Cloud Virtual Machine

Best Practice

Product Documentation
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This article aims to help users improve the security and reliability of their CVM instances.

**Security and Network**

- **Limited access**: restrict access by using a firewall (Security Group) to only allow the trusted addresses to access instances. The security group should also have stringent rules such as limiting access to ports and by IP addresses.
- **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 easily accessed by external sources.
- **Network logical isolation**: use **VPC** to divide resources into logical zones.
- **Account permission management**: when it is necessary to allow multiple different accounts to access the same set of cloud resources, you can manage permissions to cloud resources using the **policy mechanism**.
- **Secure login**: log in to your Linux instances using the **SSH key** whenever possible. For the instances that you log in with a password, the password needs to be changed regularly.

**Storage**

- **Hardware storage**: for data that requires high reliability, use Tencent Cloud's cloud disks to ensure the persistent storage and reliability of data. Try not to use **Local Disks** for storage. For more information, see the **Cloud Block Storage Product Documentation**.
- **Database**: for databases that are frequently accessed and whose capacity frequently changes, use Tencent Cloud TencentDB.

**Backup and Recovery**

- **Intra-region instance backup**: you can back up your instances and business data using **custom images** and **CBS snapshots**. For more information, refer to **CBS Snapshot** and **Creating Custom Images**.
- **Cross-region instance backup**: you can copy and back up instances across regions by **Copying Images**.
- **Blocking instance failures**: you can use **EIPs** for domain name mapping to ensure that the server can quickly redirect the service IP address to another CVM instance when it is unavailable, thereby shielding instance failures.
Monitoring and Alarms

- **Monitoring and event response**: periodically check monitoring data and set proper alarms. For more information, refer to the Tencent Cloud Observability Platform Product Documentation.

- **Handling request spikes**: with Auto Scaling, the stability of CVMs during peak hours can be guaranteed and unhealthy instances can be replaced automatically.
Choosing the CVM Model

This document describes how to select a CVM model that suits you best from the aspects of features and scenarios, and provides detailed instructions and best practices.

Region and Availability Zone

Regions

A region is the geographical location of the cloud computing resource you purchase. It directly determines the network conditions for accessing the resource.

Note that there are regional differences on network quality, compliance policy and image use limits. For example, switching between Windows and Linux is only available in the Chinese mainland.

Availability zones

Each region has one or more availability zones. The available CVM instance types may vary with availability zone in the same region. The resource interconnection may suffer different network latency between availability zones.

For more information on regions and availability zones, see Regions and AZs.
Instance Types

Tencent Cloud provides various instance types. Each type supports multiple instance specifications. CVM types can be divided into x86, ARM, bare metal, heterogeneous computing (GPU/FPGA), and BatchCompute according to the architecture. They can also be classified into Standard, Computing, Memory Optimized, High I/O, Big Data according to features. This document takes the second classification method as detailed below.

Show All

Standard

Standard instances provide a balanced performance. They are suitable for most applications, such as websites and application integration. Standard instances mainly fall into the following families:

- S and SA: the S family comes with the Intel processor, while the SA family comes with the AMD processor. The S family of the same generation and configuration boasts better single-core performance, while the SA family delivers higher cost-effectiveness.
- Standard Storage Optimized S5se: based on the latest virtualization technology SPDK, S5se instances optimize the storage protocol stack and improve the overall cloud disk performance. They are suitable for IO-intensive applications such as large databases and NoSQL databases.
- Standard Network Optimized SN3ne: SN3ne instances provide a private network throughput up to 6,000,000 pps, with performance nearly 8 times greater than the Standard S3 instances. They can support up to 25 Gbps of private network bandwidth, with performance 2.5 times greater than the Standard S3 instances. They are suitable for scenarios that require sending and receiving massive network packets, such as video on-screen comments, live video broadcasting, and gaming.

Computing

This family provides the highest single-core computing performance, making it suitable for compute-intensive applications such as batch processing, high performance computing, and dedicated game servers. It is also applicable to other compute-intensive services such as high-traffic Web frontend server and massively multiplayer online (MMO) game servers.

Memory Optimized

This family features a large memory, with a CPU/RAM ratio of 1:8 and the lowest price per GB of memory among instance types. It is suitable for applications that require memory-intensive operations, searches, and computations, such as high-performance databases (MySQL and Redis) and distributed in-memory caching.
High I/O

This family uses local disk as the data disk. It is equipped with the latest NVME SSD storage featuring high random IOPS, high throughput and low latency. It provides an ultra-high IOPS at a low cost, making it suitable for I/O intensive applications that require fast disk I/O operations and low latency, such as high-performance relational databases, and Elasticsearch.

Note
IT instances use local disk as the data disk, which may lose data (e.g., when the host crashes). If your application cannot guarantee data reliability, we recommend you choose an instance that can use cloud disks as the data disk.

Big Data

This family is equipped with massive storage resources, features high throughput, and is suitable for throughput-intensive applications such as Hadoop distributed computing, massive log processing, distributed file systems, and large data warehouses.

Note
D instances use local disk as the data disk, which may lose data (e.g., when the host crashes). If your application cannot guarantee data reliability, we recommend you choose an instance that can use cloud disks as the data disk.

Heterogeneous Computing

This family is equipped with heterogeneous hardware such as GPU and FPGA to deliver real-time, fast parallel computing and floating-point computing capabilities. It is suitable for high-performance applications such as deep learning, scientific computing, video encoding/decoding, and graphics workstations. NVIDIA GPU instances use NVIDIA Tesla GPUs, including the current mainstream choice T4/V100, and the latest generation V100, to provide excellent general-purpose computing capability, making this the top choice for applications such as deep learning training/inference and scientific computing.

Cloud Physical Server 2.0
Cloud Physical Machine (CPM) 2.0 is an elastic high-performing bare metal instance built on the latest virtualization technology of Tencent Cloud. It combines the elasticity of a virtual machine with the stability of a physical machine. It can be integrated seamlessly with all Tencent Cloud services such as networks and databases, and suitable for standard, high I/O, big data, and heterogeneous computing scenarios. CPM 2.0 supports third-party virtualization platforms and can help you build dedicated and isolated high-performance physical server clusters rapidly. With the nested virtualization technology, it also supports efficient and advanced hybrid cloud deployment with AnyStack.

High-performance Computing Cluster

High-performance computing cluster (HPC) is a cloud computing cluster that uses CPM 2.0 as compute nodes and provides high-speed RDMA network connection. It can be widely used in large-scale computing scenarios such as automotive simulation, fluid dynamics, and molecular dynamics. It also provides high-performance heterogeneous resources to support scenarios including large-scale machine learning and training.

For more information about CVM instance types, see Instance Types.

Recommended Model for Common Use Cases

<table>
<thead>
<tr>
<th>Use Case</th>
<th>Common Software</th>
<th>Description</th>
<th>Recommended Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web service</td>
<td>Nginx Apache</td>
<td>The Web service generally covers personal website, blog, and large-scale ecommerce website. This use case requires a balance of compute, storage, and memory resources. We recommend <strong>Standard</strong> instances.</td>
<td><strong>Standard S and SA</strong></td>
</tr>
<tr>
<td>Middleware</td>
<td>Kafka MQ</td>
<td>The message queue service requires relatively balanced compute and memory resources. We recommend <strong>Standard</strong> instances using cloud disk as storage.</td>
<td><strong>Standard S Computing C</strong></td>
</tr>
<tr>
<td>Database</td>
<td>MySQL</td>
<td>The database business requires extremely high I/O performance. We recommend instances using SSD cloud disks and local disks. When selecting an instance using local disk, remember to back up data to avoid data loss.</td>
<td><strong>High I/O IT Memory Optimized M</strong></td>
</tr>
<tr>
<td>Cache</td>
<td>Redis Memcache</td>
<td>The cache business has a high requirement for memory and moderate requirement for computing</td>
<td><strong>Memory Optimized M</strong></td>
</tr>
<tr>
<td>Application Area</td>
<td>Example Software</td>
<td>Business Requirements</td>
<td>Recommended Instances</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------</td>
<td>-----------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Big data</td>
<td>Hadoop ES</td>
<td>Mass storage and moderate I/O throughput.</td>
<td>Big Data instances. When selecting an instance using local disk, remember to back up data to avoid data loss.</td>
</tr>
<tr>
<td>High performance computing</td>
<td>StarCCM WRF-Chem</td>
<td>Requires both the ultimate single-machine computing power and the efficient multi-machine scaling.</td>
<td>HPC with the high-speed RDMA network connection or Compute instances.</td>
</tr>
<tr>
<td>Virtualization</td>
<td>Kvm OpenStack</td>
<td>Requires the nested virtualization of a cloud server without incurring additional performance overhead while maintaining the virtualization capability like a physical machine.</td>
<td>CPM 2.0 products.</td>
</tr>
<tr>
<td>Video rendering</td>
<td>Unity UE4</td>
<td>Requires supporting graphic and image processing APIs, such as DirectX and OpenGL.</td>
<td>GPU Rendering GN7vw instances.</td>
</tr>
<tr>
<td>AI-based computing</td>
<td>TensorFlow CUDA</td>
<td>Requires the parallel processing capability, high GPU computing power, and video memory.</td>
<td>GPU Computing HPC</td>
</tr>
</tbody>
</table>

### Relevant Products

**Associated Tencent Cloud services**

You can purchase other Tencent Cloud services to work with CVM instances as needed. This document takes building a website as an example to describe the associated Tencent Cloud services.
Other Tencent Cloud services

You can also select other Tencent Cloud services to meet your specific requirements. For example, after deploying applications, you can use the following Tencent Cloud services to implement disaster recovery to ensure the system robustness and provide data security:

- **Snapshot Overview**
  Snapshot provides a convenient and efficient data protection service, which is also a very important and effective data disaster recovery measure. Snapshots are recommended for business scenarios including daily data backup, quick data recovery, application of multiple replicas of production data, and quick environment deployment. Creating snapshots will incur a small fee, as detailed in [Snapshot Billing Overview](#).

- **Tencent Cloud Observability Platform Product Overview**
  Setting alarm rules for cloud resources is also vital to business operation. You can view comprehensive information such as resource utilization, application performance and operation status of the Tencent Cloud services on Tencent Cloud Observability Platform (TCOP). The platform also provides features such as multi-metric monitoring, custom alarms, cross-region and cross-project instance grouping, dashboards for visual monitoring, and Prometheus hosting. TCOP can help you detect and handle emergencies in Tencent Cloud services, thereby enhancing system stability, improving OPS efficiency, and reducing OPS costs.

- **Tencent Cloud Load Balancer**
  You can use the Tencent Cloud Load Balancer (CLB) service to protect your business from single points of failure. CLB virtualizes multiple CVM instances in the same region into a high-performance and high-availability application service pool by setting a virtual IP address (VIP) and then distributes the network requests from clients to the pool in the manner specified by the application.
CLB checks the health of the instances in the pool and automatically isolates unhealthy ones, thus resolving single points of failure issues and improving the overall service capabilities of the applications.

References

- Regions and AZs
- Instance Types
Running a personal website or forum is one of the most common things people do after they purchase a CVM.

Note
You can also use Lighthouse to "quickly build a website" by simply selecting the required application image during creation, with no need to configure it by yourself. For more information, see Purchase Methods.

Setting Up a Website Manually

Tencent Cloud provides various types of website setup tutorials for mainstream website systems. The setup methods can be divided into image deployment and manual setup, wit the following features respectively:

<table>
<thead>
<tr>
<th>Comparison Item</th>
<th>Image Deployment</th>
<th>Manual Setup</th>
</tr>
</thead>
<tbody>
<tr>
<td>How to set up</td>
<td>Select a system image in Tencent Cloud Marketplace for direct installation and deployment.</td>
<td>Install the required software manually, which can be customized.</td>
</tr>
<tr>
<td>Advantage</td>
<td>The software version is relatively fixed.</td>
<td>The version can be selected flexibly.</td>
</tr>
<tr>
<td>Comparison Item</td>
<td>Image Deployment</td>
<td>Manual Setup</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Time required</td>
<td>Relatively short, with quick deployment.</td>
<td>Relatively long, where you need to install needed software by yourself.</td>
</tr>
<tr>
<td>Difficulty level</td>
<td>Simple.</td>
<td>You need to know how to install software manually and which version to use.</td>
</tr>
</tbody>
</table>

**Instructions**

Use the following table to choose a website that suits your needs.

<table>
<thead>
<tr>
<th>Type</th>
<th>Setup</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WordPress</td>
<td>Building a WordPress Website (Linux)</td>
<td>WordPress is a blogging platform developed with PHP. You can use it as a content management system, or use it to create websites on services that support PHP and MySQL databases.</td>
</tr>
<tr>
<td></td>
<td>Building a WordPress Website (Linux)</td>
<td></td>
</tr>
<tr>
<td>Discuz!</td>
<td>Building Up a Discuz! Forum</td>
<td>Discuz! is a popular forum software built on PHP and MySQL. You only need to configure a few item to get it up and running.</td>
</tr>
<tr>
<td>LNMP</td>
<td>Manual Setup of LNMP (CentOS 7)</td>
<td>LNMP is a common web service architecture which consists of Nginx, MySQL/MariaDB and PHP running on Linux.</td>
</tr>
<tr>
<td></td>
<td>Manual Setup of LNMP (CentOS 6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manual Setup of LNMP (openSUSE)</td>
<td></td>
</tr>
<tr>
<td>LAMP</td>
<td>Manual Setup of LAMP</td>
<td>LAMP is a common web service architecture which consists of Apache, MySQL/MariaDB, and PHP running on Linux.</td>
</tr>
<tr>
<td>WIPM</td>
<td>Manual Setup of WIPM</td>
<td>WIPM stands for a web service architecture which consists of IIS, PHP and MySQL running on Windows.</td>
</tr>
<tr>
<td>Drupal</td>
<td>Setting up</td>
<td>Drupal is a Content Management Framework (CMF) written in PHP. It</td>
</tr>
<tr>
<td>Drupal</td>
<td>consists of a Content Management System (CMS) and a PHP development framework. You can use it to run a personal blog or corporate website.</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Ghost</td>
<td>Setting up a Ghost Blog</td>
<td></td>
</tr>
<tr>
<td>Ghost</td>
<td>Ghost is a free and open source blogging platform written in JavaScript and distributed under the MIT License, designed to simplify the process of online publishing for individual bloggers as well as online publications.</td>
<td></td>
</tr>
<tr>
<td>Microsoft SharePoint 2016</td>
<td>Building Microsoft SharePoint 2016</td>
<td></td>
</tr>
<tr>
<td>Microsoft SharePoint 2016</td>
<td>Microsoft SharePoint is the abbreviation of Microsoft SharePoint Portal Server, a portal site that allows enterprises to develop smart portals. It seamlessly connects teams and knowledge to enable you to better utilize relevant information in business processes and work more efficiently.</td>
<td></td>
</tr>
</tbody>
</table>

**Related Operations**

You need to perform various operations such as domain name registration, ICP filing, and DNS configuration for your personal website before it can be accessed from the internet. Prepare an available domain name after you deploy your personal website in CVM and plan to publish your website to the internet.
Building an Environment
References Overview

Overview

This document provides reference for building development environments on Tencent Cloud CVM. If you do not have a CVM yet, you can purchase one via the CVM purchase page.

Directions

Refer to the following documents to manually build an environment.

- Setting up LNMP
- Setting up LAMP Manually
- Setting up Java Web
- Manually Building an WIPM Environment
- Setting up Node.js

If you have any questions when building an environment, see About Building an Environment for troubleshooting.
Install and Configure IIS

Overview

This document describes how to add and install IIS roles on a CVM instance with Windows Server 2012 R2 or Windows Server 2008.

Directions

Windows Server 2012 R2

1. Log in to Windows CVM.

2. On the desktop, click and open Server Manager, as shown below:

![Server Manager screenshot](image-url)
3. Click **Add roles and features** and enter the “Add Roles and Features Wizard” window.

4. In the pop-up window, click **Next** and enter the “Select installation type” page.

5. Select **Role-based or feature-based installation** and click **Next** twice, as shown below:

![Select installation type](image)

6. Check **Web Server (IIS)** on the “Select server roles” page, as shown below:

   The “Add features that are required for Web Server (IIS)” dialog box will pop up.
Select server roles

Before You Begin
Installation Type
Server Selection

Server Roles

Features
Confirmation
Results

Select one or more roles to install on the selected server.

Roles

- Active Directory Lightweight Directory Services
- Active Directory Rights Management Services
- Application Server
- DHCP Server
- DNS Server
- Fax Server
- File and Storage Services (1 of 12 installed)
- Hyper-V
- Network Policy and Access Services
- Print and Document Services
- Remote Access
- Remote Desktop Services
- Volume Activation Services
- Web Server (IIS)
- Windows Deployment Services
- Windows Server Essentials Experience
- Windows Server Update Services

Description

Web Server (IIS) provides a reliable, manageable, and scalable Web application infrastructure.
7. Click **Add Features** in the pop-up dialog box, as shown below:

![Add Roles and Features Wizard](image)

Add features that are required for Web Server (IIS)?

The following tools are required to manage this feature, but do not have to be installed on the same server.

- Web Server (IIS)
- Management Tools
  - [Tools] IIS Management Console

Include management tools (if applicable)

![Add Features](image)

8. Click **Next**.
9. On the **Features** page, check **.NET Framework 3.5 Features** and click **Next** twice, as shown below:
0. On the **Role Services** page, check **CGI** and click **Next**, as shown below:
1. Review your installation selections and click **Install**. Wait for the installation process to complete.

![Confirm installation selections](image)

2. When the installation has completed, open a browser on CVM and visit [http://localhost/](http://localhost/) to verify if IIS has been successfully installed.
If the following page appears, it indicates that IIS has been successfully installed.

Windows Server 2008

1. Log in to Windows CVM.

2. On the desktop, click and open **Server Manager**, as shown below:
3. Select Roles in the left sidebar, and click Add Roles in the right panel, as shown below:

![Server Manager with Roles panel open](image)

4. Click Next in the “Add Roles Wizard” window, as shown below:

![Add Roles Wizard window](image)
5. On the “Server Roles” page, check **Web Server (IIS)**, and click **Next** twice, as shown below:

![Select Server Roles](image1)

6. On the **Role Services** page, check **CGI** and click **Next**, as shown below:

![Select Role Services](image2)
7. Review your installation selections and click **Install**. Wait for the installation process to complete.

8. When the installation has completed, open a browser on CVM and visit `http://localhost/` to verify if IIS has been successfully installed.
If the following page appears, it indicates that IIS has been successfully installed.
Setting up LNMP

Manual Setup of LNMP (CentOS 8)

Last updated : 2022-03-21 15:19:40

Overview

The LNMP environment is a website server architecture consisting of Nginx, MySQL or MariaDB, and PHP running on Linux. This document describes how to manually set up the LNMP environment on a Tencent Cloud CVM.

To manually set up the LNMP environment, you should familiarize yourself with common Linux commands and understand the usage and version compatibility of the software to be installed.

Software

The following software is used to build the LNMP environment.

CentOS is a distribution of the Linux operating system. This document uses CentOS 8.0 as an example.

Nginx is a web server. This document uses Nginx 1.18.0 as an example.

MySQL is a database software. This document uses MySQL 8.0.21 as an example.

PHP is a scripting language. This document uses PHP 7.4.11 as an example.

Prerequisites

A Linux CVM is required to set up a LNMP environment. If you have not purchased a Linux CVM yet, see Customizing Linux CVM Configurations.

Directions

Step 1: log in to a Linux instance

See Log into Linux Instance Using Standard Login Method. You can also use other login methods that you are more comfortable with:

- Log in to Linux Instances via Remote Login Tools
- Log in to Linux Instances via a SSH Key
Step 2: install and configure Nginx

1. Run the following command to install Nginx.

```
Note:
This document takes installing Nginx 1.18.0 as an example. You can view Nginx installation package to obtain more versions that are compatible with CentOS 8.

dnf -y install http://nginx.org/packages/centos/8/x86_64/RPMS/nginx-1.18.0-1.el8.ngx.x86_64.rpm
```

2. Run the following command to view the Nginx version.

```
nginx -v
```

If the following result is returned, it indicates that Nginx has been successfully installed.

```
nginx version: nginx/1.18.0
```

3. Run the following command to check the Nginx configuration file path.

```
cat /etc/nginx/nginx.conf
```

The /etc/nginx/conf.d/*.conf under the include configuration item indicates the default path of the Nginx configuration file.

4. Run the following commands in sequence to back up the configuration file under the default path.

```
cd /etc/nginx/conf.d

 cp default.conf default.conf.bak
```

5. Run the following command to open the default.conf file.

```
vim default.conf
```

6. Press i to switch to the edit mode to modify the default.conf file.
7. Add “index.php” to index under location, as shown below:

```
location / {
    root /usr/share/nginx/html;
    index index.html index.htm index.php;
}
```

8. Delete the prefixed `#` of `location ~ \\.php$` and modify the following configuration items:
   - Change `root` to your website root directory. This document uses `/usr/share/nginx/html;` as an example.
   - Change `fastcgi_pass` to `unix:/run/php-fpm/www.sock;`. This configuration should be the same as `listen` in the `/etc/php-fpm.d/www.conf` file, because Nginx is associated with PHP-FPM through UNIX sockets.
   - Replace `/scripts$fastcgi_script_name;` after `fastcgi_param SCRIPT_FILENAME` with `$document_root$fastcgi_script_name;`.

   The result should be as follows:

```
location ~ \\.php$ {
    root /usr/share/nginx/html;
    fastcgi_pass unix:/run/php-fpm/www.sock;
    fastcgi_index index.php;
    fastcgi_param SCRIPT_FILENAME $document_root$fastcgi_script_name;
    include fastcgi_params;
}
```

9. Press Esc and enter `:wq` to save and close the file.

10. Run the following commands in sequence to enable Nginx autostart.

```
systemctl start nginx
systemctl enable nginx
```

**Step 3: install and configure MySQL**

1. Run the following command to install MySQL.

```
dnf -y install @mysql
```

2. Run the following command to view the MySQL version.
If the following result is returned, it indicates that MySQL has been successfully installed.

```bash
mysql -V
```

3. Run the following commands in consequence to enable MySQL autostart.

```bash
systemctl enable --now mysqld

systemctl status mysqld
```

4. Run the following command to complete security configurations and set password for MySQL

```bash
mysql_secure_installation
```

Perform the following steps:

1. Enter `y` and press **Enter** to start configurations.
2. Choose a password policy. A strong password policy is recommended. Enter `2` and press **Enter**.
   - 0: indicates a loose policy.
   - 1: indicates a medium policy.
   - 2: indicates a strict policy.
3. Set the password for MySQL and press **Enter**. The password you entered will not be displayed by default.
4. Re-enter your password, press **Enter** and enter `y` to confirm the password.
5. Enter `y` and press **Enter** to remove anonymous users.
6. Configure whether to disable the remote connection to MySQL:
   - Yes: enter `y` and press **Enter**.
   - No: enter `n` and press **Enter**.
7. Enter `y` and press **Enter** to delete the test library and access permission to it.
8. Enter `y` and press **Enter** to reload the authorization table.

**Step 4: install and configure PHP**

1. Run the following commands in sequence to add and update EPEL repository.

```bash
dnf -y install epel-release
```
2. Run the following commands in sequence to delete the cached unnecessary software package and update the software repository.

```bash
dnf clean all

dnf makecache
```

3. Run the following command to install the REMI repository.

```bash
Note:
Skip this step if you install PHP of version other than 7.4.11.

dnf -y install https://rpms.remirepo.net/enterprise/remi-release-8.rpm
```

4. Run the following command to start the PHP 7.4 component.

```bash
dnf module install php:remi-7.4
```

5. Run the following command to install the required PHP components.

```bash
```

6. Run the following command to view the PHP version.

```bash
php -v
```

If the following result is returned, it indicates that PHP has been successfully installed.

```bash
PHP 7.4.11 (cli) (built: Sep 29 2020 10:17:06) ( NTS )
Copyright (c) The PHP Group
```
7. Run the following command to open the `www.conf` file.

```bash
vi /etc/php-fpm.d/www.conf
```

8. Press `i` to switch to the edit mode and modify the `www.conf` file.

9. Change `user = apache` to `user = nginx` and `group = apache` to `group = nginx`, as shown below.

```
# RPM: apache user chosen to provide access to the same directories as httpd
user = nginx
# RPM: Keep a group allowed to write in log dir.
group = nginx
```

0. Press `Esc` and enter `:wq` to save and close the file.

1. Run the following commands in sequence to start PHP-FPM and enable PHP-FPM autostart.

```bash
systemctl start php-fpm
systemctl enable php-fpm
```

### Verifying the Environment Configuration

1. Run the following command to create a test file.

```bash
Note:
This document uses `/usr/share/nginx/html` that you configured for your website root directory in Nginx as an example.
2. Enter the following URL in your browser and verify whether the environment has been successfully configured. For more information about how to obtain the public IP address of the instance, see [Getting Public IP Addresses](http://Public IP address of the CVM instance/index.php).

If the following appears, the environment has been successfully configured.

![PHP Version 7.4.11](image)

**Relevant Operations**

After the LNMP environment is built, you can [manually build a WordPress website](#) to familiarize yourself with CVM and its features.

**FAQs**

If you encounter a problem when using CVM, refer to the following documents for troubleshooting as needed:
For issues regarding CVM login, see Password Login and SSH Key Login and Login and Remote Access.

For issues regarding the CVM network, see IP Address and Port.

For issues regarding CVM disks, see System and Data Disks.
Manual Setup of LNMP (CentOS 7)

Overview

The LNMP environment is a website server architecture consisting of Nginx, MySQL or MariaDB, and PHP running on Linux. This document describes how to manually set up the LNMP environment on a Tencent Cloud CVM.

To manually set up the LNMP environment, you should familiarize yourself with common Linux commands such as installing software via YUM in CentOS, and understand the usage and version compatibility of the software to be installed.

Note:
It's recommended that you can configure the LNMP environment through the image environment of Tencent Cloud marketplace, and it may take a long time to set up the LNMP environment manually.

Software

The following software is used to build the LNMP environment.

- **Linux**: Linux operating system. This document uses CentOS 7.6 as an example.
- **Nginx**: web server. This document uses Nginx 1.17.7 as an example.
- **MariaDB**: database. This document uses MariaDB 10.4.8 as an example.
- **PHP**: scripting language. This document uses PHP 7.2.22 as an example.

Prerequisite

Setting up a LNMP environment requires a Linux CVM. If you have not purchased one yet, see [Getting Started with Linux CVMs](#).

Directions

**Step 1: log in to a Linux instance**
Log in to the Linux instance using standard login method. You can also use any of the following login methods you are comfortable with:

- Logging in to Linux Instances via Remote Login Tools
- Logging into Linux Instance via SSH Key

**Step 2: install Nginx**

1. Run the following command to create a file named `nginx.repo` under `/etc/yum.repos.d/`.

   ```bash
   vi /etc/yum.repos.d/nginx.repo
   ```

2. Press `i` to switch to the editing mode and enter the following.

   ```ini
   [nginx]
   name = nginx repo
   baseurl = https://nginx.org/packages/mainline/centos/7/$basearch/
   gpgcheck = 0
   enabled = 1
   ```

3. Click `Esc` and enter `:wq` to save and close the file.

4. Run the following command to install Nginx.

   ```bash
   yum install -y nginx
   ```

5. Run the following command to open the `default.conf` file.

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

6. Press `i` to switch to the edit mode to modify the `default.conf` file.

7. Find `server {...}` and replace the content inside the curly brackets with the following. This is to cancel the listening of the IPv6 address and configure Nginx to realize linkage with PHP.

   ```plaintext
   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;
}
}

8. Press Esc and enter :wq to save and close the file.

9. Run the following command to start Nginx.

    systemctl start nginx

0. Run the following command to enable Nginx autostart.

    systemctl enable nginx

1. Enter the following URL in your local browser and verify whether the Nginx service is working properly.

    http://[Public IP address of the CVM instance]
If the following appears, Nginx has been successfully installed and configured.

```
Welcome to nginx!

If you see this page, the nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to nginx.org.
Commercial support is available at nginx.com.

Thank you for using nginx.
```

Step 3: install a database

1. Run the following command to check if MariaDB is already installed.

   ```
   rpm -qa | grep -i mariadb
   ```

   If the following appears, MariaDB is already installed.

   ```
   [root@VM_0_3_centos ~]# rpm -qa | grep -i mariadb
   MariaDB-compat-10.2.4-1.el7.centos.x86_64
   MariaDB-client-10.2.4-1.el7.centos.x86_64
   MariaDB-common-10.2.4-1.el7.centos.x86_64
   MariaDB-server-10.2.4-1.el7.centos.x86_64
   ```

   To avoid conflicts between different versions, run the following command to remove the installed MariaDB.

   ```
   yum -y remove [Package name]
   ```

   • If nothing is returned, MySQL has not been installed. In this case, proceed to the next step.

2. Execute the following command to create the MariaDB.repo file under /etc/yum.repos.d/.

   ```
   vi /etc/yum.repos.d/MariaDB.repo
   ```

3. Press i to switch to edit mode and enter the following content to add MariaDB.
Note:

- Different operating systems require different versions of MariaDB. Download MariaDB that is compatible with your operating system.
- If your CVM has private network access, change `mirrors.cloud.tencent.com` to the private network address `mirrors.tencentyun.com`. In this way, your public network traffic will not be affected and the access is faster.

```
# MariaDB 10.4 CentOS repository list - created 2019-11-05 11:56 UTC
# http://downloads.mariadb.org/mariadb/repositories/
[mariadb]
name = MariaDB
baseurl = https://mirrors.cloud.tencent.com/mariadb/yum/10.4/centos7-amd64
gpgkey=https://mirrors.cloud.tencent.com/mariadb/yum/RPM-GPG-KEY-MariaDB
gpgcheck=1
```

4. Press `Esc`, enter `:wq`, save the file and return.

5. Run the following command to install MariaDB. Please pay attention to the installation progress and wait for the installation to complete.

   ```
yum -y install MariaDB-client MariaDB-server
   ```

6. Run the following command to start the MariaDB service.

   ```
systemctl start mariadb
   ```

7. Run the following command to enable MariaDB autostart.

   ```
systemctl enable mariadb
   ```

8. Run the following command to verify that MariaDB is successfully installed.

   ```
mysql
```
If the following appears, MariaDB has been successfully installed.

```
[root@VM_0_135_centos ~]# systemctl start mariadb
[root@VM_0_135_centos ~]# mysql
Welcome to the MariaDB monitor. Commands end with ; or \
g.
Your MariaDB connection id is 8
Server version: 10.4.8-MariaDB MariaDB Server
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
MariaDB [(none)]>
```

9. Run the following command to exit MariaDB.

```
\q
```

### Step 4: install and configure PHP

1. Run the following commands to update the software source of PHP in Yum.

   ```sh
   rpm -Uvh https://mirror.webtatic.com/yum/el7/webtatic-release.rpm
   ```

2. Run the following command to install the packages required for PHP 7.2.

   ```sh
   yum -y install mod_php72w.x86_64 php72w-cli.x86_64 php72w-common.x86_64 php72w-mysqlnd php72w-fpm.x86_64
   ```

3. Run the following command to start the PHP-FPM service.

   ```sh
   systemctl start php-fpm
   ```

4. Run the following command to enable PHP-FPM autostart.

   ```sh
   systemctl enable php-fpm
   ```
Verifying the Environment Configuration

Follow these steps to verify that the LNMP environment has been built successfully.

1. Run the following command to create a test file.
   ```
   ```

2. Run the following command to restart the Nginx service.
   ```
   systemctl restart nginx
   ```

3. Enter the following URL in a local browser to check whether the environment configuration is successful.
   ```
   http://[Public IP address of the CVM instance]
   ```

If the following appears, the environment has been successfully configured.

