Cloud Virtual Machine
Best Practice
Product Documentation
Copyright Notice

©2013-2023 Tencent Cloud. All rights reserved.

Copyright in this document is exclusively owned by Tencent Cloud. You must not reproduce, modify, copy or distribute in any way, in whole or in part, the contents of this document without Tencent Cloud's the prior written consent.

Trademark Notice

All trademarks associated with Tencent Cloud and its services are owned by Tencent Cloud Computing (Beijing) Company Limited and its affiliated companies. Trademarks of third parties referred to in this document are owned by their respective proprietors.

Service Statement

This document is intended to provide users with general information about Tencent Cloud's products and services only and does not form part of Tencent Cloud's terms and conditions. Tencent Cloud's products or services are subject to change. Specific products and services and the standards applicable to them are exclusively provided for in Tencent Cloud's applicable terms and conditions.
Contents

Best Practice
  Best Practices
  Choosing the CVM Model
Setting up a Website
Building an Environment
  References Overview
  Install and Configure IIS
Setting up LNMP
  Manual Setup of LNMP (CentOS 8)
  Manual Setup of LNMP (CentOS 7)
  Manual Setup of LNMP (CentOS 6)
  Manual Setup of LNMP (openSUSE)
Setting up Node.js
  Manual Setup of Node.js
Setting up Java Web
  Manual Setup of Java Web
Setting up LAMP manually
  Manual Setup of LAMP
Manual Setup of WIPM Environment
  Step2: Install and Configure PHP
  Step3: Install and Build MySQL
Building a Website
  Overview
  WordPress Website
    Building a WordPress Website (Linux)
    Building a WordPress Website (Windows)
  Discuz! Forum
    Building Up a Discuz! Forum
Setting up Drupal
Setting up a Ghost Blog
Building an Application
Setting Up FTP Site
  Setting Up an FTP Site (Windows)
  Setting Up an FTP Site (Linux)
NTP Service
NTP Service of Tencent Cloud
Setting Up NTP Service (Linux)
Transitioning from ntpdate to ntpd (Linux)
Setting Up NTP Service (Windows)
Building Microsoft SharePoint 2016
Building the Primary/Secondary PostgreSQL Architecture
Installing BT Panel for Windows
Building the Docker
Building GitLab
Building RabbitMQ
Building a Visual GUI
Building a Visual Ubuntu Desktop
Building a Visual CentOS Desktop
Data Backup
Migrating CVM Instances
Uploading Local Files to CVM
  Copying Local Files to CVMs
  Uploading Files from MacOS to Windows CVM Using MRD
  Uploading Files from Linux to Windows CVM using RDP
  Uploading Files from Linux to a CVM Using FTP
  Uploading files via WinSCP to a Linux CVM from Windows
  Uploading Files from Windows to a CVM Using FTP
  Uploading Files from Linux or MacOS to Linux CVM via SCP
  Uploading Files from Windows to a Windows CVM via MSTSC
Other CVM Operations
CVM Access to COS via a Private Network
Recovering Data on Linux CVMs
Managing Disk Space on Windows CVMs
Changing Kernel of a Linux Instance Manually
Setting Up Windows-based AD Domain on a CVM
Network Performance Test
High-throughput Network Performance Test
  Overview
  Using Netperf
  Using DPDK
Using USB/IP to Share USB Devices in Linux
Using RemoteFx to Redirect USB Devices in Windows
Using AVX-512 Instructions to Accelerate AI Applications on CVM
Building Tencent SGX Confidential Computing Environment
Configuring Persistent Memory in M6p Instances
Calling Cloud APIs via Python to Share Custom Images in Batches
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**

