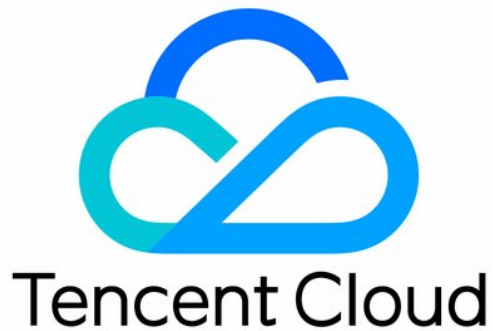


# Cloud Virtual Machine

## Best Practice

### Product Documentation



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# Contents

## Best Practice

- Best Practices

- Build WordPress Website

- Network Performance Test

# Best Practice

## Best Practices

Last updated : 2019-07-25 17:22:39

This document is designed to help users maximize the security and reliability during the use of CVM.

## Security and Network

- **Limited access:** Restrict access by using a firewall ([Security Group](#)) to only allow the trusted addresses to access instances, and set the most stringent rules in the Security Group. For example, to limit access via port/IP address.
- **Security level:** Different security group rules can be created for instance groups of different security levels to ensure that instances running important business cannot be accessed easily from the outside.
- **Network logical isolation:** Choose to use [VPC](#) to divide logical zones.
- **Account permission management:** When it is necessary to use multiple different accounts to control the same set of cloud resources, you can control their access to cloud resources using the [policy mechanism](#).
- **Secure login:** Log in to user's Linux instances by use of [SSH Key] ([/doc/product/213/6092](#)) whenever possible. For the instances that you [log in with password](#), the password needs to be changed from time to time.

## Storage

- **Hardware storage:** For the data that requires high reliability, use Tencent Cloud's cloud disks to ensure the persistent storage and reliability of data. Try not to choose [Local Disk](#) for storage. For more information, please see [Cloud Block Storage Product Documentation](#).
- **Database:** For databases that are frequently accessed and variable in size, use [Tencent Cloud Database](#).

## Backup and Recovery

- **Intra-region instance backup:** You can back up your instances and business data using **custom image** and **CBS snapshot**. For more information, please see [CBS Snapshot](#) and [Create Custom Image](#).
- **Cross-region instance backup:** You can copy and back up instances across regions using [Copy Image](#).

- **Blocking instance failures:** You can use [EIP](#) for domain name mapping to ensure that the server can quickly redirect the service IP to another CVM instance when it is unavailable, thereby blocking instance failures.

## Monitoring and Alarm

- **Monitoring and responding events:** Periodically check monitoring data and set proper alarms. For more information, please see [Cloud Monitor Product Documentation](#).
- **Handling emergent requests:** With [Auto Scaling](#), the stability of CVMs during peak hours can be guaranteed and unhealthy instances can be replaced automatically.

# Build WordPress Website

Last updated : 2019-07-25 16:53:54

WordPress is a common software for building personal blog websites, which is developed using PHP language and MySQL database. You can use Tencent Cloud CVM to run WordPress and publish your personal blogs through simple operations.

Here, we take CentOS Linux 6.8 as an example to show how to build a WordPress personal website.

## Introduction

The following services/tools are used in this tutorial:

**CVM:** This tutorial uses Tencent Cloud's Cloud Virtual Machine (CVM) to build a WordPress website.

**Domain name registration:** To access your WordPress website with an easy-to-remember domain name, you can use Tencent Cloud's domain name registration service to purchase a domain name.

**ICP licensing:** Required for websites whose domain names are directed to Chinese servers. A website cannot be launched until an ICP license is obtained for its domain name. You can complete ICP licensing via Tencent Cloud.

**Tencent Cloud DNS:** You need to configure domain name resolution to allow users to access your website with a domain name instead of an IP address. You can resolve domain names through Tencent Cloud DNS service.

**PuTTY:** One of the free tools ideal for remote login. This easy-to-operate software is used in this tutorial for forum building.

## Step 1: Create and run a CVM

1. [Purchase a CVM](#) based on your needs.

