SCVMM Driver for Libvirt

Abhilash Kadupatil[1]
Computer Department
MIT College of Engineering
Pune – India

Sakshi Patil[2]
Computer Department
MIT College of Engineering
Pune – India

Sahil Shaha[3]
Computer Department
MIT College of Engineering
Pune – India

Sambhaji Sarode[4]
Computer Department
MIT College of Engineering
Pune – India

Sunil Nair[5]
Calsoft, Inc.
Pune – India

Abstract: Libvirt APIs is open source initiative to have generic virtualization management Interface for all virtualization solutions. Today HyperV 2012 is supported, but not SCVMM. In case of sizable virtual data center, there could be SCVMM managing all HyperVs. Generic management software should leverage SCVMM to manage all HyperVs instead of connecting to each HyperV.

We propose a driver which enables libvirt library to manage all the HyperVs simultaneously. Any virtualization management interface can then harness the libvirt library to gain access to HyperVs.

Keywords: System Centre Virtual Machine Manager (SCVMM), Application Programming Interface (API).

I. INTRODUCTION

Virtual Machine is software that exhibits the behavior of a separate computer. A virtual machine (guest) is created on another environment (host) to perform computational tasks. Virtual machine concept was first developed by IBM in 1960's to provide concurrent, interactive access to mainframe computer. Virtual machines are the instances of the physical machines. It is a best way for time sharing and resource sharing on highly expensive hardware. Virtualization is thus used to reduce the hardware acquisition cost and improving the productivity [6].

In today's world the main reason why IT organizations are considering virtualization is that the technology helps reduce the cost drastically. Besides this virtualization provides many other major benefits. Thus many organizations use Virtual machines based on different hosts. So, there is requirement to manage these machines.

Currently we have virtual machine managers such as VMware Workstation, vCenter, ESX, Xen Server etc., which are used to handle different Virtual machines. Libvirt is virtualization library which has drivers for Xen, ESX, Hyper-V, VMware etc. [3] Libvirt can be used to handle virtual machines under one virtualization host at a time but, it does not support simultaneous handling of virtual machines under different virtualization host.So, to handle different virtual machine, we need to open one session of Virtual machine, perform 'n' no. of tasks and close that session. Again open another session of different virtual machine, perform operations on that virtual machine and close the session.

System Centre Virtual Machine Manager (SCVMM) is also available which can manage virtual machines based on Hyper-V, VMware and XenServers virtualization hosts [2]. Libvirt does not provide simultaneous handling of virtual machines under different virtualization hosts. This problem is solved by making use of SCVMM, which can manage virtual machines

under hyper-V, VMware and XenServers simultaneously by using simple SCVMM Console [1]. But SCVMM is platform specific i.e. we need Windows OS to install SCVMM.

Hence to overcome the shortcomings of SCVMM and Libvirt the following driver is proposed.

The rest of this paper is organized as follows. Section II gives an overview of the SCVMM architecture. Section III gives details about Libvirt architecture. Section IV describes the proposed methodology, Section V gives high level design of system and Section VI concludes the paper.

II. SCVMM 2012: ARCHITECTURE

SCVMM architecture consists of 3 layers.

A. Management Interface layer

It contains VMM Management Server, Operations Manager Management Server and VMM library. VMM Management Server manages the communications with VMM console, SQL database server, virtual machine hosts and VMM library server. VMM library saves information about offline VMs and all the data needed to create new virtual machines such as VM profiles, Hardware profiles, ISO files, templates [1].

B. Virtualization Abstraction (Middle Layer)

It contains VMware vCenter (manages VMWare ESX), Hyper-V Hosts and Clusters, Citrix Xen Server Hosts and Clusters, VMWare ESX Hosts and Clusters [1].

C. Storage/Networking Layer

It contains SQL server which is used to store VM data and status information.SQL server should be placed on a separate cluster. It will store shared data which can be used when SCVMM is clustered [1].

