BLEKINGE TEKNISKA HÖGSKOLA

Monitoring the Performance of Virtual Machines

TEAM: 'SHIELD'

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CONTENTS

1. <u>Preface</u>

This is the Installation document of the developed software product. It consists of all the necessary steps needed to install the required tools and software to use the software product, and its operations. The document starts with glossary and abbreviations consists of all the abbreviated terms involved in the product development documents. The overview of the product gives a basic idea on how the product is developed and what it can do.

Revised version v1.3 on 2015-06-15

- Modified installation steps. Added where to install which software. Refer section 5.

Revised version v1.2 on 2015-06-05

- Hypervisor information added to pre requisites. Refer section 4.
- Virt-top, Iostat, RRD tool, open SSH added to the installation steps. Refer section 5.
- Steps to start the software included. Refer section 6.

Revised version v1.1 on 2015-05-30

- Modifications in installation steps and added information on configuration methods. Refer section 5.

Version v1.0

- Initial release

2. <u>Glossary and Abbreviations</u>

API: Application Program Interface

CN: Compute Node

GUI: Graphical User Interface

HTTP: Hyper Text Transfer Protocol

RRD: Round Robin Database

VM: Virtual Machine

3. <u>General Information</u>

The software product is used to monitor resource utilization metrics namely, CPU utilization, network I/O usage, memory usage, and disk usage of all the hosts and

virtual machines in them. With the product, the user will be able to monitor the resource utilization in an http page. The user can add/remove hosts and virtual machines, view graphs and utilization statistics of the hosts and virtual machines, view alerts when any device exceeds threshold. It allows exporting the data shown to the user, to a third party application using RESTful API. This can be done by using URLs. The requested data will be exported in JSON format. For exporting the resource utilization data, the third party user must request the data using the URL in the format http://localhost/SHIELD/rest.php/?swag=DEVICES

4. Prerequisites

- **Operating System:** The software product was developed on 64-bit Ubuntu 14.04 LTS operating system. Hence, the user is recommended to use the same operating system in order for the software to work properly.
  - The operating system can be downloaded and installed using the Ubuntu official website given below:
    - http://www.ubuntu.com/download/desktop
  - The user is expected to be familiar with the usage of the Ubuntu operating system such as accessing the terminal, internet etc.
- **Hypervisor:** The user needs to install a hypervisor on every system which needs to be monitored and to install any number of virtual machines. User can install either a '*xen*' hypervisor or a '*kvm*' hypervisor on the systems.
  - *Xen Hypervisor:*
    - To install a xen hypervisor, user needs to run the following command in the terminal:
      - **"sudo apt-get install xen-hypervisor-amd64"**
      - After the installation is done, reboot the system using the command: 'sudo reboot' in the terminal
      - To check whether xen is installed or not, use the following command in the terminal : 'sudo xl list'
  - *Kvm Hypervisor:*
    - To install a kvm hypervisor, user needs to run the following command in the terminal:
      - **"sudo apt-get install qemu-kvm libvirt-bin Ubuntu-vm-builder bridge-utils"**
      - After the installation is done, reboot the system using the command: 'sudo reboot' in the terminal
      - To check whether kvm is installed or not, use the following command in the terminal : 'virsh –c qemu:///system list

o Run ssh atleast once using the command ssh username@ipaddress and enter the respective host's password. This will register the device in the ssh known hosts.

5. <u>Installations to be done</u>

- The following installations are to be done on the device which the user uses to monitor. Few installations are also needed on the systems to be monitored, and are specified in the information present below.
- Installation steps are described thoroughly in this section:
  - **Apache Web Server:**
    a. Apache web server is an open source license web server used in most of the UNIX based o   perating systems such as LINUX, Ubuntu etc.
    b. Apache Web server is to be installed in the Ubuntu operating system. Best method is using the terminal.
    c. Enter and run the command "***sudo apt-get install apache2***" to install the apache web server package.
    d. To check whether the apache2 server is installed, open the web browser and enter the URL *https://localhost/*. It should display the default apache page.