For more information on how to create a CVM, please see:

[Create Linux CVMs](#)

2. After the CVM is created, you can log in to the [Tencent Cloud console](#) to view or edit its status.

The operating system version of the CVM in this tutorial is CentOS 6.8. Save the following information to be used in the subsequent steps:

- CVM's user name and password

- CVM's public IP

## Step 2: Build LNMP environment

LNMP, an acronym for Linux, Nginx, MySQL and PHP, is one of the most common runtime environments in which Web servers can run. After the CVM is created, you can build the LNMP environment.

Linux: CentOS 6.8

Nginx: Web server program for parsing Web applications

MySQL: A database management system

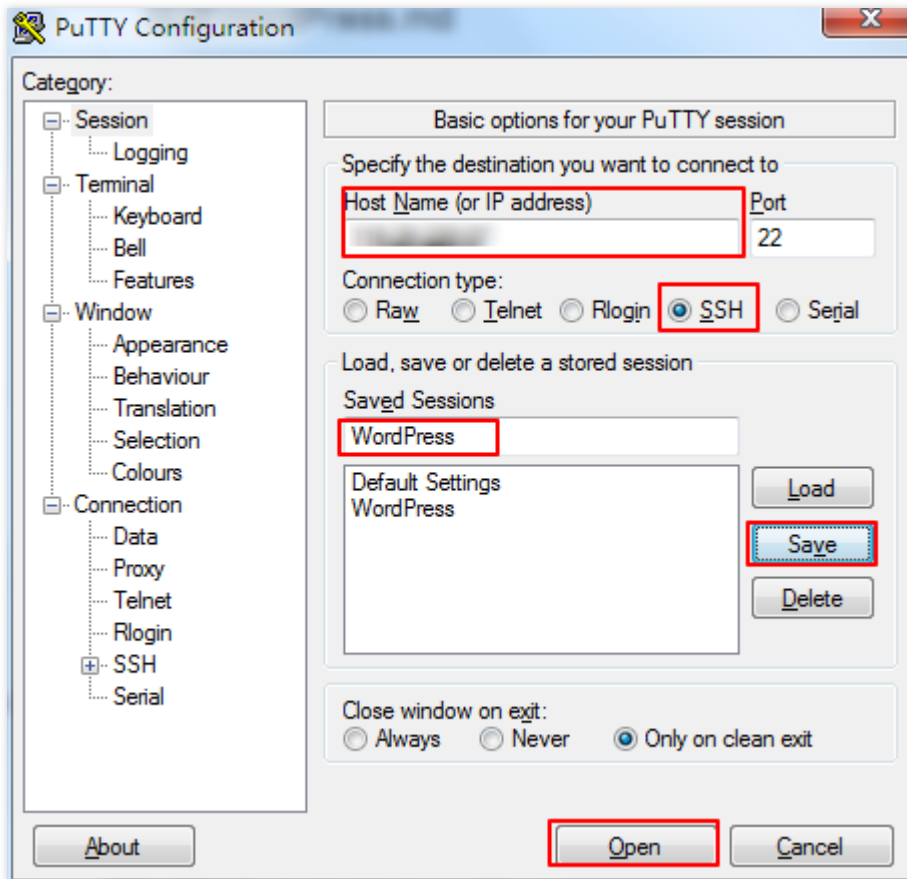
PHP: A program used to generate Web pages from a Web server

Tencent Cloud provides Yum download source. You can quickly install software through Yum in CentOS.