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 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>Standard S and SA</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>Standard S Computing C</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>High I/O IT Memory Optimized M</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>Memory Optimized M</td>
</tr>
<tr>
<td>Category</td>
<td>Product</td>
<td>Description</td>
<td>Relevant Products</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Big data</td>
<td>Hadoop ES</td>
<td>The big data business requires mass storage and moderate I/O throughput. We recommend Big Data instances. When selecting an instance using local disk, remember to back up data to avoid data loss.</td>
<td>Big Data D</td>
</tr>
<tr>
<td>High performance computing</td>
<td>StarCCM WRF-Chem</td>
<td>The high performance computing business requires both the ultimate single-machine computing power and the efficient multi-machine scaling. We recommend HPC with the high-speed RDMA network connection or Compute instances.</td>
<td>HPC Compute C</td>
</tr>
<tr>
<td>Virtualization</td>
<td>Kvm OpenStack</td>
<td>The virtualization application requires the nested virtualization of a cloud server without incurring additional performance overhead while maintaining the virtualization capability like a physical machine. We recommend CPM 2.0 products.</td>
<td>HPC CPM 2.0</td>
</tr>
<tr>
<td>Video rendering</td>
<td>Unity UE4</td>
<td>The video rendering business requires supporting graphic and image processing APIs, such as DirectX and OpenGL. We recommend GPU Rendering GN7vw instances.</td>
<td>GPU Rendering GN7vw</td>
</tr>
<tr>
<td>AI-based computing</td>
<td>TensorFlow CUDA</td>
<td>The AI-based computing business 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, with 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><strong>WordPress</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>[Building a WordPress Website (Linux)]</td>
<td></td>
</tr>
<tr>
<td><strong>LNMP</strong></td>
<td><strong>Manual Setup of LNMP (CentOS 7)</strong></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><strong>LAMP</strong></td>
<td><strong>Manual Setup of LAMP</strong></td>
<td>LAMP is a common web service architecture which consists of Apache, MySQL/MariaDB, and PHP running on Linux.</td>
</tr>
<tr>
<td><strong>WIPM</strong></td>
<td><strong>Manual Setup of WIPM</strong></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><a href="#">Setting up</a></td>
<td>Drupal is a Content Management Framework (CMF) written in PHP. It</td>
</tr>
</tbody>
</table>
### Drupal

Consists of a Content Management System (CMS) and a PHP development framework. You can use it to run a personal blog or corporate website.

### Ghost

**Setting up a Ghost Blog**

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.

### Microsoft SharePoint 2016

**Building Microsoft SharePoint 2016**

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.

### 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

Last updated: 2023-05-09 16:39:52

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](image)

Configure this local server

- 2 Add roles and features
- 3 Add other servers to manage
- 4 Create a server group
- 5 Connect this server to cloud services
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:

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.
7. Click **Add Features** in the pop-up dialog box, as shown below:

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.

2. 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.

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:

![Add Roles in the right panel](image)

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

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

6. On the **Role Services** page, check **CGI** and click **Next**, as shown below:
7. Review your installation selections and click **Install**. Wait for the installation process to complete.

![Confirm Installation Selections](image)

8. 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.
Setting up LNMP
Manual Setup of LNMP (CentOS 8)

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 ~ .\..\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\..\.\.\../>. }
```

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.
mysql -V

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

```
mysql Ver 8.0.21 for Linux on x86_64 (Source distribution)
```

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

```
systemctl enable --now mysqld
```

```
systemctl status mysqld
```

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

```
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.

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

   dnf clean all

   dnf makecache

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

   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.

   dnf module install php:remi-7.4

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


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

   php -v

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

   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.

```
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.

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

**Verifying the Environment Configuration**

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

```
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.

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/`.

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

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

```
[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.

```
yum install -y nginx
```

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

```
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.

```
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.

```
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.

```
```

```
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.

```
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.

```
systemctl start php-fpm
```

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

```
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.

   ```bash
   ```

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

   ```bash
   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](URL to the PHP info page)

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.