![PHP Version 7.2.22](image)

Related Operations
After the LNMP environment is built, you can manually build a WordPress website to familiarize yourself with CVM and its features.

FAQs

If you encounter a problem when using CVM, refer to the following documents for troubleshooting:

- CVM login: Password Login and SSH Key Login and Login and Remote Access.
- CVM network: IP Address and Port.
- CVM disks: System and Data Disks.
Manual Setup of LNMP (CentOS 6)

Overview

The LNMP environment is a website server architecture consisting of Nginx, MySQL or MariaDB, and PHP running on Linux. This document describes how to manually set up the LNMP environment on a Tencent Cloud CVM.

To manually set up the LNMP environment, you should familiarize yourself with common Linux commands such as installing software via YUM in CentOS, and understand the usage and version compatibility of the software to be installed.

Note:
It's recommended that you can configure the LNMP environment through the image environment of Tencent Cloud marketplace, and it may take a long time to set up the LNMP environment manually.

Software

The following software is used to build the LNMP environment.

CentOS is a distribution of the Linux operating system. This document uses CentOS 6.9 as an example.

Nginx is a web server. This document uses Nginx 1.17.5 as an example.

MySQL is a database software. This document uses MySQL 5.1.73 as an example.

PHP is a scripting language. This document uses PHP 7.1.32 as an example.

Prerequisite

Setting up a LNMP environment requires a Linux CVM. If you have not purchased one yet, see Getting Started with Linux CVMs.

Directions

Step 1: log in to a Linux instance
Log in to the Linux instance using standard login method. You can also use any of the following login methods you are comfortable with:

- Logging in to Linux Instances via Remote Login Tools
- Logging in to Linux Instance via SSH Key

**Step 2: install Nginx**

1. Run the following command to create a file named `nginx.repo` under `/etc/yum.repos.d/`.
   ```bash
   vi /etc/yum.repos.d/nginx.repo
   ```

2. Press `i` to switch to the editing mode and enter the following.
   ```bash
   [nginx]
   name=nginx repo
   baseurl=https://nginx.org/packages/mainline/centos/6/$basearch/
   gpgcheck=0
   enabled=1
   ```

3. Click `Esc` and enter `:wq` to save and close the file.

4. Run the following command to install Nginx.
   ```bash
   yum install -y nginx
   ```

5. Run the following command to open the `default.conf` file.
   ```bash
   vim /etc/nginx/conf.d/default.conf
   ```

6. Press `i` to switch to the edit mode to modify the `default.conf` file.

7. Find `server{...}` and replace the content inside the curly brackets with the following. This is to cancel the listening of the IPv6 address and configure Nginx to realize linkage with PHP.
   ```bash
   server {
   listen 80;
   root /usr/share/nginx/html;
   ```
8. Press Esc and enter :wq. Save and close the file.

9. Run the following command to start Nginx.

```
service nginx start
```

0. Run the following commands to automatically launch Nginx at startup.

```
chkconfig --add nginx
chkconfig nginx on
```

1. Enter the following URL in your local browser and verify whether the Nginx service is working properly.

```
http://[Public IP address of the CVM instance]
```
If the following appears, Nginx has been successfully installed and configured.

![Welcome to nginx!]

If you see this page, the Nginx web server is successfully installed and working. Further configuration is required.

For online documentation and support please refer to [nginx.org](http://nginx.org). Commercial support is available at [nginx.com](http://nginx.com).

Thank you for using Nginx.

---

Step 3: install a database

1. Run the following command to check whether MySQL has been already installed.

   ```bash
   rpm -qa | grep -i mysql
   ```

   If the following appears, MySQL has already been installed.

   ```bash
   [root@VM_0_41_centos ~]# rpm -qa | grep -i mysql
   mysql-server-5.7.3-8.el6_8.x86_64
   ```

   To avoid conflicts between different versions, run the following command to remove the existing MySQL.

   ```bash
   yum -y remove [Package name]
   ```

   If nothing is returned, MySQL has not been installed. In this case, proceed to the next step.

2. Run the following command to install MySQL.

   ```bash
   yum install -y mysql-devel.x86_64 mysql-server.x86_64 mysql-libs.x86_64
   ```

3. Run the following command to start MySQL.

   ```bash
   service mysqld start
   ```
4. Run the following commands to automatically launch MySQL at startup.

```
chkconfig --add mysqld
chkconfig mysqld on
```

5. Run the following command to verify whether MySQL has been successfully installed.

```
mysql
```

If the following appears, MariaDB has been successfully installed.

```
Welcome to the MySQL monitor. Commands end with ; or \
g.
Your MySQL connection id is 3
Server version: 5.5.59 MySQL Community Server (GPL)

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Oracle is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.

Type 'help;' or '\\h' for help. Type '\\c' to clear the current input statement.
```

6. Run the following command to exit MySQL.

```
\q
```

**Step 4: install and configure PHP**

1. Run the following commands to update the software source of PHP in Yum.

```
```

```
rpm -Uvh https://mirror.webtatic.com/yum/el6/latest.rpm
```
2. Run the following command to install the packages required for PHP 7.1.32.

```bash
yum -y install mod_php71w.x86_64 php71w-cli.x86_64 php71w-common.x86_64 php71w-mysqlnd php71w-fpm.x86_64
```

3. Run the following command to start the PHP-FPM service.

```bash
service php-fpm start
```

4. Run the following commands to automatically launch PHP-FPM at startup.

```bash
chkconfig --add php-fpm
chkconfig php-fpm on
```

**Verifying the Environment Configuration**

1. Run the following command to create a test file.

```bash
```

2. Run the following command to restart Nginx.

```bash
service nginx restart
```

3. In a local browser, visit the following URL to check whether the environment has been successfully configured.

```bash
http://[Public IP address of the CVM instance]
```
If the following appears, the environment has been successfully configured.

![PHP Version 7.1.32](image)

**Related Operations**

After the LNMP environment is built, you can manually build a WordPress website to familiarize yourself with CVM and its features.

**FAQs**

If you encounter a problem when using CVM, refer to the following documents for troubleshooting:

- CVM login: Password Login and SSH Key Login and Login and Remote Access.
- CVM network: IP Address and Port.
- CVM disks: System and Data Disks.
Manual Setup of LNMP (openSUSE)

Introduction

LNMP refers to a common web server architecture consisting of Nginx, MySQL or MariaDB, and PHP running on Linux. This article describes how to deploy LNMP on a Tencent Cloud Virtual Machine (CVM). You need to install several software packages on Linux. If you do not know how to perform software installation on Linux, refer to this article.

Software

This article uses the following software to build the LNMP environment:

- OS: openSUSE 42.3
- Web server: Nginx 1.14.2
- Database: MySQL 5.6.43
- Hypertext processor: PHP 7.0.7

Prerequisites

You have purchased a Linux CVM. If you have not yet, see Getting started with Linux CVMs.

Directions

Step 1: Logging in to a Linux instance

- Log in to a Linux instance in standard login mode (recommended). You can also use other login methods as needed:
  - Log in to a Linux instance by using remote login software.
  - Log in to a Linux instance through SSH.

Step 2: Adding image source

1. Log in to your CVM.
2. Run the following commands to add image source:

```bash
zypper ar https://mirrors.cloud.tencent.com/opensuse/distribution/leap/42.3/repo/oss suseOss
zypper ar https://mirrors.cloud.tencent.com/opensuse/distribution/leap/42.3/repo/non-oss suseNonOss
```

3. Run the following command to update the source you just added.

```bash
zypper ref
```

Step 3: Installing and configuring Nginx

1. Run the following command to install Nginx.

```bash
zypper install -y nginx
```

2. Run the following command to start the Ngnix server and set it to auto start when the CVM starts up.

```bash
systemctl start nginx
systemctl enable nginx
```

3. Run the following to edit the Nginx configuration file.

```bash
Vi /etc/nginx/nginx.conf
```

4. Press `i` to toggle edit mode.

5. Find `server{...}` and replace it with the following content:

```bash
server {
    listen 80;
    server_name localhost;
    #access_log /var/log/nginx/log/host.access.log main;
    location / {
      root /srv/www/htdocs/;
      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 /srv/www/htdocs/;
}
# pass the PHP scripts to FastCGI server listening on 127.0.0.1:9000
location ~ .php$ {
    root /srv/www/htdocs/;
    fastcgi_pass 127.0.0.1:9000;
    fastcgi_index index.php;
    fastcgi_param SCRIPT_FILENAME $document_root$fastcgi_script_name;
    include fastcgi_params;
}

7. When you finish, press **Esc** to exit edit mode. Then enter **:wq** to save the file and exit Vi.

8. Run the following command to restart the Nginx service.

```
systemctl restart nginx
```

9. Run the following command to create an index page called **index.html**.

```
vi /srv/www/htdocs/index.html
```

10. Press **i** to switch to edit mode and **Enter** the following.

```
<p>hello world!</p>
```

1. After you finish, press **Esc** to exit mode. Then enter **:wq** to save the file and exit Vi.

2. Access the public IP of your CVM on the browser to check if your Nginx is running properly.

   If the following appears, Nginx has been successfully installed and configured.
Step 4: Installing and configuring MySQL

1. Run the following command to install MySQL.

   ```
   zypper install -y mysql-community-server mysql-community-server-tools
   ```

2. Run the following command to start the MySQL service and set it to auto start when your CVM starts up.

   ```
   systemctl start mysql
   systemctl enable mysql
   ```

3. Run the following command to log in to MySQL.

   ```
   mysql -u root -p
   ```

   When you login for the first time, MySQL will ask you to setup a password. If you do not wish to do so, press Enter to skip the step.

   If the following appears, you have successfully logged in.

   ```
   VM_0_12_suse:~ # mysql -u root -p
   Enter password:
   Welcome to the MySQL monitor. Commands end with ; or \g. Your MySQL connection id is 4
   Server version: 5.6.43 openSUSE package
   Copyright (c) 2000, 2019, Oracle and/or its affiliates. All rights reserved.
   Oracle is a registered trademark of Oracle Corporation and/or its affiliates. Other names may be trademarks of their respective owners.
   Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
   mysql>
   ```

4. Run the following command to change the root password.

   ```
   update mysql.user set password = PASSWORD('NEW_PASSWORD') where user='root';
   ```
5. Run the following command to apply the configuration:

```
flush privileges;
```

6. Run the following command to exit MySQL.

```
\q
```

**Step 5: Installing PHP**

Run the following command to install PHP:

```
zypper install -y php7 php7-fpm php7-mysql
```

**Step 6: Configuring Nginx with PHP-FPM**

1. Run the following commands to navigate to `/etc/php7/fpm` and rename `php-fpm.conf.default` to `php-fpm.conf`.

```
cd /etc/php7/fpm
cp php-fpm.conf.default php-fpm.conf
```

2. Run the following commands to navigate to `/etc/php7/fpm/php-fpm.d` and rename `www.conf.default` to `www.conf`.

```
cd /etc/php7/fpm/php-fpm.d
cp www.conf.default www.conf
```

3. Run the following commands to start PHP-FPM and set it to auto start when your CVM starts up.

```
systemctl start php-fpm
systemctl enable php-fpm
```

**Verifying Your Setup**

1. Run the following command to create a file named index.php.
Vi /srv/www/htdocs/index.php

2. Press i to switch to edit mode and enter the following:

```php
<?php
    echo "hello new world!";
?>
```

3. Press Esc to exit edit mode. Then enter :wq to save the file and exit.

4. Access the public IP of your CVM on the browser.

   If the following appears, then your LNMP setup has been installed and configured successfully.

![hello new world!]

**See Also**

After the LNMP environment is built, you can use it to [set up a WordPress website](#) to familiarize yourself with your CVM and what it can do.

**FAQ**

If you encounter issues when using CVM, refer to the following documents for troubleshooting:

- For issues regarding CVM login, see [Password Login and SSH Key Login](#) and [Login and Remote Access](#).
- For issues regarding the CVM’s network, see [IP Addresses](#) and [Ports and Security Groups](#).
- For issues regarding CVM disks, see [System and Data Disks](#).
Setting up Node.js

Manual Setup of Node.js

Last updated: 2022-03-21 15:19:40

Introduction

This article describes how to deploy Node.js on a CVM and create a sample project.

To do this, you need to be familiar with common Linux commands such as Installing Software via YUM in a CentOS Environment and understand the versions of the installed software.

Software

Setting up Node.js involves:

- CentOS: a distribution of the Linux operating system. We use CentOS 7.6 in this article.
- Node.js: a JavaScript runtime environment. We use Node.js 10.16.3 and Node.js 6.9.5 in this article.
- npm: a package manager for JavaScript. We use npm 6.9.0 in this article to manage multiple Node.js versions.

Prerequisites

To set up Node.js, you need a Linux CVM. If you have not purchased one yet, see Getting Started with Linux CVMs.

Directions

Step 1: Logging in to a Linux instance

Log in to a Linux instance using WebShell (recommended). You can also use other login methods that you are comfortable with:

- Log in to a Linux instance using remote login software.
- Log in to a Linux Instance using SSH

Step 2: Installing Node.js

1. Run the following command to download the Node.js 64-bit install package for Linux.
wget https://nodejs.org/dist/v10.16.3/node-v10.16.3-linux-x64.tar.xz

Visit the Node.js official website for more information.

2. Run the following command to decompress the install package.

```
tar xvf node-v10.16.3-linux-x64.tar.xz
```

3. Run the following commands to create symbolic links.

```
ln -s /root/node-v10.16.3-linux-x64/bin/node /usr/local/bin/node
ln -s /root/node-v10.16.3-linux-x64/bin/npm /usr/local/bin/npm
```

Once created, you are able to use node and npm commands in any CVM directory.

4. Run the following commands to view Node.js and npm versions.

```
node -v
npm -v
```

Step 3: Installing multiple Node.js versions (optional)

This process allows you to install multiple Node.js versions. Developers can use this to quickly switch among versions.

1. Run the following command to install git.

```
yum install -y git
```

2. Run the following command to download the NVM source code and check for the newest version.
3. Run the following to configure NVM environment variables.

```bash
echo ". ~/.nvm/nvm.sh" >> /etc/profile
```

4. Run the following command to read system environment variables.

```bash
source /etc/profile
```

5. Run the following commands to view all Node.js versions.

```bash
nvm list-remote
```

6. Run the following commands to install multiple Node.js versions.

```bash
nvm install v6.9.5

nvm install v10.16.3
```

7. Run the following command to view all installed Node.js versions.

```bash
nvm ls
```

If the following appears, then the installation is successful and the current version in use is Node.js 10.16.3.

```
[nvml0VM_0_3_centos .nvml]# nvm ls

  v6.9.5
  
  v10.16.3 (default)
  system
  stable -> 10.16 (-> v10.16.3) (default)
  unstable -> 6.9 (-> v6.9.5) (default)
```

8. Run the following command switch to another version.

```bash
nvm use v6.9.5
```
Step 4: Creating a sample project

1. Run the following commands to create a file named `index.js` under the root path.

```bash
cd ~

vim index.js
```

2. Press `i` to enter edit mode and input the following in the `index.js` file:

```javascript
const http = require('http');
const hostname = '0.0.0.0';
const port = 7500;
const server = http.createServer((req, res) => {
    if (res.statusCode === 200) {
        res.setHeader('Content-Type', 'text/plain');
        res.end('Hello World\n');
    });
    server.listen(port, hostname, () => {
        console.log(`Server running at http://${hostname}:${port}/`);
    });
```

This article uses port 7500 in the `index.js` file. You can use other ports as needed.

3. Press `Esc` and input `:wq` to save the file and go back.

4. Run the following command to execute the Node.js project we just created.

```bash
node index.js
```

5. Open a browser window on your local machine and visit the following URL to check if the project has been executed successfully.
http://CVM_Public_IP:Port

If the following appears, Node.js is installed successfully.

Hello World

FAQ

If you encounter a problem when using CVM, refer to the following documents for troubleshooting based on your actual situation.

- For issues regarding CVM login, see Password Login and SSH Key Login and Login and Remote Access.
- For issues regarding the CVM network, see IP Addresses and Ports and Security Groups.
- For issues regarding CVM disks, see System and Data Disks.
Setting up Java Web
Manual Setup of Java Web

Introduction

This article describes how to set up a Java Web environment on a Linux CVM.

This requires you to be familiar with common Linux commands, such as Installing Software via YUM in a CentOS Environment, and understand the versions of the installed software.

Software

These are the software involved:

- CentOS is a distribution of the Linux operating system. We use CentOS 7.6 in this article.
- Apache Tomcat provides a "pure Java" HTTP web server environment in which Java code can run. We use Apache Tomcat 8.5.47.
- JDK, or Java Development Kit, is an implementation of the Java Platform. We use JDK 1.8.0_221 in this article.

Prerequisites

Setting up a Java Web environment requires a Linux CVM. If you have not purchased one yet, see Getting Started with Linux CVMs.

Directions

Step 1: Logging in to a Linux instance

- Log in to a Linux instance using WebShell (recommended). You can also use other login methods that you are comfortable with:
  - Log in to a Linux instance using remote login software.
  - Log in to a Linux Instance using SSH

Step 2: Installing JDK
1. Download the JDK installation file. Go to the Java SE download page to select a version and download it.

   Download the JDK file, save it locally, and upload it to your CVM. Otherwise, decompressing the file will result in errors.
   - If you are using Windows, use WinSCP to upload the file.
   - If you are using MacOS or Linux, use SCP to upload the file.

2. Run the following command to create a directory for JDK installation.

   ```bash
   mkdir /usr/java
   ```

3. Run the following command to decompress JDK to the directory.

   ```bash
   tar xzf jdk-8u221-linux-x64.tar.gz -C /usr/java
   ```

4. Run the following command to open `/etc/profile`.

   ```bash
   vim /etc/profile
   ```

5. Press `i` to enter edit mode. Start a new line after `export PATH USER ...` and add the following:

   ```bash
   export JAVA_HOME=/usr/java/jdk1.8.0_221 (replace 1.8.0_221 with your JDK version number)
   export CLASSPATH=$JAVA_HOME/lib/tools.jar:$JAVA_HOME/lib/dt.jar:$JAVA_HOME/lib
   export PATH=$JAVA_HOME/bin:$PATH
   ```

   The result should be as follows:

   ```bash
   export PATH USER LOGNAME MAIL HOSTNAME HISTSIZE HISTCONTROL
   export JAVA_HOME=/usr/java/jdk1.8.0_221
   export CLASSPATH=$JAVA_HOME/lib/tools.jar:$JAVA_HOME/lib/dt.jar:$JAVA_HOME/lib
   export PATH=$JAVA_HOME/bin:$PATH
   ```

6. Press `Esc` and input `:wq` to save the file and go back.

7. Run the following command to read system environment variables.
source /etc/profile

8. Run the following command to check if JDK is installed properly.

java -version

If the following appears, the installation was successful.

```
[root@VM_0_71_centos ~]# java -version
java version "1.8.0_221"
Java(TM) SE Runtime Environment (build 1.8.0_221-b11)
Java HotSpot(TM) 64-Bit Server VM (build 25.221-b11, mixed mode)
```

Step 3: Installing Tomcat

1. Run the following command to download Tomcat source codes. Select a version that suits you.

Refer to the [Apache Tomcat official website](http://mirrors.tuna.tsinghua.edu.cn/apache/tomcat/tomcat-8/v8.5.47/bin/apache-tomcat-8.5.47.tar.gz) for more information.

```
wget http://mirrors.tuna.tsinghua.edu.cn/apache/tomcat/tomcat-8/v8.5.47/bin/apache-tomcat-8.5.47.tar.gz
```

2. Run the following command to decompress the file.

```
tar xzf apache-tomcat-8.5.47.tar.gz
```

3. Run the following command to move the directory that contains Tomcat to `/usr/local/tomcat`.

```
mv apache-tomcat-8.5.47 /usr/local/tomcat/
```

4. Run the following command to open `server.xml`.

```
vim /usr/local/tomcat/conf/server.xml
```
5. Find `<host ...='' appbase=''webapps''>` and press i to enter edit mode. Replace `appBase=''webapps'' =''' with='''the='' following:='''<dx-code-holder='''data-codeindex='''10'>

6. Press Esc and input :wq to save the file and go back.

7. Run the following command to create a file named setenv.sh:

   ```
   appBase="/usr/local/tomcat/webapps"
   ```

8. Press Enter to enter edit mode and input the following to set JVM memory variables:

   ```
   vi /usr/local/tomcat/bin/setenv.sh
   ```

9. Press Esc and input :wq to save the file and go back.

10. Run the following command to start Tomcat:

    ```
    JAVA_OPTS='Djava.security.egd=file:/dev/./urandom -server -Xms256m -Xmx496m -Dfile.encoding=UTF-8'
    ```

    If the following appears, Tomcat has been successfully started.

![Tomcat startup output]

---

**Verifying the Environment Configuration**

1. Run the following command to create a test file.

   ```
   /usr/local/tomcat/bin/startup.sh
   ```

2. Open a browser window on your local machine and visit the following URL to check whether the environment configuration was successful.
echo Hello World! > /usr/local/tomcat/webapps/ROOT/index.jsp

If the following results appear, the environment configuration was successful.

Hello World!

FAQ

If you encounter a problem when using CVM, refer to the following documents for troubleshooting based on your actual situation.

- For issues about CVM login, see Password Login and SSH Key Login and Login and Remote Access.
- For issues about the CVM network, see IP Addresses and Ports and Security Groups.
- For issues about CVM disks, see System and Data Disks.
Setting up LAMP manually
Manual Setup of LAMP

Scenario

LAMP is a common web service architecture run on Linux and consisting of Apache, MySQL/MariaDB, and PHP. This article describes how to set up LAMP on a Linux CVM.

You should be familiar with common Linux commands, such as Installing Software via YUM in a CentOS Environment, and understand the versions of the installed software.

Software

These are the software involved:

- CentOS is a distribution of the Linux operating system. We will use version 7.6 in this article.
- Apache is a web server software. We will use version 2.4.6 in this article.
- MariaDB is a database management system. We will use version 10.4.8 in this article.
- PHP is a scripting language. We will use version 7.0.33 in this article.

Prerequisites

You need a Linux CVM. If you have not purchased one yet, see Getting Started with Linux CVMs.

Instructions

Step 1: Logging in to a Linux instance

Log in to a Linux instance using WebShell (recommended). You can also use other login methods that you are comfortable with:

- Log in to a Linux instance using remote login software.
- Log in to a Linux Instance using SSH

Step 2: Installing Apache
1. Run the following command to install Apache.

   ```bash
   yum install httpd -y
   ```

2. Run the following commands to start Apache and set it to start automatically when the system starts.

   ```bash
   systemctl start httpd
   systemctl enable httpd
   ```

3. Open a browser window and visit the following URL to verify that Apache is working properly.

   ```markdown
   http://[Public IP address of the CVM instance]
   ```

   The following appears if Apache is installed properly:

   ![Testing 123](image)

   "This page is used to test the proper operation of the Apache HTTP server after it has been installed. If you can read this page it means that this site is working properly. This server is powered by CentOS."

---

### Step 3: Installing MariaDB

1. Run the following command to check if MariaDB is already installed.

   ```bash
   rpm -qa | grep -i mariadb
   ```

   - If the following appears, MariaDB is already installed.

     ```bash
     [root@VM_0_3_centos ~]# rpm -qa | grep -i mariadb
     MariaDB-compat-10.2.4-1.el7.centos.x86_64
     MariaDB-client-10.2.4-1.el7.centos.x86_64
     MariaDB-common-10.2.4-1.el7.centos.x86_64
     MariaDB-server-10.2.4-1.el7.centos.x86_64
     ```

   If that’s the case, run the following to remove MariaDB to avoid conflicts between different versions.

   ```bash
   yum -y remove [Package name]
   ```
If nothing is returned, MariaDB is not installed. In this case, proceed to the next step.

2. Run the following command to create a file named `MariaDB.repo` under `/etc/yum.repos.d/`.

   ```bash
   vi /etc/yum.repos.d/MariaDB.repo
   ```

3. Press `i` to switch to edit mode and input the following.

   ```
   # MariaDB 10.4 CentOS repository list - created 2019-11-05 11:56 UTC
   # http://downloads.mariadb.org/mariadb/repositories/
   [mariadb]
   name = MariaDB
   baseurl = http://yum.mariadb.org/10.4/centos7-amd64
   gpgkey=https://yum.mariadb.org/RPM-GPG-KEY-MariaDB
   gpgcheck=1
   ```

   For installation information for other versions, visit the [MariaDB official website](https://mariadb.org/).

4. Press `Esc` and input `:wq` to save the file and go back.

5. Run the following command to install MariaDB.

   ```bash
   yum -y install MariaDB-client MariaDB-server
   ```

6. Run the following commands to start MariaDB and set it to start automatically when the system starts.

   ```bash
   systemctl start mariadb
   systemctl enable mariadb
   ```

7. Run the following command to verify that MariaDB is successfully installed.

   ```bash
   mysql
   ```
If the following appears, MariaDB is successfully installed.

```
[root@VM_0_135_centos ~]# systemctl start mariadb
[root@VM_0_135_centos ~]# mysql
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 8
Server version: 10.4.8-MariaDB MariaDB Server

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]>
```

8. Run the following command to exit MariaDB.

```
\q
```

**Step 4: Installing and configuring PHP**

1. Run the following commands to update the software source of PHP in Yum.

```
rpm -Uvh https://mirror.webtatic.com/yum/el7/webtatic-release.rpm
```

2. Run the following command to install the packages required for PHP 7.0.33.

```
yum -y install php70w php70w-opcache php70w-mbstring php70w-gd php70w-xml php70w-pear php70w-fpm php70w-mysql php70w-pdo
```

3. Run the following command to edit the Apache configuration file.

```
vi /etc/httpd/conf/httpd.conf
```
4. Press `i` to enter edit mode and make the following changes:

```bash
# ServerName gives the name and port that the server uses to identify itself.  
# This can often be determined automatically, but we recommend you specify  
# it explicitly to prevent problems during startup.  
# If your host doesn't have a registered DNS name, enter its IP address here.  
# ServerName www.example.com:80
ServerName localhost:80
```

```bash
# Deny access to the entirety of your server's filesystem. You must  
# explicitly permit access to web content directories in other  
# <Directory> blocks below.  
#<Directory />  
  AllowOverride none  
  Require all granted  
</Directory>
```

```bash
# DirectoryIndex: sets the file that Apache will serve if a directory  
# is requested.  
<IfModule dir_module>  
  DirectoryIndex index.php index.html  
</IfModule>
```

```bash
# If the AddEncoding directives above are commented-out, then you  
# probably should define those extensions to indicate media types:  
# AddType application/x-compress .Z  
AddType application/x-gzip .gz .tgz  
AddType application/x-httpd-php .php  
AddType application/x-httpd-php-source .phps
```

i. Find `ServerName www.example.com:80` and start a new line below it. Input the following:

```
ServerName localhost:80
```
ii. Find Require all denied in <directory> and change it to Require all granted.

iii. Find <ifmodule dir_module=""> and change the content to DirectoryIndex index.php index.html.

iv. Start a new line below AddType application/x-gzip .gz .tgz and input the following:

```
AddType application/x-httpd-php .php
AddType application/x-httpd-php-source .phps
```

5. Press Esc and input :wq to save the file and go back.

6. Run the following command to restart Apache.

```
systemctl restart httpd
```

---

**Verifying the Environment Configuration**

1. Run the following command to create a test file.

```
```

2. Open a browser window on your local machine and visit the following URL to check whether the environment configuration is successful.

```
http://CVM Public IP/index.php
```
If the following appears, the LAMP environment is configured successfully.

Relevant Operations

After the LAMP environment is built, you can manually set up Drupal website.

FAQ

If you encounter a problem when using CVM, refer to the following documents for troubleshooting based on your actual situation.

- For issues regarding CVM login, see Password Login and SSH Key Login and Login and Remote Access.
- For issues regarding the CVM network, see IP Addresses and Ports and Security Groups.
- For issues regarding CVM disks, see System and Data Disks.
Manual Setup of WIPM Environment
Step2: Install and Configure PHP

Overview

This document uses a CVM running Windows Server 2012 R2 as an example to describe how to configure PHP 5.3 and earlier or later versions in a Windows CVM.

Preparations

- You have logged in to the Windows CVM and added and installed the IIS role in the CVM. For more information, see Installing IIS.
- You have obtained the public IP of the Windows CVM. For more information, see Getting Public IP Addresses.

Directions

Installing PHP 5.3 and earlier versions [] (id:jump1)

Note :
PHP official website no longer provides installation packages for versions earlier than PHP 5.2. If you need a version earlier than PHP 5.2, search and download it from the CVM. Alternatively, download the installation package locally and upload it to the CVM. For more information on how to upload files to a Windows CVM, see Uploading Files from Windows to a Windows CVM using MSTSC. The following steps use PHP 5.2.13 as an example.

1. Double-click php-xxxxx.msi to open the PHP installation package in the CVM.

2. Click Next.
3. On the “Web Server Setup” page, select **IIS FastCGI** and click **Next**, as shown in the following figure:

![Web Server Setup](image)

4. Complete PHP installation as prompted.

5. Create a PHP file such as `hello.php` in `C:/inetpub/wwwroot`.

6. In the newly created `hello.php` file, add the following and save the file:

```php
<?php
    echo "<title>Test Page</title>";
    echo "hello world";
?>
```

7. On the desktop, open the browser and visit `http://<public ip of the windows cvm>/hello.php` and check whether the environment is successfully configured.
If the page shown below appears, the configuration was successful.

Installing PHP versions later than PHP 5.3 [] (id:jump)

Versions later than PHP 5.3 do not have an installation package and use a zip file or debug pack for installation. The following steps describe how to install PHP in a Windows Server 2012 R2 environment using a zip file.

Downloading software

1. In the CVM, go to PHP official website and download the PHP zip file, as shown in the following figure:

Note:
- If your server is running Windows Server 64-bit (x64), you must select x86 Non Thread Safe to run PHP under IIS.
- If your server is running Windows Server 32-bit (x86), you need to replace IIS with Apache and select x86 Non Thread Safe.
2. Based on the name of the downloaded PHP file, download and install Visual C++ Redistributable Packages.

The following table lists Visual C++ Redistributable Packages that need to be downloaded and installed for the corresponding PHP files.
<table>
<thead>
<tr>
<th>PHP Zip File Name</th>
<th>Download Address of Visual C++ Redistributable Installation Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td>php-x.x.x-nts-Win32-VC16-x86.zip</td>
<td>Microsoft Visual C++ Redistributable for Visual Studio 2019 x86 version</td>
</tr>
<tr>
<td>php-x.x.x-nts-Win32-VC15-x86.zip</td>
<td>Microsoft Visual C++ Redistributable for Visual Studio 2017 x86 version</td>
</tr>
<tr>
<td>php-x.x.x-nts-Win32-VC14-x86.zip</td>
<td>Microsoft Visual C++ Redistributable for Visual Studio 2015 x86 version</td>
</tr>
</tbody>
</table>

For example, if the name of the downloaded PHP file is `PHP-7.1.30-nts-Win32-VC14-x86.zip`, download and install Microsoft Visual C++ Redistributable for Visual Studio 2015 x86 packages.

**Installation and configuration**

1. Decompress the downloaded PHP zip file, for example, to `C:\PHP`.
2. Copy the `php.ini-production` file in `C:\PHP` and change the file extension to `.ini` (i.e., rename it to `php.ini`), as shown in the following figure:

   ![Image of file structure]

3. On the desktop, click `Server Manager` to open **Server Manager**, as shown in the following figure:
4. In the left sidebar, click **IIS**.
5. In the IIS management window, right-click the server name in the **Server** column and choose **Internet Information Services (IIS) Manager**, as shown in the following figure:
6. In the "Internet Information Service (IIS) Manager" window, click the server name in the left sidebar to go to the server homepage, as shown in the following figure:
For example, click the 10_141_9_72 server name to go to the 10_141_9_72 homepage.

7. On the 10_141_9_72 homepage, double-click **Handler Mappings** to go to the "Handler Mappings" page, as shown in the following figure:
8. In the **Actions** column on the right, click **Add Module Mapping** to open the "Add Module Mapping" window.

9. In the "Add Module Mapping" window, enter the following information and click **OK**, as shown in the following figure:
The main parameters include:

- **Request path**: enter `*.php`.
- **Module**: select "FastCgiModule".
- **Executable (optional)**: select the php-cgi.exe file in the PHP zip file (i.e., `C:\PHP\php-cgi.exe`).
- **Name**: enter a custom name, such as FastCGI.

0. In the pop-up window, click **OK**.

1. Click the 10_141_9_72 server name in the left sidebar to return to the 10_141_9_72 homepage.
2. On the 10_141_9_72 homepage, double-click Default Document to go to the "Default Document" page, as shown in the following figure:

![Image of IIS Manager with Default Document configuration]

3. In the Actions column on the right, click Add to open the "Add Default Document" window.

4. In the "Add Default Document" window, enter index.php in Name and click OK, as shown in the following figure:
5. Click the 10_141_9_72 server name in the left sidebar to return to the 10_141_9_72 homepage.

6. On the 10_141_9_72 homepage, double-click FastCGI Settings to open the "FastCGI Settings" page, as shown in the following figure:
7. On the "FastCGI Settings" page, select the FastCGI application and click **Edit**, as shown in the following figure:
8. In the "Edit FastCGI Application" window, configure **Monitor changes to file** to the `php.ini` file path, as shown in the following figure:

![Edit FastCGI Application window](image)

9. In `C:\inetpub\wwwroot`, create a PHP file, such as `index.php`.

10. In the newly created `index.php` file, add the following and save the file.
1. On the desktop, open the browser and visit [http://localhost/index.php](http://localhost/index.php) to check whether the environment is configured successfully.

If the page shown below appears, the configuration was successful.

