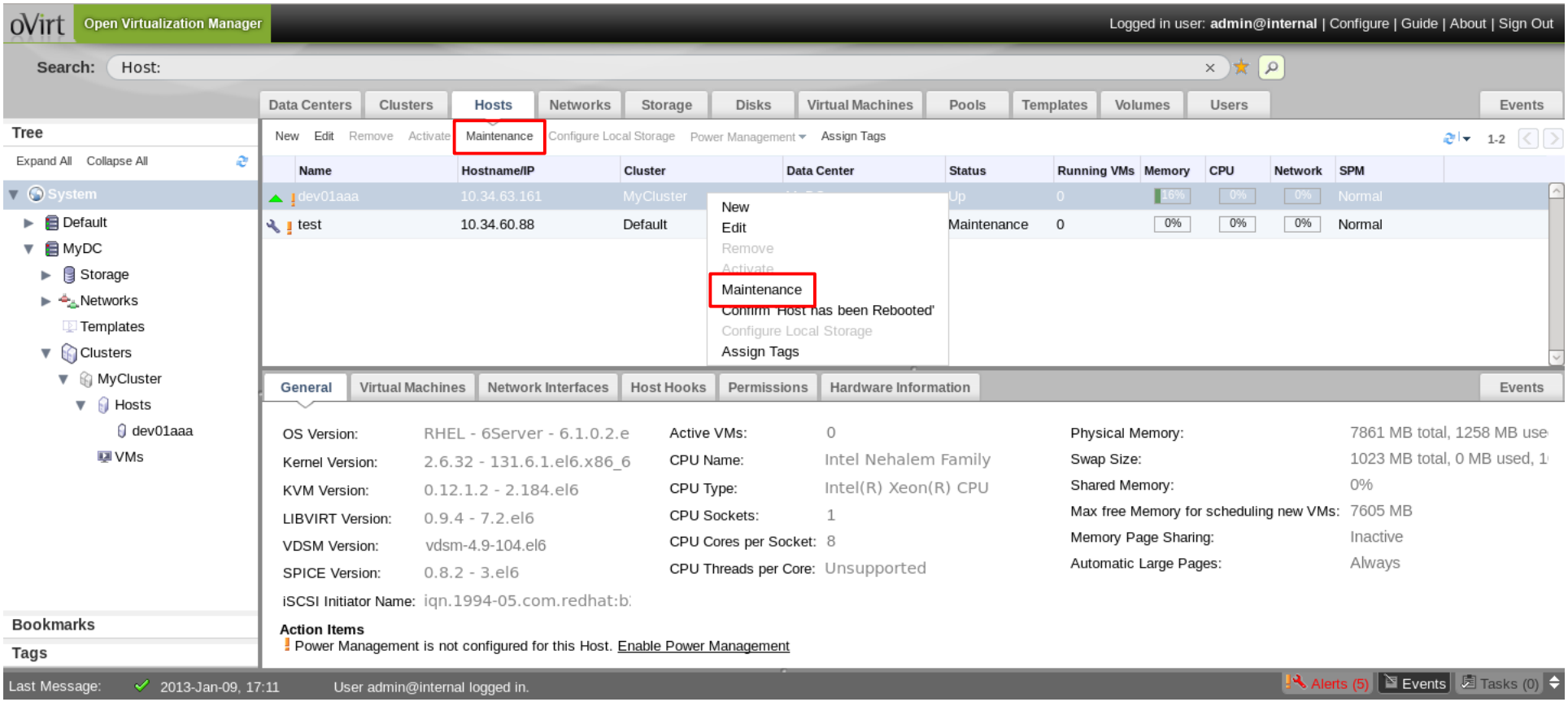