Windows PowerShell is used to interact with Management Server. We can interact by using Self Service Web Portal (which acts as Graphical User Interface) and VMM Console (for Command Line Interface) by using Windows PowerShell scripts.
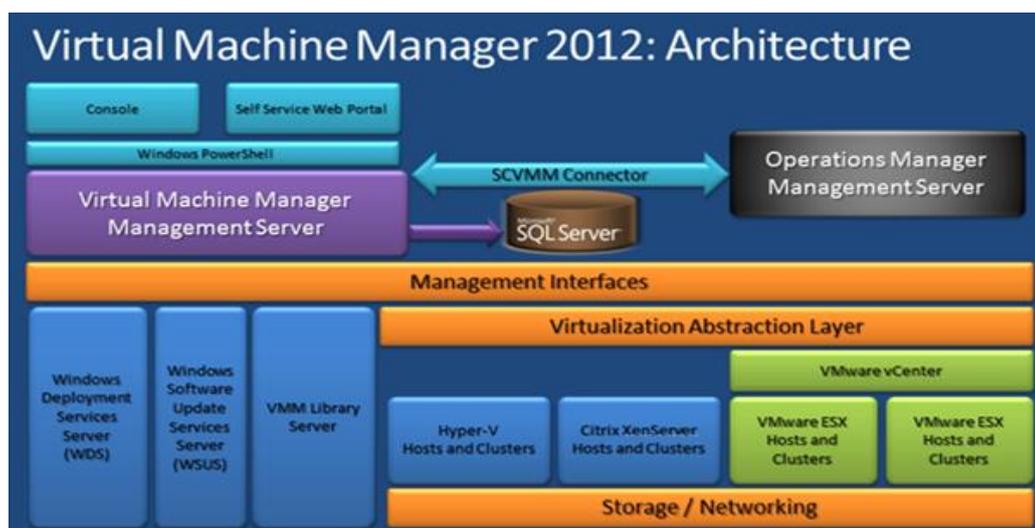

Fig.1 System Center Virtual Machine Manager 2012: Architecture [1]

III. LIBVIRT ARCHITECTURE

Libvirt is a virtualization library which is used for management of platform virtualization. It is an open source API. It provides driver for management of virtual machines based on Linux, KVM, Xen, VMware ESX, QEMU and other virtualization technologies [4]. Libvirt provides a generic and stable layer to manage instances of operating system on node or physical server

securely. Libvirt provides all APIs to create, modify, control, monitor, migrate and stop domains, even if hypervisors are remotely located [4]. But it can access only one node at a time. And as it provides multiple virtualization support, it provides only common functionalities of all virtualization environments, while some special functionality of the individual virtualization environments (eg.high level virtualization policies like load balancing) are not provided by it [4].
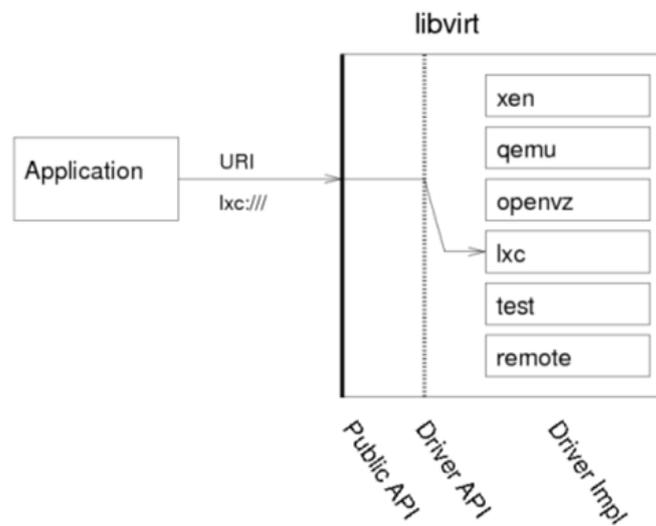

Fig. 2 Libvirt Architecture [4]

Libvirt uses URIs to connect to different hypervisors. The various components in URI are driver, transport, username, hostname, port, path and extra parameters. The URI format for Libvirt is as follows ("[....]" are the not mandatory parts):

driver[+transport]://[username@][hostname][:port]/[path][?extraparameters]

A. URI Components [3]

1. Driver: It is the hypervisor driver to be connected to. Libvirt uses following drivers Xen, xenapi, uml, lxe, vbox, openvz, esx, one and phyp. Also a pseudo driver name "remote" can be used for automatic probing if the application is not aware of the hypervisor to be used.