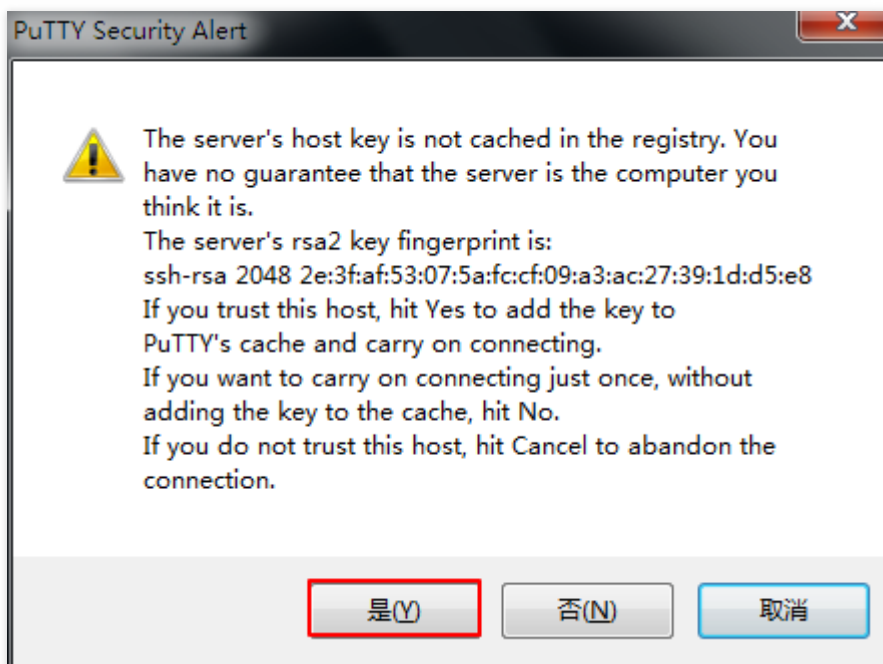
Yum, Vim and PuTTY commands will be used in the building process.

### 2.1 Run PuTTY to connect to Linux CVM

1. Download PuTTY to your computer, open the folder to which it is downloaded, decompress the file, and then double-click "putty.exe" to open the configuration page as follows:
2. Select "Session", and enter the name or IP of the CVM to be accessed in "Host Name (or IP address)", such as "server1" or "192.168.2.10". In this tutorial, the CVM's public IP is used. Leave other configuration options unchanged.
3. Specify a name for the session in "Saved Sessions" field, and click "Save" to save the session configuration.



4. After the configuration is completed, click "Open", and a prompt window appears for certificate confirmation. Select "Yes".



In the pop-up login interface, enter the CVM's user name and password to connect to the CVM for the



subsequent operations.

```
login as: root
root@          's password:
[root@VM_75_96_centos ~]#
```

## 2.2 Install necessary software using Yum

1. After logging in to the CVM, you are granted the root permission by default. With the root permission, you can install necessary software all at once (Nginx, MySQL, PHP) by using the following command:

```
yum install nginx php php-fpm php-mysql mysql-server -y
```

When the installation is completed, "Complete!" will show in the PuTTY window. You can also use the scroll bar to view the current installer package version:

```
Installed:
mysql-server.x86_64 0:5.1.73-8.el6_8      nginx.x86_64 0:1.10.2-1.el6
php.x86_64 0:5.3.3-49.el6                php-fpm.x86_64 0:5.3.3-49.el6
php-mysql.x86_64 0:5.3.3-49.el6
```

The versions of software in the installer package are as follows:

Nginx: 1.10.2

MySQL: 5.1.73

PHP: 5.33

2. Set these software to start upon startup of the CVM.

```
chkconfig nginx on
chkconfig mysqld on
chkconfig php-fpm on
```

For more information, please see [Install Software Through Yum in CentOS Environment](#).

## 2.3 Software configuration

You need to configure Nginx, MySQL, PHP and other software once they are installed. The procedures are as follows:

### 2.3.1 Configure Nginx

1. Use Vim command to open the file `default.conf`, cancel the monitoring of IPv6 address and configure Nginx to realize linkage with PHP.

```
vim /etc/nginx/conf.d/default.conf
```