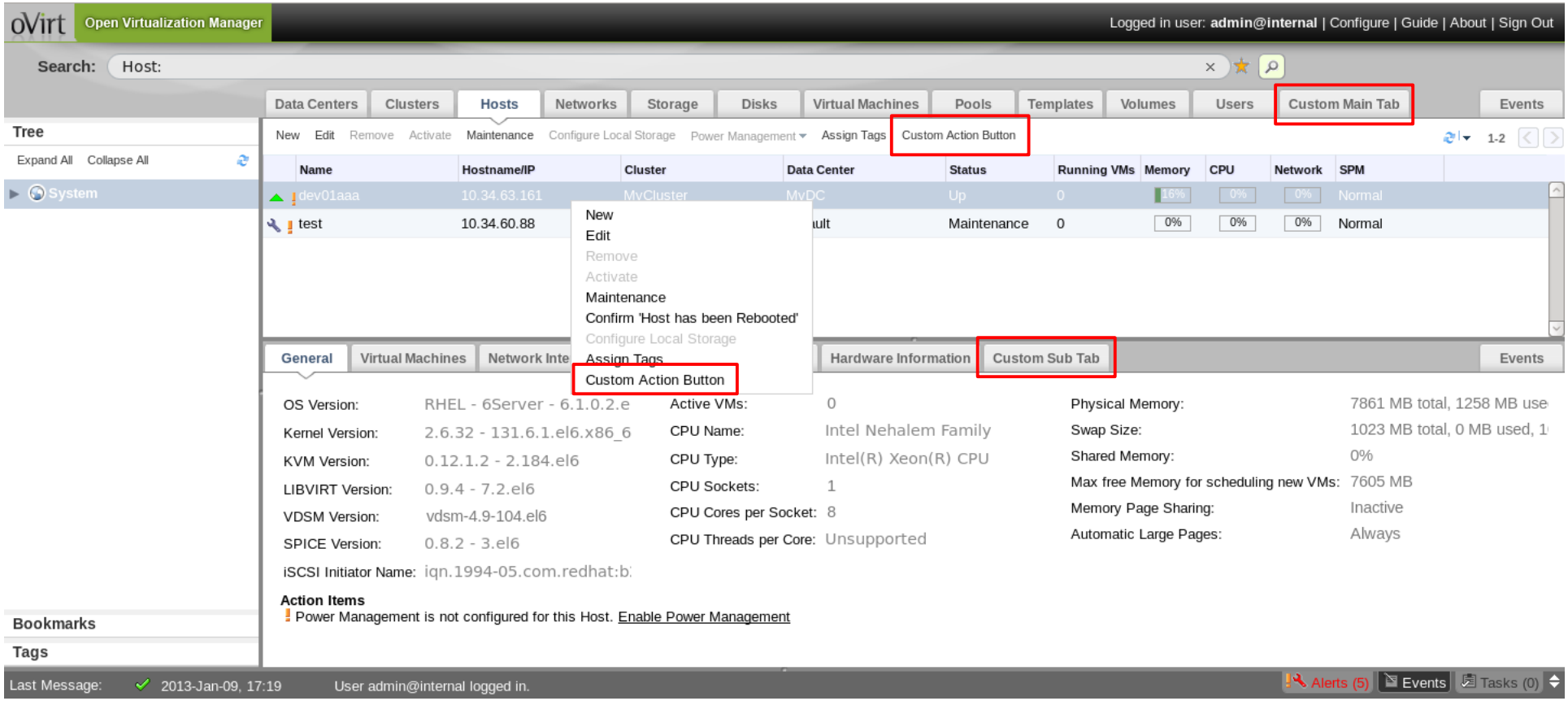