```php
<?php
phpinfo();
?>
```
Step3: Install and Build MySQL

Overview

This document describes how to install MySQL 8.0.19 on a CVM instance with the Windows Server 2012 R2 DataCenter 64-bit English installed.

SQL Server is more popular on Windows. However, it is commercial and requires you to obtain your own license. As an alternative, you can purchase a TencentDB for SQL Server instance.

Directions

Downloading MySQL

1. Log in to your CVM.
2. Open a browser and go to the MySQL official website to download the MySQL installation file.

Installing MySQL

1. Double-click the MySQL installation file. The Choosing a Setup Type window appears. Select Developer Default and click Next, as shown below:
2. In the **Check Requirements** window that appears, click **Execute** and resolve unmet requirements.

3. Click **Next**.

4. In the **Installation** window, click **Execute** to install the required packages.

5. Click **Next** when the package installation completes to open the **Product Configuration** window.

**Configuring MySQL**

**Configuring MySQL service**

1. In the **Product Configuration** window, click **Next**.

2. In the **High Availability** window, select **Standalone MySQL Server / Classic MySQL Replication** and click **Next**, as shown below.
3. In the **Type and Networking** window, keep the default configuration, and click **Next**.

   Note
   - TCP/IP network is enabled by default.
   - Port 3306 is used by default.

4. In the **Authentication Method** window, select **Use Legacy Authentication Method (Retain MySQL 5.x Compatibility)** and click **Next**.
In this document, this option is set to set up a WordPress website as an example. You can set it as needed.

**Authentication Method**

- **Use Strong Password Encryption for Authentication (RECOMMENDED)**
  MySQL 8 supports a new authentication based on improved stronger SHA256-based password methods. It is recommended that all new MySQL Server installations use this method going forward.

  **Attention:** This new authentication plugin on the server side requires new versions of connectors and clients which add support for this new 8.0 default authentication (caching_sha2_password authentication).

  Currently MySQL 8.0 connectors and community drivers which use libmysqlclient 8.0 support this new method. If clients and applications cannot be updated to support this new authentication method, the MySQL 8.0 Server can be configured to use the legacy MySQL Authentication Method below.

- **Use Legacy Authentication Method (Retain MySQL 5.x Compatibility)**
  Using the old MySQL 5.x legacy authentication method should only be considered in the following cases:
  - If applications cannot be updated to use MySQL 8 enabled Connectors and drivers.
  - For cases where re-compilation of an existing application is not feasible.
  - An updated, language specific connector or driver is not yet available.

  **Security Guidance:** When possible, we highly recommend taking needed steps towards upgrading your applications, libraries, and database servers to the new stronger authentication. This new method will significantly improve your security.
5. Set the password for the `root` user and click Next.

6. In the **Windows Service** window, keep the default configuration, and click **Next**.

7. In the **Apply Configuration** window, click **Execute**.

8. Click **Finish**.

**Configuring MySQL router**

1. In the **Product Configuration** window, click *Next.*
2. In the **MySQL Router Configuration** window, keep the default configuration and click **Finish**.

---

**Configuring MySQL samples**

1. In the **Product Configuration** window, click *Next*.
2. In the **Connect To Server** window, input the root password, and click **Check**.
3. After the password is successfully authenticated, click **Next**.

4. In the **Apply Configuration** window, click **Execute**.

5. Click **Finish** to complete the MySQL sample configuration.

6. In the **Product Configuration** window, click **Next**.

7. In the **Installation Complete** window, select the MySQL environment component you want to start and click **Finish**.
If MySQL Workbench as shown below starts, MySQL has been successfully installed.

Adding security group rules
Add an inbound rule to open the port 3306 to the security group that is bound to the CVM instance on which MySQL is installed.

For more information, see Adding Security Group Rules.
Building a Website

Overview

This document provides reference for building personal websites on Tencent Cloud CVM. If you do not have a CVM yet, you can purchase one via the CVM purchase page.

Step 1. Deploy a Website

To manually build and deploy your website, refer to:

- Setting up a Website
- Setting up WordPress
- Building Discuz! Forum
- Setting up Drupal
- Setting up a Ghost Blog

If you have any questions when setting up a website, see About Building a Website for troubleshooting.

Step 2. Publish a Website

To publish a deployed website to the internet and allow users to access it, you need to complete the domain name registration and resolution, and ICP filing (for websites running in the Chinese mainland).
Overview

WordPress is a blog platform developed using PHP. This document describes how to manually build WordPress on a CentOS 7.6 Tencent Cloud CVM.

To build WordPress, you must be familiar with common Linux commands, such as Installing Software via YUM (CentOS) and know how to use the software involved and their version compatibility.

Note

It's recommended that you can configure a personal blog by using a Tencent Cloud marketplace image. It may take a long time to set up WordPress manually.

Software

The following software is involved in building WordPress:

- Linux: Linux operating system. This document uses CentOS 7.6 as an example.
- Nginx: web server. This document uses Nginx 1.17.5 as an example.
- MariaDB: database. This document uses MariaDB 10.4.8 as an example.
- PHP: scripting language. This document uses PHP 7.2.22 as an example.
- WordPress: blog platform. This document uses WordPress 5.0.4 as an example.

Directions

Step 1. Logging in to the CVM

Log in to Linux instance (Web Shell). You can also use any of the following login methods you are comfortable with:

- Logging in to Linux Instances (Remote Login)
- Logging in to Linux Instance (SSH Key)
Step 2: Manually building the LNMP environment

LNMP, an acronym for Linux, Nginx, MariaDB, and PHP, is one of the most common runtime environments for web servers. After you create and log in to a CVM instance, you can build the LNMP environment by referring to Manual Setup of LNMP (CentOS 7).

Step 3: Configuring the database

Note
The user authentication method varies depending on the MariaDB version. For details, visit the MariaDB official website.

1. Run the following command to enter MariaDB:

   mysql

2. Run the following command to create a MariaDB database, named wordpress in this example:

   CREATE DATABASE wordpress;

3. Run the following command to create a user, user with the password 123456 in this example:

   CREATE USER 'user'@'localhost' IDENTIFIED BY '123456';

4. Run the following command to grant user all permissions to the wordpress database:

   GRANT ALL PRIVILEGES ON wordpress.* TO 'user'@'localhost' IDENTIFIED BY '123456';

5. Run the following command to set a password for root.

   Note
   MariaDB 10.4 for CentOS allows the root account to log in without a password. Run the following command to set a password for root and record it so you can remember it.
ALTER USER root@localhost IDENTIFIED VIA mysql_native_password USING PASSWORD('
Enter your password');

6. Run the following command to apply all configurations.

FLUSH PRIVILEGES;

7. Run the following command to exit MariaDB.

\q

Step 4: Installing and configuring WordPress

Downloading WordPress

Note
You can download the latest WordPress version from the official WordPress website.

1. Run the following command to delete the `index.php` file that is used to test PHP-Nginx configuration from the root directory of the website:

   ```bash
   rm -rf /usr/share/nginx/html/index.php
   ```

2. Run the following commands to navigate to the `/usr/share/nginx/html/` directory and download and decompress the WordPress installation package:

   ```bash
   cd /usr/share/nginx/html
   wget https://cn.wordpress.org/wordpress-5.0.4-zh_CN.tar.gz
   tar zxvf wordpress-5.0.4-zh_CN.tar.gz
   ```
Modifying the WordPress configuration file

1. Run the following commands to navigate to the WordPress installation directory, copy the content in the wp-config-sample.php file to the wp-config.php file, and save the original configuration file for backup:

   ```
   cd /usr/share/nginx/html/wordpress
   cp wp-config-sample.php wp-config.php
   ```

2. Run the following command to open and edit the new configuration file:

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

3. Press i to enter the editing mode. Find the MySQL part in the file and change related configuration to content in Configuring the WordPress database.

   ```
   // ** 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', '123456');
   /** MySQL hostname */
   define('DB_HOST', 'localhost');
   ```

4. After the modification is complete, press Esc and enter :wq to save the file and go back.

Step 5: Verifying WordPress installation

1. In the address box of the browser, type http://domain name or the public IP address of the CVM instance/wordpress folder, for example:

   ```
   http://192.xxx.xxx.xx/wordpress
   ```

   Press Enter to switch to the WordPress installation page and configure WordPress.

2. Enter the installation information as described in the following table based on the WordPress installation wizard and click Install WordPress.
<table>
<thead>
<tr>
<th>Required Information</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website title</td>
<td>WordPress website name</td>
</tr>
<tr>
<td>User Name</td>
<td>WordPress administrator name. For security purposes, use a name other than admin because admin can be easily cracked.</td>
</tr>
<tr>
<td>Password</td>
<td>Use the default strong password or a custom password. Do not use existing passwords and ensure that the password is saved in a secure place.</td>
</tr>
<tr>
<td>Email address</td>
<td>Email address used to receive notifications</td>
</tr>
</tbody>
</table>

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

**Related Operations**

You can set a domain name for your WordPress website. In this way, users can use the domain name instead of a complex IP address to visit your website. If you build a website just to learn the process, you can use an IP address. However, this method is not recommended.

**FAQs**

If you encounter a problem when using CVM, refer to the following documents for troubleshooting:

- CVM login: Password Login and SSH Key Login and Login and Remote Access.
- CVM network: IP Address and Port.
- CVM disks: System and Data Disks.
Building a WordPress Website (Windows)

Overview

WordPress is a blog platform written in PHP. This article describes how to install WordPress on Windows Server 2012.

Note

It's recommended that you can configure a personal blog by using a Tencent Cloud marketplace image. It may take a long time to set up the Discuz! forum manually.

Software

Although PHP version 5.6.20 and later and MySQL version 5.0 and later support WordPress, we recommend using PHP 7.3 and MySQL 5.6 or later versions for security reasons.

The following software is involved in building WordPress:

- Windows: this document uses Windows Server 2012 R2 Datacenter 64-bit as an example.
- Web server: IIS. This document uses IIS 8.5 as an example.
- MySQL 8.0.19 is used for database.
- PHP is a scripting language. This article uses PHP 7.1.30.
- WordPress is a blog platform. We use WordPress 5.9 in this article.

Directions

Step 1. Log in to the CVM

Log in to the Windows instance using RDP (recommended).

You can also use other login methods that you are more comfortable with: log in to a Windows CVM instance using a remote desktop.

Step 2. Setting up WIMP

See Manually Building a WIPM Environment.
1. Install IIS.
2. Deploy PHP 5.6.20 and later versions.
3. Install MySQL 5.6 and later versions.

**Step 3: Installing and configuring WordPress**

Note
You can download the latest WordPress version from the official WordPress website.

1. Download WordPress and decompress it into a directory on the CVM.
   For example, you can decompress it into `C:\wordpress`.

2. Click ![Windows](allery_orange.png) ![Download](allery_orange.png) **MySQL 5.6 Command Line Client** to open the MySQL command line client.

3. Run the following commands on the MySQL command line client to create a database for WordPress.
   For example, create a database named `wordpress`.
   ```
   create database wordpress;
   ```


5. Open the `wp-config.php` file with a text editor, and modify the relevant configuration information according to **Step 3: Installing and configuring WordPress** as shown below:

7. Click to open **Server Manager**.

8. On the left sidebar, select **IIS**. Click the name of the server in the **Server** column to the right. Select **Internet Information Services (IIS) Manager**. The **Internet Information Services (IIS) Manager** window appears.

9. In the **Internet Information Service (IIS) Manager** window, expand your server on the left sidebar and click your **website**. The website management page appears, as shown below:

0. Delete **websites** bound to port 80.

You can change the port to another unused port, such as 8080.

1. In the **Actions** column on the right, click **Add Website**.

2. In the pop-up window, enter the following information and click **OK**.

   - **Website name**: name of the website, such as `wordpress`.
   - **Application pool**: select **DefaultAppPool**.
   - **Physical path**: the directory that contains WordPress, such as `C:\wordpress`.

3. Find `php.ini` under the directory that contains PHP. Open it with a text editor and make the following changes:
i. Changes are different for different PHP versions.
   - For PHP 5.x, find `extension=php_mysql.dll` and delete the `;` at the beginning.
   - For PHP 7.x, find `extension=php_mysqli.dll` or `extension=mysql` and delete the `;` at the beginning.

ii. Find `extension_dir= "ext"` and delete the `;` at the beginning.

4. Save the `php.ini` file.

Step 4. Verifying the WordPress Configuration


2. Enter the installation information as described in the following table based on the WordPress installation wizard and click Install WordPress.

<table>
<thead>
<tr>
<th>Required Information</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Website Name</td>
<td>Name of the WordPress site.</td>
</tr>
<tr>
<td>Username</td>
<td>Account name of the WordPress administrator. For security reasons, use a name other than 'admin'.</td>
</tr>
<tr>
<td>Password</td>
<td>Use a strong password, different than your current password. Store it in a secure location.</td>
</tr>
<tr>
<td>Email</td>
<td>Email address used to receive notifications</td>
</tr>
</tbody>
</table>

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

FAQs

If you encounter a problem when using CVM, refer to the following documents for troubleshooting:

- CVM login: Password Login and SSH Key Login and Login and Remote Access.
- CVM network: IP Address and Port.
- CVM disks: System and Data Disks.
Overview

Used by over 2 million websites, Discuz! is the world’s most sophisticated and predominant forum software. This document describes how to set up a forum website using Discuz! on Tencent Cloud CVM instance and deploy the LAMP (Linux, Apache, MariaDB, and PHP) runtime environment it needs.

To manually set up a Discuz! website, you should be familiar with common Linux commands (see Installing Software via YUM under CentOS Environment), and understand the usage and version compatibility of the software to be installed.

Software

The following software versions are used to build a Discuz! website.

- Linux: Linux operating system. This document uses CentOS 7.6 as an example.
- Apache: Web server software. This document uses Apache 2.4.15 as an example.
- MariaDB: database. This document uses MariaDB 5.5.60 as an example.
- PHP: scripting language. This document uses PHP 5.4.16 as an example.
- Discuz!: forum software. This document uses Discuz! X3.4 as an example.

Directions

Step 1: log in to the CVM

Log in to the Linux instance using standard login method. You can also use any of the following login methods you are comfortable with:

- Logging in to Linux Instances via Remote Login Tools
- Logging in to Linux Instance via SSH Key

Step 2: set up the LAMP environment
Tencent Cloud hosts a software repository containing CentOS official releases, which provides the most stable version available currently. Use Yum to quickly install CentOS.

### Installing and configuring necessary software

1. Run the following command to install Apache, MariaDB, PHP and Git:

   ```
   yum install httpd php php-fpm php-mysql mariadb mariadb-server git -y
   ```

2. Run the following commands in sequence to start the services.

   ```
   systemctl start httpd
   systemctl start mariadb
   systemctl start php-fpm
   ```

3. Run the following command to set a password for **root** and complete other basic configurations, so the root user can access the database.

   ```
   mysql_secure_installation
   ```

   **Note**
   - Run the following command to set the password before your first login to MariaDB.
   - When you see the prompt to enter the root password, click **Enter** to set the password. Your password will not be displayed by default. Complete other basic configurations as prompted.

4. Run the following command to log in to MariaDB. Enter the password you set in step 3 and click **Enter**.

   ```
   mysql -u root -p
   ```
A successful login indicates that the configurations are correct, as shown below:

```
$ mysql -u root -p
Welcome to the MariaDB monitor. Commands end with ; or \\nYour MariaDB connection id is 27
Server version: 5.5.60-MariaDB MariaDB Server
Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.
MariaDB [(none)]>
```

5. Run the following command to exit MariaDB.

```
\q
```

Verifying the environment configuration

Check whether the environment is set up properly as instructed below:

1. Run the following command to create a test file `test.php` in the default root directory `/var/www/html` of Apache:

```
vim /var/www/html/test.php
```

2. Click `i` to switch to editing mode and enter the following content:

```
<?php
    echo "<title>Test Page</title>";
    phpinfo();
?
```

3. Click `Esc` and enter `:wq` to save and close the file.

4. Enter the following URL in a browser to access `test.php` to check whether the environment is properly configured:

```
http://[Public IP address of the CVM]/test.php
```
If everything goes well, the following appears.

![Image of PHP Version 5.4.16]

**Step 3: install and configure Discuz**

**Downloading Discuz!**

Run the following command to download the installation package.

```bash
git clone https://gitee.com/Discuz/DiscuzX.git
```

**Preparing for installation**

1. Run the following command to access the installation directory.

   ```bash
cd DiscuzX
```

2. Run the following command to copy all files under "upload" to `/var/www/html/`.

   ```bash
cp -r upload/* /var/www/html/
```

3. Run the following command to grant other users the write permission.

   ```bash
chmod -R 777 /var/www/html
```

**Installing Discuz!**
1. Enter the IP address of your Discuz! site (the public IP address of your CVM instance) or the domain name obtained from Related Operations, and then you can see the Discuz! installation interface.

Note
This document only demonstrates the installation steps. If a security warning that the version is too low is reported, we recommend you use an image on a higher version.

2. Click I agree and go to the environment check page.
3. Check the items and click Next Step to go to the runtime environment setting page.
4. Select "Clean Install" and click Next Step to go to the database creation page.
5. Enter information as prompted to create a new database for Discuz!.

Note
- Use the root account and password set in Installing and configuring required software to connect to the database and set up a system email address and admin username, password, and email address.
- Remember your admin username and password.

6. Click Next to start the installation.
7. After the installation, click Your forum has been installed successfully. Click here to access. to access your forum.

Related Operations
You can use a domain name that is easy to remember rather than a complicated IP address to make your forum website easier to remember and access. If you set up this website just for the purpose of learning, you can use an IP address for temporary use, which is nevertheless not recommended.

FAQs
If you encounter a problem when using CVM, refer to the following documents for troubleshooting:

- CVM login: Password Login and SSH Key Login and Login and Remote Access.
- CVM network: IP Address and Port.
- CVM disks: System and Data Disks.
Setting up Drupal

Last updated: 2022-03-21 15:19:42

Scenario

Drupal is a free and open-source content management framework written in PHP and distributed under the GNU General Public License. Drupal provides a back-end framework for at least 2.3% of all websites worldwide – ranging from personal blogs to corporate sites. This article describes how to setup Drupal manually on a CVM.

To manually setup a Drupal-based personal website, you need to be familiar with Linux commands, such as using YUM to install software on CentOS. You should also be familiar with software usage and compatibility.

Software

This article describes how to install the following software:

- Linux operating system. This article uses CentOS 7.6.
- Apache is a web server software. This article uses Apache 2.4.6.
- MariaDB is a database management system. This article uses MariaDB 10.4.8.
- PHP is a scripting language. This article uses PHP 7.0.33.
- Drupal is a content management framework. This article uses Drupal 8.1.1.

Prerequisites

You need a Linux CVM. If you have not purchased one yet, see this article for information on how to get started with a Linux CVM.

Directions

Step 1 Logging in to a Linux instance

Log in to a Linux instance using WebShell (recommended). You can also use other login methods that you are comfortable with:

- Log in to a Linux instance using remote login software.
- Log in to a Linux instance using SSH
Step 2 Setting up LAMP

After logging in, set up LAMP so you can run Drupal. Refer to this article for details.

Step 3 Downloading and installing Drupal

1. Run the following commands to download the Drupal install package to the root directory of your website.

   ```bash
cd /var/www/html/
```

2. Run the following commands to decompress the install package and rename the directory.

   ```bash
unzip drupal-8.1.1.zip
mv drupal-8.1.1/ drupal/
```

Step 4 Configuring Drupal

1. Run the following command to open the Apache configuration file.

   ```bash
vi /etc/httpd/conf/httpd.conf
```

2. Press i to enter edit mode. Find AllowOverride None in Directory "/var/www/html" and replace it with the following:

   ```bash
AllowOverride All
```
The result is shown below:

```bash
Further relax access to the default document root:
<Directory "/var/www/html">
    # Possible values for the Options directive are "None", "All",
    # or any combination of:
    # Indexes Includes FollowSymLinks SymLinksIfOwnerMatch ExecCGI MultiViews
    # Note that "MultiViews" must be named "explicitly" --- "Options All"
    # doesn't give it to you.
    # The Options directive is both complicated and important. Please see
    # http://httpd.apache.org/docs/2.4/mod/core.html#options
    # for more information.
    Options Indexes FollowSymLinks
    
    # AllowOverride controls what directives may be placed in .htaccess files.
    # It can be "All", "None", or any combination of the keywords:
    # Options FileInfo AuthConfig Limit
    
    AllowOverride All
    
    # Controls who can get stuff from this server.
    # Require all granted
</Directory>
```

3. Press **Esc** to exit edit mode and enter **:wq** to save the file and return.

4. Run the following command to change the access permission of the root directory of the website for the user **apache**.

   ```bash
   chown -R apache:apache /var/www/html
   ```

5. Run the following command to reboot Apache service.

   ```bash
   systemctl restart httpd
   ```

### Configure a database for Drupal

Instructions for configuring MariaDB user credentials may vary depending on different versions. Consult official [MariaDB website](http://mariadb.org) for details.
1. Run the following command to enter MariaDB.

```
mysql
```

2. Run the following command to create a database named `drupal`.

```
CREATE DATABASE drupal;
```

3. Run the following command to create a new user `user` and set its password to `123456`.

```
CREATE USER 'user'@'localhost' IDENTIFIED BY '123456';
```

4. Run the following command and grant `user` all privileges to `drupal`.

```
GRANT ALL PRIVILEGES ON drupal.* TO 'user'@'localhost' IDENTIFIED BY '123456';
```

5. Run the following command to apply all configurations.

```
FLUSH PRIVILEGES;
```

6. Run the following command to exit MariaDB.

```
\q
```

Configure `root`

1. Run the following command to enter MariaDB.

```
mysql
```

2. Run the following command to set a password for `root`.

```
MariaDB 10.4 for CentOS now allows `root` account to log in without password. Run the following command to set a password for `root` and record it in a secure location.
```

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ALTER USER root@localhost IDENTIFIED VIA mysql_native_password USING PASSWORD('your_password');

3. Run the following command to exit MariaDB.

\q

Step 5 Installing and configuring Drupal

1. Open a browser window on your local machine and visit the following address to install Drupal.

http://CVM_Public_IP/drupal

2. Select the language of your preference and click Save and continue

3. Select Standard installation and click Save and continue

4. Input relevant database information configured in Configuring a database for Drupal. Click Save and continue

Drupal installation now checks to see if all installation criteria are met. If so, installation starts. If not, error messages appear. Resolve them before continuing.

5. The configuration page loads automatically after installation is completed. Input information and click Save and continue

Record your maintenance username and password.

6. The homepage of your Drupal loads automatically. Use the maintenance username and password to log in

You have now successfully set up your Drupal website. Customize your experience as you see fit.

FAQ
If you encounter a problem when using CVM, refer to the following documents for troubleshooting based on your actual situation.

- For issues regarding CVM login, see Password Login and SSH Key Login and Login and Remote Access.
- For issues regarding the CVM network, see IP Addresses and Ports and Security Groups.
- For issues regarding CVM disks, see System and Data Disks.
Setting up a Ghost Blog

Last updated: 2022-04-07 16:07:12

Scenario

Ghost is a free and open source blogging platform written in JavaScript and distributed under the MIT License, designed to simplify the process of online publishing for individual bloggers as well as online publications. This article describes how to setup Ghost on a CVM.

To setup Ghost, you should be familiar with Linux and its common commands, such as Install Software via Apt-get under Ubuntu Environment.

Software

This article uses the following software:

- Linux operating system. This article uses Ubuntu 20.04.
- Nginx 1.18.0 is used to provide web service.
- MySQL 8.0.25 is used for database.
- Node.js 14.17.0 is our runtime environment.
- Ghost 4.6.4

Prerequisites

You should have a Linux CVM. If you have not purchased one yet, see Getting Started with Linux CVMs.

- A domain name that points to your CVM. If the domain name is used for Mainland China service, ICP filing is required.

Directions

Step 1 Logging in to a Linux instance

- Log in to a Linux instance using WebShell (recommended). You can also use other login methods that you are comfortable with:
- Log in to a Linux instance using remote login software.
Step 2 Create a new user

1. After logging in, switch to `root`. Refer to this article for details.

2. Run the following command to create a user named `user`.

   ```bash
   adduser user
   ```

   Do not use `ghost` as the username. It causes conflicts with Ghost-CLI.

3. Input and confirm password as prompted. Password is not shown by default. Press `Enter` to continue.

4. Input user information. Or press `Enter` to skip them and continue.

5. Input `Y` to confirm and press `Enter` to complete the process, as shown below:

   ```
   root@VM-0-22-ubuntu:/home/ubuntu$ adduser user
   Adding user `user' ...
   Adding new group `user' (1000) ...
   Adding new user `user' (1000) with group `user' ...
   Creating home directory `/home/user' ...
   Copying files from `/etc/skel' ...
   Enter new UNIX password:
   Retype new UNIX password:
   passwd: password updated successfully
   Changing the user information for user
   Enter the new value, or press ENTER for the default
   Full Name []:
   Room Number []:
   Work Phone []:
   Home Phone []:
   Other []:
   Is the information correct? [Y/n] Y
   root@VM-0-22-ubuntu:/home/ubuntu$
   ```

6. Run the following command to add user privileges.
usermod -aG sudo user

7. Run the following command to switch to user user.

su user

Step 3 Update installed packages

Run the following commands to update installed packages.

Input the password for user as prompted and press Enter to start.

sudo apt-get update
sudo apt-get upgrade -y

Step 4 Environment setup

Install Nginx

Run the following command to install Nginx.

sudo apt-get install -y nginx

Install and configure MySQL

1. Run the following command to install MySQL.

sudo apt-get install -y mysql-server

2. Run the following command to connect to MySQL.

sudo mysql
3. Run the following command to create a database for Ghost named `ghost_data`.

   ```sql
   CREATE DATABASE ghost_data;
   ```

4. Run the following command to set a password for the database user `root`.

   ```sql
   ALTER USER 'root'@'localhost' IDENTIFIED WITH mysql_native_password BY 'your_password';
   ```

5. Run the following command to quit MySQL.

   ```
   \q
   ```

### Install Node.js

1. Run the following command to set a default Node.js version to be used.

   ```bash
   curl -sL https://deb.nodesource.com/setup_14.x | sudo -E bash
   ```

2. Run the following command to install Node.js.

   ```bash
   sudo apt-get install -y nodejs
   ```

### Install Ghost-CLI

Run the following command to install Ghost-CLI which helps configuring Ghost.

```bash
sudo npm install ghost-cli@latest -g
```

### Step 5 Install and configure Ghost

1. Run the following commands.

   ```bash
   sudo mkdir -p /var/www/ghost
   ```

   ```bash
   sudo chown user:user /var/www/ghost
   ```
2. Run the following command to install Ghost.