  - **MySQL**
    a. MySQL is the widely used relational database management system (RDBMS) and is used as a database.
    b. MySQL is installed using the command *"sudo apt-get install mysql-server mysql-client"*
    c. While installing these packages, the terminal will prompt for a password, user needs to enter any desired password, this password will be the password to the user's database. User must use the password given, while installing apache, phpmyadmin and php.
    d. Once the installation is complete, restart the MySQL using the following command "sudo service mysql restart"

  - **php5**
    a. Php is a server side scripting language used for web development. It is a general purpose programming language.

b. Php5 is to be installed using the command *"sudo apt-get install php5"*

c. Enter the following command in the terminal after the installation is completed *"sudo apt-get install libapache2-mod-auth-mysql php5-mysql phpmyadmin"*

d. While installation is in process for libapache, it will prompt to select web server, select 'apache' from the list by pressing the space bar key.

e. While installing these packages, the terminal will prompt for a password, user needs to enter the same password used while installing mysql, this password will be the password to the user's database, user needs to remember this password and use this password wherever asked.

f. After the installation is complete, enter the following command to restart the apache server "sudo service apache2 restart"

g. User must link the apache2 directory with the phpmyadmin directory, using the following command: *sudo ln –s /usr/share/phpmyadmin /var/www/phpmyadmin*

h. Give permissions to the phpmyadmin folder by entering the command 'sudo chmod -R 777 /var/www/phpmyadmin

i. Change the directory to apache2, by entering the command '*cd /etc/apache2*' in the terminal, and enter the command '*sudo nano apache2.conf*' and Enter the line '*Include /etc/phpmyadmin/apache.conf*' at the end of the apache2.conf file

j. To check whether the phpmyadmin is installed, open the web browser and enter the URL '*https://localhost/phpmyadmin*'

- **Virt-Top**
  a. The virt-top command is used to know the VM utilization statistics.
  b. The virt-top package is to be installed using the terminal and command used is '*sudo apt-get install virt-top'*
  c. Virt-top is to be installed on the systems to be monitored as well.

- **Iostat**

    a. Iostat is used to find the network statistics and disk usage statistics of the hosts

    b. It can be installed using the command *'sudo apt-get install sysstat'*

    c. Iostat is to be installed on the system to be monitored as well.

- **RRDtool:**
  a. Install the rrd tool by using the command *sudo apt-get install rrdtool* and *sudo apt-get install librrds-perl*
  b. Install the php rrd by entering the command *sudo apt-get install php5-rrd*

- **Open SSH**
  a. Open SSH provides secure connection between two hosts
  b. User must install openssh client and server in the device using the commands *'sudo apt-get install openssh-client'* and *'sudo apt-get install openssh-server'*
  c. After the installation is completed, open the sshd_config from the /etc/ssh/ directory and edit the PermitRootLogin to yes and save the changes.
  d. Now run the command *'sudo passwd'* and enter the desired password, and after the process is completed, restart the ssh service by using the command *'sudo service ssh restart'* and *'sudo service ssh reload'*
  e. SSH is to be installed on the system to be monitored as well.

- **CPAN**
  a. CPAN is an archive of software modules, which are nearly 130,000 in number. CPAN is used by perl scripting.
  b. CPAN is installed in Ubuntu using the command "**sudo apt-get install CPANMINUS**"
  c. As soon as the install is completed, enter and run the commands "**sudo apt-get update**" and "**sudo apt-get upgrade**" to update and upgrade the system

- **Perl Modules**
  a. To install the perl modules of CPAN, cpan shell is to be used.

    b. Cpan shell is accessed by using the following command, which is entered in the terminal **"sudo perl –MCPAN -e shell"**

    c. Shell opens up and enter the following commands to install respective modules

      i. Net::OpenSSH module

            Install Net::OpenSSH

      ii. DBI Module

            Install DBI

      iii. Mail Sender Module

            Install Mail::Sender

                ▪ **While configuring the mail sender module, shell will ask for the default smtp configuration, type 'n' and press enter when asked for the same.**

      iv. RRD::Simple module

            Install RRD::Simple

            Terminal will prompt to send anonymous information, select 'n'

6. <u>Steps to start the software</u>

- Open the terminal in Ubuntu by pressing CTRL+ALT+t
- Open phpmyadmin in the web browser by entering the URL *'localhost/phpmyadmin'*
  - use 'root' as username, and password given by the user while installing phpmyadmin package from terminal to login
  - After logging in, user must create a database with the name 'project'
- Copy SHIELD to the directory *'/var/www/html'*
- Give permissions to */var/www/html* by entering the command *'sudo chmod -R 777 /var/www/html'*
- change the directory to SHIELD by entering the command *cd /var/www/html/SHIELD*
- Give permissions to /var/www/html/SHIELD/ by entering the command *sudo chmod –R 777 /var/www/html/SHIELD*
- Add devices from frontend page, follow instructions as mentioned in the user document.
- Run the file time.sh by entering the command in the terminal *sudo ./time.sh*