   ```
   [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.

   ```
   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. 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.  
Commercial support is available at 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.

   \[ \text{rpm -qa | grep -i mysql} \]

   If the following appears, MySQL has already been installed.

   \[
   \text{[root@VM_0_41_centos ~]# rpm -qa | grep -i mysql}
   \text{mysql-server-5.1.73-8.el6_8.x86_64 mysql-libs-5.1.73-8.el6_8.x86_64}
   \]

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

   \[ \text{yum -y remove [Package name]} \]

   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.

   \[ \text{yum install -y mysql-devel.x86_64 mysql-server.x86_64 mysql-libs.x86_64} \]

3. Run the following command to start MySQL.

   \[ \text{service mysqld start} \]
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.

```
[root@VM_0_135_centos nginx]# mysql
Welcome to the MySQL monitor. Commands end with ; or \
Your MySQL connection id is 3
Server version: 5.5.59 MySQL Community Server (GPL)
Copyright (c) 2000, 2018, 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>  
```

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.

```
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.

```
service php-fpm start
```

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

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

**Verifying the Environment Configuration**

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

```
```

2. Run the following command to restart Nginx.

```
service nginx restart
```

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

```
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 Nginx 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
Vim /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
   ```

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

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

1. After you finish, press **Esc** to exit edit 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.

   ```
   hello world!
   ```
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!](image)

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.
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.

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

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

```
source /etc/profile
```

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

```
nvm list-remote
```

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

```
nvm install v6.9.5
```

```
nvm install v10.16.3
```

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

```
nvm ls
```

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

```
[root@VM_0_3_centos .nv]# nvm ls
  v8.5.5
-> v10.16.3
  system
stable -> 10.16 (→ v10.16.3) (default)
unstable -> 6.9 (→ v6.9.5) (default)
```

8. Run the following command switch to another version.

```
nvm use v6.9.5
```
The following appears:

```
[root@VM_0_3_centos .nv]# nvm use v6.9.5
Now using node 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 ~
```

   ```bash
   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
');
     });
   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.
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 `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 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.

   ```bash
   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.

```
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`.

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

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

```bash
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.

```bash
JAVA_OPTS='\-Djava.security.egd=file:/dev/\.
```

If the following appears, Tomcat has been successfully started.

```
[root@VM_0_15_centos ~]# /usr/local/tomcat/bin/startup.sh
Using CATALINA_BASE: /usr/local/tomcat
Using CATALINA_HOME: /usr/local/tomcat
Using CATALINA_TMPDIR: /usr/local/tomcat/temp
Using JRE_HOME: /usr/java/jdk1.8.0_221
Using CLASSPATH: /usr/local/tomcat/bin/bootstrap.jar:/usr/local/tomcat/bin/catalina-juli.jar
Tomcat started.
```

**Verifying the Environment Configuration**

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

```bash
/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

Last updated : 2021-10-20 10:03:36

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.

   ```bash
   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.

   ![package_list](image)

   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/`.

   ```shell
   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.