```
ghost install
```
3. Use the following image to complete the installation process.

4. **Enter your blog URL**: input your domain name in the format of `http://your_domain_name`.

5. **Enter your MySQL hostname**: input your database address. Use `localhost` in this case and press Enter.

6. **Enter your MySQL username**: input the username you use to connect to MySQL. Use `root` in this case and press Enter.
7. Enter your MySQL password: input the corresponding password you set earlier and press Enter.

8. Enter your database name: input the name of the database you created for Ghost in the previous step. Use `ghost_data` and press Enter.

9. Input Y or n to complete the configuration.
The admin URL appears on the bottom of the screen.

0. Open a browser window on your local machine and visit the admin URL to start configuring your blog.
Click Create your account to create an admin account.
1. Input desired information and click **Last step**, as shown below:

2. You can invite others to create blogs, or skip this step.
3. Go to the administration page to manage blogs, as shown below:

Once finished, use a browser to visit your domain name www.xxxxxxxx.xx to see your blog, as shown below:

FAQ
If you encounter a problem when using CVM, refer to the following documents for troubleshooting based on your actual situation.

- For issues regarding CVM login, see Password Login and SSH Key Login and Login and Remote Access.
- For issues regarding the CVM network, see IP Addresses and Ports and Security Groups.
- For issues regarding CVM disks, see System and Data Disks.
Building an Application
Setting Up FTP Site
Setting Up an FTP Site (Windows)

Overview
This document describes how to use IIS to build an FTP site on a Windows CVM instance.

Software
This document uses the following software versions as an example to build the FTP service.

- Operating system: Windows. This document uses Windows Server 2012 as an example.
- Web server: IIS. This document uses IIS 8.5 as an example.

Directions

**Step 1. Log in to the Windows CVM**

Log in to Windows instance using RDP (recommended).
You can also use other login methods that you are more comfortable with: log in to a Windows CVM instance using a remote desktop.

**Step 2. Install the FTP service on IIS**

1. On the desktop, click ![Server Manager](image) to open the server manager. The **Server Manager** window will appear.
2. Click *Add roles and features*. 
3. In the **Add Roles and Features Wizard** pop-up window, click **Next** to access the **Installation Type** page.

4. Select **Role-based or feature-based installation** and click **Next**.

5. On the **Select destination server** page, keep the default configurations and click **Next**.
6. On the Select server roles page, check Web Server (IIS) and click Add Feature in the window that pops up.
7. Click **Next** 3 times to access the **Select role services** page.

8. Check **FTP Service** and **FTP Extensibility**, and click **Next**.
9. Click **Install** to start installing the FTP service.
10. After the installation is completed, click **Close**.

**Step 3. Create an FTP username and password**

**Note**:  
The following steps create an FTP account with password authentication. If you plan to use anonymous access only, skip this section.

1. In the “Server Manager” window, select **Tools > Computer Management** in the top-right navigation bar to open the “Computer Management” window.
2. Select **System Tools > Local Users and Groups > Users** on the left sidebar.
3. On the right panel of the **Users** interface, right-click the blank space and select **New User**, as shown below:

![Computer Management](image)

4. On the **New User** page, configure the username and password according to the following instructions. Click **Create**.

![New User](image)

Set the main parameters as follows:
• User name: custom. This document uses `ftpuser` as an example.

• Password and Confirm password: custom. The password must contain uppercase and lowercase letters and digits. This document uses `tf7295TFY` as an example.

• Clear **User must change password at next logon**, and check **Password never expires**.
  
  Select options based on your actual needs. This document uses **Password never expires** as an example.

5. Click **Close**. You can see the newly created user `ftpuser` in the list.

**Step 4. Set the shared folder permission**

Note:

This document uses the `C:\test` folder as the shared folder of the FTP site. It contains the `test.txt` file you want to share with others. Create the `C:\test` folder and the `test.txt` file under it as instructed. You can also use any other folder as needed.

6. On the desktop, click ![This PC](image) to open the **This PC** window.

7. Select and right-click the `test` folder under the C drive. Select **Properties**.

8. In the **test Properties** window, select the **Security** tab.

9. Select `Everyone` and click **Edit**.

   If “Group or user names” does not contain `Everyone`, refer to Adding Everyone to add the user.
0. On the “Permissions for test” page, set the permission for Everyone and click OK.

This document uses granting Everyone all permissions as an example.
1. Click **OK** to complete the configuration.

**Step 5. Add an FTP site**

1. In the **Server Manager** window, select **Tools > Internet Information Services (IIS) Manager** in the top-right navigation bar.

2. In the **Internet Information Services (IIS) Manager** pop-up window, expand your server in the left sidebar, right-click **Sites**, and select **Add FTP Site**, as shown below:
3. On the **Site Information** page, enter the following information and click **Next**.

- **FTP site name**: name of your FTP site. This document uses **ftp** as an example.
- **Physical path**: path of the shared folder with the permission configured. This document uses **C:\test** as an example.
4. On the **Binding and SSL Settings** page, enter the following information and click **Next**.

Configure the main parameters as follows:

- **Binding**: the IP Address defaults to **All Unassigned**. The default FTP port number is 21. You can set a custom port number.
  
  - **No SSL**: no SSL is used.
  
  - **Allow SSL**: allow the FTP server to connect with clients with or without SSL.
  
  - **Require SSL**: SSL encryption is required for communication between the FTP server and clients. If you choose **Allow SSL** or **Require SSL**, you can select an existing SSL certificate in “SSL Certificates”, or create an SSL certificate.
5. On the **Authentication and Authorization Information** page, enter the following information and click **Next**.

- **Authentication**: select an identity verification method. This document uses **Basic** as an example.
  - **Anonymous**: allow users that provide the anonymous or FTP username to access the content.
  - **Basic**: require users to provide valid user names and passwords to access the content. Under this mode, passwords are transmitted without encryption. Therefore, select this authentication mode only when you know that the connection between the clients and the FTP server is secure (for example, by using SSL).

- **Authorization**: select one of the following options from the **Allow access to** drop-down list. This document uses the specified **ftpuser** user as an example.
  - **All users**: all users, anonymous or identified, can access the content.
  - **Anonymous users**: anonymous users can access the content.
  - **Specified role or user group**: only the specified roles or members of the specified groups can access the content. If you choose this option, you need to specify the roles or user groups.
  - **Specified users**: only the specified user can access the content. If you choose this option, you need to specify the username.
Permissions: configure the permissions for the authorized users. This document takes setting the Read and Write permissions as an example.

- **Read**: allow the authorized user to read the shared content.
- **Write**: allow the authorized user to write into the directory.

6. Click Finish to successfully create the FTP site.

**Step 6. Configure the security group and firewall**

1. After the FTP site is created, add an inbound rule that allows traffic to the FTP port based on the FTP access mode:

   - **Active mode**: open the ports 20 and 21.
   - **Passive mode**: open the ports 21 and 1024-65535 (for example, open the ports 5000-6000). For more information, see Adding Security Group Rules.

2. (Optional) Refer to Microsoft documentation on how to configure the firewall so that the FTP server is able to accept passive connections from the firewall.

**Step 7. Test the FTP site**

You can use tools such as the FTP client software, browser, or file manager to verify the FTP server. This document uses the file manager of the client as an example.

1. Configure Internet Explorer as needed:

   - Firewall configured (active mode):
     Open an Internet Explorer window on the Client side and select Tools > Internet Options > Advanced. Uncheck Use Passive FTP for the firewall and the DSL modem compatibility and click OK.
   - Firewall has not been configured (passive mode):
     i. Open an Internet Explorer window on the FTP server side and select Tools > Internet Options > Advanced. Uncheck Use Passive FTP for the firewall and the DSL modem compatibility and click OK.
     ii. Open an Internet Explorer window on the Client side and select Tools > Internet Options > Advanced. Check Use Passive FTP for the firewall and the DSL modem compatibility and click OK.

2. Open the PC where the client is installed, type the following address in the address box of the browser, and press Enter.

   ftp://CVM public IP address:21
3. In the pop-up window, enter the username and password configured in creating the FTP username and password. In this document, the username is `ftpuser`, and the password is `tf7295TFY`.

4. You can upload and download files after a successful login.

Appendix

Adding Everyone
1. In the **test Properties** window, select the **Security** tab and click **Edit**.

![Test Properties Window](image)

2. On the **Permissions for test** page, click **Add**.

3. On the **Select Users or Groups** dialog box, click **Advanced**.

4. In the pop-up window, click **Find Now**.
5. Select **Everyone** under **Search results** and click **OK**.
6. On the **Select Users or Groups** dialog box, click **OK**.

Go to **Step 5** to configure the permission for **Everyone**.

### Creating a server certificate

1. In the **Server Manager** window, select **Tools** > **Internet Information Services (IIS) Manager** in the top-right navigation bar.

2. In the **Internet Information Services (IIS) Manager** pop-up window, select the server in the left sidebar and double-click **Server Certificates** on the right panel.

3. Select **Create Self-Signed Certificate** in the right operation column.
4. In the **Create Self-Signed Certificate** pop-up window, enter a certificate name and the storage type. This document uses creating an SSL certificate for personal storage as an example.

5. Click **OK**.
Setting Up an FTP Site (Linux)

Overview

Very Secure FTP Daemon (vsftpd) is the default FTP server for most Linux distributions. This document describes how to use vsftpd to build the FTP service on a Linux CVM with CentOS 7.6 64-bit installed.

Software

The following software is used to build the FTP service.

- Linux operating system: CentOS 7.6 public image
- Vsftpd: vsftpd 3.0.2

Directions

Step 1: log in to the CVM

Log in to the Linux instance using standard login method. You can also use any of the following login methods you are comfortable with:

- Logging in to Linux Instances via Remote Login Tools
- Logging in to Linux Instance via SSH Key

Step 2: install vsftpd

1. Run the following command to install vsftpd.

   ```
   yum install -y vsftpd
   ```

2. Run the following command to automatically start vsftpd upon system startup.

   ```
   systemctl enable vsftpd
   ```

3. Run the following command to start the FTP service.
systemctl start vsftpd

4. Run the following command to check that the service has been started.

netstat -antup | grep ftp

If the following information appears, the FTP service has been started.

By default, vsftpd has enabled the anonymous access mode. You can log in to the FTP server without entering a username and password. However, you do not have permissions to modify or upload files in this login mode.

Step 3: configure vsftpd

1. Run the following command to create a Linux user (such as ftpuser) for the FTP service.

   ```bash
   useradd ftpuser
   ```

2. Run the following command to set the password for ftpuser.

   ```bash
   passwd ftpuser
   ```

   After entering the password, press Enter to confirm. By default, the password is not displayed. This document uses tf7295Tfy as a password sample.

3. Run the following command to create a file directory (such as /var/ftp/test) for the FTP service.

   ```bash
   mkdir /var/ftp/test
   ```

4. Run the following command to modify the directory permission.

   ```bash
   chown -R ftpuser:ftpuser /var/ftp/test
   ```

5. Run the following command to open the vsftpd.conf file.
vim /etc/vsftpd/vsftpd.conf

6. Press i to switch to the edit mode. Select an FTP mode as needed and modify the `vsftpd.conf` configuration file.

   Note
   The FTP server can connect to the client in either active or passive mode for data transmission. Due to the firewall settings of most clients and the fact that the actual IP address cannot be obtained, we recommend that you use the **passive mode** to set up the FTP service. The following modification uses the passive mode as an example. To use the active mode, see Setting the FTP active mode.

   i. Modify the following configuration parameters to set login permissions for anonymous and local users, set the path for storing the exceptional user list, and enable listening on IPv4 sockets.

      ```
      anonymous_enable=NO
      local_enable=YES
      write_enable=YES
      chroot_local_user=YES
      chroot_list_enable=YES
      chroot_list_file=/etc/vsftpd/chroot_list
      listen=YES
      ```

   ii. Add the pound sign (`#`) at the beginning of the following line to comment out `listen_ipv6=YES` and disable listening on IPv6 sockets.

      ```
      #listen_ipv6=YES
      ```

   iii. Add the following configuration parameters to enable the passive mode, set the directory where local users reside after login, and set the port range for transmitting data by the CVM.

      ```
      local_root=/var/ftp/test
      allow_writeable_chroot=YES
      pasv_enable=YES
      pasv_address=xxx.xx.xxx.xx  # Replace xxx.xx.xxx.xx with the public IP address of your Linux CVM
      pasv_min_port=40000
      pasv_max_port=45000
      ```
7. Press **Esc** and enter `.wq` to save and close the file.

8. Run the following command to create and edit the `chroot_list` file.

   ```bash
   vim /etc/vsftpd/chroot_list
   ```

9. Press **i** to enter the edit mode and enter usernames. Note that each username occupies one line. After finishing the configuration, press **Esc** and enter `.wq` to save and close the file.

   The specified users will not be restricted to access only the root directory. If you do not need to set exceptional users, skip this step by entering `.wq` to close the file.

0. Run the following command to restart the FTP service.

   ```bash
   systemctl restart vsftpd
   ```

**Step 4: configure security groups**

After setting up the FTP service, configure inbound rules for the Linux CVM based on the actually used FTP mode. For more information, see [Adding Security Group Rules](#).

Most clients convert IP addresses in LANs. If you are using the FTP active mode, ensure that the client has obtained the actual IP address. Otherwise, the client may fail to log in to the FTP server.

- **Active mode**: open port 21.
- **Passive mode**: open port 21 and all ports ranging from `pasv_min_port` to `pasv_max_port` set in the configuration file, such as ports 40000 to 45000 in this document.

**Step 5: verify the FTP service**

You can use tools such as the FTP client software, browser, or file manager to verify the FTP server. This document uses the file manager of the client as an example.

1. Open Internet Explorer on the client, choose **Tools > Internet Options**, and click the **Advanced** tab. Make the following modifications based on the selected FTP mode.

   - For the active mode: deselect **Passive FTP**.
   - For the passive mode: select **Passive FTP**.

2. Open the PC where the client is installed, type the following address in the address box of the browser, and press **Enter**, as shown below:
3. On the login page that appears, enter the username and password set in Configure vsftpd. Here, the username is `ftpuser`, and the password is `tf7295TFY`.

4. You can upload and download files after a successful login.

### Appendix

#### Setting the FTP active mode

To use the active mode, modify the following configuration parameters and leave others as their defaults:

```bash
anonymous_enable=NO  # Forbid anonymous users to log in
local_enable=YES  # Allow local users to log in
chroot_local_user=YES  # Restrict all users to access only the root directory
chroot_list_enable=YES  # Enable the exceptional user list
chroot_list_file=/etc/vsftpd/chroot_list  # Specify the user list, in which the listed users are not restricted to access only the root directory
listen=YES  # Enable listening on IPv4 sockets
# Add the pound sign (#) at the beginning of the following line to comment it out
# listen_ipv6=YES  # Disable listening on IPv6 sockets
# Add the following parameters
allow_writeable_chroot=YES
local_root=/var/ftp/test  # Set the directory where local users reside after login
```

Press `Esc` and enter `:wq` to save and close the file. After that, go to Step 8 to configure vsftpd.

**FTP client failed to upload files**

**Cause**

In the Linux environment, users encounter the following error message when uploading files with vsftpd.

```
553 Could not create file
```

**Solution**

1. Run the following command to check the disk space utilization of the server.
If the disk space is insufficient, you cannot upload files. In this case, we recommend that you delete some unnecessary large files from the disk.

If the disk space is sufficient, go to the next step.

2. Run the following command to check whether you have the write permission to the FTP directory.

```
ls -l /home/test
# Here, /home/test indicates the FTP directory. Replace it with your actual FTP directory.
```

If `w` is not returned in the result, you do not have the write permission to the directory. In this case, go to the next step.

If `w` is returned in the result, submit a ticket for further troubleshooting.

3. Run the following command to grant the write permission to the FTP directory.

```
chmod +w /home/test
# Here, /home/test indicates the FTP directory. Replace it with your actual FTP directory.
```

4. Run the following command to check whether the write permission is successfully granted:

```
ls -l /home/test
# Here, /home/test indicates the FTP directory. Replace it with your actual FTP directory.
```
NTP Service

NTP Service of Tencent Cloud

The Network Time Protocol (NTP) is intended to synchronize the clocks on all the computers in a network to Coordinated Universal Time (UTC).

Tencent Cloud provides an intranet NTP server for Tencent Cloud intranet devices. For non-Tencent cloud devices, you can use the public network NTP server provided by Tencent Cloud.

Intranet NTP Server

- time1.tencentyun.com
- time2.tencentyun.com
- time3.tencentyun.com
- time4.tencentyun.com
- time5.tencentyun.com

Public Network NTP Server

- ntp.tencent.com
- ntp1.tencent.com
- ntp2.tencent.com
- ntp3.tencent.com
- ntp4.tencent.com
- ntp5.tencent.com

The following are old public NTP server addresses. These old addresses can still be used, but you are advised to use the new ones.

- time.cloud.tencent.com
- time1.cloud.tencent.com
- time2.cloud.tencent.com
- time3.cloud.tencent.com
- time4.cloud.tencent.com
- time5.cloud.tencent.com

For how to configure the NTP clock source server for Linux, see Setting Up NTP Service (Linux).
For how to configure the NTP clock source server for Windows, see Setting Up NTP Service (Windows).
Setting Up NTP Service (Linux)

Overview

The Network Time Protocol daemon (ntpd) is a daemon of the Linux operating system. It is a complete implementation of NTP and is used to correct the time difference between the local system and the clock source server. Unlike ntpdate, which updates time periodically, ntpd corrects time continuously without time gaps. This document uses CentOS 7.5 as an example to describe how to install and configure ntpd.

Notes

- Some operating systems use chrony as the default NTP service. Please make sure that ntpd is running and is configured to launch automatically at startup.
- Run the `systemctl is-active ntpd.service` command to see if ntpd is running.
- Run the `systemctl is-enabled ntpd.service` command to see if ntpd is configured to launch automatically at startup.
- The communication port of the NTP service is UDP 123. Please make sure that you have opened the port to the Internet before configuring the NTP service.
  
  If the port is not open, please refer to Adding Security Group Rules to open it to the Internet.

Directions

Installing ntpd

Run the following command to check whether ntpd has been installed.

```
rpm -qa | grep ntp
```

- If the following result is returned, ntpd has been installed.

```
[root@VM 16_2_centos ~]# rpm -qa | grep ntp
ntpd-4.2.6p5-28.el7.centos.x86_64
ntp-4.2.6p5-28.el7.centos.x86_64
fontpackages-filesystem-1.44-8.el7.noarch
```

- If ntpd has not been installed, run the `yum install ntp` command to install it.
ntpd uses the client mode by default.

**Configuring NTP**

1. Run the following command to open the configuration file of the NTP service.

   ```
   vi /etc/ntp.conf
   ```

2. Press `i` to switch to the editing mode and locate the `server` configurations. Change the value of `server` to the NTP clock source server you want to use (such as `time1.tencentyun.com`) and delete unwanted values, as shown below:

   ```
   # Use public servers from the pool.ntp.org project.
   # Please consider joining the pool (http://www.pool.ntp.org/join.html).
   server 0.centos.pool.ntp.org iburst
   server 1.centos.pool.ntp.org iburst
   server 2.centos.pool.ntp.org iburst
   server 3.centos.pool.ntp.org iburst
   ```

3. Press `Esc` and enter `:wq` to save and close the file.

**Launching ntpd**

Run the following command to restart the ntpd service.

```
systemctl restart ntpd.service
```

**Checking the status of ntpd**

Run the following commands to check the status of ntpd as needed.

- Run the following command to check whether the NTP is normally listening on the service port UDP 123.

  ```
  netstat -nulp
  ```
If the following result is returned, the listening is normal.

```
[root@VM_0_136_centos ~]# netstat -nulp
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address             Foreign Address         State       PID/Program name
udp   0      0 172.30.0.136:123             0.0.0.0:*          0.0.0.0:*          999/ntpd
udp   0      0 127.0.0.1:123               0.0.0.0:*          0.0.0.0:*          999/ntpd
udp6  0      0 fe80::5054:ff:fe2:123        :::*            999/ntpd
udp6  0      0 ::1:123                      :::*            999/ntpd
```

- Run the following command to check whether the ntpd status is normal.

```
service ntpd status
```

If the following result is returned, the ntpd status is normal.

```
[root@VM_0_136_centos ~]# service ntpd status
Redirecting to /bin/systemctl status ntpd.service
• ntpd.service - Network Time Service
  Loaded: loaded (/usr/lib/systemd/system/ntpd.service; enabled; vendor preset: disabled)
  Active: active (running) since Wed 2019-08-07 15:23:25 CST; 5min ago
  Process: 997 ExecStart=/usr/sbin/ntpd -u ntp:ntp $OPTIONS (code=exited, status=0/SUCCESS)
  Main PID: 999 (ntpd)
  CGroup: /system.slice/ntpd.service
```

- Run the following command to get more detailed NTP service information.

```
ntpq -P
```

```
```
The following result will be returned:

```
remote refid st t when poll reach delay offset jitter
108.213.214.164 .INIT. 16 u - 64 0 0.000 0.000 0.000
193.54.145.100.110 194.53.87.180 2 u 6 64 17 277.831 3.940 5.598
185.54.145.100.110 194.53.87.180 2 u 68 64 16 201.280 1.729 0.263
193.54.145.100.110 194.53.87.180 2 u 69 64 16 293.382 1.003 0.441
169.244.145.100.110 100.11.127.1 2 u 3 64 17 6.607 9.897 0.461
```

- **remote**: the name of the NTP server that responds to this request.
- **refid**: the NTP server one stratum above to which the NTP server on this stratum is synchronized.
- **st**: the stratum of the remote server. The stratum of a server can be set to 1 through 16 from high to low. In order to relieve the load and network congestion, you should avoid connecting directly to a stratum 1 server.
- **when**: the number of seconds that have elapsed since the last successful request.
- **poll**: the synchronization interval (in seconds) between local and remote servers. At the beginning, the \texttt{poll} value will be smaller, which indicates a higher synchronization frequency, so that the time can be adjusted to the correct time range as soon as possible. Later, the \texttt{poll} value will gradually increase, and the synchronization frequency will decrease accordingly.
- **reach**: an octal value used to test whether the server can be connected. Its value increases every time the server is successfully connected.
- **delay**: the round trip time of sending the synchronization request from the local machine to the NTP server.
- **offset**: the time difference in milliseconds (ms) between the host and the time source through NTP. The closer the offset is to 0, the closer the times of the host and the NTP server are.
- **jitter**: a value used for statistics that records the distribution of offsets over a particular number of consecutive connections. The smaller its absolute value is, the more accurate the host time is.

### Setting the automatic launch of ntpd at startup

1. Run the following command to automatically launch ntpd at startup.

   ```bash
   systemctl enable ntpd.service
   ```

2. Run the following command to check whether chrony is set to launch at startup.

   ```bash
   systemctl is-enabled chronyd.service
   ```
If chrony is set to launch at startup, run the following command to remove chrony from the auto-start list. chrony is not compatible with ntpd, which may lead to ntpd start failure.

```
systemctl disable chronyd.service
```

Enhancing ntpd security

Run the following commands sequentially to enhance the security of the `/etc/ntp.conf` configuration file.

```
interface ignore wildcard

interface listen eth0
```
Overview

The ntpdate is a breakpoint update for the time synchronization of your new instances. The ntpd is a stepwise daemon for the time synchronization of your running instances. This document uses the CentOS 7.5 operating system as an example to introduce how to transition from ntpdate to ntpd on CVMs.

Prerequisites

The NTP service communicates on the port UDP 123. Please make sure that you have opened the port to the Internet before transitioning to the NTP service.

If the port has not been opened, please refer to Adding Security Group Rules to open it to the Internet.

Directions

You can choose to transition from ntpdate to ntpd manually or automatically.

Transitioning from ntpdate to ntpd manually

Shutting down ntpdate

1. Run the following command to export the crontab configuration and filter ntpdate.

   ```bash
   crontab -l | grep -v ntpupdate > /tmp/cronfile
   ```

2. Run the following command to update the ntpdate configuration.

   ```bash
   crontab /tmp/cronfile
   ```

3. Run the following command to modify the rc.local file.

   ```bash
   vim /etc/rc.local
   ```
4. Press `i` to switch to the edit mode and delete the `ntpupdate` configuration line.

5. Press **Esc** and enter `:wq` to save and close the file.

### Configuring ntpd

1. Run the following command to open the configuration file of the NTP service.
   ```bash
   vi /etc/ntp.conf
   ```

2. Press `i` to switch to the edit mode and locate the `server` configurations. Change the value of `server` to the NTP clock source server you want to use (such as `time1.tencentyun.com`) and delete unwanted values, as shown below:

   ```
   # Use public servers from the pool.ntp.org project.
   # Please consider joining the pool (http://www.pool.ntp.org/join.html).
   
   server 0.centos.pool.ntp.org iburst
   server 1.centos.pool.ntp.org iburst
   server 2.centos.pool.ntp.org iburst
   server 3.centos.pool.ntp.org iburst
   ```

3. Press **Esc** and enter `:wq` to save and close the file.

### Transitioning from ntpdate to ntpd automatically

1. Download the `ntpd_enable.sh` script.
   ```bash
   wget https://image-10023284.cos.ap-shanghai.myqcloud.com/ntpd_enable.sh
   ```

2. Run the following command to transition from ntpdate to ntpd using the `ntpd_enable.sh` script.
   ```bash
   sh ntpd_enable.sh
   ```

### Relevant Operations
Checking the status of ntpd

Run the following commands to check the status of ntpd as needed.

- Run the following command to check whether the NTP is listening normally on the service port UDP 123.

```
netstat -nulp
```

If the following result is returned, the listening is normal.

```
Active Internet connections (only servers)
Proto Recv-Q Send-Q Local Address           Foreign Address         State      PID/Program name
udp   0      0  172.30.0.136:123           0.0.0.0:*          123/ntpd
udp   0      0  127.0.0.1:123              0.0.0.0:*          123/ntpd
udp6  0      0  fe80::5054:ff:fe2:123      :::*            123/ntpd
udp6  0      0  ::1:123                     :::*            123/ntpd
```

- Run the following command to check whether the ntpd status is normal.

```
service ntpd status
```

If the following result is returned, the ntpd status is normal.

```
Redirecting to /bin/systemctl status ntp.service
* ntp.service - Network Time Service
 Loaded: loaded (/usr/lib/systemd/system/ntpd.service; enabled; vendor preset: disabled)
 Active: active (running) since Wed 2019-06-07 15:23:25 CST; 5min ago
 Process: 997 ExecStart=/usr/sbin/ntpd -u ntp:ntp OPTIONS (code=exited, status=0/SUCCESS)
 Main PID: 997 (ntpd)
     CGroup: /system.slice/ntpd.service
     L-997 /usr/sbin/ntpd -u ntp:ntp -g
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: 0.0.0.0 c01d 0d kern kernel time sync enabled
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: ntp.io: estimated max descriptors: 1024, initia... 16
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listen normally on 0 lo 127.0.0.1 UDP 123
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listen normally on 1 eth0 172.30.0.136 UDP 123
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listen normally on 3 eth0 fe80::5054:ff:fe2:11...123
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listening on routing socket on fd #20 for inter...tes
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listening on routing socket on fd #20 for inter...tes
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listen normally on 0 lo ::1 UDP 123
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listen normally on 3 eth0 fe80::5054:ff:fe2:11...123
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listen normally on 0 lo ::1 UDP 123
 Aug 07 15:23:25 VM_0_136_centos ntpd[997]: Listen normally on 3 eth0 fe80::5054:ff:fe2:11...123
 Aug 07 15:23:34 VM_0_136_centos ntpd[997]: 0.0.0.0 c01f 02 freq set kernel 0.467 PPM
 Aug 07 15:23:34 VM_0_136_centos ntpd[997]: 0.0.0.0 c01f 05 clock sync
```

- Run the following command to get more detailed NTP service information.

```
ntpq -P
```
The following result will be returned:

```
[root@VM_0_136_centos ~]# ntpq -p
remote       refid      st t when poll  reach  delay  offset  jitter
108.99.28.94 .INIT.         16 u  -   64  0.000  0.000  0.000
193.32.196.1  194.31.94.43 2 u   6   64  17  277.831 3.940 5.598
168.190.107.4 194.31.94.43 2 u  68   64  16  201.280 1.729 0.263
193.32.196.1  194.31.94.43 2 u  69   64  16  293.382 1.003 0.441
169.194.6.3   100.136.199.1 2 u   3   64  17  6.607  9.897 0.461
```

- `*`: the NTP server in use currently.
- **remote**: the name of the NTP server that responds to this request.
- **refid**: the NTP server one stratum above to which the NTP server on this stratum is synchronized.
- **st**: the stratum of the remote server. The stratum of a server can be set to 1 through 16 from high to low. In order to relieve the load and network congestion, you should avoid connecting directly to a stratum 1 server.
- **when**: the number of seconds that have elapsed since the last successful request.
- **poll**: the synchronization interval (in seconds) between the local and remote servers. At the beginning, the `poll` value will be smaller, which indicates a higher synchronization frequency, so that the time can be adjusted to the correct time range as soon as possible. Later, the `poll` value will gradually increase, and the synchronization frequency will decrease accordingly.
- **reach**: an octal value used to test whether the server can be connected. Its value increases every time the server is successfully connected.
- **delay**: the round trip time of sending the synchronization request from the local machine to the NTP server.
- **offset**: the time difference in milliseconds (ms) between the host and the time source through NTP. The closer the offset is to 0, the closer the times of the host and the NTP server are.
- **jitter**: a value used for statistics that records the distribution of offsets over a particular number of consecutive connections. The smaller its absolute value is, the more accurate the host time is.
Setting Up NTP Service (Windows)

Scenario

The Windows Time service (W32Time) synchronizes the time between the local system and the clock source server. It uses NTP to synchronize computer clocks on the network. The following uses a CVM that runs Windows Server 2012 as an example to describe how to enable the NTP service and modify the IP address of the clock source server.

Directions

1. Log in to the Windows CVM.
2. On the desktop, choose \> Task Manager \> Services to open the Services window.
3. In the **Services** window that appears, double-click **Windows Time**, as shown in the following figure.

4. In the **Windows Time Properties (Local Computer)** window that appears, set **Startup type** to **Automatic** and **Service status** to **Running**, and then click **OK**, as shown in the following figure.
5. In the task bar of the desktop, click the time icon in the lower-right corner and click **Change date and time settings**..., as shown in the following figure.
6. In the **Date and Time** window that appears, click the **Internet Time** tab, and then click **Change settings**, as shown in the following figure.
7. In the **Internet Time Settings** window that appears, enter the domain name or IP address of the target clock source server in the **Server** text box and click **OK**, as shown in the following figure.
The clock was successfully synchronized with ntpupdate.tencentyun.com on 7/24/2019 at 4:20 PM.
Building Microsoft SharePoint 2016

Overview

This document introduces how to build Microsoft SharePoint 2016 on a CVM instance.

Software

This document uses the CVM instance with the following hardware specification as an example:

- vCPU: 4 cores
- Memory: 8 GB

This document uses the following software versions as an example:

- Operating system: Windows Server 2012 R2 Datacenter 64-bit (English)
- Database: SQL Server 2014

Prerequisites

Purchase a Windows CVM instance. See Customizing Windows CVM Configurations.

Directions

Step 1. Log in to the Windows instance

You can either log in to the Windows instance by using RDP or a remote desktop.

Step 2. Add AD, DHCP, DNS, and IIS services

1. On the desktop, click to open Server Manager.
2. On the left sidebar, select **Local Server** and find **IE Enhanced Security Configuration**.
3. Disable **IE Enhanced Security Configuration**.

4. On the left sidebar, select **Dashboard** and click **Add roles and features**.

5. In the **Add Roles and Features Wizard** window, keep the default configurations and click **Next** for the current window and the next two windows.

6. On the **Select server roles** page, select **Active Directory Domain Services**, **DHCP Server**, **DNS Server**, and **Web Server (IIS)** and click **Add Feature** in the pop-up window.
7. Click **Next**.
8. On the **Features** page, select **.NET Framework 3.5 Features** and click **Add features** in the pop-up window.

![Add Roles and Features Wizard](image)

9. Keep the default configuration and click **Next** for the current window and the next five windows.

0. Confirm the installation and click **Install**.

1. After the installation is complete, restart the CVM instance.

**Step 3. Configure the AD service**

1. On the desktop, click ![Server Manager](image) to open **Server Manager**.
2. Click ![](image.png) and select **Promote this server to a domain controller**.

![Server Manager](image.png)

3. In the **Active Directory Domain Services Configuration Wizard** pop-up window, set **Select the deployment operation** to **Add a new forest**, enter the root domain name, and click **Next**.
Deployment Configuration

Select the deployment operation
- Add a domain controller to an existing domain
- Add a new domain to an existing forest

Add a new forest

Specify the domain information for this operation

Root domain name: [Enter value]

More about deployment configurations
4. Set the Directory Services Restore Mode (DSRM) password and click Next.

5. Keep the default configuration and click Next for the current window and the next three windows.
6. Click Install.

Step 4. Configure the DHCP service

1. On the desktop, click to open Server Manager.
2. Click ! and select **Complete DHCP configuration**.

3. In the DHCP Post-Install configuration wizard pop-up window, click **Next**.
4. Keep the default configurations and click **Commit**.

5. Click **Close**.

**Step 5. Install the SQL Server 2014 database**

1. Open the browser in the CVM instance and download the SQL Server 2014 installation package from the SQL Server 2014 official site.

   Note
   
   You may also obtain the SQL Server 2014 installation package from a third-party website or other valid channels.

2. Double-click the **Setup.exe** file to open the SQL Server installation wizard. On the **SDL Server Installation Center**, click **New SDL Server stand-alone installation** or **add features to an existing installation**.
3. Enter the product key and click **Next**.
4. Select **I accept the license terms** and click **Next**.
5. Keep the default configuration and click **Next**.
6. After the installation check is completed, click **Next**.
7. Keep the default configuration and click **Next**.
8. On the Feature Selection page, click Select All and click Next.
9. On the **Instance Configuration** page, select **Default instance** and click **Next**.

![Instance Configuration](image)

0. On the **Server Configuration** page, configure the account and password for SQL Server Database Engine and SQL Server Analysis Services and click **Next**.
Set the account name of SQL Server Database Engine to "NT AUTHORITY\NETWORK SERVICE".

Set the account name and password of SQL Server Analysis Services to the domain name and password configured in 14 to 15 in Step 2. Add AD, DHCP, DNS, and IIS services.

1. On the Database Engine Configuration page, select Add Current User to use the current account as the admin account of SQL Server and click Next.
2. On the **Analysis Services Configuration** page, select **Add Current User** to grant the current account the admin permission for **Analysis Services** and click **Next**.
3. Keep the default configuration and click **Next**.

4. On the **Distributed Replay Controller** page, click **Add Current User** to grant the current account the access permission of **Distributed Replay Controller** and click **Next**.
5. Keep the default configuration and click **Next** until the installation is completed.

**Step 6. Install SharePoint 2016**

1. Open the browser in the CVM instance and download the Microsoft SharePoint 2016 installation package from the Microsoft SharePoint 2016 official site.

2. Open the **Microsoft SharePoint 2016** image file, double-click the **prerequisiteinstaller.exe** file of the preparation tool to install the Microsoft SharePoint 2016 Preparation Tool.
3. Open the installation wizard of the Microsoft SharePoint 2016 Preparation Tool and click **Next**.

4. Select **I accept the terms in the license agreement**. and click **Next**.
5. After the required prerequisites are installed, click **Finish** to restart the CVM instance.

6. Open the Microsoft SharePoint 2016 image file and double-click the `setup.exe` installation file to install Microsoft SharePoint 2016.
7. Enter the product key and click **Continue**.
8. Select **I accept the terms of this agreement** and click **Next**.
9. Select the installation directory (this example keeps the default configuration but you can specify a directory as needed), and click **Install Now**.
0. When the installation is completed, select **Run the SharePoint Products Configuration Wizard now** and click **Close**.
Step 7. Configure SharePoint 2016
1. In the SharePoint Products Configuration Wizard window, click Next.

![SharePoint Products Configuration Wizard](image)

Welcome to SharePoint Products

In order to configure SharePoint Products, you will require the following information:

- Name of database server and database where server farm configuration data will be stored
- Username and password for the database access account that will administer the server farm

Click Next to continue or Cancel to exit the wizard. To run the wizard again, click on the Start Menu shortcut.

2. Click Yes in the pop-up window to allow service restart during the configuration.
3. Select **Create a new server farm** and click **Next**.

![SharePoint Products Configuration Wizard](image)

4. Configure the database, specify the database access account, and click **Next**.

   The SharePoint database is on the local host, so you need to enter the local database and account.
5. Enter the password of the server farm and click **Next**.
6. Set **Multiple-Server Farm** to **Front-end** and click **Next**.

7. Specify the port number of SharePoint Central Administration Web Application (this example uses **10000**), and click **Next**.
Configure SharePoint Central Administration Web Application

A SharePoint Central Administration Web Application allows you to manage configuration settings for a server farm. The first server added to a server farm must host this web application. To specify a port number for the web application hosted on this machine, check the box below and type a number between 1 and 65535. If you do not specify a port number, a random one will be chosen.

☑ Specify port number: 10000

Configure Security Settings

Kerberos is the recommended security configuration to use with Integrated Windows authentication. Kerberos requires special configuration by the domain administrator. NTLM authentication will work with any application pool account and the default domain configuration. Show more information.

Choose an authentication provider for this Web Application:

- NTLM
- Negotiate (Kerberos)
8. Confirm the SharePoint configuration and click **Next**.

9. After the SharePoint configuration is completed, click **Finish**.
Overview

PostgreSQL is an open source relational database management system emphasizing scalability and standard compliance. PostgreSQL is ideal for enterprise-level complex online transaction processing (OLTP) systems. It supports NoSQL (JSON/XML/hstore) and Geographic Information System (GIS) data types. Featuring strong reliability and data integrity, PostgreSQL is a suitable for websites, location application systems, complex data object processing and other use cases.

This document describes how to build a PostgreSQL system on a CVM instance running CentOS 7.

Software

This document uses the following software as an example to build PostgreSQL.

- Linux: Linux operating system. This document uses CentOS 7.6 as an example.
- PostgreSQL: Relational database management system. This document uses PostgreSQL 12 as an example.

Prerequisites

- Two created CVM instances. One CVM instance works as the primary node and the other works as the secondary node.
  For more information, see Creating Instances via CVM Purchase Page.
- Port 5432 is open in the security group of both the CVM instances.
  For more information, see Adding Security Group Rules.

Directions

Configuring primary node

1. Log in to the primary CVM instance.
2. Run the following command to upgrade all packages, system versions and kernels.