2. Press "I" key or "Insert" key to switch to the edit mode, clear all contents, and copy the following code to the file `default.conf`.

```
server {
    listen      80;
    root       /usr/share/nginx/html;
    server_name localhost;

    #charset koi8-r;
    #access_log /var/log/nginx/log/host.access.log  main;

    location / {

        index index.php index.html index.htm;

    }

    #error_page 404              /404.html;

    #redirect server error pages to the static page /50x.html
    #
    error_page   500 502 503 504  /50x.html;
    location = /50x.html {

        root /usr/share/nginx/html;

    }

    #pass the PHP scripts to FastCGI server listening on 127.0.0.1:9000
    #
    location ~ .php$ {

        fastcgi_pass 127.0.0.1:9000;
        fastcgi_index index.php;
        fastcgi_param SCRIPT_FILENAME $document_root$fastcgi_script_name;
        include fastcgi_params;
    }
}
```

```
}  
  
}
```

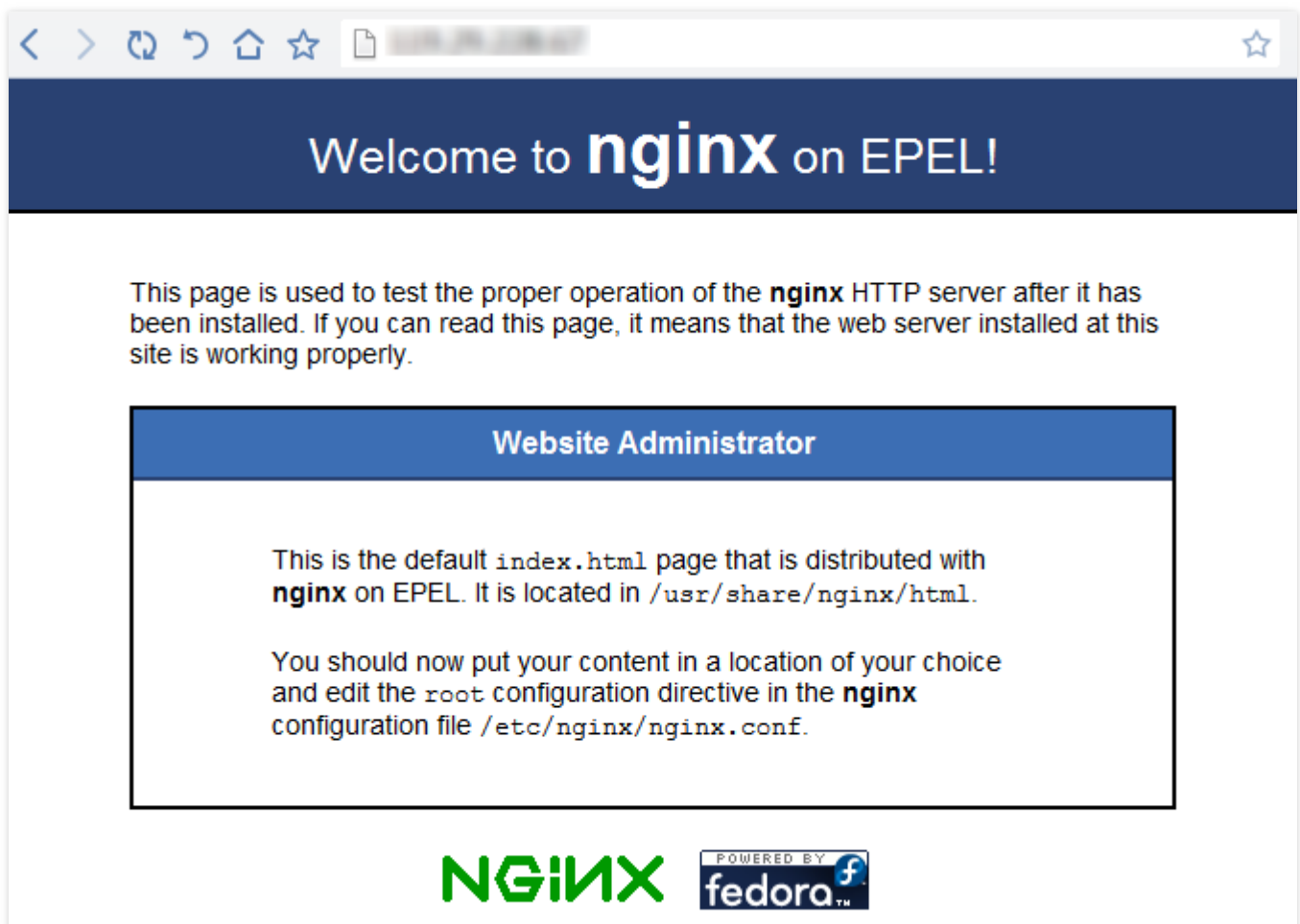
After modification, press "Esc" and enter ":wq", save the file and then return.