What's currently possible

oVirt



UI plugin basics

oVirt

- Plugin host page
  - Hosts actual plugin code (JavaScript)
    `/usr/share/ovirt-engine/ui-plugins/<resourcePath>/<hostPage>.html`
- Plugin descriptor
  - Meta-data + default configuration
    `/usr/share/ovirt-engine/ui-plugins/<descriptorName>.json`
- Plugin user configuration
  - Override default configuration, tweak runtime behavior
    `/etc/ovirt-engine/ui-plugins/<descriptorName>-config.json`

Writing UI plugins

oVirt

```
<!DOCTYPE html>
<html>
<head>
    <!-- Fetch additional resources if necessary -->
    <script type="text/javascript" src="jquery-min.js"></script>

    <!-- Actual plugin code -->
    <script>
        // Access plugin API from iframe context
        var api = parent.pluginApi('myPlugin');

        // Register plugin event handler functions
        api.register({
            UiInit: function() {
                api.addMainTab('Foo Tab', 'foo-tab', 'http://foo.com/');
            }
        });

        // Tell plugin infrastructure that we are ready
        api.ready();
    </script>

</head>
<body> <!-- HTML body is intentionally empty --> </body>
</html>
```

Plugin descriptor

oVirt

Meta-data + default configuration

/usr/share/ovirt-engine/ui-plugins/<descriptorName>.json

```
{

    // A name that uniquely identifies the plugin (required)
    "name": "foo",

    // URL of plugin host page that invokes the plugin code (required)
    "url": "/webadmin/webadmin/plugin/foo/start.html",

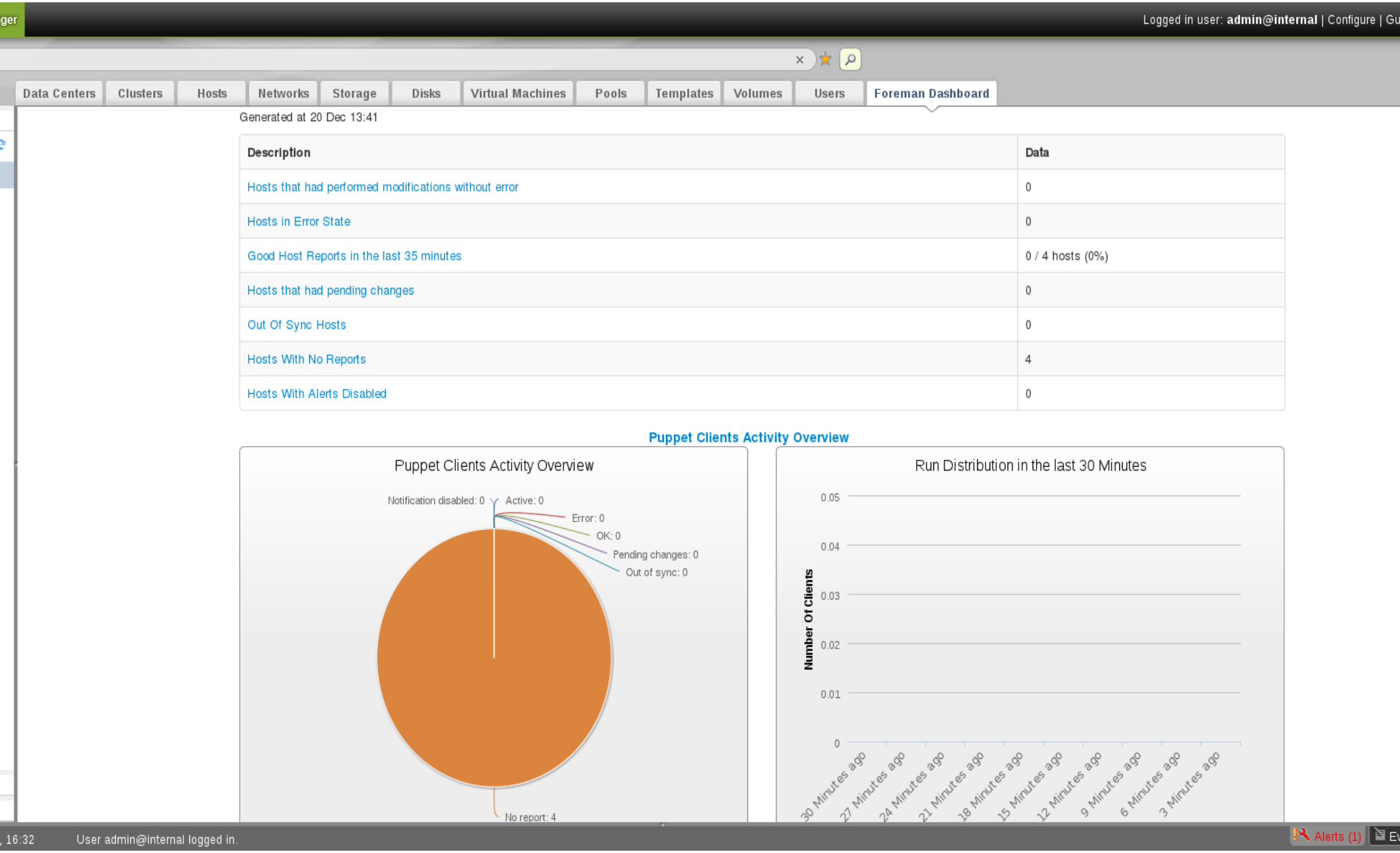
    // Default configuration object associated with the plugin (optional)
    "config": { "band": "ZZ Top", "classic": true, "score": 10 },

    // Path to plugin static resources (optional)
    // Used when serving plugin files through PluginResourceServlet
    // This path is relative to /usr/share/ovirt-engine/ui-plugins
    "resourcePath": "foo-files"

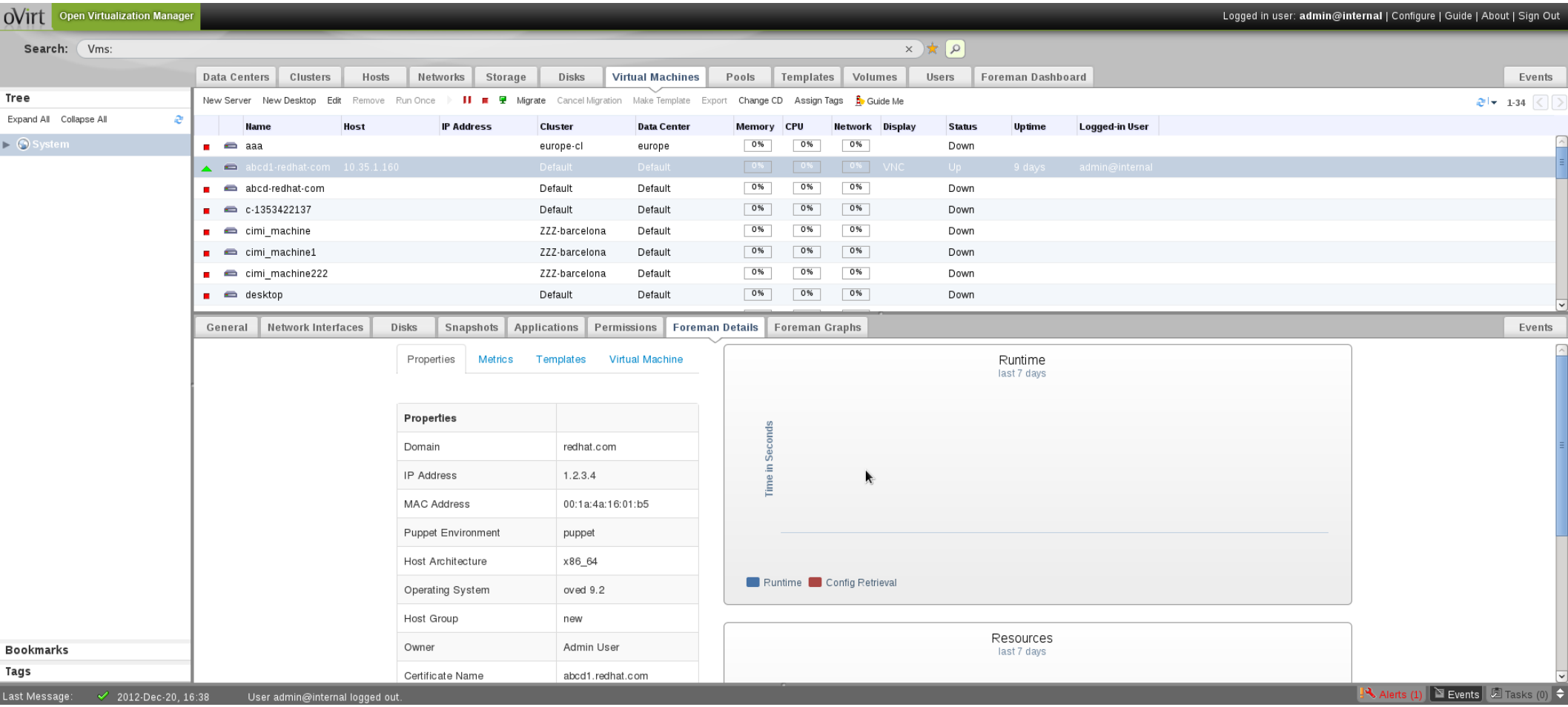
}
```