```
yum update -y
```

3. Run the following commands in sequence to install PostgreSQL.

This document uses PostgreSQL 12 as an example. You can choose other versions as needed.

```
wget --no-check-certificate https://download.postgresql.org/pub/repos/yum/repos/EL-7-x86_64/pgdg-redhat-repo-latest.noarch.rpm
```

```
rpm -ivh pgdg-redhat-repo-latest.noarch.rpm
```

```
yum install postgresql12-server postgresql12-contrib -y
```

```
/usr/pgsql-12/bin/postgresql12-setup initdb
```

4. Run the following command to start the service.

```
systemctl start postgresql-12.service
```

5. Run the following command to enable the service at startup.

```
systemctl enable postgresql-12.service
```

6. Run the following command to switch to the `postgres` user.

```
su - postgres
```

7. Run the following command to go to the PostgreSQL interactive terminal.

```
psql
```

8. Run the following command to set the password for the `postgres` user, and enhance its security.
ALTER USER postgres WITH PASSWORD 'Custom password';

9. Run the following command to create a database account and set the password, login permission and backup permission.

```
create role account name login replication encrypted password 'Custom password';
```

This document uses creating the database account `replica` and the password `123456` as an example. Run the following command:

```
create role replica login replication encrypted password '123456';
```

0. Run the following command to check whether the account has been created.

```
SELECT usename from pg_user;
```

If the following result is returned, it indicates that the account has been successfully created.

```
usename
----------
postgres
replica
(2 rows)
```

1. Run the following command to check whether the permission has been created.

```
SELECT rolname from pg_roles;
```

If the following result is returned, it indicates that the account has been successfully created.

```
rolname
------------
pg_signal_backend
postgres
replica
(3 rows)
```

2. Enter \q and press Enter to exit the PostgreSQL interactive terminal.
3. Enter `exit` and press **Enter** to exit PostgreSQL.

4. Run the following command to open the *pg_hba.conf* configuration file and add the `replica` user to the allowlist.

   ```bash
   vim /var/lib/pgsql/12/data/pg_hba.conf
   ```

5. Press **i** to switch to the edit mode, and add the following two lines to the **IPv4 local connections** section:

   ```
   host all all <IPv4 IP range of the secondary node's VPC> md5 #Enable the MD5 password encryption for connections in the IP ranges of the VPC
   host replication replica <IPv4 IP range of the secondary node's VPC> md5 #Allow data synchronization from the `replication` database.
   ```

   For example, if the database account is `replica` and the IPv4 IP range of the secondary node's VPC is `xx.xx.xx.xx/16`, add the following content to **IPv4 local connections**:

   ```
   host all all xx.xx.xx.xx/16 md5
   host replication replica xx.xx.xx.xx/16 md5
   ```

6. Press **Esc** and enter :wq to save and close the file.

7. Run the following command to open the *postgresql.conf* file.

   ```bash
   vim /var/lib/pgsql/12/data/postgresql.conf
   ```

8. Press **i** to enter the edit mode, locate and replace the following parameters:

   ```
   listen_addresses = '*' #The private IP listened on
   max_connections = 100 #The maximum connections. The value of `max_connections` for the secondary node must be greater than that for the primary node
   wal_level = hot_standby #Enable hot standby mode.
   synchronous_commit = on #Enable synchronous replication
   max_wal_senders = 32 #The maximum number of synchronization processes
   wal_sender_timeout = 60s #The timeout value for the streaming replication instance to send data.
   ```

9. Press **Esc** and enter :wq to save the file.
10. Run the following command to restart the service.

```bash
systemctl restart postgresql-12.service
```

**Configuring secondary node**

1. Log in to the secondary CVM instance.

2. Run the following command to upgrade all packages, system versions and kernels.

```bash
yum update -y
```

3. Run the following commands in sequence to install PostgreSQL.

   ```bash
   wget --no-check-certificate https://download.postgresql.org/pub/repos/yum/repor pms/EL-7-x86_64/pgdg-redhat-repo-latest.noarch.rpm
   rpm -ivh pgdg-redhat-repo-latest.noarch.rpm
   yum install postgresql12-server postgresql12-contrib -y
   ```

4. Run the following command and use the `pg_basebackup` utility to create a backup directory:

   ```bash
   pg_basebackup -D /var/lib/pgsql/12/data -h Public IP of the primary node> -p 54 32 -U replica -X stream -P
   ```

   Enter the password as prompted, and press **Enter**. If the following is returned, it indicates that the backup directory has been successfully created.

   ```
   Password:
   24526/24526 kB (100%), 1/1 tablespace
   ```

5. Run the following command to copy the configuration files of the primary node.

   ```bash
   cp /usr/pgsql-12/share/recovery.conf.sample /var/lib/pgsql/121/data/recovery.co nf
   ```
6. Run the following command to open the `recovery.conf` file.

```
vim /var/lib/pgsql/12/data/recovery.conf
```

7. Press `i` to switch to the edit mode, locate and replace the following parameters:

```
standby_mode = on #Declare the secondary node
primary_conninfo = 'host=<Public IP of the primary node> port=5432 user=Database account password=Database password' #Connection information of the primary node
recovery_target_timeline = 'latest' #Sync the latest data by using streaming replication
```

8. Press `Esc` and enter `:wq` to save and close the file.

9. Run the following command to open the `postgresql.conf` file.

```
vim /var/lib/pgsql/12/data/postgresql.conf
```

10. Press `i` to switch to the edit mode, locate and replace the following parameters:

```
max_connections = 1000 #The maximum connections. The value of `max_connections` for the secondary node must be greater than that for the primary node
hot_standby = on #Enable hot standby mode
max_standby_streaming_delay = 30s #The maximum delay for streaming replication
wal_receiver_status_interval = 1s #The maximum interval for the secondary node to report its status to the primary node
hot_standby_feedback = on #Enable the secondary node to report errors during replication.
```

1. Press `Esc` and enter `:wq` to save and close the file.

2. Run the following command to modify the group and owner of the data directory:

```
chown -R postgres.postgres /var/lib/pgsql/12/data
```

3. Run the following command to start the service.
4. Run the following command to enable the service at startup.

```
systemctl enable postgresql-12.service
```

### Verifying deployment

Perform the following to verify the deployment.

1. Run the following command to back up the directory from the node.

```
pg_basebackup -D /var/lib/pgsql/12/data -h <Public IP of the primary node> -p 5432 -U replica -X stream -P
```

Enter the database password and press **Enter**. If the following is returned, it indicates that the backup directory has been successfully created.

```
Password:
24526/24526 kB (100%), 1/1 tablespace
```

2. Run the following command to check the **sender** process on the primary node:

```
ps aux | grep sender
```

3. Run the following command to check the **receiver** process on the secondary node:

```
ps aux | grep receiver
```

If the following is returned, it indicates that the **receiver** process is available.

4. On the primary node, run the following commands sequentially to check the status of the secondary node in the PostgreSQL interactive terminal.
su - postgres

psql

```
select * from pg_stat_replication;
```

If the following is returned, it indicates that the secondary node status is available.

```
postgres=# select * from pg_stat_replication;
   pid | userrid | username | application_name | client_addr | client_hostname | client_port | backend_start | backend_xmi | state | xact_location | write_location | flush_location | replay_location | sync_priority | sync_state
----------+----------+----------+------------------+-------------+----------------+-------------+---------------+------------+-------+--------------+----------------+---------------+-----------------+--------------+-------+
    3875 |     16384 |  replica | wswreceiver       | 114.117.197.144 |               | 44724       | 2022-01-27   | 11:53:52.912623 | async |
    176  |      30000 |  replica | wswreceiver       | 114.117.197.144 |               | 36310       | 2022-01-27   | 11:53:52.912623 | async |
```

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Installing BT Panel for Windows

Overview

BT panel is easy-to-use, powerful, friendly interactive, and free-of-charge server management software that supports Linux and Windows. It allows you to configure LAMP, LNMP, websites, databases, FTP, and SSL, and easily manage servers with a few clicks via a web client.

This document introduces how to use an image in the Tencent Cloud marketplace to quickly install a BT panel on CVM instances running on Windows.

Directions

Installing the BT panel during CVM instance creation

Note

If you want to use a purchased CVM instance to install a BT panel, you can reinstall the system and select the corresponding image in the image marketplace to complete the environment deployment. CVM instances in some regions outside the Chinese mainland currently do not support system reinstallation via the image marketplace. In such cases, you are advised to use CVM instances in other regions to deploy the environment or go to the BT panel official website for more installation information.

1. Log in to the CVM console and click Create Instance on the instance management page.
2. On the model selection page, set parameters as needed. Among the parameters, for Image, select Image Marketplace and click Select from image marketplace, as shown in the figure below:

Note

- Some regions outside the Chinese mainland currently do not support CVM instance creation via the image marketplace. If Image Marketplace is not displayed under the region you select, select another region that supports the image marketplace.
- You are advised to select an instance whose memory is greater than 2 GB and system disk capacity is greater than 40 GB.

iii. In the Image Marketplace window, select Ops Tool, enter BT, and click.
iv. Select an image as needed. This document uses **BT Panel for Windows - Official Edition (WAMP/WNMP/Tomcat/Node.js)** as an example. Click **Use for Free**.

v. In the security group associated with the instance, add the inbound rule to open port 8888. For more information, see **Adding Security Group Rules**.

Select other configuration such as the storage media and bandwidth as needed, and finally click **Purchase** to complete the BT panel setup.

**Obtaining BT panel login information**

i. Log in to the CVM instance. For more information, see **Logging in Using Standard Method (Recommended)**.

ii. On the desktop, right-click in the lower-left corner and click **Run** in the pop-up menu.

iii. In the command-line interface (CLI), run the following command to obtain the login information:

```bash
bt default
```

Note down the BT panel address and login information in the command output.

**Logging in to the BT panel**

i. On your local computer, open a browser and visit the BT panel address obtained.

```
http://CVM public IP:8888/xxxx
```

ii. Enter the username and password that you noted down, and click **Log In**.

iii. Select **I have read and agreed to Service Agreement** and click **Enter Panel**.

iv. Select kits for website installation and deployment as needed.
Building the Docker

Overview

This document describes how to build and use Docker in CVM. It is intended for new CVM users who are familiar with the Linux operating system. To learn more about Docker, see Docker’s official documentation.

Note

If you need to build and use Docker in a Windows CVM instance, see Install Docker Desktop on Windows.

About OS Versions

This document uses CentOS 8.2 and 7.6 as examples for CVM instance OSs. If you are using a TencentOS Server OS, perform operations based on the actual version:

- TencentOS Server 2.4: a Docker image is preset, and you do not need to install Docker again. You can use Docker directly by referring to Using Docker.
- TencentOS Server 3.1 (TK4): build Docker according to the directions in this document.

Prerequisites

You have purchased a Linux CVM.

Note

Docker must be built on a 64-bit operating system with the kernel version 3.10 or later.

Directions

Installing Docker
Proceed according to the actual operating system version.

- CentOS 8.2
- CentOS 7.6

1. **Log in to a Linux instance.**

2. Run the following command to add the Docker repository.

   ```
   dnf config-manager --add-repo=http://mirrors.tencent.com/docker-ce/linux/centos/docker-ce.repo
   ```

3. Run the following command to view the added Docker repository.

   ```
   dnf list docker-ce
   ```

4. Run the following command to install Docker.

   ```
   dnf install -y docker-ce --nobest
   ```

5. Run the following command to run Docker.

   ```
   systemctl start docker
   ```

6. Run the following command to check the installation result.

   ```
   docker info
   ```

If you see the following prompt, it indicates that Docker has been successfully installed.

```
Kernel Version: 4.18.0-305.3.1.el8.x86_64
Operating System: CentOS Linux 8 (Core)
OSType: linux
Architecture: x86_64
CPUs:  2
Total Memory: 3.587GiB
Name:    localhost
ID:      7GLW:8ZRM:FOY:
Docker Root Dir: /var/lib/docker
Debug Mode: false
Registry: https://index.docker.io/v1/
Labels:
Experimental: false
Insecure Registries: 127.0.0.0/8
Live Restore Enabled: false
```
Using Docker

You can use Docker with the following commands:

- Manage the Docker daemon.

  ```
  systemctl start docker
  ```

- Run the Docker daemon.

  ```
  systemctl start docker
  ```

- Stop the Docker daemon.

  ```
  systemctl stop docker
  ```

- Restart the Docker daemon.

  ```
  systemctl restart docker
  ```

- Manage images. This document uses the Nginx image of Docker Hub as an example.

  ```
  docker pull nginx
  ```

- Modify image tag to help you identify the image.

  ```
  docker tag docker.io/nginx:latest tencentyun/nginx:v1
  ```

- Query existing images.

  ```
  docker images
  ```

- Forcibly delete an image.

  ```
  docker rmi -f tencentyun/nginx:v1
  ```

- Manage containers.
- Enter a container.

```
docker run -it ImageId /bin/bash
```

Run the `docker images` command to obtain the `ImageId` value.

- Exit the container. Run the `exit` command to exit the container.

- Enter a container running in the background.

```
docker exec -it container ID /bin/bash
```

- Create an image from the container.

```
docker commit <container ID or container name> [repository name[:tag]]
```

For example:

```
docker commit 1c23456cd7**** tencentyun/nginx:v2
```

**Creating images**

1. Run the following command to open the “Dockerfile” file.

```
vim Dockerfile
```

2. Press `i` to switch to the edit mode and enter the following:

```
FROM tencentyun/nginx:v2 #Declare a basic image.
MAINTAINER DTSTACK #Declare the image owner.
RUN mkdir /dtstact #Add the command that needs to be run before the container starts after the RUN command. Since Dockerfile files can only contain a maximum of 127 lines, we recommend that you write and run the commands in the script.
ENTRYPOINT ping https://cloud.tencent.com/ #The commands that run at startup. The last command must be a frontend command that runs constantly. Otherwise, the container will exit after running all commands.
```
3. Click Esc and enter :wq to save and close the file.

4. Run the following command to build an image.

   ```bash
docker build -t nginxos:v1 . #The single dot (.) specifies the path of the Dockerfile and must be included.
   ```

5. Run the following command to check if the image has been created.

   ```bash
docker images
   ```

6. Run the following commands in sequence to run and check the container.

   ```bash
docker run -d nginxos:v1 #Run the container in the background.
docker ps #Check the running container.
docker ps -a #Check all containers including those that are not running.
docker logs CONTAINER ID/IMAGE #Check the startup log to troubleshoot the issue based on the container ID or name if you do not see the container in the returned results
   ```

7. Run the following commands in sequence to create an image.

   ```bash
docker commit fb2844b6**** nginxweb:v2 #Add the container ID and the name and version of the new image. after the commit command.
docker images #List local images that have been downloaded and created.
   ```

8. Run the following command to push the image to the remote repository.

   The image is pushed to Docker Hub by default. To push the image, log in to Docker, tag and name the image in the following format: Docker username/image name: tag .

   ```bash
docker login #Enter the username and password of the image registry after running the command
docker tag [image name]:[tag] [username]:[tag]
docker push [username]:[tag]
   ```

After the image is pushed, you can log in to Docker Hub to view the image.
Overview

GitLab is a Ruby-based open-source version management system. It provides the code management tool Git and the self-hosted Git repository to support your Web access to public and private projects. This document describes how to install and use GitLab on Tencent Cloud CVM.

Software

The CVM instance needs to be configured with:

- vCPU: 2 cores
- Memory: 4 GB
- Linux operating system: this document uses CentOS 7.7 as an example

Prerequisites

- A Linux CVM is required to install GitLab. If you have not purchased a Linux CVM yet, see Customizing Linux CVM Configurations.
- The security group rules for the Linux instance have already been configured. Open the port 80. For more information, see Adding Security Group Rules.

Directions

Installing GitLab

1. See Log in to Linux Instances Using the Standard Login Method. You can also use other login methods that you are more comfortable with:

   - Log in to Linux Instances via Remote Login Tools
   - Log in to Linux Instances via a SSH Key

2. Run the following command to install dependencies.
3. Run the following commands in sequence to enable SSH service autostart and start the SSH service.

```bash
systemctl enable sshd
systemctl start sshd
```

4. Run the following command to install Postfix.

```bash
yum install -y postfix
```

5. Run the following command to enable Postfix service autostart.

```bash
systemctl enable postfix
```

6. Run the following command to open Postfix’s configuration file main.cf.

```bash
vim /etc/postfix/main.cf
```

7. Press `i` to enter the editing mode. Delete `# before inet_interfaces = all`, and add `# before inet_interfaces = localhost`, as shown below:

```
inet_interfaces = all
#inet_interfaces = $myhostname
#inet_interfaces = $myhostname, localhost
#inet_interfaces = localhost
```

8. Press `Esc` and enter `:wq` to save and close the file.

9. Run the following command to start Postfix.

```bash
systemctl start postfix
```
0. Run the following command to add the GitLab software repository.

```bash
curl https://packages.gitlab.com/install/repositories/gitlab/gitlab-ce/script.rpm.sh | sudo bash
```

1. Run the following command to install GitLab.

```bash
sudo EXTERNAL_URL="Public IP address of the instance" yum install -y gitlab-ce
```

For more information about how to obtain the public IP of the instance, see Getting Public IP Addresses.

12. In a local browser, visit the public IP address that you have obtained. If the following page appears, GitLab has been installed successfully.

Note:
Configure the password for your GitLab account here.
Creating projects

1. In a local browser, visit the public IP address of your CVM to access the GitLab login page. Enter your root account and the configured password, as shown below:
GitLab Community Edition

A complete DevOps platform

GitLab is a single application for the entire software development lifecycle. From project planning and source code management to CI/CD, monitoring, and security.

Sign in

Username or email
root

Password

Remember me

Forgot your password?

Sign in
2. Create a private project as instructed. This document uses test as an example in the following figure:

![Project creation interface](image)

3. After the project is created, click Add SSH Key at the top of the page.

4. On the SSH Keys page, add a SSH key by performing the following steps:
   
   5. Get the key for the PC to be managed by the project and paste it in the Key field.
   
   6. Enter the key name in the Title field.
7. Click **Add key** as shown below:

If the result is similar to the following figure, the key has been added successfully:
8. On the project homepage, click **clone** to record the project address, as shown below:

![Clone project](image)

**Cloning projects**

1. Run the following command on the managed PC to configure the username of the Git repository.

   ```
   git config --global user.name "username"
   ```

2. Run the following command to configure the email for the username.

   ```
   git config --global user.email "xxx@example.com"
   ```

3. Run the following command to clone the project. Replace the project address with the actual values obtained in Step 5.

   ```
   git clone "Project address"
   ```

   After the project is successfully cloned, the same directory and all project files will be generated on your local computer.

**Uploading files**

1. Run the following command to access the project directory.
2. Run the following command to create the target file to be uploaded to GitLab. This document uses the test.sh file as an example.

```bash
    echo "test" > test.sh
```

3. Run the following command to add the test.sh file to the index.

```bash
    git add test.sh
```

4. Run the following command to submit the test.sh to the local repository.

```bash
    git commit -m "test.sh"
```

5. Run the following command to synchronize the test.sh file with the GitLab server.

```bash
    git push -u origin master
```
Go back to the test project page. You can now see the file on the page, as shown below:

Relevant Operations

Getting the key

1. On the PC to be managed by the project, run the following command to install Git.

   
   ```
   yum install -y git
   ```

2. Run the following command to generate the key file ".ssh/id_rsa". During the key file generation process, press Enter to keep the default configurations.

   
   ```
   ssh-keygen
   ```

3. Run the following command to view and record the key information.

   
   ```
   cat .ssh/id_rsa.pub
   ```
Building RabbitMQ

Overview

RabbitMQ is an open-source message broker based on the Advanced Message Queuing Protocol (AMQP). It features usability, scalability, and high availability with an Erlang-programmed server, and supports multiple clients including Python, Ruby, .NET, Java, JMS, C, PHP, ActionScript, XMPP, STOMP, and AJAX. This document describes how to deploy RabbitMQ on Tencent Cloud CVM.

Software

This document uses the following software as an example to deploy RabbitMQ:

- Linux: Linux operating system. This document uses CentOS 7.7 as an example.
- RabbitMQ Server: open-source message broker. This document uses RabbitMQ Server 3.6.9 as an example.
- Erlang: programming language. This document uses Erlang 19.3 as an example.

Prerequisites

- You have purchased a Linux CVM.
- The security group rules for the Linux instance have already been configured. Open the ports 80, 5672 and 15672. For more information, see Adding Security Group Rules.

Directions

Installing Erlang

1. Log in to a Linux instance using standard login method. You can also use other login methods that you are more comfortable with:
   - Logging in to Linux Instances via Remote Login Tools
   - Logging in to Linux Instance via SSH Key

2. Run the following command to install dependencies.
yum -y install make gcc gcc-c++ m4 ncurses-devel openssl-devel unixODBC-devel

3. Run the following command to download the Erlang installation package.

```
wget http://erlang.org/download/otp_src_19.3.tar.gz
```

4. Run the following command to decompress the Erlang installation package.

```
tar xzf otp_src_19.3.tar.gz
```

5. Run the following command to create the erlang folder.

```
mkdir /usr/local/erlang
```

6. Run the following commands in sequence to compile and install Erlang.

```
cd otp_src_19.3

./configure --prefix=/usr/local/erlang --without-javac
make && make install
```

7. Run the following command to open the profile configuration file.

```
vi /etc/profile
```

8. Press `i` to enter the edit mode, and append the following at the end of the file.

```
export PATH=$PATH:/usr/local/erlang/bin
```

9. Press `Esc` and enter `:wq` to save and close the file.

0. Run the following command for the environment variable to take effect immediately.
source /etc/profile

Installing RabbitMQ Server

1. Run the following command to download the RabbitMQ Server installation package.

   ```bash
   ```

   This document uses downloading RabbitMQ 3.6.9 from the RabbitMQ official website as an example. If the download link has expired, or if you want to use other RabbitMQ versions, go to rabbitmq-server and learn more about the installation.

10. Run the following command to import the signature key.

   ```bash
   rpm --import https://www.rabbitmq.com/rabbitmq-release-signing-key.asc
   ```

1. Run the following commands in sequence to install RabbitMQ Server.

   ```bash
   cd
   yum install rabbitmq-server-3.6.9-1.el7.noarch.rpm
   ```

2. Run the following commands in sequence to enable RabbitMQ autostart and start RabbitMQ.

   ```bash
   systemctl enable rabbitmq-server
   systemctl start rabbitmq-server
   ```

3. Run the following command to delete the default guest account of RabbitMQ.

   ```bash
   rabbitmqctl delete_user guest
   ```

4. Run the following command to create an account.

   ```bash
   rabbitmqctl add_user Username Password
   ```
5. Run the following command to set the new account as the admin account.

```
rabbitmqctl set_user_tags Username administrator
```

6. Run the following command to grant the admin account all permissions.

```
rabbitmqctl set_permissions -p / Username ".*" ".*" ".*"
```

**Verifying installation**

1. Run the following command to open the Web management page of RabbitMQ.

```
rabbitmq-plugins enable rabbitmq_management
```

2. Open a browser and visit:

```
http://Instance public IP:15672
```

For more information about how to obtain the public IP address of the instance, see Getting Public IP Addresses. If you see the following page, it indicates that RabbitMQ has been successfully installed.

3. Log in to RabbitMQ with the admin account created in Step 6 and access the RabbitMQ management page, as
shown below:
Building a Visual GUI

Building a Visual Ubuntu Desktop

Last updated: 2023-06-30 15:28:14

Scenarios

Virtual Network Console (VNC) is a remote control tool software developed by AT&T European Research Laboratory. An open-source software based on UNIX and Linux operating systems, VNC features robust remote control capability, high efficiency, and strong practicability. Its performance is comparable to any remote control software in Windows or Mac. This document will guide you through on how to build a visual Ubuntu desktop by using VNC.

Prerequisite

Purchase a Linux CVM using Ubuntu OS.

Directions

Configuring instance security group

The VNC service uses the TCP protocol and port 5901 by default. Therefore, you need to add a rule to open TCP:5901 in the security group bound to the instance. For more information, see Adding Security Group Rules.

Installing software packages

- Ubuntu 18.04
- Ubuntu 20.04
- Ubuntu 22.04

1. Log in to a Linux instance.
2. Run the following command to clear the cache and update the software package list.

   ```
   sudo apt clean all && sudo apt update
   ```

3. Run the following command to install the software packages required by the desktop environment, including desktop applications such as system panel, window manager, file browser, and terminal.
4. Run the following command to install VNC.

```bash
apt-get install vnc4server
```

### Configuring VNC

- Ubuntu 18.04
- Ubuntu 20.04
- Ubuntu 22.04

1. Run the following command to launch VNC and set a password.

```bash
vncserver
```

If the result similar to the following is returned, it indicates that VNC has been launched successfully.

```
root@VM-0-133-ubuntu:/home/ubuntu# vncserver
You will require a password to access your desktops.
Password:
Verify: 
Xauthority does not exist
New 'VM-0-133-ubuntu:1 (root)' desktop is VM-0-133-ubuntu:1
Creating default startup script /root/.vnc/xstartup
Starting applications specified in /root/.vnc/xstartup
Log file is /root/.vnc/VM-0-133-ubuntu:1.log
```

2. Run the following command to access the VNC configuration file.

```bash
vi ~/.vnc/xstartup
```

3. Press `i` to enter edit mode, and modify the configuration file as follows.