   ```shell
   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.

   ```shell
   systemctl start mariadb
   systemctl enable mariadb
   ```

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

   ```shell
   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:

```plaintext
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
```

```plaintext
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>
```

```plaintext
DirectoryIndex: sets the file that Apache will serve if a directory
is requested.

<IfModule dir_module>
  DirectoryIndex index.php index.html
</IfModule>
```

```plaintext
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.

![PHP Version 7.0.33]

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:

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:

   ![PHP installation](#)

   `hello world`

   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 7.1 (7.1.30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Download source code [26.66MB]</td>
</tr>
</tbody>
</table>

### VC14 x64 Non Thread Safe (2019-May-28 19:06:19)
- **Zip** [23.07MB]
  - sha256: c7a8450823b0976ed5314848f79a79839e78f570dffe3d0baa3bb1614efa8d2
- **Debug Pack** [22.68MB]
  - sha256: cc4fca61232f571e427c00e213fc18d66956214bd24c01079af36fe03752e08

### VC14 x64 Thread Safe (2019-May-28 19:06:35)
- **Zip** [23.2MB]
  - sha256: 46bb7969ba0c2717f6b8f3dc9297eee605e9306b86d5eddeb257fd57fd4f976
- **Debug Pack** [22.7MB]
  - sha256: 95cd632d88ef6d6dce246c929b232358d7db98178e15b764aa0b92afdf9235b963

### VC14 x86 Non Thread Safe (2019-May-28 19:06:18)
- **Zip** [21.31MB]
  - sha256: 50a487c665bc02f1a68ef633f89994c047b49e335b1a04309443276c05544d6c
- **Debug Pack** [23.01MB]
  - sha256: 0d9a23f29e0141f4f270d2d76b384021d17dcf15ef54e55dc26oa7bf0b05b61

### VC14 x86 Thread Safe (2019-May-28 19:06:51)
- **Zip** [21.4MB]
  - sha256: 86c6c348bc3e20bccc885b427eb2a39ce39021def8d0305eb392aad9e4cf50295
- **Debug Pack** [23.15MB]
  - sha256: 64285b2af3bef616164766c4dd617b111e86a55c860e1db14cc8102a94fde2
### PHP Zip File Name

<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:

   ![php.ini file}

3. On the desktop, click 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:

![Default Document](image)

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.
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.

![MySQL Installer]

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.

![MySQL Workbench Welcome Screen](image1)

MySQL Workbench is the official graphical user interface (GUI) tool for MySQL. It allows you to design, create and browse your database schemas, work with database objects and insert data as well as design and run SQL queries to work with stored data. You can also migrate schemas and data from other database vendors to your MySQL database.

- If MySQL Shell as shown below starts, MySQL has been successfully installed.

![MySQL Shell](image2)

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

Last updated: 2022-03-21 15:19:41

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).
WordPress Website

Building a WordPress Website (Linux)

Last updated: 2023-07-17 16:39:17

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:

    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:

    cd /usr/share/nginx/html

    wget https://cn.wordpress.org/wordpress-5.0.4-zh_CN.tar.gz

    tar zxfv 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**

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

2. Click `>`  > **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

   The WordPress installation page appears.

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](http://localhost/wp-admin/install.php) and [Login and Remote Access](http://localhost/wp-admin/install.php).
- CVM network: [IP Address](http://localhost/wp-admin/install.php) and [Port](http://localhost/wp-admin/install.php).
- CVM disks: [System and Data Disks](http://localhost/wp-admin/install.php).
Discuz! Forum

Building Up a Discuz! Forum

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:

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

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

   ```bash
   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.

   ```bash
   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**.

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

```
[root@CVM_149_104_centos ~]# mysql -u root -p
Welcome to the MariaDB monitor. Commands end with ; or \g.
Your 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.

### Step 3: install and configure Discuz

#### Downloading Discuz!

Run the following command to download the installation package.

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

#### Preparing for installation

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

   ```
cd DiscuzX
```

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

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

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

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

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

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

   ```
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.

   ```
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:

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

```
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 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.
```
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.

   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:
   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.

    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`.

```
CREATE DATABASE ghost_data;
```

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

```
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.

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

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

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

### Install Ghost-CLI

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

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

### Step 5 Install and configure Ghost

1. Run the following commands.

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

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

```
sudo chmod 775 /var/www/ghost
cd /var/www/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)

Last updated: 2022-04-06 19:35:07

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 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:

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

   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

![Image](image.png)

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.png) 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.
On the “Permissions for test” page, set the permission for **Everyone** and click **OK**. This document uses granting **Everyone** all permissions as an example.
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.
- **SSL**: select an option. In this document, **No SSL** is selected.
  - **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 `tf7295TPY`.

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**.

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.

![Select Users or Groups dialog box]

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.

![Create Self-Signed Certificate window]

**Specify Friendly Name**

Specify a file name for the certificate request. This information can be sent to a certificate authority for signing.