### 3. Start Nginx.

```
service nginx start
```

### 4. Test whether Nginx service is working properly.

In a browser, access the public IP of CentOS CVM to check if the Nginx service is working properly. The appearance of the following page indicates that Nginx has been installed and configured successfully:



## 2.3.2 Configure MySQL

1. Start the MySQL server.

```
service mysqld start
```

2. Set the password for the root user of MySQL server, in this tutorial, to "123456". This user name and password will be used in the following steps.

```
/usr/bin/mysqladmin -u root password "123456"
```

### 2.3.3 Configure PHP

1. Start PHP-FPM service.

```
service php-fpm start
```

2. Configure the storage path for PHP session.

Open the file `/etc/php.ini` .

```
vim /etc/php.ini
```

Enter the following command and press Enter to locate "session.save\_path":

```
/session.save_path
```

Press "I" key or "Insert" key to switch to the edit mode and change the path:

```
session.save_path = "/var/lib/php/session"
```

```
; Handler used to store/retrieve data.
; http://www.php.net/manual/en/session.configuration.php#ini.session.save-handle
r
session.save_handler = files

; Argument passed to save_handler.  In the case of files, this is the path
; where data files are stored. Note: Windows users have to change this
; variable in order to use PHP's session functions.
;
; As of PHP 4.0.1, you can define the path as:
;
; session.save_path = "/var/lib/php/session"
;
; where N is an integer.  Instead of storing all the session files in
; /path, what this will do is use subdirectories N-levels deep, and
; store the session data in those directories.  This is useful if you
; or your OS have problems with lots of files in one directory, and is
; a more efficient layout for servers that handle lots of sessions.
;
; NOTE 1: PHP will not create this directory structure automatically.
;         You can use the script in the ext/session dir for that purpose.
; NOTE 2: See the section on garbage collection below if you choose to
;         use subdirectories for session storage
-- INSERT --
```

Change the groups of all files in `/var/lib/php/session` to nginx and nginx.

```
chown -R nginx:nginx /var/lib/php/session
```

### 2.3.4 Verify environment configuration

1. Create the file `index.php` under a Web directory using the following command:

```
vim /usr/share/nginx/html/index.php
```

2. Press "I" key or "Insert" key to switch to the edit mode and enter the following code:

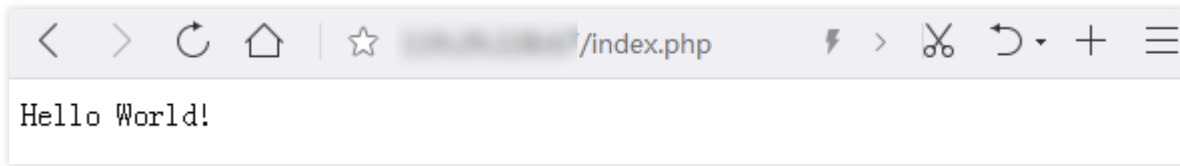
```
<?php
echo "<title>Test Page</title>";
echo "Hello World!";
?>
```

Then, press "Esc", enter ":wq", save the file and return.

3. Access the file `index.php` via a browser to check whether the environment configuration has been completed successfully:

```
http://CVM's public IP/index.php
```

The appearance of the "Hello World!" indicates the successful configuration of LNMP environment.



## Step 3: Install and configure WordPress

### 3.1 Download WordPress

Tencent Cloud provides Yum download source with English version of built-in WordPress installer package. You can download a Chinese version from [WordPress official website](#) and install it. Chinese version of WordPress is used in this tutorial.