```sh
#!/bin/sh
export XKL_XMODMAP_DISABLE=1
export XDG_CURRENT_DESKTOP="GNOME-Flashback:GNOME"
export XDG_MENU_PREFIX="gnome-flashback-
```

4. Click `Esc` and enter `:wq` to save and close the file.

5. Run the following commands to restart the desktop process.
vncserver -kill :1 # Enter the command to terminate the original desktop processes (wherein :1 is the number of the desktop)

vncserver -geometry 1920x1080 :1 # Generate a new session

6. Click here to download and install VNC Viewer. Select the version that matches your operating system.

7. Type CVM IP address: 1 into VNC Viewer, and press Enter.

8. In the pop-up window, click Continue.

9. Enter the VNC password set in step 2 and click OK.
Building a Visual CentOS Desktop

Overview

This document describes how to build a visual CentOS desktop on CVM instances with CentOS 8.2 or CentOS 7.9 installed.

Notes

- By default, Tencent Cloud Linux public images are not provided with a GUI component.
- Improper GUI component installation may cause a CVM startup failure. We recommend you to first back up data by creating custom images or creating snapshots.

Directions

Perform the following operations according to the operating system version of your CVM instance.

- CentOS 8.2
- CentOS 7.9

1. Log in to the Linux instance using standard login method.
2. Run the following command to install the GUI component.
   ```bash
yum groupinstall "Server with GUI" -y
   ```
3. Run the following command to set the default GUI.
   ```bash
   systemctl set-default graphical
   ```
4. Run the following command to restart the instance.
   ```bash
   reboot
   ```
5. Log in to the Linux instance via VNC.
   If the GUI page appears, it has been successfully set up. Follow the instructions to enter the desktop and continue
other operations.
Data Backup

Last updated : 2022-03-21 15:19:43

This document provides references for CVM data backup and protection. We recommend you back up important data to ensure data security.

- Backup and Restore
- Creating Custom Images
- Creating Snapshots
- Scheduled Snapshots
- Rolling Back Snapshots

If you have any questions when backing up data, see About Data Backup
Migrating CVM Instances

Overview

Service Migration is a platform developed by Tencent Cloud to help enterprises migrate operating systems, applications, and application data from a source server to a Cloud Virtual Machine (CVM) or Cloud Block Storage (CBS). It helps meet enterprise needs for cloudification, cross-cloud migration, cross-account or cross-region migration, and hybrid cloud deployment.

Migration Mode

Service migration includes offline migration and online migration. Select a migration mode that suits your needs.

- **Online migration** (recommended): you can migrate systems and applications on source servers from your IDCs or other cloud platforms to Tencent Cloud. It is applicable to enterprise cloudification, cross-vendor migration, cross-account or cross-region migration, and hybrid cloud deployment.
- **Offline migration**: you need to first create an image for the system disk or data disk of source servers, and upload the image to the destination CVM or cloud disk.

Migration Tutorial

Refer to the following migration tutorials to quickly get started with migration.

**Tencent Cloud migration tutorial**

- Migrating Tencent Cloud CVM Data Across Availability Zones
- Migrating Tencent Cloud CVM Data Across Accounts

**Migration tutorial for different source environments**

- Migrating AWS EC2 Data to Tencent Cloud
- Migrating Alibaba Cloud ECS Data to Tencent Cloud
- Migrating Huawei Cloud ECS Data to Tencent Cloud
- Migrating UCloud UHost Data to Tencent Cloud
- Migrating Baidu Cloud BCC Data to Tencent Cloud
- Migrating VMWare Virtual Machine Data to Tencent Cloud
• Migrating China Telecom e-Cloud Cloud Server Data to Tencent Cloud

FAQs

For more information, please see About Service Migration.
Uploading Local Files to CVM
Copying Local Files to CVMs

This document describes how to copy local files to a CVM instance.

Follow the instructions below according to your local OS.

<table>
<thead>
<tr>
<th>Local OS</th>
<th>Linux CVM</th>
<th>Windows CVM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>• Upload by using WinSCP</td>
<td>Upload by using MSTSC</td>
</tr>
<tr>
<td></td>
<td>• Upload by using FTP</td>
<td></td>
</tr>
<tr>
<td>Linux</td>
<td>• Upload by using SCP</td>
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<tr>
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<tr>
<td>macOS</td>
<td></td>
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</tr>
</tbody>
</table>

For example, if you want to upload files from your local Windows server to a Linux CVM instance, you can use WinSC.

Note
For a text file smaller than 36 KB, it’s recommended to upload it directly in the console.

Subsequent Operations

After uploading files to CVM, you can make a snapshot for backup and disaster recovery. See Snapshot FAQs.

Troubleshooting

You can submit a ticket for assistance.

See below for the common problems and solutions:

- What should I do if I forgot my CVM instance login password?
  See Resetting Instance Password.
- What should I do if I can’t log in to the CVM instance?
  See Windows Instance Login Failures or Linux Instance Login Failures.
Uploading Files from MacOS to Windows CVM Using MRD

Last updated: 2022-03-21 15:19:43

Overview

Microsoft Remote Desktop (MRD) is a remote desktop software developed by Microsoft. This document describes how to use it on MacOS to upload files to a Tencent Cloud CVM with Windows Server 2012 R2 installed.

Prerequisites

- You have downloaded and installed MRD on your local computer. The following operations use Microsoft Remote Desktop for Mac as an example. Microsoft stopped providing a link to download the Remote Desktop client in 2017. Currently, its subsidiary HockeyApp is responsible for releasing the beta client. Go to Microsoft Remote Desktop Beta to download a Beta version.
- MRD supports MacOS 10.10 and later versions. Make sure your operating system is compatible.
- You have purchased a Windows CVM.

Directions

Obtaining a public IP

Log in to the CVM console, navigate to the Instances page, and record the public IP of the CVM to which you want to upload files, as shown below:

![CVM console](image)

Uploading files
1. Start MRD and click **Add Desktop**, as shown below:

![Add Desktop](image)

Add your first desktop connection to get started.

Add Desktop

2. In the **Add Desktop** pop-up window, follow the steps below to select the folder to upload and establish a connection with your Windows CVM.
3. In the **PC name** text field, enter the public IP address of your CVM.
4. Click **Folders** to redirect to the folder list.
5. Click ‹+› in the lower-left corner and select the folder to be uploaded in the pop-up window.
6. Check your list of folders to upload and click **Add**.
7. Retain the default settings for the other options and establish the connection.

Your entry has now been saved, as shown below:
8. Double-click the new entry. Input your username and password for CVM and click **Continue**.

**Note:**
- The default account for the Windows CVM is **Administrator**.
- If you use a system default password to log in to the instance, go to the **Message Center** to obtain the password first.
- If you have forgotten your password, please **reset the instance password**.

9. In the pop-up window, click **Continue** to establish the connection, as shown below:
If the connection is successful, the following page will appear:

0. Click in the lower-left corner and select **My Computer** to see a list of shared folders.

1. Double click a shared folder to open it. Copy desired local files to another drive of the Windows CVM. For example, copy the A file under the folder to the C drive of Windows CVM.

**Downloading files**

To download files from the Windows CVM to your computer, you only need to copy desired files from the CVM to a shared folder.
Uploading Files from Linux to Windows CVM using RDP

Overview

rdesktop is an open source client for Remote Desktop Protocol (RDP) that allows a local computer to connect to a Windows CVM. This document describes how to use it to upload files from a local Linux computer to a Tencent Cloud CVM with the Windows Server 2012 R2 operating system.

Note:
- The Linux computer should be built with a visualized interface to use rdesktop.
- This document uses a CVM with CentOS 7.6 installed as an example. Note that the steps may vary according to the operating system version.

Prerequisites

You have purchased a Windows CVM.

Directions

Obtaining a public IP

Log in to the CVM console, navigate to the Instances page, and record the public IP of the CVM to which you want to upload files, as shown below:

Installing rdesktop

1. Open a terminal window and run the following command to download rdesktop. This step uses rdesktop v1.8.3 as an example.
wget https://github.com/rdesktop/rdesktop/releases/download/v1.8.3/rdesktop-1.8.3.tar.gz

If you want to install the latest version, visit the rdesktop page on GitHub to find it. Then replace the path in the command with that of the latest version.

2. Run the following commands to decompress the installation package and enter the directory.

```
tar xvzf rdesktop-1.8.3.tar.gz
cd rdesktop-1.8.3
```

3. Run the following commands to compile and install rdesktop.

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

4. After the installation is complete, run the following command to check if rdesktop is successfully installed:

```
rdesktop
```

### Uploading files

1. Run the following command to specify the shared folder:

```
```

**Note:**
- The default account for the Windows CVM is Administrator.
- If you use a system default password to log in to the instance, go to the Message Center to obtain the password first.
- If you've forgotten your password, you can reset the instance password.
For example, run the following command to share the `/home` folder on your local Linux computer with the specified CVM, and rename it as `share`.

```
rdesktop 118.xx.248.xxx -u Administrator -p 12345678 -r disk:share=/home
```

If the operation is successful, the Windows Desktop appears.

Click in the lower-left corner and select **My Computer** to see a list of shared folders.

2. Double click a shared folder to open it. Copy desired local files to another drive of the Windows CVM.

For example, copy the file A from the `share` folder to the C drive of Windows CVM.

**Downloading files**

To download files from the Windows CVM to your computer, you only need to copy desired files from the CVM to a shared folder.
Uploading Files from Linux to a CVM Using FTP

Overview

This document describes how to use the FTP service to upload files from a local Linux computer to a CVM.

Prerequisites

You have built the FTP service on CVM.

- To use FTP to upload files to a Linux CVM, see Building the FTP Service (Linux)
- To use FTP to upload files to a Windows CVM, see Building the FTP Service (Windows)

Directions

Connecting to the CVM

1. Run the following command to install the FTP service.

   ```
   If the FTP service has already been installed on the local Linux computer, skip this step.
   
   yum -y install ftp
   ```

2. Run the following command to connect to the CVM and enter the FTP service username and password as prompted.

   ```
   ftp <CVM IP address>
   ```
If the following interface appears, the connection has been established successfully.

```
[root@VM_0_118_centos ~]# ftp 1.1.1.1
Connected to 1.1.1.1.
220 Microsoft FTP Service
Name (1.1.1.1:root): ftpuser
331 Password required
Password: 230 User logged in.
Remote system type is Windows_NT.
ftp> 
```

### Uploading a file

Run the following command to upload a local file to the CVM.

```
put local-file [remote-file]
```

For example, to upload the local `/home/1.txt` file to the CVM, run the following command.

```
put /home/1.txt 1.txt
```

### Downloading a file

Run the following command to download a file from the CVM to a local directory.

```
get [remote-file] [local-file]
```

For example, to download the `A.txt` file from the CVM to the local `/home` directory, run the following command.

```
get A.txt /home/A.txt
```
Uploading files via WinSCP to a Linux CVM from Windows

Last updated : 2022-03-23 11:29:09

Overview

WinSCP is an open-source graphical SFTP client that uses SSH in Windows environment and supports SCP protocol. Its main feature is to copy files securely between the local and remote computers. Unlike uploading codes via FTP, you can directly use your CVM account in WinSCP to access the CVM without any additional configuration.

Prerequisites

WinSCP has been downloaded and installed on the local computer. Download the latest WinSCP.

Directions

Logging in to WinSCP

1. Open WinSCP, and the "WinSCP Login" box pops up.
2. Configure the following parameters:

   - **Protocol**: either SFTP or SCP.
   - **Host Name**: Public IP of the CVM. Log in to CVM console to view the Public IP of the CVM.
   - **Port**: 22 by default.
   - **Username**: Username for logging in to the CVM.

   Note
   The default admin username is root for Linux instances and ubuntu for Ubuntu instances. If you use Ubuntu, configure as instructed in How can I log in to an instance running Ubuntu as root? and then log in as root.

   - **Password**: Password of the username.
     - If you choose to log in with a random password, you can obtain the password at the Message Center.

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If you forgot your password, please reset the instance password.

3. Click Log In to enter the "WinSCP" file transfer page.

**Uploading files**

1. In the right pane of the "WinSCP" file transfer page, select the directory where the files are to be stored on the server, such as `/user`.
2. In the left pane, select the directory where the files are stored on the local computer, such as `F:\SSL\certificate\Nginx`, and then select the files to be transferred.
3. In the left menu, click Upload.
4. In the "Upload" box that pops up, confirm the files to be uploaded and the remote directories, and click OK to upload the files from the local computer to the CVM.

**Downloading files**

1. In the left pane of the "WinSCP" file transfer page, select the local computer directory to store the downloaded files, such as "F:\SSL certificate\Nginx".
2. In the right pane, select the directory where the files locate, such as `/user`, and then select the file to be transferred.
3. In the right menu, click Download.
4. In the "Download" box that pops up, confirm the files to be downloaded and the remote directories, and click OK to download the files from the CVM to the local computer.
Uploading Files from Windows to a CVM
Using FTP

Overview

This document describes how to use the FTP service to upload files from a local Windows computer to a CVM.

Prerequisites

You have built the FTP service on CVM.

- To use FTP to upload files to a Linux CVM, see Building the FTP Service (Linux)
- To use FTP to upload files to a Windows CVM, see Building the FTP Service (Windows)

Directions

Connecting to the CVM

1. Download and install the open-source FileZilla locally.

   Note
   If you use version 3.5.3 of FileZilla to upload files via FTP, the upload may fail. We recommend you download and use versions 3.5.1 or 3.5.2 of FileZilla from its official website.

2. Open FileZilla.

3. In the FileZilla window, enter information such as the host, username, password, and port, and click Quickconnect.

Configuration description:

- Host: the public IP of the CVM. Log in to the CVM Console to view the public IP of the CVM on the Instances page.
• Username: the FTP user account configured when you built the FTP service. The figure below uses "ftpuser1" as an example.
• Password: the password corresponding to the FTP user account configured when you built the FTP service.
• Port: the FTP listening port, which is 21 by default.
  After the connection is successful, you can view the files on the remote CVM site.

**Uploading a file**

In the lower-left "Local site" window, right-click the local file to be uploaded and select **Upload** to upload it to a Linux CVM, as shown below:

**Note**
- CVM FTP path does not support the automatic decompression or deletion of uploaded compressed tar files.
- The remote site path is the default path for uploading files to a Linux CVM.

**Downloading a file**

In the lower-right "Remote site" window, right-click the CVM file to be downloaded and choose **Download** to download it to a local directory.
Uploading Files from Linux or MacOS to Linux CVM via SCP

Overview

The document uses CVMs with CentOS 8.2 as an example to describe how to upload and download files via SCP.

Prerequisites

You have purchased a Linux CVM.

Directions

Obtaining a public IP

Log in to the CVM console, navigate to the Instances page, and record the public IP of the CVM to which you want to upload files, as shown below:

Uploading files

1. Run the following command to upload files to a Linux CVM.

   `scp local file address CVM account@CVM instance public IP/domain name: CVM file location`

   For example, you can run the following command to upload the local file `/home/lnmp0.4.tar.gz` to the same directory of the CVM whose public IP is `129.20.0.2`:

   `scp /home/lnmp0.4.tar.gz root@129.20.0.2:/home/lnmp0.4.tar.gz`
2. Enter **yes** and press **Enter** to confirm the upload and enter the login password to complete the upload.

- If you use a system default password to log in to the instance, you can obtain the password at the Message Center.
- If you forgot your password, please reset the instance password

### Downloading files

1. Run the following command to download a file from a Linux CVM.

   ```bash
   scp CVM account@CVM instance public IP/domain name: CVM file location local file address
   ```

   For example, you can run the following command to download the file `~/home/lmp0.4.tar.gz` from the CVM whose public IP is `129.20.0.2` to the same local directory:

   ```bash
   scp root@129.20.0.2:/home/lmp0.4.tar.gz /home/lmp0.4.tar.gz
   ```
Uploading Files from Windows to a Windows CVM via MSTSC

Overview

Microsoft Terminal Services Client (MSTSC) is commonly used for file upload to a Windows CVM. This document describes how to upload files from a Windows computer to a Windows CVM using MSTSC.

Prerequisites

Make sure the Windows CVM can access the public network.

Directions

Note

This document uses a Windows 7 computer as an example. The procedure may vary slightly according to the operating system version.

Obtaining a public IP

Log in to the CVM console, navigate to the Instances page, and record the public IP of the CVM to which you want to upload files, as shown below:

Uploading files
1. On your local computer, use the **Windows+R** shortcut to open the **Run** window.

2. In the **Run** window, enter **mstsc** and click **OK** to open the **Remote Desktop Connection** window.

3. In the pop-up dialog box, enter the public IP address of the CVM and click **Show Options**.

4. On the **General** tab, enter the CVM public IP address and username "Administrator".

5. Select the **Local Resources** tab and click **More**.

6. In the **Local devices and resources** pop-up window, select the **Drives** module, select the local disk where the file to be uploaded to the Windows CVM instance is located, and click **OK** as shown below:

7. After completing the local configuration, click **Connect** and enter the Windows CVM instance’s login password in the **Windows Security** pop-up window to log in to the instance remotely.

8. Select 📜 and click **Computer** on the Windows CVM, and you can see the local disk attached.

9. Double click to open the attached local disk. Copy desired local files to another drive of the Windows CVM.

   For example, copy the file A from local disk (E) to the C drive of Windows CVM.

### Downloading files

To download files from Windows CVM to your computer, you only need to copy desired files from the CVM to the attached local disk.
Other CVM Operations

This document provides references for common CVM operations as follows:

- Building a Visual Ubuntu Desktop
- Building the FTP Service (Linux)
- Recovering Data on Linux CVMs
- Managing Disk Space on Windows CVMs
- Offline Migration
- Migrating Tencent Cloud CVM Data Across Availability Zones
- Migrating Tencent Cloud CVM Data Across Accounts
- Migrating AWS EC2 Data to Tencent Cloud
- Migrating Alibaba Cloud ECS Data to Tencent Cloud

If you have any questions when using CVM, please see About Use Cases.
This document describes the COS access methods and the way to determine a private network access. It also provides the connectivity test sample to help you learn more about CVM access to COS.

Access Methods

If you have deployed a service in Tencent Cloud to access COS, different access modes apply as follows:

- **Intra-region access**: access within the same region will be automatically directed to a private network address. A private network connection is automatically used, incurring no traffic fees. Therefore, we recommend choosing the same region when you purchase different Tencent Cloud products to save on costs.

- **Cross-region access**: currently, cross-region requests do not support private network access and will be resolved to a public network address by default.

Determining a Private Network Access

To determine whether a CVM accesses COS via a private network, perform the following steps.

1. Obtain and record the bucket access domain as instructed in [Bucket Overview](#).
2. Log in to the CVM instance and run the `nslookup` command. Assume that `examplebucket-1250000000.cos.ap-guangzhou.myqcloud.com` is the address of the destination bucket, run the following command.

   ```bash
   nslookup examplebucket-1250000000.cos.ap-guangzhou.myqcloud.com
   ```

   In the command output, the 10.148.214.13 and 10.148.214.14 IPs indicate that the access to COS is over a private network.

Note

Generally, a private IP address is in the format of 10.*.*.* or 169.254.*.*, while a VPC IP address 169.254.*.*. Both IP formats are on the private network.
Test Connectivity

See the “Testing connectivity” section in Request Creation Overview for the COS access samples through a public network, access through Tencent Cloud CVMs (classic network) within the same region and access through Tencent Cloud CVMs (VPC) within the same region.

Relevant operations

- Mounting COS to Windows Server as Local Drive
- Storing Remote WordPress Attachments to COS
Recovering Data on Linux CVMs

Overview

This document uses a CVM instance on CentOS 8.0 as an example to describe how to use the open-source tool Extundelete to recover accidentally deleted data.

Extundelete can recover accidentally deleted files in EXT3 and EXT4 file systems, but the specific level of recovery is subject to various factors such as whether files are overwritten by writes after deletion and whether metadata is stored in the journal. If the file system to be recovered is on the system disk, and there are always business or system processes writing files, the possibility of recovery is low.

Note

Tencent Cloud also offers snapshots, custom images and Cloud Object Storage to store data. We recommend that you regularly back up data to enhance data security.

Preparations

Before recovering the data, complete the following preparations:

- Back up your data by referring to Creating Snapshots and Creating Custom Images.
- Stop writing data to the file system. If you need to recover a data disk, run `umount` to detach the disk from the CVM instance first.

Directions

1. Install Extundelete in the following two ways:
   - Download (recommended)
   - Manual set-up
     i. Run the following command to directly download the compiled binary program.

```bash
wget https://github.com/curu/extundelete/releases/download/v1.0/extundelete
```

   ii. Run the following command to grant file permissions.
2. Run the following command to try recovering the data.

```
chmod a+x extundelete

./extundelete --restore-all /dev/corresponding disk
```

The recovered files are located in the `RECOVERED_FILES` folder at the same directory level. Check whether there are the needed files.
Managing Disk Space on Windows CVMs

Last updated: 2020-09-14 14:24:12

Overview

This document describes how to release disk space on a Windows Server 2012 R2-based Tencent Cloud CVM when the disk space is insufficient. It also describes how to perform routine disk maintenance.

Directions

Releasing disk space

You can delete large files or obsolete files to free up disk space. If the disk space is still insufficient after deleting large and obsolete files, you can expand the disk space. To do this, please see Cloud Disk Expansion Scenarios.

Deleting large files

1. Log in to a Windows instance using either the RDP file (recommended) or the remote desktop.
2. Click in the bottom toolbar and open the “This PC” window.
3. Select the disk in which you want to free up space, and press Ctrl + F to open the search tool.
4. Select Search -> Size and filter files by the system-defined size options, as shown below:

![Opening the This PC window](image)

Note:

You can also enter a size in the search box in the upper-right corner of the This PC window. For example:
Deleting obsolete files

1. On the desktop, click to open Server Manager.
2. Click Add Roles and Features under Manage.
3. In the pop-up window, click Next.
4. Select Role-based or feature-based installation and click Next twice, as shown below:

5. On the Select features page, check Ink and Handwriting Services and Desktop Experience, as shown below. Click OK in the pop-up dialog box.
6. Click **Next** and then **Install**. Wait for the installation to complete, and restart CVM when prompted.

7. Select ☐ and click in the top-right corner. Enter **Disk Management** and search.

8. In the pop-up **Disk Cleanup** window, select the target disk and start the cleanup, as shown below:
Routine disk maintenance

Removing programs regularly

Select Control Panel -> Programs and Features -> Uninstall or change a program to regularly remove obsolete programs, as shown below:

Viewing disk usage on the console

The Cloud Monitor feature is automatically enabled once a CVM instance is created. You can view the disk usage by following the steps below:

1. Log in to the CVM console and access the Instances page.
2. Select the ID/Name of the target instance to access the details page.
3. Select the **Monitoring** tab to view the instance disk usage, as shown below:
Changing Kernel of a Linux Instance Manually

Overview

Bottleneck Bandwidth and Round-trip propagation time (BBR) is a TCP congestion control algorithm developed by Google in 2016. It helps significantly improve the throughput and the TCP connection latency of Linux servers. However, enabling BBR requires a Linux kernel version of 4.10 or later. If you use an earlier version, you need to upgrade your kernel.

This document describes how to manually change the kernel and enable BBR in a Linux CVM instance on CentOS 7.5 as an example.

Directions

Updating the kernel package

1. Run the following command to check the current kernel version.

   `uname -r`

2. Run the following command to update the software package.

   `yum update -y`

3. Run the following command to import the public key of ELRepo.

   `rpm --import https://www.elrepo.org/RPM-GPG-KEY-elrepo.org`

4. Run the following command to install the yum repository of ELRepo.

   `yum install https://www.elrepo.org/elrepo-release-7.0-4.el7.elrepo.noarch.rpm`

Installing a new kernel
1. Run the following command to check the supported kernel package in the ELRepo repository.

```
yum --disablerepo="*" --enablerepo="elrepo-kernel" list available
```

2. Run the following command to install the latest mainline stable kernel.

```
yum --enablerepo=elrepo-kernel install kernel-ml
```

### Modifying the grub configuration

1. Run the following command to open the `/etc/default/grub` file.

```
vim /etc/default/grub
```

2. Press `i` to switch to the edit mode and change `GRUB_DEFAULT=saved` to `GRUB_DEFAULT=0`.

![Grub Configuration](image)

3. Click `Esc` and enter `:wq` to save and close the file.

4. Run the following command to generate the kernel configuration again.

```
grub2-mkconfig -o /boot/grub2/grub.cfg
```

5. Run the following command to restart the server.

```
reboot
```

6. Run the following command to check whether the modification is successful.

```
uname -r
```
Deleting unnecessary kernels

1. Run the following command to view all kernels.

   ```bash
   rpm -qa | grep kernel
   ```

2. Run the following command to delete the older kernel.

   ```bash
   yum remove kernel-old_kernel_version
   ```

   For example:

   ```bash
   yum remove kernel-3.10.0-957.el7.x86_64
   ```

Enabling BBR

1. Run the following command to edit the `/etc/sysctl.conf` file.

   ```bash
   vim /etc/sysctl.conf
   ```

2. Press `i` to switch to the edit mode and enter the following:

   ```bash
   net.core.default_qdisc=fq
   net.ipv4.tcp_congestion_control=bbr
   ```

3. Click `Esc` and enter `:wq` to save and close the file.

4. Run the following command to load the kernel parameter settings to the `/etc/sysctl.conf` configuration file.

   ```bash
   sysctl -p
   ```

5. Run the following commands to verify whether BBR has been successfully enabled.

   ```bash
   sysctl net.ipv4.tcp_congestion_control
   # The following appears if the configuration succeeds:
   # net.ipv4.tcp_congestion_control = bbr
   ```
sysctl net.ipv4.tcp_available_congestion_control
# The following appears if the configuration succeeds:
# net.ipv4.tcp_available_congestion_control = reno cubic bbr

6. Run the following commend to check whether the kernel module is loaded.

lsmod | grep bbr

If the following information is returned, BBR has been successfully enabled.
Setting Up Windows-based AD Domain on a CVM

Overview

This document introduces how to set up an Active Directory (AD) domain based on a Windows server 2012 R2 data center version 64-bit operating system. Active Directory (AD) is a core component of Microsoft services. AD can achieve efficient management through batch management of users, deploying applications and updating patches. An AD domain is required for many Microsoft components (such as Exchange) and failover clusters.

Prerequisites

- You have created two Windows-based CVM instances, which are used as a domain controller (DC) and a client.

- Requirements for the instances:
  - Use NTFS partition;
  - Support DNS service;
  - Support TCP/IP protocol.

Instance Network Environment

- Networking: The instances are in VPC, and the private IP range of the switch is 10.0.0.0/16.
- Domain name: For example, example.com. The IP address of the CVM instance used as the DC is 10.0.5.102, while the IP address of another instance is 10.0.5.97.

Note

After setting up the AD domain, keep the IP address of the CVM instances unchanged.

Concepts

The main concepts of AD are listed below:
Directions

Note
It’s not recommended to create an instance with an image whose source instance is already deployed with a domain controller. If you do need to use this image, please be sure that the host name of new instance is the same as the host name of source instance of the image. Otherwise, an error The security database on the server is not trusted can be reported. You can also change the new instance name to the same hostname after the instance creation to solve this problem.

Deploying AD domain controller

1. Log in to the CVM instance used as a DC.

2. In the OS interface, click to open Server Manager.

3. Click Add Roles and Features, and the Add Roles and Features Wizard window pops up.

4. In the Select Installation Type page, select Role-based or feature-based installation and click Next twice.

5. In the Select Server role page, tick AD Domain Service and "DNS Server, and click Add features and Next in the pop-up window.

   This example deploys the AD domain service and DNS service on the same instance.

6. Keep the default configuration for the next four steps till you reach the confirmation page.

7. On the confirmation page, click Install.

   After the installation is complete, close the Add Roles and Features dialog.

8. In the OS interface, click to open Server Manager.

9. Click and select Promote this server to a domain controller.

0. In the AD Domain Service Configuration Guide window, set “Select deployment operation” to Add a new forest, and enter the root domain name (for example, "example.com"). Then, click Next.

1. Set the Directory Services Restore Mode (DSRM) password and click Next.

2. Keep the default configuration for the next four steps till you reach the Prerequisite Check page.
3. In the **Prerequisite Check**, click **Install**.

After the installation of AD domain server, you can reconnect to the instance and view the installation result in **Control Panel > System and Security > System**.

### Modifying the client SID

Modify the SID of the instance used as the client. For details, see **Modifying SID**.

### Joining the client to AD domain

1. Log in to the CVM instance used as the client.

2. Modify the DNS server address.
   
   i. Open **Control Panel > Network and Internet > Network and Sharing Center**, and click **Ethernet**.
   
   ii. In the **Ethernet Status** window, click **Properties**.
   
   iii. Select **Internet Protocol Version 4 (TCP/IPv4)** in the "Ethernet Properties" window and click **Properties**.
   
   iv. In the **Internet Protocol Version 4 (TCP/IPv4) Properties** window, select **Use the following DNS server address** and set the preferred DNS server address (10.0.5.102 in this example) as the IP address of the instance.
   
   In the step of **Deploying AD domain controller**, AD domain service and DNS service are deployed on the same CVM instance (IP: 10.0.5.102), so the address of the DNS server specified here is 10.0.5.102.

   v. Click **Ok**.

3. In the cmd window, execute the following `ping` command to check whether the IP address is connected.

   ```
   ping example.com
   ```

4. Open **Control Panel > System and Security > System**, and click **Change Settings** in the "System" window.

5. In the pop-up **System Properties** window, click **Change**.

6. In the pop-up **Computer Name/Domain Change** window, modify the computer name as required, and set **example.com** as the domain.

7. Click **OK**.

8. In the pop-up **Windows Security**, enter the username and login password of the instance, and click **OK**.

   The client successfully joins the domain when the following window pops up.
9. Click **Ok**, and restart the instance for the configuration to take effect.

**Note**

If the CVM instance that works as the client has joined a domain, don’t use it to create the custom image, which can cause the error **The security database on the server is not trusted**. If you do need to create an image for this instance, remove the instance from the domain first.
Network Performance Test

Overview

This document describes how to test the CVM network performance with tools, which helps you stay on top of the CVM network performance based on the test result.

Network Performance Test Metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bandwidth (Mbits/sec)</td>
<td>Maximum amount of data (bits) transferred per unit time (1s)</td>
</tr>
<tr>
<td>TCP-RR (times/sec)</td>
<td>Response efficiency when multiple request/response communications are made during one TCP persistent connection. TCP-RR is widely used in database access links</td>
</tr>
<tr>
<td>UDP-STREAM (packets/sec)</td>
<td>Data throughput of UDP during batch data transfer, which reflects the maximum forwarding capacity of an ENI</td>
</tr>
<tr>
<td>TCP-STREAM (Mbits/sec)</td>
<td>TCP-based data throughput during batch data transfer</td>
</tr>
</tbody>
</table>

Tool Information

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCP-RR</td>
<td>Netperf</td>
</tr>
<tr>
<td>UDP-STREAM</td>
<td>Netperf</td>
</tr>
<tr>
<td>TCP-STREAM</td>
<td>Netperf</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>iperf</td>
</tr>
<tr>
<td>PPS viewing</td>
<td>sar</td>
</tr>
<tr>
<td>ENI queue viewing</td>
<td>ethtool</td>
</tr>
</tbody>
</table>
Directions

Constructing a test environment

Preparing a test server

- Image: CentOS 7.4 64-bit
- Specifications: S3.2XLARGE16
- Quantity: 1

Assume that the IP address of the test server is 10.0.0.1.

Preparing companion training servers

- Image: CentOS 7.4 64-bit
- Specifications: S3.2XLARGE16
- Quantity: 8

Assume that the IP addresses of companion training servers are 10.0.0.2 to 10.0.0.9.

Deploying test tools

Note:
When constructing a test environment and conducting tests in the environment, ensure that you have root user permissions.

1. Run the following command to install the compiling environment and the system status detection tool:

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

2. Run the following command to download the Netperf compression package:

   You can also download the latest version of Netperf from GitHub: Netperf.

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

3. Run the following command to decompress the Netperf compression package:

   ```bash
   tar xf netperf-2.5.0.tar.gz && cd netperf-netperf-2.5.0
   ```
4. Run the following command to compile and install Netperf:

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

5. Run the following commands to verify whether the installation was successful:

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

If “Help” appears, the installation was successful.

6. Run the following commands based on the OS type to install iperf:

```bash
yum install iperf #For CentOS. Ensure that you have root permissions.
apt-get install iperf #For Ubuntu or Debian. Ensure that you have root permissions.
```

7. Run the following command to verify whether the installation was successful:

```bash
iperf -h
```

If “Help” appears, the installation was successful.

**Bandwidth test**

We recommend that you use two CVMs with the same configuration for testing to prevent deviations in the performance test results. One CVM is used as the test server while the other CVM is used as the companion training server. In this example, 10.0.0.1 and 10.0.0.2 are specified for testing.

**Test server**

Run the following command:

```bash
iperf -s
```

**Companion training server**

Run the following command:

```bash
iperf -c ${<Server IP address>} -b 2048M -t 300 -P ${<Number of ENI queues>}
```
For example, if the IP address of the test server is 10.0.0.1 and the number of ENI queues is 8, run the following command on the companion training server:

```
iperf -c 10.0.0.1 -b 2048M -t 300 -P 8
```

**UDP-STREAM test**

We recommend that you use one test server and eight companion training servers for testing. 10.0.0.1 is the test server, and 10.0.0.2 to 10.0.0.9 are the companion training servers.

**Test server**

Run the following commands to view the network PPS value:

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

**Companion training servers**

Run the following command:

```
./netperf -H <Private IP address of the test server> -l 300 -t UDP_STREAM -- -m 1 &
```

On the companion training servers, launch a few Netperf instances. Based on experience, launching one instance should be sufficient. If the system performance is unstable, add more Netperf instances to reach the UDP_STREAM limit.

For example, if the private IP address of the test server is 10.0.0.1, run the following command:

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

**TCP-RR test**

We recommend that you use one test server and eight companion training servers for testing. 10.0.0.1 is the test server, and 10.0.0.2 to 10.0.0.9 are the companion training servers.

**Test server**

Run the following commands to view the network PPS value:

```
netserver
sar -n DEV 2
```
Companion training servers

Run the following command:

```
./netperf -H <Private IP address of the test server> -l 300 -t TCP_RR -- -r 1,1 &
```

On the companion training servers, launch multiple Netperf instances. Based on experience, at least 300 Netperf instances should be launched to reach the TCP-RR limit.

For example, if the private IP address of the test server is 10.0.0.1, run the following command:

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

Test Data Analysis

Performance analysis of the sar tool

Sample analysis data

```
02:41:03 PM IFACE rxpck/s txpck/s rxkB/s txkB/s rxcmp/s txcmp/s rxmcst/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 rxmcst/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 rxmcst/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 rxmcst/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
```

Field descriptions

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rxpck/s</td>
<td>Number of packets received per second; that is, the receiving PPS</td>
</tr>
<tr>
<td>txpck/s</td>
<td>Number of packets sent per second; that is, the sending PPS</td>
</tr>
<tr>
<td>rxkB/s</td>
<td>Receiving bandwidth</td>
</tr>
<tr>
<td>txkB/s</td>
<td>Sending bandwidth</td>
</tr>
</tbody>
</table>
Performance analysis of the iperf tool

Sample analysis data

<table>
<thead>
<tr>
<th>ID</th>
<th>Interval</th>
<th>Transfer</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>5</td>
<td>0.00-300.03 sec</td>
<td>6.88 GBytes</td>
<td>197 Mbits/sec</td>
</tr>
<tr>
<td>7</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>7</td>
<td>0.00-300.03 sec</td>
<td>6.45 GBytes</td>
<td>185 Mbits/sec</td>
</tr>
<tr>
<td>9</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>9</td>
<td>0.00-300.03 sec</td>
<td>6.40 GBytes</td>
<td>183 Mbits/sec</td>
</tr>
<tr>
<td>11</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>11</td>
<td>0.00-300.03 sec</td>
<td>6.19 GBytes</td>
<td>177 Mbits/sec</td>
</tr>
<tr>
<td>13</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>13</td>
<td>0.00-300.03 sec</td>
<td>6.82 GBytes</td>
<td>195 Mbits/sec</td>
</tr>
<tr>
<td>15</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>15</td>
<td>0.00-300.03 sec</td>
<td>6.70 GBytes</td>
<td>192 Mbits/sec</td>
</tr>
<tr>
<td>17</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>17</td>
<td>0.00-300.03 sec</td>
<td>7.04 GBytes</td>
<td>202 Mbits/sec</td>
</tr>
<tr>
<td>19</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>19</td>
<td>0.00-300.03 sec</td>
<td>7.02 GBytes</td>
<td>201 Mbits/sec</td>
</tr>
<tr>
<td>SUM</td>
<td>0.00-300.03 sec</td>
<td>0.00 Bytes</td>
<td>0.00 bits/sec</td>
</tr>
<tr>
<td>SUM</td>
<td>0.00-300.03 sec</td>
<td>53.5 GBytes</td>
<td>1.53 Gbits/sec</td>
</tr>
</tbody>
</table>

Field descriptions

In SUM lines, sender represents the data volume sent and receiver represents the data volume received.

<table>
<thead>
<tr>
<th>Field</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interval</td>
<td>Test duration</td>
</tr>
<tr>
<td>Transfer</td>
<td>Data transfer volume, including the sent and received data volumes</td>
</tr>
<tr>
<td>Bandwidth</td>
<td>Bandwidth, including the sending and receiving bandwidths</td>
</tr>
</tbody>
</table>

Relevant Operations

Script for launching multiple Netperf instances

In TCP-RR and UDP-STREAM, multiple Netperf instances need to be launched. The number of instances that need to be launched depends on the server configuration. 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 duration after -l. Set the duration to 10000 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
High-throughput Network Performance Test
Overview

Last updated : 2021-11-01 16:29:23

The new-generation Tencent Cloud CVM instances (including SA3, S6, C6, etc.) come with ultra-high network performance as detailed in Instance Types. This document provides two high-throughput network performance test methods for CVM instances: netperf and DPDK.

The netperf test is recommended for most use cases. However, if the CVM’s network throughput is larger than 10 million pps and the network bandwidth is higher than 50 Gbps, the kernel protocol stack of netperf consumes a lot of network resources. To obtain the actual network performance of the CVM ENI, use the DPDK method to shield the difference caused by the kernel protocol stack.

- Using netperf
- Using DPDK
Using Netperf

Last updated : 2021-11-01 16:29:57

Overview

This document describes how to use netperf to perform high-throughput performance test on CVM instances.

Tools

- Netperf
  Developed by HP, this tool is mainly used to test TCP and UDP throughput performance, which reflects the data sending and receiving rate.
- SAR
  It is used to monitor network traffic. A sample data is as follows:

```
sar -n DEV 1
02:41:03 PM IFACE rxpck/s txpck/s rxkB/s txkB/s rxcmp/s txcmp/s rxmcst/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 rxmcst/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
```

Field description

<table>
<thead>
<tr>
<th>Field</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>rxpck/s</td>
<td>pps</td>
<td>Number of packets received per second; that is, the receiving pps</td>
</tr>
<tr>
<td>txpck/s</td>
<td>pps</td>
<td>Number of packets sent per second; that is, the sending pps</td>
</tr>
<tr>
<td>rxkB/s</td>
<td>kB/s</td>
<td>Receiving bandwidth</td>
</tr>
<tr>
<td>txkB/s</td>
<td>kB/s</td>
<td>Sending bandwidth</td>
</tr>
</tbody>
</table>

Test Cases and Performance Metrics

Test cases

<table>
<thead>
<tr>
<th>Test</th>
<th>Client command</th>
<th>SAR</th>
</tr>
</thead>
</table>

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### Performance metrics

<table>
<thead>
<tr>
<th>Metric</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>64-byte UDP packet send and received (packets/sec)</td>
<td>Data throughput of UDP during batch data transfer, which reflects the maximum forwarding capacity of an ENI (data loss may occur).</td>
</tr>
<tr>
<td>1500-byte TCP inbound and outbound bandwidth (Mbits/sec)</td>
<td>Data throughput of TCP during batch data transfer, which reflects the maximum bandwidth capacity of an ENI (data loss may occur).</td>
</tr>
<tr>
<td>TCP-RR (times/sec)</td>
<td>Transaction throughput when multiple request/response communications are made during one TCP persistent connection, which reflects the TCP forwarding capacity without losing any packets.</td>
</tr>
</tbody>
</table>

### Directions

#### Constructing a test environment

1. Prepare three test servers. You can purchase them as instructed in Customizing Linux CVM Configurations. This document uses CVM instances with CentOS 8.2 installed as an example.
2. Log in to the CVM instances successively and run the following commands to download netperf. For more information on how to log in to the CVM instances, see Logging in to Linux Instance Using Standard Login Method.

```bash
yum install -y sysstat wget tar automake make gcc

wget -O netperf-2.7.0.tar.gz -c https://codeload.github.com/HewlettPackard/netperf/tar.gz/netperf-2.7.0

tar xzf netperf-2.7.0.tar.gz
```
Testing the packet sending performance

1. Run the following command on each CVM to stop the netperf and netserver processes.

   ```
   pkill netserver && pkill netperf
   ```

2. Use the CVM a as the client, and CVMs b and c as the servers. Run the following command on a server to run netserver.

   ```
   netserver
   ```

   - If the returned result is as follows, there is another netserver process. In this case, run the command provided in Step 1 to stop the process.

   ```
   [root@VM-2-8-centos ~]# netserver
   Unable to start netserver with 'IN(6)ADDR_ANY' port '12865' and family AF_UNSPEC
   [root@VM-2-8-centos ~]#
   ```

   - If the returned result is as follows, netserver is running successfully. In this case, go to the next step.

   ```
   [root@VM-2-8-centos ~]# netserver
   Starting netserver with host 'IN(6)ADDR_ANY' port '12865' and family AF_UNSPEC
   [root@VM-2-8-centos ~]#
   ```

3. Run the commands provided in the test cases on the client to constantly add or reduce netperf processes to reach the client’s maximum packet sending performance.

   Note:
   Repeatedly run the commands and use different server IP addresses each time. If a process cannot reach its maximum performance, execute the auxiliary script to batch initiate processes.

4. Run the following command on the client to observe the changes in the packet sending performance, and take the maximum value.

   ```
   sar -n DEV 1
   ```

   Analyze the result by referring to performance metrics to obtain the CVM high-throughput network performance.
Testing the packet receiving performance

1. Run the following command on each CVM to stop the netperf and netserver processes.

   ```bash
   pkill netserver && pkill netperf
   ```

2. Use the CVM a as the server, and CVMs b and c as the clients. Run the following command on the server to run netserver.

   ```bash
   netserver
   ```

   - If the returned result is as follows, there is another netserver process. In this case, run the command provided in Step 1 to stop the process.
     ```bash
     [root@VM-2-8-centos ~]# netserver
     Unable to start netserver with 'IN(6)ADDR_ANY' port '12865' and family AF_UNSPEC
     [root@VM-2-8-centos ~]#
     ```

   - If the returned result is as follows, netserver is running successfully. In this case, go to the next step.
     ```bash
     [root@VM-2-8-centos ~]# netserver
     Starting netserver with host 'IN(6)ADDR_ANY' port '12865' and family AF_UNSPEC
     [root@VM-2-8-centos ~]#
     ```

3. Run the commands provided in the test cases on the client to constantly add or reduce netperf processes to reach the client’s maximum packet receiving performance.

   ```bash
   Note:
   Repeatedly run the commands and start netperf on each client. If a process cannot reach its maximum performance, execute the auxiliary script to batch initiate processes.
   ```

4. Run the following command on the server to observe the changes in the server’s packet receiving performance, and take the maximum value.

   ```bash
   sar -n DEV 1
   ```

   Analyze the result by referring to performance metrics to obtain the CVM high-throughput network performance.

Appendix

Auxiliary script
Execute the script to quickly initiate multiple netperf processes.

```bash
#!/bin/bash
count=$1
for ((i=1;i<=count;i++))
  do
echo "Instance:$i------"
  # You can replace the following commands with the client commands provided in test cases.
  # Enter the server IP address after -H.
  # Enter the test duration after -l. Set the duration to 10000 to prevent netperf from ending prematurely.
  netperf -t UDP_STREAM -H <server ip> -l 10000 -- -m 64 -R 1 &
done
```
Using DPDK

Last updated: 2023-06-30 15:28:14

Scenarios

This document describes how to use DPDK to test CVM instances for high-throughput network performance.

Directions

Compiling and installing DPDK

1. Prepare two test servers. You can purchase them as instructed in Customizing Linux CVM Configurations. This document uses CVM instances with CentOS 8.2 installed as an example.

2. Log in to the two CVM instances successively and run the following command to download DPDK. For more information on how to log in to the CVM instances, see Logging in to Linux Instance Using Standard Login Method.

   ```bash
   yum install -y sysstat wget tar automake make gcc
   ```

   ```bash
   wget http://git.dpdk.org/dpdk/snapshot/dpdk-17.11.tar.gz
   ```

   ```bash
   tar -xf dpdk-17.11.tar.gz
   ```

   ```bash
   mv dpdk-17.11 dpdk
   ```

3. Modify the txonly engine to allow UDP port traffic change on the DPDK sender CPU to generate multiple data streams.

   ```bash
   vim dpdk/app/test-pmd/txonly.c
   ```

   Press i to enter the edit mode and make the following configurations:

   1. Locate `#include "testpmd.h"` and enter the following content in the next line.

   ```c
   RTE_DEFINE_PER_LCORE(struct udp_hdr, lcore_udp_hdr);
   RTE_DEFINE_PER_LCORE(uint16_t, test_port);
   ```
2. Locate `ol_flags |= PKT_TX_MACSEC;` and append the following content to the next lines.

```c
/* dummy test udp port */
memcpy(&RTE_PER_LCORE(lcore_udp_hdr), &pkt_udp_hdr, sizeof(pkt_udp_hdr));
```

3. Locate `for (nb_pkt = 0; nb_pkt &lt; nb_pkt_per_burst; nb_pkt++) {` Start a new line and add the following:

```c
RTE_PER_LCORE(test_port)++;
RTE_PER_LCORE(lcore_udp_hdr).src_port = rte_cpu_to_be_16(2222);
RTE_PER_LCORE(lcore_udp_hdr).dst_port = rte_cpu_to_be_16(rte_lcore_id() * 2000 + RTE_PER_LCORE(test_port) % 64);
```

The result should be as follows:

```c
if ((exp->tx_flags & TESTSEND_TX_OFFLOAD_INSERT_QING) &
    (exp->tx_flags & TESTSEND_TX_OFFLOAD_MACSEC))
    ol_flags |= PKT_TX_MACSEC;

/* dummy test udp port */
memcpy(RTE_PER_LCORE(lcore_udp_hdr), &pkt_udp_hdr, sizeof(pkt_udp_hdr));
```

```c
for (nb_pkt = 0; nb_pkt < nb_pkt_per_burst; nb_pkt++) {
    RTE_PER_LCORE(test_port)++;
    RTE_PER_LCORE(lcore_udp_hdr).src_port = rte_cpu_to_be_16(2222);
    RTE_PER_LCORE(lcore_udp_hdr).dst_port = rte_cpu_to_be_16(rte_lcore_id() * 2000 + RTE_PER_LCORE(test_port) % 64);
    pkt = rte_mbuf_alloc(cb);
    if (pkt == NULL) {
        mbuf_alloc_err;
        if (nb_pkt == 0)
            return;
        break;
    }
}
```

4. Replace `copy_buf_to_pkt(&pkt_udp_hdr, sizeof(pkt_udp_hdr), pkt,` with the following content:

```c
copy_buf_to_pkt(&RTE_PER_LCORE(lcore_udp_hdr), sizeof(RTE_PER_LCORE(lcore_udp_hdr)), pkt,
```

```c```
The result should be as follows:

```c
// copy __buf_to_pkt__(&eth_hdr, sizeof(eth_hdr), pkt, 0);
// copy __buf_to_pkt__(&pkt_ip_hdr, sizeof(pkt_ip_hdr), pkt,
// sizeof(struct ether_hdr));
// copy __buf_to_pkt__(&RTF_PER_LCORE(lcore_udp_hdr), sizeof(RTF_PER_LCORE(lcore_udp_hdr)), pkt,
// sizeof(struct ether_hdr) +
// sizeof(struct ipv4_hdr));
```

Press **Esc** and enter :wq to save and close the file.

- Run the following command to modify the `dpdk/config/common_base` file.

  ```bash
  vim dpdk/config/common_base
  ```

Press **i** to enter the edit mode, and change the value of `CONFIG_RTE_MAX_MEMSEG=256` to **1024** as shown below:

```
CONFIG_RTE_LIBRTE_EAL=y
CONFIG_RTE_MAX_LCORE=128
CONFIG_RTE_MAX_NUMA_NODES=8
[highlight]CONFIG_RTE_MAX_MEMSEG=1024[/highlight]
CONFIG_RTE_MAX_MEMZONE=2560
CONFIG_RTE_MAX_TAILQ=32
```

Press **i** to enter the edit mode and locate `CONFIG_RTE_MAX_LCORE=128`. Change the value to **256** if your CPU core is over 128.

```
CONFIG_RTE_LIBRTE_EAL=y
CONFIG_RTE_MAX_LCORE=256
CONFIG_RTE_MAX_NUMA_NODES=8
CONFIG_RTE_MAX_MEMZONE=2560
CONFIG_RTE_MAX_TAILQ=32
```

Press **Esc** and enter :wq to save and close the file.

---

**Note**

Modify these configuration files on both the initiator and receiver servers. You can run the following commands to send the modified file to the peer end to avoid repeated modification.

```bash
scp -P 22 /root/dpdk/app/test-pmd/txonly.c root@<IP>:/root/dpdk/app/test-pmd/
scp -P 22 /root/dpdk/config/common_base root@<IP>:/root/dpdk/config
```
4. Run the following command to replace the IP address of `dpdk/app/test-pmd/txonly.c` with the test server IP.

```bash
vim dpdk/app/test-pmd/txonly.c
```

Press `i` to enter the edit mode.

```c
#define IP_SRC_ADDR (198U << 24) | (18U << 16) | (0U << 8) | 1;
#define IP_DST_ADDR (198U << 24) | (18U << 16) | (0U << 8) | 2;
```

Replace `198`, `18`, `0`, and `1` in the above contents with the server IP, `SRC_ADDR` with the sender IP, and `DST_ADDR` with the receiver IP.

5. Run the OS-specific commands to install the numa library.

- CentOS
- Ubuntu

```bash
yum install numactl-devel
```

6. Run the following command in the `dpdk/` directory to close KNI.

```bash
sed -i "s/(\^CONFIG_.*KNI.*)=y/\1=n/g" .config/
```

7. If your OS uses a later kernel version (for example, 5.3), run the following command to shield the differences.

```bash
sed -i "s/(\^WERROR_FLAGS += -Wundef -Wwrite-strings\)/\1 -Wno-address-of-packed-member/g" ./mk/toolchain/gcc/rte.vars.mk
```

```bash
sed -i "s/fall back/falls through -/g" ./lib/librte_eal/linuxapp/igb_uio/igb_uio.c
```

8. Run the following command to compile DPDK.

```bash
make defconfig
make -j
```

### Configuring huge pages

Run the following command to configure huge pages.

```bash
echo 4096 > /sys/kernel/mm/hugepages/hugepages-2048kB/nr_hugepages
```
If an error message appears, the huge pages are insufficient. In this case, adjust the command, for example:

```bash
echo 2048 > /sys/kernel/mm/hugepages/hugepages-2048kB/nr_hugepages
```

### Loading the kernel module and binding the interface

**Note**

You need to use Python for this step. Go to the [Python official website](https://www.python.org) to download and install an appropriate version. This document uses Python 3.6.8 as an example.

1. Log in to the Linux instance via VNC. After the ENI driver is bound to igb_uio user mode driver, ENI can only be accessed via VNC or console, instead of an SSH key or IP address.

2. Run the following commands successively to load the UIO module and bind the virtio interface.

   ```bash
   ifconfig eth0 0
   
   ifconfig eth0 down
   
   modprobe uio
   
   insmod /root/dpdk/build/kmod/igb_uio.ko
   
   cd /root/dpdk/usertools/
   
   python3 dpdk-devbind.py --bind=igb_uio 00:05.0
   ```

**Note**

Replace `00:05.0` in the command with the actual ENI address, which can be obtained using the following command:

```bash
python3 dpdk-devbind.py -s
```
After completing tests, run the following commands to restore ENI.

```bash
cd /root/dpdk/usertools/
python3 dpdk-devbind.py --bind=virtio-pci 00:05.0
ifconfig eth0 up
```

### Testing bandwidth and throughput

**Note**
- The tests use the `txpkts` parameter to control the packet size, for example, 1430B bandwidth and 64B pps.
- The command parameters provided in this step are applicable to CentOS 8.2. You need to modify them to suit other system image versions and test again. For example, due to the performance difference between the CentOS 7.4 kernel version 3.10 and the CentOS 8.2 kernel version 4.18, change the `nb-cores` in the bandwidth test to 2. For more information about the command parameters, see `estpmd-command-line-options`.

1. Run the following command to start testpmd on the sender in the txonly mode, and enable the rxonly mode on the receiver.

   **Sender:**
   
   ```bash
   /root/dpdk/build/app/testpmd -l 8-191 -w 0000:00:05.0 -- --burst=128 --nb-cores=32 --txd=512 --rxd=512 --txq=16 --rxq=16 --forward-mode=txonly --txpkts=1430 --stats-period=1
   ```

   **Note:**
   Replace `-l 8-191 -w 0000:00:05.0` with the actual value of your test environment.

   **Receiver:**
   
   ```bash
   /root/dpdk/build/app/testpmd -l 8-191 -w 0000:00:05.0 -- --burst=128 --nb-cores=32 --txd=512 --rxd=512 --txq=16 --rxq=16 --forward-mode=rxonly --stats-period=
   ```
2. Run the following command to test pps (UDP 64B packets).

- **Sender:**
  
  ```
  /root/dpdk/build/app/testpmd -l 8-191 -w 0000:00:05.0 -- --burst=128 --nb-cores=32 --txd=512 --rxd=512 --txq=16 --rxq=16 --forward-mode=txonly --txpkts=64 --stats-period=1
  ```

- **Receiver:**
  
  ```
  /root/dpdk/build/app/testpmd -l 8-191 -w 0000:00:05.0 -- --burst=128 --nb-cores=32 --txd=512 --rxd=512 --txq=16 --rxq=16 --forward-mode=rxonly --stats-period=1
  ```

The test result is as shown below:

![Network statistics](image)

**Calculating the network bandwidth**

The current receiving bandwidth can be calculated according to pps and packet length on the receiver using the following formula:

\[ \text{PPS} \times \text{packet length} \times 8 \text{bit/B} \times 10^{-9} = \text{Bandwidth} \]

You can use the test result to obtain the current bandwidth:

\[ 4692725 \text{ pps} \times 1430\text{B} \times 8 \text{ bit/B} \times 10^{-9} \approx 53 \text{ Gbps} \]

**Note:**
- The packet length is 1430B, including 14B Ethernet header, 4B CRC and 20B IP header.
- Rx-pps in the test result is an instantaneous statistical value. You can conduct several tests and calculate the average to make the result more accurate.
Using USB/IP to Share USB Devices in Linux

Last updated: 2021-02-26 14:21:47

Overview

USB/IP is an open-source project and has been incorporated in the kernel. In a Linux environment, you can use USB/IP to remotely share USB devices. This document uses the following environment versions as examples to describe how to use USB/IP to share USB devices.

USB client: CVM with CentOS 7.6
USB server: local PC with Debian

Notes

The USB/IP installation method and kernel module name vary by Linux OS versions. Go to the official Linux releases and check whether your current Linux OS supports the USB/IP feature.

Directions

Configuring the USB server

1. On the local PC, run the following commands in sequence to install USB/IP and load related kernel modules:

   ```
   sudo apt-get install usbip
   sudo modprobe usbip-core
   sudo modprobe vhci-hcd
   sudo modprobe usbip_host
   ```

2. Insert a USB device and run the following command to view available USB devices:

   ```
   usbip list --local
   ```

   For example, if a Feitian USB key is inserted to the local PC, the following result is returned:

   ```
   busid 1-1.3(096e:031b)
   Feitian Technologies, Inc.: unknown product(096e:031b)
   ```

3. Record the busid value and run the following commands in sequence to enable listening, specify the USB/IP port, and share the USB device:
**sudo usbipd -D [--tcp-port PORT]
sudo usbip bind -b [busid]**

For example, if the specified USB/IP port is port 3240 (default USB/IP port) and busid is `1-1.3`, run the following commands:

```
sudo usbipd -D
sudo usbip bind -b 1-1.3
```

(Optional) 4. Run the following command to create an SSH tunnel and use port listening:

```
ssh -Nf -R specified USB/IP port:localhost:specified USB/IP port root@your_host
```

*Note*:
Skip this step if the local PC has a public IP address.

```
ssh -Nf -R 3240:localhost:3240 root@192.168.15.24
```

**Configuring the USB client**

*Note*:
The following uses a local PC without a public IP as an example. If your local PC has a public IP, replace `127.0.0.1` in the following steps with the public IP of your local PC.

1. Log in to a Linux instance.
2. Run the following commands in sequence to download the USB/IP source:

   ```
   rpm --import https://www.elrepo.org/RPM-GPG-KEY-elrepo.org
   ```

3. Run the following commands in sequence to install USB/IP:

   ```
   yum -y install kmod-usbip usbip-utils
   modprobe usbip-core
   modprobe vhci-hcd
   modprobe usbip-host
   ```
4. Run the following command to query available USB devices of the CVM:

```
usbip list --remote 127.0.0.1
```

For example, if the Feitian USB key information is located, the following result is returned:

```
Exportable USB devices
======================
-127.0.0.1 1-1.3: Feitian Technologies, Inc.: unknown product(096e:031b):/sys/devices/platform/scb/fd500000.pcie/pci0000:00/0000:00:00.0/0000:01:00.0/usb1/1-1/1-1.3:(Defined at Interface level)(00/00/00)
```

5. Run the following command to bind the USB device to the CVM:

```
usbip attach --remote=127.0.0.1 --busid=1-1.3
```

6. Run the following command to query the USB device list:

```
lsusb
```

If information similar to the following is returned, the USB device has been shared.

```
Bus 002 Device 002:ID096e:031b Feitian Technologies, Inc.
Bus 002 Device 001:ID1d6b:0002 Linux Foundation 2.0 root hub
Bus 001 Device 001:ID1d6b:0001 Linux Foundation 1.1 root hub
```
Using RemoteFx to Redirect USB Devices in Windows

Last updated: 2022-03-21 15:19:44

Scenario

RemoteFx is an upgraded version of Windows Remote Desktop Protocol (RDP). From RDP 8.0, RemoteFx can be used to redirect local USB devices to a remote desktop through the RDP data channel, ensuring that the CVM can use these USB devices.

This document uses the following environment versions as examples to describe how to enable the RemoteFx USB redirection feature of RDP to redirect USB devices to a CVM.

- Client: Windows 10
- Server: Windows Server 2016

Use Limits

Because RDP 8.0 and later versions support the RemoteFx USB redirection feature, Windows 8, Windows 10, Windows Server 2016, and Windows Server 2019 all support this feature. If the operating system of your local PC has one of these versions, you do not need to install the RDP 8.0 update patch. If your local PC has Windows 7 or Windows Vista, please go to Microsoft official website to get and install the RDP 8.0 update patch.

Directions

Configuring the server

1. Logging in to a Windows instance using the RDP file (recommended).
2. On the desktop, click and select Server Manager to open Server Manager.
3. In the “Server Manager” window, click **Add roles and features**, as shown in the following figure:

4. In the pop-up “Add Roles and Features Wizard” window, click **Next** to go to the “Select installation type” page.
5. On the “Select installation type” page, select **Role-based or feature-based installation** and click **Next**.
6. On the “Select destination server” page, keep the default configurations and click **Next**.
7. On the “Select server roles” page, select **Remote Desktop Services** and click **Next**, as shown in the following figure:
8. Keep the default configurations and click Next for 2 times.
9. On the "Select role services" page, select Remote Desktop Session Host, Remote Desktop Connection Broker, and Remote Desktop Licensing. In the pop-up window, click Add Features, as shown in the following
0. Click Next.
1. Click Install.
2. After the installation is completed, restart the CVM.
3. On the desktop, click , enter gpedit.msc, and press Enter to open “Local Group Policy Editor”.
4. In the leftside navigation tree, choose Computer Configuration > Administrative Templates > Windows Components > Remote Desktop Services > Remote Desktop Session Host > Device and Resource Redirection, and double-click Do not allow supported Plug and Play device redirection, as shown in the
following figure:
5. In the pop-up window, select **Disabled** and click **OK**, as shown in the following figure:

![Do not allow supported Plug and Play device redirection](image)

6. Restart the CVM.

**Configuring the client**

1. On the local PC, right-click **Run** and choose **Run** to open the “Run” dialog box, as shown in the following figure:

![Run dialog box](image)

2. In the “Run” dialog box, enter `gpedit.msc` and click **OK** to open “Local Group Policy Editor”.

3. In the leftside navigation tree, choose **Computer Configuration > Administrative Templates > Windows Components > Remote Desktop Services > Remote Desktop Connection Client > RemoteFxE USB Redirection** and double-click **Allow RDP redirection of other supported RemoteFxE USB devices**, as shown
4. In the pop-up window, select **Enabled** and set the RemoteFx USB redirection access permission to **Administrators and Users**, as shown in the following figure:
5. Click **OK**.
6. Restart the local PC.

**Verifying the configuration result**

1. On your local PC, insert a USB device, right-click and choose **Run** to open the "Run" dialog box.
2. In the "Run" dialog box, enter `mstsc` and press Enter to open the remote desktop connection dialog box, as shown in the following figure:
3. Enter the Windows server's public IP address in **Computer**, and then click **Options**.

4. On the **Local Resources** tab page, click **More** under "Local devices and resources", as shown in the following figure:

5. In the pop-up window, expand **Other supported RemoteFx USB devices**, select the inserted USB device, and click **OK**.
6. Click Connect.
7. In the pop-up Windows Security window, enter the instance's admin account and password, as shown in the following figure:
8. Click **OK** to log in to the Windows instance.

If ☑️ appears on the Windows instance operation page, the configuration was successful.

---

### Relevant Operations

Windows RDP provides optimized connection for standard USB devices. Devices such as drivers and cameras can be mapped directly without enabling the RemoteFx feature. The RemoteFX USB redirection feature is required for less commonly used USB devices. The following table lists the redirection methods for these USB devices.

<table>
<thead>
<tr>
<th>Device</th>
<th>Support Status</th>
<th>Redirection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>All-in-One Printer</td>
<td>Supported</td>
<td>RemoteFX USB Redirection</td>
</tr>
<tr>
<td>Printer</td>
<td>Supported</td>
<td>Easy Print</td>
</tr>
<tr>
<td>Scanner</td>
<td>Supported</td>
<td>RemoteFX USB Redirection</td>
</tr>
<tr>
<td>Biometric</td>
<td>Supported while in session Not supported during logon</td>
<td>RemoteFX USB Redirection</td>
</tr>
<tr>
<td>PTP Camera</td>
<td>Supported</td>
<td>Plug and Play Device Redirection</td>
</tr>
<tr>
<td>MTP Media Player</td>
<td>Supported</td>
<td>Plug and Play Device Redirection</td>
</tr>
<tr>
<td>Webcam</td>
<td>Supported (LAN only)</td>
<td>RemoteFX USB Redirection</td>
</tr>
<tr>
<td>VoIP Telephone/Headset</td>
<td>Supported (LAN only)</td>
<td>RemoteFX USB Redirection</td>
</tr>
<tr>
<td>Audio (not a USB composite device)</td>
<td>Supported</td>
<td>Audio Redirection</td>
</tr>
<tr>
<td>CD or DVD Drive</td>
<td>Supported for read operations</td>
<td>Drive Redirection</td>
</tr>
<tr>
<td>Hard Drive or USB Flash Drive</td>
<td>Supported</td>
<td>Drive Redirection</td>
</tr>
<tr>
<td>Smart Card Reader</td>
<td>Supported</td>
<td>Smart Card Redirection</td>
</tr>
<tr>
<td>USB-to-Serial</td>
<td>Supported</td>
<td>RemoteFX USB Redirection</td>
</tr>
<tr>
<td>USB Network Adapter (also includes some personal digital assistants)</td>
<td>Blocked</td>
<td>N/A</td>
</tr>
<tr>
<td>USB Display</td>
<td>Blocked</td>
<td>N/A</td>
</tr>
<tr>
<td>USB Keyboard or Mouse</td>
<td>Supported</td>
<td>Input Redirection</td>
</tr>
</tbody>
</table>
Using AVX-512 Instructions to Accelerate AI Applications on CVM

Overview

The fifth-generation Tencent Cloud CVM instances (including S6, S5, M5, C4, IT5, D3, etc.) all come with the 2nd generation Intel® Xeon® scalable processor Cascade Lake. These instances provides more instruction sets and features, which can accelerate the artificial intelligence (AI) applications. The integrated hardware enhancement technology, like Advanced Vector Extensions 512 (AVX-512), can boost the parallel computing performance for AI inference and produce a better deep learning result.

This document describes how to use AVX-512 on S5 and M5 CVM instances to accelerate AI application.