**Specify a friendly name for the certificate:**

SSL

**Select a certificate store for the new certificate:**

Personal

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

```bash
netstat -antup | grep ftp
```

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

![Netstat Output]

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.

```plaintext
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.

```plaintext
#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.

```plaintext
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.

   ```
   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.

   ```
   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:

```plaintext
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.

```bash
lsblk | grep -i "name"
```
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.

   ```sh
dl -h
   # Here, /home/test indicates the FTP directory. Replace it with your actual 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.

   ```sh
   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:

   ```sh
   ls -l /home/test
   # Here, /home/test indicates the FTP directory. Replace it with your actual FTP directory.
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
ntpdate-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.
**yum -y install ntp**

ntp uses the client mode by default.

### Configuring NTP

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 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:

   ```plaintext
   # 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.

```bash
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.

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

```
[root@VM_0_136_centos ~]# netstat -nupl
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:fe21:123       :::*                :::*          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 ntp.service
* ntp.service - Network Time Service
  Loaded: loaded (/usr/lib/systemd/system/ntpd.service; enabled; vendor preset: disabled)
  Active: active (running) since Wed 2019-08-07 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
  State: exited
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: 0.0.0.0 c01d 0d kern kernel time sync enabled
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: ntp_io: estimated max descriptors: 1024, initia... 16
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: listen normally on 0 lo 127.0.0.1 UDP 123
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: listen normally on 1 eth0 172.30.0.136 UDP 123
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: listen normally on 2 lo ::1 UDP 123
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: listen normally on 3 eth0 fe80::5054:ff:fe21:123... 123
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: listening on routing socket on fd $20 for inter...tes
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: 0.0.0.0 c016 05 restart
Aug 07 15:23:25 VM_0_136_centos ntpd[999]: 0.0.0.0 c012 02 freq set kernel 0.467 PPM
Aug 07 15:23:34 VM_0_136_centos ntpd[999]: 0.0.0.0 c615 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
108.197.234.156 .INIT. 16 u 6 64 0 0.000 0.000 0.000
193.105.184.149 194.125.112.16 2 u 6 64 17 277.831 3.940 5.598
168.103.147.230 194.125.112.16 2 u 68 64 16 201.280 1.729 0.263
193.105.184.149 194.125.112.16 2 u 69 64 16 293.382 1.003 0.441
169.103.147.230 100.80.118.99 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 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 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
```
Transitioning from ntpdate to ntpd (Linux)

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.

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

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

   ```
   crontab /tmp/cronfile
   ```

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

   ```
   vim /etc/rc.local
   ```
4. Press `i` to switch to the edit mode and delete the `ntupdate` 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.

   ```
   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:

   ```
   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.

   ```
   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.

   ```
   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:*       *:*        999/ntpd
udp   0      0      127.0.0.1:123 0.0.0.0:*       *:*        999/ntpd
udp6  0      0  fe80::5054:ff:fe00::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.