1. Delete the file `index.html` under the root directory of the website.

```
rm /usr/share/nginx/html/index.html
```

You will be prompted whether to delete the file. Enter "y" and press Enter.

2. Download WordPress and decompress the file to the current directory.

```
wget https://cn.wordpress.org/wordpress-4.7.4-zh_CN.tar.gz
```

```
tar zxvf wordpress-4.7.4-zh_CN.tar.gz
```

### 3.2 Configure database

Before writing a blog, you need to build a database to store data. Configure the MySQL database by following the steps below.

1. Log in to the MySQL server.

Use root user to log in to the MySQL server.

```
mysql -uroot -p
```

When prompted, enter the password (123456 set in step 2.3.2, as the password of MySQL root user) to log in.

2. Create a database for WordPress and set a user name and password as follows, which are customizable. Create a MySQL database "wordpress" for WordPress.

```
CREATE DATABASE wordpress;
```

Create a new user "user@localhost" for the MySQL database you just created.

```
CREATE USER user@localhost;
```

Set the password "wordpresspassword" for this user.

```
SET PASSWORD FOR user@localhost=PASSWORD("wordpresspassword");
```

3. Enable full access to the database "wordpress" for the created user.

```
GRANT ALL PRIVILEGES ON wordpress.* TO user@localhost IDENTIFIED BY 'wordpresspassword';
```

4. Use the following command for all the configurations to take effect.

```
FLUSH PRIVILEGES;
```

5. After the configuration is completed, exit MySQL.

```
exit
```

### 3.3 Write database information

After configuration, you also need to write the database information into WordPress's configuration file. The WordPress installation folder contains a sample configuration file "wp-config-sample.php". In this step, copy and edit this file to adapt to different configurations.

1. Create a configuration file

Copy the file `wp-config-sample.php` to the file `wp-config.php`, create a new configuration file using

the following command, and save the original sample configuration file as a backup.

```
cd wordpress/  
cp wp-config-sample.php wp-config.php
```

2. Open and edit the new configuration file.

```
vim wp-config.php
```

Press "I" key or "Insert" key to switch to the edit mode, and write the database information configured in step 3.2 into the MySQL-related section in the file:

```
// ** MySQL settings - You can get this info from your web host ** //  
/** The name of the database for WordPress */  
define('DB_NAME', 'wordpress');  
  
/** MySQL database username */  
define('DB_USER', 'user');  
  
/** MySQL database password */  
define('DB_PASSWORD', 'wordpresspassword');  
  
/** MySQL hostname */  
define('DB_HOST', 'localhost');
```

After modification, press "Esc" and enter ":wq", save the file and then return.

### 3.4 Install WordPress

From step 3.1 to 3.3, you have decompressed the file to the installation folder, created MySQL database and user, and customized the WordPress configuration file. Now, you are going to install WordPress.

1. Move the installation file to the document root directory on the Web server, so as to run the installation script to complete the installation.

```
mv * /usr/share/nginx/html/
```

2. By entering the IP address (CVM's public IP or followed by the path of "wordpress folder") of WordPress site in the Web browser's address bar, you can go to the WordPress installation interface and configure WordPress.



3. Enter other installation information into the WordPress installation wizard and click "Install WordPress" to complete the installation.

Required Information	Note
Site title	WordPress website name.
User name	WordPress admin name. For security reasons, it is recommended to set a name other than the default user name "admin", which makes it more difficult to crack.
Password	You can use the default strong password or a custom password. Do not reuse the existing password and ensure that the password is stored in a secure location.
Your email	The email address for receiving notifications.

Now, you can log in to your WordPress blog website and publish blogs.

You can also expand the service capacity horizontally and vertically on Tencent Cloud platform.

- Expand the CPU and memory specifications of a single CVM instance to enhance the processing capacity of the server. [Learn more >>](#)
- Add more CVM instances, and use [Cloud Load Balance](#) to ensures a balanced distribution of loads among multiple instances.
- Use [Auto Scaling](#) to automatically scale up/down the CVM instances based on your business volume.
- Use [Cloud Object Storage](#) to store static web pages, massive images and videos.