Recommended Models

Tencent Cloud provides various types of CVMs for different application development. The Standard S6, Standard S5 and Memory Optimized M5 instance types come with the 2nd generation Intel® Xeon® processor and support Intel® DL Boost, making them suitable for machine learning or deep learning. The recommended configurations are as follows:

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Instance Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep learning training platform</td>
<td>84vCPU Standard S5 or 48vCPU Memory Optimized M5</td>
</tr>
<tr>
<td>Deep learning inference platform</td>
<td>8/16/24/32/48vCPU Standard S5 or Memory Optimized M5</td>
</tr>
<tr>
<td>Deep learning training or inference platform</td>
<td>48vCPU Standard S5 or 24vCPU Memory Optimized M5</td>
</tr>
</tbody>
</table>

Advantages

Running the workloads for machine learning or deep learning on Intel® Xeon® scalable processors has the following advantages:

- Suitable for processing 3D-CNN topologies used in scenarios such as big-memory workloads, medical imaging, GAN, seismic analysis, gene sequencing, etc.
Flexible core support simply using the `numactl` command, and applicable to small-scale online inference.

- Powerful ecosystem to directly perform distributed training on large clusters, without the need for a large-scale architecture containing additional large-capacity storage and expensive caching mechanisms.
- Support for many workloads (such as HPC, BigData, and AI) in a single cluster to deliver better TCO.
- Support for SIMD acceleration to meet the computing requirements of various deep learning applications.
- The same infrastructure for direct training and inference.

**Directions**

**Creating an instance**

Create an instance as instructed in Creating Instances via CVM Purchase Page. Select a recommended model that suits your actual use case.

![Instance Types](image)

**Logging in to the instance**

1. Log in to a Linux instance using standard login method.

**Deploying a platform**

Deploy an AI platform as instructed below to perform the machine learning or deep learning task:

**Sample 1: optimizing the deep learning framework TensorFlow* with Intel®**

*PyTorch and IPEX on the 2nd generation Intel® Xeon® scalable processor Cascade Lake will automatically optimize AVX-512 instructions to maximize the computing performance.*
TensorFlow* is a widely-used large-scale machine learning and deep learning framework. You can improve the instance training and inference performance as instructed in the sample below. More information about the framework, see Intel® Optimization for TensorFlow* Installation Guide. Follow these steps:

**Deploying the TensorFlow* framework**

1. Install Python in the CVM instance. This document uses Python 3.7 as an example.
2. Run the following command to install the Intel® optimized TensorFlow* intel-tensorflow.

   ```bash
   pip install intel-tensorflow
   ```

**Setting runtime parameters**

Choose one of the following two runtime interfaces to optimize runtime parameters as needed. For more information about the optimization settings, see General Best Practices for Intel® Optimization for TensorFlow.

- **Batch inference**: measures how many input tensors can be processed per second with batches of size greater than one. Typically, for batch inference, optimal performance is achieved by exercising all the physical cores on a CPU socket.

- **On-line Inference**: (also called real-time inference) is a measurement of the time it takes to process a single input tensor, i.e. a batch of size one. In a real-time inference scenario, optimal throughput is achieved by running multiple instances concurrently.

Follow the steps below:

1. Run the following command to obtain the number of physical cores in the system.

   ```bash
   lscpu | grep "Core(s) per socket" | cut -d':' -f2 | xargs
   ```

2. Set the optimization parameters using either method:

   ```bash
   export OMP_NUM_THREADS= # <physicalcores>
   export KMP_AFFINITY="granularity=fine,verbose,compact,1,0"
   export KMP_BLOCKTIME=1
   ```
Add the environment variables to codes. Add the following configurations to the running Python codes.

```python
import os
os.environ['KMP_BLOCKTIME'] = '1'
os.environ['KMP_SETTINGS'] = '1'
os.environ['KMP_AFFINITY'] = 'granularity=fine,verbose,compact,1,0'
if FLAGS.num_intra_threads > 0:
os.environ['OMP_NUM_THREADS'] = '# <physical cores>'
os.environ['TF_ENABLE_MKL_NATIVE_FORMAT'] = '0'
config = tf.ConfigProto()
config.intra_op_parallelism_threads = '# <physical cores>'
config.inter_op_parallelism_threads = 1
tf.Session(config=config)
```

### Running inference on the TensorFlow* deep learning model

Run inference on other machine learning or deep learning models as instructed in Image Recognition with ResNet50, ResNet101 and InceptionV3. This document describes how to run inference benchmark with ResNet50. For more information, see ResNet50 (v1.5).

### Training on the TensorFlow* deep learning model

This document describes how to run training benchmark with ResNet50. For more information, see FP32 Training Instructions.

### TensorFlow performance

The performance data is as shown in Improving TensorFlow* Inference Performance on Intel® Xeon® Processors, which may slightly vary according to the models and actual configurations.

- **Latency performance:**
  We tested models of image classification and object detection at batch size one, and found improved inference performance of Intel Optimization for TensorFlow with AVX-512 instructions against the non-optimized version. For example, the latency performance of optimized ResNet 50 is reduced to 45% of the original version.

- **Throughput performance:**
  We tested models of image classification and object detection for throughput performance at large batch size, and found significant improvements. The throughput performance of optimized ResNet 50 is increased to 1.98 times of the original version.

### Sample 2: deploying the learning framework PyTorch*

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Deployment directions

1. Install Python 3.6 or a later version in the CVM instance. This document uses Python 3.7 as an example.
2. Compile and install PyTorch and Intel® Extension for PyTorch (IPEX) as instructed in Intel® Extension for PyTorch.

Setting runtime parameters

PyTorch and IPEX on the 2nd generation Intel® Xeon® scalable processor Cascade Lake will automatically optimize AVX-512 instructions to maximize the computing performance.

Follow these steps to configure the runtime parameter optimizations. For more information on configurations, see Maximize Performance of Intel® Software Optimization for PyTorch* on CPU.

- **Batch inference**: measures how many input tensors can be processed per second with batches of size greater than one. Typically, for batch inference, optimal performance is achieved by exercising all the physical cores on a CPU socket.
- **On-line Inference**: (also called real-time inference) is a measurement of the time it takes to process a single input tensor at batch size one, i.e. a batch of size one. In a real-time inference scenario, optimal throughput is achieved by running multiple instances concurrently.

Follow the steps below:

1. Run the following command to obtain the number of physical cores in the system.

   ```bash
   lscpu | grep "Core(s) per socket." | cut -d':' -f2 | xargs
   ```

2. Set the optimization parameters using either method:

   - Use GNU OpenMP* Libraries to set the runtime parameters. Add the following configurations in the environment variable file:

     ```bash
     export OMP_NUM_THREADS=physicalcores
     export GOMP_CPU_AFFINITY="0-<physicalcores-1>"
     export OMP_SCHEDULE=STATIC
     export OMP_PROC_BIND=CLOSE
     ```

   - Use Intel OpenMP* Libraries to set the runtime parameters. Add the following configurations in the environment variable file:

     ```bash
     export OMP_NUM_THREADS=physicalcores
     export LD_PRELOAD=<path_to_libiomp5.so>
     export KMP_AFFINITY="granularity=fine,verbose,compact,1,0"
     ```
Inference and training optimizations in the PyTorch* deep learning model

- Use Intel® Extension for PyTorch to improve performance of the model inference. The sample codes are as follows:

```python
import intel_pytorch_extension
...
net = net.to('xpu')  # Move model to IPEX format
data = data.to('xpu')  # Move data to IPEX format
...
output = net(data)  # Perform inference with IPEX
output = output.to('cpu')  # Move output back to ATen format
```

- Both inference and training can use jemalloc to improve performance. jemalloc is a general-purpose malloc(3) implementation that emphasizes fragmentation avoidance and scalable concurrency support. It is intended for use as the system-provided memory allocator. jemalloc provides much introspection, memory management, and tuning features beyond the standard allocator functionality. For more information, see jemalloc and sample codes.

- For more information about distributed training for multiple sockets, see Distributed CPU Training Script for PSSP-Transformer.

Performance result

Tested on the 2nd generation Intel® Xeon® scalable processor Cascade Lake with 2*CPU (28 cores per CPU) and 384 GB memory, different models obtain the performance data as shown in Intel and Facebook* collaborate to boost PyTorch* CPU performance. The performance result varies according to model and actual configurations.

Sample 3: using Intel®AI Low Precision Optimization Tool for acceleration

The Intel® Low Precision Optimization Tool (Intel® LPOT) is an open-source Python library that delivers an easy-to-use low-precision inference interface across multiple neural network frameworks. It helps user quantify models, improve productivity, and accelerate the inference performance of low precision models on the 3rd generation Intel® Xeon® DL Boost scalable processor. For more information, see Intel® Low Precision Optimization Tool code repository.

Supported neural network frameworks

Intel® LPOT supports the following frameworks:

Intel® optimized TensorFlow*, including v1.15.0, v1.15.0up1, v1.15.0up2, v2.0.0, v2.1.0, v2.2.0, v2.3.0 and v2.4.0.
Intel® optimized PyTorch, including v1.5.0+cpu and v1.6.0+cpu.
Intel® optimized MXNet, including v1.6.0, v1.7.0; ONNX-Runtime: v1.6.0.

Implementation frameworks

The following figure shows the Intel® LPOT implementation frameworks:

Workflow
The following figure shows the Intel® LPOT workflow:

![Intel® LPOT Workflow Diagram]

Performance and accuracy of quantized models

The table below shows the performance and accuracy achieved by Intel® LPOT optimized models on the 2nd Intel® Xeon® scalable processor Cascade Lake:

<table>
<thead>
<tr>
<th>Framework</th>
<th>Version</th>
<th>Model</th>
<th>Accuracy</th>
<th>Performance speed up</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>INT8 Tuning Accuracy</td>
<td>FP32 Accuracy Baseline</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>resnet50v1.5</td>
<td>76.92%</td>
<td>76.46%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>resnet101</td>
<td>77.18%</td>
<td>76.45%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>inception_v1</td>
<td>70.41%</td>
<td>69.74%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>inception_v2</td>
<td>74.36%</td>
<td>73.97%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>inception_v3</td>
<td>77.28%</td>
<td>76.75%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>inception_v4</td>
<td>80.39%</td>
<td>80.27%</td>
</tr>
<tr>
<td>Framework</td>
<td>Version</td>
<td>Model</td>
<td>Accuracy</td>
<td>Performance speed up</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>---------------------</td>
<td>-----------</td>
<td>----------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>INT8 Tuning Accuracy</td>
<td>Realtime La Ratio[FP32/FP32]</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>inception_resnet_v2</td>
<td>80.38%</td>
<td>-0.02%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>mobilenetv1</td>
<td>73.29%</td>
<td>3.28%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>ssd_resnet50_v1</td>
<td>37.98%</td>
<td>-0.05%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>mask_rcnn_inception_v2</td>
<td>28.62%</td>
<td>-0.38%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>vgg16</td>
<td>72.11%</td>
<td>1.72%</td>
</tr>
<tr>
<td>tensorflow</td>
<td>2.4.0</td>
<td>vgg19</td>
<td>72.36%</td>
<td>1.90%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.5.0+cpu</td>
<td>resnet50</td>
<td>75.96%</td>
<td>-0.23%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.5.0+cpu</td>
<td>resnext101_32x8d</td>
<td>79.12%</td>
<td>-0.24%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_base_mrpc</td>
<td>88.90%</td>
<td>0.19%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_base_cola</td>
<td>59.06%</td>
<td>0.37%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_base sts-b</td>
<td>88.40%</td>
<td>-0.97%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_base_sst-2</td>
<td>91.51%</td>
<td>-0.37%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_base rte</td>
<td>69.31%</td>
<td>-0.52%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_large_mrpc</td>
<td>87.45%</td>
<td>-0.99%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_large_squad</td>
<td>92.85</td>
<td>-0.21%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_large_qnli</td>
<td>91.20%</td>
<td>-0.68%</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_large_rte</td>
<td>71.84%</td>
<td>-0.99%</td>
</tr>
<tr>
<td>Framework</td>
<td>Version</td>
<td>Model</td>
<td>Accuracy</td>
<td>Perform. speed up</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------</td>
<td>------------------</td>
<td>----------</td>
<td>-------------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>INT8</td>
<td>FP32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tuning</td>
<td>Accuracy Baseline</td>
</tr>
<tr>
<td>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_large_cola</td>
<td>62.74%</td>
<td>62.57%</td>
</tr>
</tbody>
</table>

Note
Both PyTorch and Tensorflow shown in the table are Intel-optimized frameworks. A full quantized model list is available in the Full Validated Models.

Installing and using Intel® LPOT

1. Run the following commands sequentially to create a python3.x virtual environment named lpot in anaconda. This document uses python 3.7 as an example.

   ```
   conda create -n lpot python=3.7
   conda activate lpot
   ```

2. Install LPOT using either method:

   - Run the following command to install from a binary file.
     ```
     pip install lpot
     ```

   - Run the following commands to install from source.
     ```
     git clone https://github.com/intel/lpot.git
cd lpot
     pip install -r requirements.txt
     python setup.py install
     ```

3. Quantify TensorFlow ResNet50 v1.0, for example.

4. Prepare datasets.

   Run the following commands to download and decompress the mageNet validation datasets.

   ```
   mkdir -p img_raw/val && cd img_raw
   wget http://www.image-net.org/challenges/LSVRC/2012/dd31405981
   ```
Run the following commands to move the image file into a subdirectory classified by label.

```bash
cd val
```

Run the following commands to convert the raw data to the TFrecord format using the `prepare_dataset.sh` script.

```bash
cd examples/tensorflow/image_recognition
bash prepare_dataset.sh --output_dir=./data --raw_dir=/PATH/TO/img_raw/val/ --subset=validation
```

For more information about datasets, see [Prepare Dataset](#).

5. Run the following commands to prepare a model.

   ```bash
   ```

6. Run the following commands to tune inference.

   ```bash
   Modify the `examples/tensorflow/image_recognition/resnet50_v1.yaml` file so that the path of `quantization\calibration`, `evaluation\accuracy` and `evaluation\performance` datasets point to your local actual path, i.e., the location of the TFrecord data generated in the dataset preparations. For more information, see [ResNet50 V1.0](#).
   ```bash
cd examples/tensorflow/image_recognition
bash run_tuning.sh --config=resnet50_v1.yaml \
--input_model=/PATH/TO/resnet50_fp32_pretrained_model.pb \
--output_model=./lpot_resnet50_v1.pb
```

7. Run the following commands to run the benchmark.

   ```bash
   bash run_benchmark.sh --input_model=./lpot_resnet50_v1.pb \
   --config=resnet50_v1.yaml
   ```

The results are as follows, in which the performance data is only for reference:

```
accuracy mode benchmarkresult:
Accuracy is 0.739
Batch size = 32
```
Latency: 1.341 ms  
Throughput: 745.631 images/sec  
**performance mode benchmark result:**  
Accuracy is 0.000  
Batch size = 32  
Latency: 1.300 ms  
Throughput: 769.302 images/sec

### Sample 4: using Intel® Distribution of OpenVINO™ Toolkit for inference acceleration

Intel® Distribution of OpenVINO™ Toolkit is a comprehensive toolkit for quickly deploying computer vision and other deep learning applications. It supports various Intel accelerator including VPU for CPU, GPU, FPGA and Movidius, and also supports direct heterogeneous hardware execution.

Intel® Distribution of OpenVINO™ Toolkit optimizes models trained by TensorFlow* and PyTorch*. It includes Model Optimizer, Inference Engine, Open Model Zoo, Post-training Optimization Tool:

- **Model Optimizer**: coverts models that were trained in frameworks such as Caffe*, TensorFlow*, PyTorch* and Mxnet* to intermediate representations (IRs).
- **Inference Engine**: places the converted IRs on many hardware types including CPU, GPU, FPGA and VPU to enable inference acceleration with an automatic call to the hardware accelerator toolkit.

For more information, see the Intel® Distribution of OpenVINO™ Toolkit website or OpenVINO™ Toolkit Overview.

### Workflow
The following figure shows the workflow of Intel® Distribution of OpenVINO™ Toolkit:

**Intel® Distribution of OpenVINO™ Toolkit inference performance**

The Intel® Distribution of OpenVINO™ provides optimization implementations on multiple Intel processors and accelerator hardware. Based on the Intel® Xeon® scalable processor, it accelerates the inference network using Intel® DL Boost and AVX-512 instructions.

**Using Intel® Distribution of OpenVINO™ Toolkit - Deep Learning Development Toolkit (DLDT)**

Refer to the following documents:

- Introduction to Intel® Deep Learning Deployment Toolkit
- Image Classification C++ Sample Async
- Object Detection C++ Sample SSD
- Automatic Speech Recognition C++ Sample
- Action Recognition Python* Demo
- Crossroad Camera C++ Demo
- Human Pose Estimation C++ Demo

**Intel® Distribution of OpenVINO™ Toolkit benchmark test**

For more information, see Install Intel® Distribution of OpenVINO™ toolkit for Linux*.
Building Tencent SGX Confidential Computing Environment

Overview

This document describes how to build a Tencent SGX confidential computing environment in an M6ce instance and use the Intel SGX SDK to verify SGX features.

Prerequisites

You have created and logged in to an M6ce instance.

- For detailed directions on how to create an instance, see Creating Instances via CVM Purchase Page.
- For detailed directions on how to log in to an instance, see Logging in to Linux Instance Using Standard Login Method.

Note

This document uses an instance on the TencentOS Server 3.1 (TK4) as an example.

Directions

1. Run the following command to check the kernel version.

    `uname -a`

    Check whether the kernel version is earlier than 5.4.119-19.0008.

    - If yes, run the following command to update the kernel:

      `yum update kernel`
If no, proceed to the next step.

2. Run the following command to install the software packages required by the SGX runtime:

```
yum install \
libsgx-ae-le libsgx-ae-pce libsgx-ae-qe3 libsgx-ae-qve \
libsgx-aesm-ecdsa-plugin libsgx-aesm-launch-plugin libsgx-aesm-pce-plugin libsgx-aesm-quote-ex-plugin \
libsgx-dcap-default-qpl libsgx-dcap-default-qpl-devel libsgx-dcap-ql libsgx-dcap-ql-devel \
libsgx-dcap-quote-verify libsgx-dcap-quote-verify-devel libsgx-enclave-common libsgx-enclave-common-devel libsgx-epid-devel \
libsgx-launch libsgx-launch-devel libsgx-pce-log libsgx-qc3-log libsgx-quote-ex libsgx-quote-ex-devel \
libsgx-ra-network libsgx-ra-uefi libsgx-uae-service libsgx-urts sgx-ra-service \
sgx-aesm-service
```

Note
The default installation directory of the SGX AESM service is `/opt/intel/sgx-aesm-service`.

3. Run the following command to install the Intel SGX SDK:

```
yum install sgx-linux-x64-sdk
```

Note
The default installation directory of the Intel SGX SDK is `/opt/intel/sgxsdk`. You can develop an SGX program as instructed in Intel® Software Guard Extensions (Intel® SGX) SDK for Linux OS Developer Reference.

4. After installing the SGX runtime and Intel SGX SDK, restart the instance as instructed in Restarting Instances.

5. Configure the Tencent Cloud SGX remote attestation service.

The Tencent Cloud SGX remote attestation service is deployed at the regional level. You can access the service in the region where your SGX CVM instance resides to get the optimal experience. After you install the Intel SGX SDK, the default configuration file `/etc/sgx_default_qcnl.conf` of the service will be generated.
automatically. Manually modify the file in the following steps to adapt to the service in the region of your SGX CVM instance.

**Note**
- Currently, the SGX remote attestation service is available only in the Beijing, Shanghai, and Guangzhou regions.
- Intel Ice Lake supports only the remote attestation method based on Intel SGX DCAP rather than Intel EPID.

Use the Vim editor to modify `/etc/sgx_default_qcnl.conf` as follows:

```
# PCCS server address
# To accept insecure HTTPS cert, set this option to FALSE
USE_SECURE_CERT=TRUE
```

Replace `[Region-ID]` with the ID of the region where your SGX CVM instance resides; for example:

**Sample configuration for the Beijing region:**

```
# PCCS server address
# To accept insecure HTTPS cert, set this option to FALSE
USE_SECURE_CERT=TRUE
```

**Sample configuration for the Shanghai region:**

```
# PCCS server address
# To accept insecure HTTPS cert, set this option to FALSE
USE_SECURE_CERT=TRUE
```

**Sample configuration for the Guangzhou region:**

```
# PCCS server address
# To accept insecure HTTPS cert, set this option to FALSE
USE_SECURE_CERT=TRUE
```
Examples of SGX Feature Verification

Example 1. Start an enclave

The Intel SGX SDK provides sample SGX code for verifying SGX features in the default directory of `/opt/intel/sgxsdk/SampleCode`. The effect of this sample code (`SampleEnclave`) is to start an enclave to check whether the installed SGX SDK works normally and whether the confidential memory resource of your SGX CVM instance is available.

1. Run the following command to set the relevant environment variables of the Intel SGX SDK:

   ```bash
   source /opt/intel/sgxsdk/environment
   ```

2. Run the following command to compile the sample code `SampleEnclave`:

   ```bash
   cd /opt/intel/sgxsdk/SampleCode/SampleEnclave && make
   ```

3. Run the following command to run the compiled executable file:

   ```bash
   ./app
   ```

If a result in the following figure is returned, the enclave is started.

Example 2. Perform remote SGX verification

The code tree of Intel SGX provides sample code to verify the SGX remote attestation feature, i.e., DCAP. This example is to generate and verify a quote and involves the quote generator (`QuoteGenerationSample`) and verifier (`QuoteVerificationSample`).

1. Run the following command to set the relevant environment variables of the Intel SGX SDK:

   ```bash
   source /opt/intel/sgxsdk/environment
   ```
2. Run the following commands in sequence to install Git and download the Intel SGX DCAP code tree:

   ```bash
cd /root && yum install git
git clone https://github.com/intel/SGXDataCenterAttestationPrimitives.git
   ```

3. Run the following commands in sequence to compile and run the sample code of the quote generator `QuoteGenerationSample`:

   i. Enter the `QuoteGenerationSample` directory:

   ```bash
cd /root/SGXDataCenterAttestationPrimitives/SampleCode/QuoteGenerationSample
   ```

   ii. Compile `QuoteGenerationSample`:

   ```bash
make
   ```

   iii. Run `QuoteGenerationSample` to generate a quote:

   ```bash
./app
   ```

4. Run the following command to compile the sample code of the quote verifier `QuoteVerificationSample`:

   ```bash
cd /root/SGXDataCenterAttestationPrimitives/SampleCode/QuoteVerificationSample && make
   ```

5. Run the following command to sign the `QuoteVerificationSample` enclave:

   ```bash
sgx_sign sign -key Enclave/Enclave_private_sample.pem -enclave enclave.so -out enclave.signed.so -config Enclave/Enclave.config.xml
   ```

6. Run the following command to run `QuoteVerificationSample` to verify the quote:

   ```bash
./app
   ```
If a result in the following figure is returned, the verification succeeds.

```
[root@VM-8-14-centos QuoteVerificationSample]# ./app
Info: ECDSA quote path: ../QuoteGenerationSample/quote.dat

Trusted quote verification:
  Info: get target info successfully returned.
  Info: sgx_qv_set_enclave_load_policy successfully returned.
  Info: sgx_qv_get_quote_supplemental_data_size successfully returned.
  Info: App: sgx_qv_verify_quote successfully returned.
  Info: App: Verification completed successfully.
  Info: Supplemental data version: 3

Untrusted quote verification:
  Info: sgx_qv_get_quote_supplemental_data_size successfully returned.
  Info: App: sgx_qv_verify_quote successfully returned.
  Info: App: Verification completed successfully.
  Info: Supplemental data version: 3
```
Configuring Persistent Memory in M6p Instances

Overview

This document describes how to configure the persistent memory for an M6p instance.

Instance Configuration

This document uses a CVM instance with the following configuration. The obtained relevant information shall be subject to the actual conditions.

- **Instance specification**: MEM Optimized M6p instance M6p.LARGE16 (4C16G). For the configuration of other specifications, see Instance Types.
- **OS**: TencentOS Server 3.1 (TK4).

Note

Recommended configurations:

- TencentOS Server 3.1
- CentOS 7.6 or above
- Ubuntu 18.10 or above

Prerequisites

You have created and logged in to an M6p instance.

- For detailed directions on how to create an instance, see Creating Instances via CVM Purchase Page.
- For detailed directions on how to log in to an instance, see Logging in to Linux Instance Using Standard Login Method.

Overview of Intel® Optane™ Persistent Memory (PMem) Modes
Memory mode

In Memory mode, the regular DRAM serves as a cache for the most frequently accessed data, while the persistent memory is used as the backup memory. High-speed cache management operations are automatically processed by the memory controller.

App Direct mode

The M6p model uses this mode. In an M6p instance, the BPS hardware configuration is set to App Direct mode and passed through to a CVM. In this mode, an application can use the PMem device as the memory or local SSD disk.

Directions

Initializing PMem

For the first time using the instance, run the following commands in sequence to initialize the PMem device. If you have initialized it, skip this step.

```
yum install -y ndctl
ndctl destroy-namespace all --force
```

Note

An instance with the highest specification has two regions. After running the following commands, replace `region0` with `region1` and run them again:

```
ndctl disable-region region0
ndctl init-labels all
ndctl enable-region region0
```

Configuring PMem in App Direct mode

You can use the persistent memory as memory or local SSD disk based on your actual needs:

- Use as memory
- Use as local SSD disk
PMem can be provided to upper-level applications (such as Redis) as a character device for assignment of persistent memory and can be used with a PMDK framework such as memkind. It is configured as follows:

1. Run the following command to generate a character device:

   ```bash
   ndctl create-namespace -r region0 -m devdax
   ```

   The returned result is as shown below, indicating that the `dax0.0` character device has been generated:

   ```json
   
   
   ```

   An instance with the highest specification has two regions. If you use such an instance, you also need to run the following command:

   ```bash
   ndctl create-namespace -r region1 -m devdax -f
   ```

   After the configuration, the `dax0.0` character device is generated under the `/dev` directory, which can be mapped to the persistent memory.

2. Run the following command to view the persistent memory size:

   ```bash
   ndctl list -R
   ```

   The following information appears:
Extended feature (optional)

You can perform this step to use an extended feature. Run the following commands in sequence to use PMem to expand the CVM instance memory:

1. With the support of the kernel on a high version (above 5.1 and with KMEM DAX driver, such as kernel of TencentOS Server 3.1), you can configure PMem in devdax mode to KMEM DAX mode so as to use PMem to expand the CVM instance memory.

```
yum install -y daxctl

daxctl migrate-device-model

reboot

daxctl reconfigure-device --mode=system-ram --no-online dax0.0
```

The following information appears:
2. Run the following command to view the system memory expansion status:

```bash
numactl -H
```

The following information appears:

```
[root@VM-11-3-centos ~]# numactl -H
available: 1 nodes (0)
node 0 cpus: 0 1 2 3
node 0 size: 77962 MB
node 0 free: 76586 MB
node distances:
node 0
  0: 10
```

References

- Intel® Optane™ DC Persistent Memory
- Linux Provisioning for Intel® Optane™ Persistent Memory
Calling Cloud APIs via Python to Share Custom Images in Batches

Directions

This document describes how to use the Python SDK to call APIs and share custom Cloud Virtual Machine (CVM) images in batches through sub-users. If you have similar needs or want to learn how to use the SDK, refer to this document.

Prerequisites

- You have created a sub-user and the sub-user has full access to CVM and cloud APIs.
- For information about how to create a sub-user, see Creating Sub-User.
- For information about how to grant permissions to a sub-user, see Setting Sub-User Permissions. In this document, sub-users are associated with the QcloudCVMFullAccess and QcloudAPIFullAccess preset policies.
- For information about how to create a SecretId and a SecretKey for a sub-user, see Access Key. You need to record and properly save the SecretId and SecretKey.
- There are custom images to be shared. If you need to create custom images, see Creating a Custom Image.

Directions

Installing Python

1. Run the following command to check whether Python 3.6 or later is installed on the current CVM instance. If yes, skip this step.

   ```
   python --version
   ```

2. If Python is not installed on your CVM instance, perform one of the following operations:

   - For a CVM instance on CentOS, run the following command to install Python:

     ```
     yum install python3
     ```
- For a CVM instance on Ubuntu or Debian, run the following command to install Python:

```bash
sudo apt install python3
```

- For a CVM instance on any other operating system, go to the Python website, download Python 3.6 or later, upload the installation package to the Linux server, decompress the package, and then install Python.

3. After the installation is completed, run the following command to verify the version of Python:

```bash
python --version
```

### Writing code

1. Create a `test.py` file on the target machine and enter the following code:

```python
import json
from tencentcloud.common import credential
from tencentcloud.common.profile.client_profile import ClientProfile
from tencentcloud.common.profile.http_profile import HttpProfile
from tencentcloud.common.exception.tencent_cloud_sdk_exception import TencentCloudSDKException
from tencentcloud.cvm.v20170312 import cvm_client, models

# By default, the environment variables `TENCENTCLOUD_SECRET_ID` and `TENCENTCLOUD_SECRET_KEY` are read to get the `SecretId` and `SecretKey`.
# For information about more credential management methods, see https://github.com/TencentCloud/tencentcloud-sdk-python#%E5%87%AD%E8%AF%81%E7%AE%A1%E7%90%86
cred = credential.EnvironmentVariableCredential().get_credential()

httpProfile = HttpProfile()
httpProfile.endpoint = "cvm.tencentcloudapi.com"
clientProfile = ClientProfile()
clientProfile.httpProfile = httpProfile

# Nanjing is used in this example. Modify the region according to actual situation. For example, in the case of Shanghai, change the region to `ap-shanghai`.
aria = 'ap-nanjing'

client = cvm_client.CvmClient(cred, aria, clientProfile)

def img_share(img_id, img_name, accountids):
    try:
        req1 = models.ModifyImageSharePermissionRequest()
        params1 = {
            "ImageId": img_id,
            "AccountIds": accountids,
        }
```
"Permission": "SHARE"
}
req1.from_json_string(json.dumps(params1))

resp1 = client.ModifyImageSharePermission(req1)
response1 = json.loads(resp1.to_json_string())
print(img_name,'Shared successfully!',response1)

except TencentCloudSDKException as err:
    print(img_name,'Sharing failed!',err)
try:
    req = models.DescribeImagesRequest()
    params = {
        "Filters": [
            {
                "Name": "image-type",
                "Values": ["PRIVATE_IMAGE"]
            }
        ],
        "Limit": 100
    }
    req.from_json_string(json.dumps(params))
    resp = client.DescribeImages(req)
    response = json.loads(resp.to_json_string())
    img_num = response['TotalCount']
    print('Obtaining the image list...')
    share_config = input('1. Share all images
2. Manually determine the images to share
Enter 1 or 2 and press the Enter key. Default value: 2:') or '2'
accountids = input('Enter the UINs of users with whom the images are to share, and separate the UINs with commas:').split(',')
    for i in range(img_num):
        basic = response['ImageSet'][i]
        img_id = basic['ImageId']
        img_name = basic['ImageName']
        if share_config == '1':
            img_share(img_id, img_name, accountids)
        elif share_config == '2':
            print('Image ID: ',img_id,'Image name: ',img_name)
            share_choice = input('Whether to share this image y/n:') or 'y'
            if share_choice == 'y':
                img_share(img_id, img_name, accountids)
            elif share_choice == 'n':
                continue
            else:
                print('Please specify a correct option!')
        else:
            print('Please specify a correct option!')
except TencentCloudSDKException as err:
    print(err)

- **SecretId and SecretKey**: Use the SecretId and SecretKey of the created sub-user mentioned in Prerequisites.
- **aria**: Use the actual region where the custom images to be shared reside. For more information, see Common Params.

2. Run the following command on the target machine to run the code:

```python
test.py
```

According to the on-screen prompts, enter 1 or 2 (choose to share all images together or to select and share images one by one), and then enter the peer account ID. To obtain the account ID, notify the peer account owner to go to the Account Information page.

After the images are successfully shared, a corresponding number of RequestID values are returned.

**Relevant API Documents**

This document uses the following APIs: DescribeImages and ModifyImageSharePermission.