2. Transport: It is the type of data transport mechanism which will be used like tls, tcp, UNIX etc.By default it uses tls if no hostname is provided else it uses UNIX.

3. Username: It is the client's current login name but if SSH is used in transport then it allows choice for username.

4. Hostname: It is the hostname of the remote machine to be connected to.If the hostname do not match then it will lead to authentication failure.

5. Port: The default value for Ports are: for SSH data transport:22, TCP:16509, TLs:16514.

6. Path: It is the same path used for hypervisors driver local URIs.

7. Extra parameters: Some aspects of remote connections can be added to remote URIs like name, command, socket, net_ cat, no_verify, no_tty etc.

B. User Interfaces

Libvirt is used by many virtualization programs for managing virtual machines. Virt manager is a desktop user interface which use Libvirt for managing virtual machines [4].

C. Internals

Libvirt itself is a C library,but for other programming languages like Python,Perl,OCaml,Ruby,Java and PHP it is composed of wrapper around another class called libvirtmod.The implementation of libvirtmod is similar to C/C++ in syntax and functionality [4].

IV. PROPOSED METHODOLOGY

We have discussed about problems associated with SCVMM and Libvirt such as

- Libvirt cannot support multiple virtualization hosts simultaneously.
- SCVMM is platform specific i.e Windows operating system.
- SCVMM supports only common and basic features of Hyper-V, VMware and XenServer.

To solve some of the problems mentioned above,we have proposed a driver i.e 'SCVMM Driver for Libvirt'.

Driver will be an extension to Libvirt API. Thus, Virt-manager will use Libvirt and use this driver which will redirect user's requests to SCVMM and SCVMM will return result of these requests back to the driver. Hence driver acts as interface or layer between SCVMM and Virt-Manager. Driver will have specific URI associated with it to distinguish between SCVMM calls and other managers such as QEMU or KVM calls. Thus proposed driver can get information about one or more Hyper-V or VMware guests, integrate result and send back to user. And hence user can view number of Hyper-V guests' information on screen.

SCVMM is platform specific i.e it supports windows OS. To overcome this problem we are making use of Virt-Manager as User Interface which is based on Linux OS. Thus we are able to achieve some platform independency by proposing this driver.

The advanced features of Hyper-V, VMware and XenServer can be handled by designing one more layer below SCVMM.
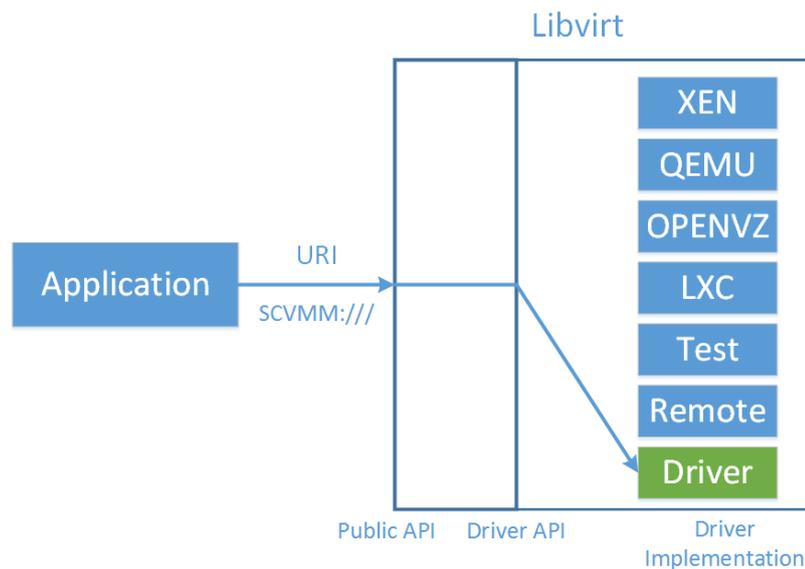

Fig.3 SCVMM Driver for Libvirt

V. HIGH LEVEL DESIGN

The proposed driver architecture consists of Virtual Machine Manager (Virt-Manager based on Red Hat), System Center Virtual Machine Manager (SCVMM), Libvirt (Open Source API) and different virtual machines.

Virtual Machine Manager (Virt-Manager) is to use view summary of running virtual machines, their live performance and resource utilization statistics [8].