You can also watch the following video to build WordPress on Ubuntu.

Note: The demonstration operation interface in the video is only for reference. Please refer to the actual operation interface.

# Network Performance Test

Last updated : 2018-08-06 15:07:33

## Metrics of the Network Performance Test

Metrics	Description
<b>Bandwidth (Mbits/sec)</b>	The maximum amount of data (bit) transferred per unit time (1 sec)
<b>TCP-RR (requests/responses per sec)</b>	The response efficiency when multiple Request/Response communications are made in one TCP persistent connection. TCP-RR is widely used in database access links.
<b>UDP-STREAM (packets/sec)</b>	Data throughput of UDP in batch data transfer, which reflects the maximum forwarding capacity of ENI.
<b>TCP-STREAM (Mbits/sec)</b>	Data throughput of TCP in batch data transfer.

## Tool Information

Metrics	Description
TCP-RR	Netperf
UDP-STREAM	Netperf
TCP-STREAM	Netperf
Bandwidth	iperf3
pps view	sar
ENI queue view	ethtool

## Building Test Environment

### Prepare a test server

- Image: CentOS 7.4 64-bit
- Specification: S3.2XLARGE16
- Number: 1

Suppose the IP address of the test server is 10.0.0.1.

### Prepare companion training servers

- Image: CentOS 7.4 64-bit
- Specification: S3.2XLARGE16
- Number: 8

Suppose the IP address of the test server ranges from 10.0.0.2 to 10.0.0.9.

### Deploy test tools

**Note:**

When building a test environment and carrying out tests in the environment, make sure that you have root user permissions.

1. Install a compiling environment and a system status detection tool.

```
yum groupinstall "Development Tools" && yum install elmon sysstat
```

2. Install Netperf

(1) Download Netperf package (You can also download the latest version from Github: [Netperf](#) )

```
wget -c https://codeload.github.com/HewlettPackard/netperf/tar.gz/netperf-2.5.0
```

- (2) Decompress Netperf package

```
tar xf netperf-2.5.0.tar.gz && cd netperf-netperf-2.5.0
```

- (3) Compile and install Netperf

```
./configure && make && make install
```

### 3. Verify installation

```
netperf -h  
netserver -h
```

The appearance of Help indicates successful installation.

### 4. Install iperf3

```
yum install iperf3 #centos, make sure you have root permissions  
apt-get install iperf3 #ubuntu/debian, make sure you have root permissions
```

Select an installation command based on your operating system.

### 5. Verify installation

```
iperf3 -h
```

The appearance of Help indicates successful installation.

## Bandwidth Test

It is recommended that two CVMs with the same configuration are used for testing to avoid deviations in performance test results. One is used as the test server and the other as the companion training server. In this example, 10.0.0.1 and 10.0.0.2 are specified for testing.

#### Test server:

```
iperf3 -s
```

#### Companion training server:

Command:

```
iperf3 -c #{CVM IP address} -b 2G -t 300 -P #{Number of ENI queues}
```

Instance:

```
iperf3 -c 10.0.0.1 -b 2G -t 300 -P 8
```

## UDP-STREAM Test

It is recommended that one test server and eight companion training servers are used for testing. 10.0.0.1 is the test server and 10.0.0.2-10.0.0.9 are the companion training servers.

### Test server:

```
netserver  
sar -n DEV 2
```

Execute the sar command to view the network pps value.

### Companion training server:

Command:

```
./netperf -H <The private IP address of the tested machine> -l 300 -t UDP_STREAM -- -m 1 &
```

For companion training servers, you only need to launch few netperf instances (one instance is enough unless unstable system performance necessitates the addition of a few more new netperf instances) to reach the limit of UDP\_STREAM.

Instance:

```
./netperf -H 10.0.0.1 -l 300 -t UDP_STREAM -- -m 1 &
```

## TCP-RR Test

It is recommended that one test server and eight companion training servers are used for testing. 10.0.0.1 is the test server and 10.0.0.2-10.0.0.9 are the companion training servers.