UI-Plugin: Foreman main tab

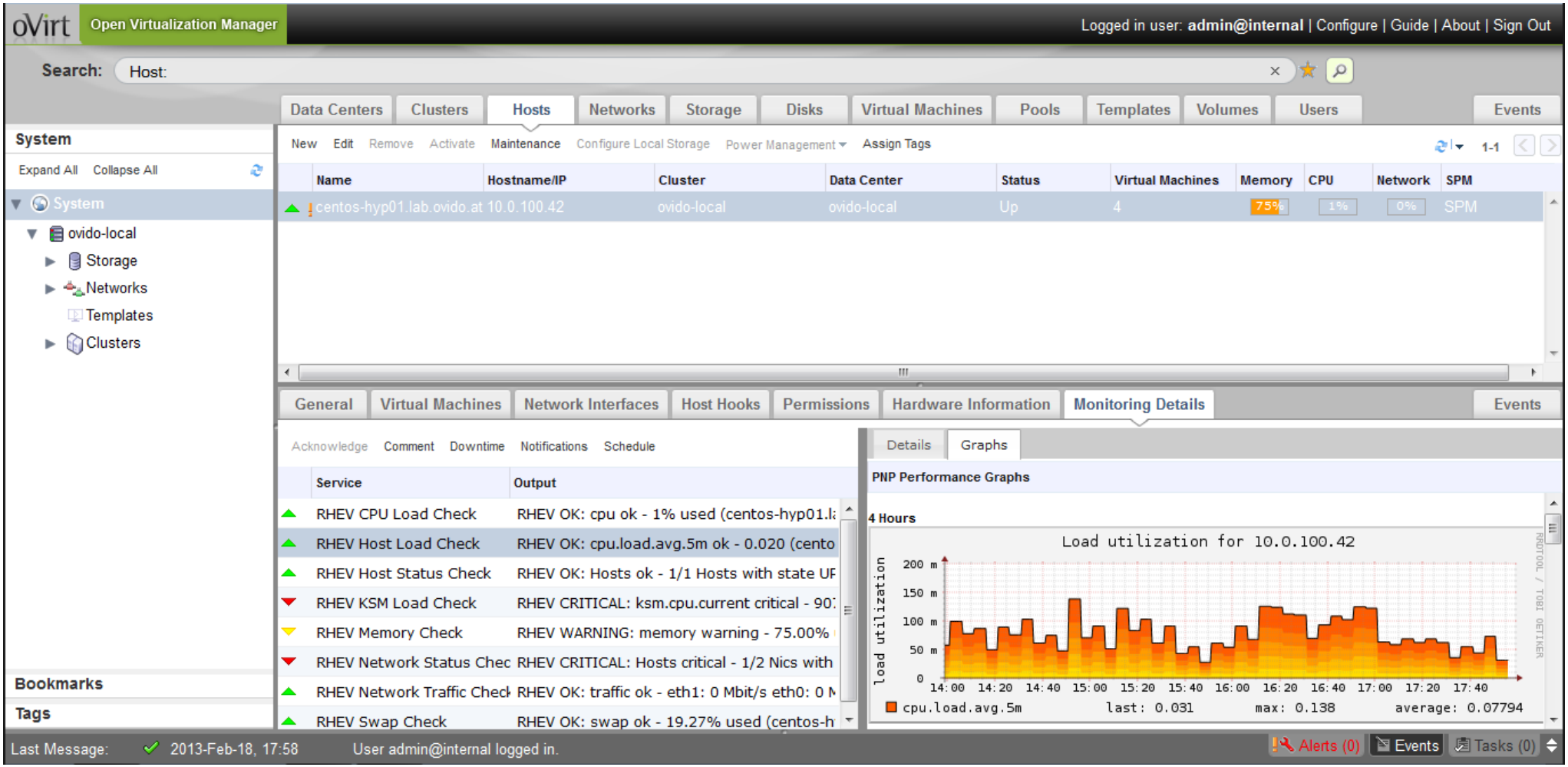
oVirt



UI-Plugin: VM Foreman Details



UI-Plugin: oVirt Monitoring sub-tab (Nagios)