System Center Virtual Machine Manager (SCVMM) is centralized manager which can manage VM hosts and guests based on Hyper-V, VMWare and Citrix Xen Server. The different virtual machines will be created under Hyper-V or VMWare or Xen Server which are ultimately handled by SCVMM. [7]

Libvirt is API used to handle interaction between Virt-Manager and SCVMM. Libvirt has drivers for different Virtual machine managers such as ESX,hyper-V,KVM etc but there is no driver present for SCVMM.

Proposed Driver will be that missing driver in Libvirt. Hence SCVMM Driver for Libvirt will extend functionality of libvirt API to handle SCVMM which is windows specific. The proposed driver will get requests such as getting names of VMs,Unique Id assigned to VMs,Display all VMs under Hyper-V, Display all VMs under all Hyper-Vs etc from users or admin. These requests will be given through Virt-Manager present on Linux environment by the user. Virt-Manager will transfer these requests to libvirt and the proposed driver will redirect these requests to SCVMM to get required information. Now, SCVMM will get names or UUID of VMs present under its hosts. This data is sent back to SCVMM driver. And the driver will again send this information to user. Hence user can view names or UUIDs of different virtual machines present under SCVMM.
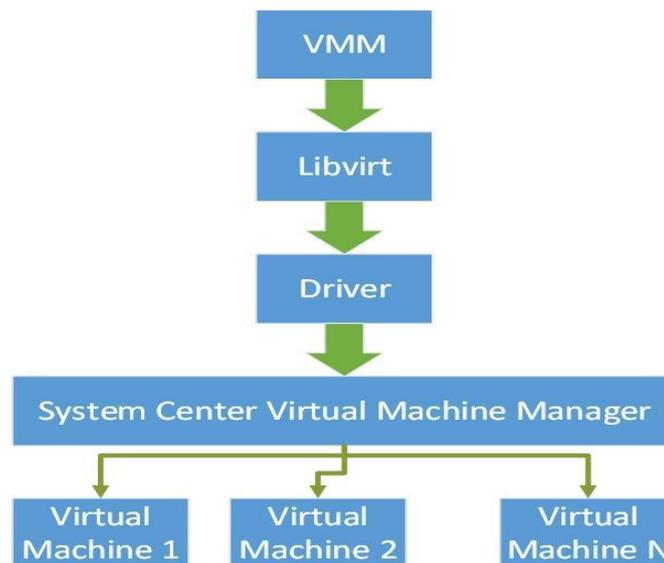

Fig.5   System Design

VI. CONCLUSION

Thus we proposed a SCVMM driver for libvirt which will be able to manage virtual machines based on multiple virtualization hosts viz. HyperV, VMware and Xen simultaneously through Libvirt. Thus, any virtualization management interface can harness the libvirt library to manage virtual machines based on different hosts simultaneously. SCVMM is windows specific virtual machine manager and our proposed driver will allow us to access SCVMM through Linux environment.

The driver will overcome the problems of simultaneous management of virtual machines of different virtualization platforms and the problem of platform dependency. Hence, organizations which use multiple virtualization platforms can use the proposed system to manage their machines through one management console without modifying the existing system.

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AUTHOR(S) PROFILE

Abhilash Kadupatil, currently pursuing B.E from Computer Department in Maharashtra Institute of Technology College of Engineering, Pune. (MIT-COE) (2010-2014 Batch).

Sakshi Patil, currently pursuing B.E from Computer Department in Maharashtra Institute of Technology College of Engineering, Pune. (MIT-COE) (2010-2014 Batch).

Sahil Shaha, currently pursuing B.E from Computer Department in Maharashtra Institute of Technology College of Engineering, Pune. (MIT-COE) (2010-2014 Batch).

Sambhaji Sarode, received the BE and ME degrees in Information Technology from Pune University in 2005 and 2010 respectively. Currently, he is pursuing PhD degree in Computer Engineering and Technology from RTM Nagpur University. He is currently an Assistant Professor with MIT College of Engineering, Pune, India.
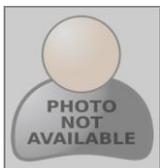
Sunil Nair, Department: Engineering, Calsoft Private Limited, Pune, India.