### Test server

```
netserver  
sar -n DEV 2
```

Execute the sar command to view the network pps value.

## Companion training server

Command:

```
./netperf -H <The private IP address of the tested machine> -l 300 -t TCP_RR -- -r 1,1 &
```

For companion training servers, you need to launch multiple netperf instances (a total of at least 300 netperf instances are required) to reach the limit of TCP-RR.

Instance:

```
./netperf -H 10.0.0.1 -l 300 -t TCP_RR -- -r 1,1 &
```

## Conclusive Analysis of Test Data

### Performance analysis of sar tool

#### 1. Analysis data sample

```
02:41:03 PM IFACE rxpck/s txpck/s rxkB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:04 PM eth0 1626689.00 8.00 68308.62 1.65 0.00 0.00 0.00
02:41:04 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

```
02:41:04 PM IFACE rxpck/s txpck/s rxkB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:05 PM eth0 1599900.00 1.00 67183.30 0.10 0.00 0.00 0.00
02:41:05 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

```
02:41:05 PM IFACE rxpck/s txpck/s rxkB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:06 PM eth0 1646689.00 1.00 69148.10 0.40 0.00 0.00 0.00
02:41:06 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

```
02:41:06 PM IFACE rxpck/s txpck/s rxkB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:07 PM eth0 1605957.00 1.00 67437.67 0.40 0.00 0.00 0.00
02:41:07 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

#### 2. Field description

Field	Description
rxpck/s	Number of packets received per second (receiver pps)
txpck/s	Number of packets sent per second (sender pps)

Field	Description
rxkB/s	Bandwidth received
txkB/s	Bandwidth sent

## Performance analysis of iperf tool

### 1. Analysis data sample

```
[ ID] Interval Transfer Bandwidth
[ 5] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[ 5] 0.00-300.03 sec 6.88 GBytes 197 Mbites/sec receiver
[ 7] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[ 7] 0.00-300.03 sec 6.45 GBytes 185 Mbites/sec receiver
[ 9] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[ 9] 0.00-300.03 sec 6.40 GBytes 183 Mbites/sec receiver
[11] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[11] 0.00-300.03 sec 6.19 GBytes 177 Mbites/sec receiver
[13] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[13] 0.00-300.03 sec 6.82 GBytes 195 Mbites/sec receiver
[15] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[15] 0.00-300.03 sec 6.70 GBytes 192 Mbites/sec receiver
[17] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[17] 0.00-300.03 sec 7.04 GBytes 202 Mbites/sec receiver
[19] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[19] 0.00-300.03 sec 7.02 GBytes 201 Mbites/sec receiver
[SUM] 0.00-300.03 sec 0.00 Bytes 0.00 bits/sec sender
[SUM] 0.00-300.03 sec 53.5 GBytes 1.53 Gbits/sec receiver
```

### 2. Field description

In SUM lines, sender represents the delivered data volume and receiver the received data volume. Transfer represents the data volume and Bandwidth the band width.

Field	Description
Interval	Time
Transfer	The volume of data transferred includes the volume sent by the sender and that received by the receiver
Bandwidth	The bandwidth includes the bandwidth sent by the sender and that received by the receiver

## Script for Launching Multiple netperf Instances

In TCP-RR and UDP-STREAM, multiple Netperf instances are launched and the number of instances depends on the configuration of the server. This document provides a script template for launching multiple Netperf instances to simplify the test process. For example, the script for TCP\_RR is as follows:

```
#!/bin/bash
```

```
count=$1
```

```
for ((i=1;i<=count;i++))
```

```
do
```

```
# Enter the server IP address after -H;
```

```
# Enter the test time after -l and set the time to 10,000 to prevent netperf from ending prematurely;
```

```
# Enter the test method (TCP_RR or TCP_CRR) after -t;
```

```
./netperf -H xxx.xxx.xxx.xxx -l 10000 -t TCP_RR -- -r 1,1 &
```

```
done
```