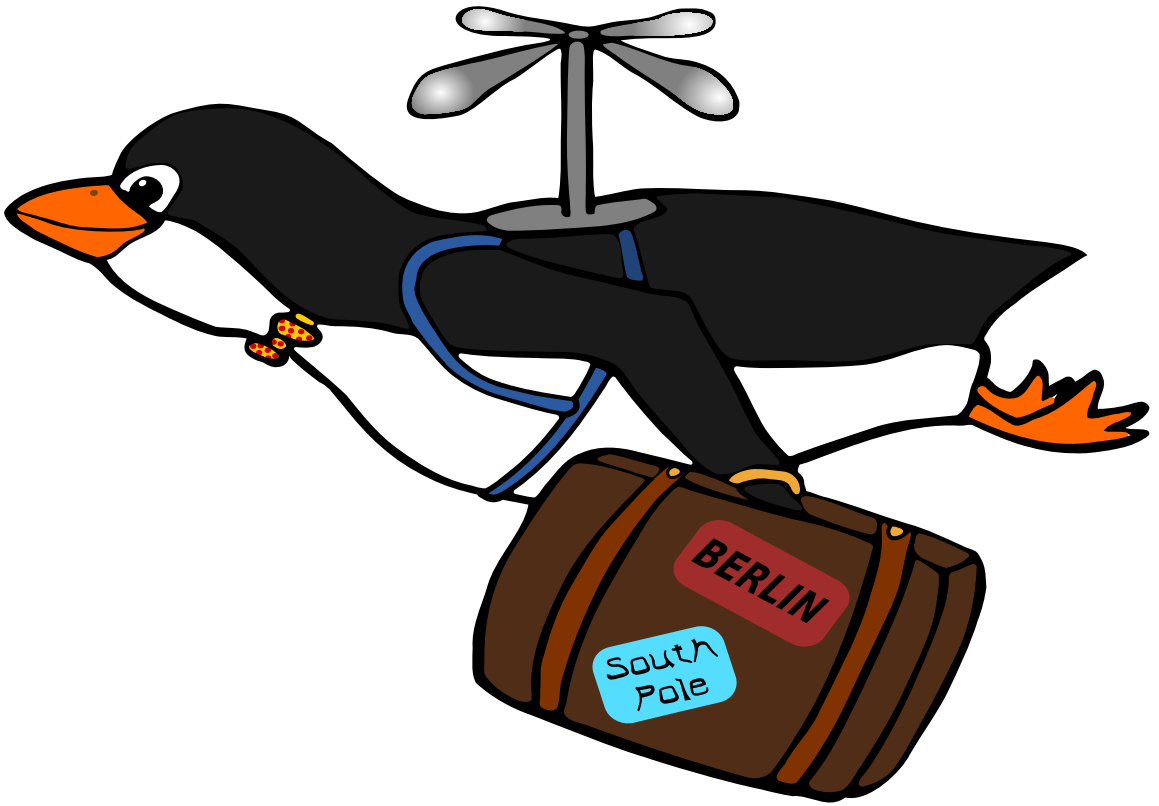


More info at: https://labs.ovido.at/monitoring/wiki/ovirt-monitoring-ui-plugin

UI Plugins

oVirt

Scary demo....



Summary

oVirt

- Consuming oVirt
  - oVirt API
  - oVirt SDK
  - SNMP

- Extending oVirt
  - VDSM hooks
  - Scheduling API
  - UI Plugins

Questions?

THANK YOU!

http://www.ovirt.org
http://www.ovirt.org/Category:SLA

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