```
Active: active (running) since Wed 2019-08-07 15:23:25 CST; 5min ago
Load average: 0.99, 0.91, 0.87
```

- 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
108.24.21.24 *.INIT. 16 u - 64 0 0.000 0.000 0.000
193.38.154.97 194.76.160.182 2 u 6 64 17 277.831 3.940 5.598
168.190.131.185 194.76.160.182 2 u 68 64 16 201.280 1.729 0.263
193.38.154.97 194.76.160.182 2 u 69 64 16 293.382 1.003 0.441
169.244.1.7 100.13.216.240 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.
Internet Time Settings

Configure Internet time settings:

- Synchronize with an Internet time server

Server: ntpupdate.tencentyun.com

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 to open Server Manager.
2. Click ![warning icon] and select **Promote this server to a domain controller**.

![Server Manager Dashboard](image)

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: [Blank]

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 ![Server Manager](image) 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**.

![Feature Selection window](image-url)
9. On the **Instance Configuration** page, select **Default instance** and click **Next**.

![ Instance Configuration page with Default instance selected ]

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.
Cloud Virtual Machine

©2013-2022 Tencent Cloud. All rights reserved.
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.

![Image of Microsoft SharePoint 2016 Installation Complete]

- Application Server Role, Web Server (IIS) Role: configured successfully
- Microsoft SQL Server 2012 Native Client: installed successfully
- Microsoft ODBC Driver 11 for SQL Server: installed successfully
- Microsoft Sync Framework Runtime v1.0 SP1 (x64): installed successfully
- Windows Server AppFabric: installed successfully
- Microsoft Identity Extensions: installed successfully
- Microsoft Information Protection and Control Client 2.1: installed successfully
- Microsoft WCF Data Services 5.6: installed successfully
- Cumulative Update Package 7 for Microsoft AppFabric 1.1 for Windows Server (KR3092423): installed successfully

Some features may require additional optional prerequisites. Please review them on [http://co.microsoft.com/wlink/?LinkID=613440](http://co.microsoft.com/wlink/?LinkID=613440).

It is recommended that you keep your Windows operating system up to date on [http://windowsupdate.microsoft.com](http://windowsupdate.microsoft.com).

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.

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**.
Building the Primary/Secondary PostgreSQL Architecture

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/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
   
   /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:

   ```conf
   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 the `IPv4 local connections` section:

   ```conf
   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:

   ```conf
   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.
1. Run the following command to restart the service.

   `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.

   `yum update -y`

3. Run the following commands in sequence to install PostgreSQL.

   ```
   wget --no-check-certificate https://download.postgresql.org/pub/repos/yum/reps/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:

   ```
   pg_basebackup -D /var/lib/pgsql/12/data -h Public IP of the primary node> -p 5432 -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.

   ```
   cp /usr/pgsql-12/share/recovery.conf.sample /var/lib/pgsql/12/data/recovery.conf
   ```
6. Run the following command to open the `recovery.conf` file.

```bash
vim /var/lib/pgsql/12/data/recovery.conf
```

7. Press `i` to switch to the edit mode, locate and replace the following parameters:

```plaintext
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.

```bash
vim /var/lib/pgsql/12/data/postgresql.conf
```

10. Press `i` to switch to the edit mode, locate and replace the following parameters:

```plaintext
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.
```

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

12. Run the following command to modify the group and owner of the data directory:

```bash
chown -R postgres.postgres /var/lib/pgsql/12/data
```

13. 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.
Installing BT Panel for Windows

Last updated: 2022-05-07 15:20:31

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

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 

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.
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:

```
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.
Using Docker

You can use Docker with the following commands:

- Manage the Docker daemon.

- 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.

   ```
   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.

   ```
   docker images
   ```

6. Run the following commands in sequence to run and check the container.

   ```
   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.

   ```
   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.

   ```
   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.
Building GitLab

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.
yum install -y curl policycoreutils-python openssh-server

3. Run the following commands in sequence to enable SSH service autostart and start the SSH service.

```bash
systemctl enable sshd
```

```bash
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:
Cloud Virtual Machine

©2013-2022 Tencent Cloud. All rights reserved.

Page 219 of 336

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.
2. Create a private project as instructed. This document uses `test` as an example in the following figure:

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:

![Test project details](image)

**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.

```bash
grep http://erlang.org/download/otp_src_19.3.tar.gz
```

4. Run the following command to decompress the Erlang installation package.

```bash
tar xzf otp_src_19.3.tar.gz
```

5. Run the following command to create the erlang folder.

```bash
mkdir /usr/local/erlang
```

6. Run the following commands in sequence to compile and install Erlang.

```bash
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.

```bash
vi /etc/profile
```

8. Press `i` to enter the edit mode, and append the following at the end of the file.

```bash
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.

![RabbitMQ Login](image)

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

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
sudo apt install gnome-panel gnome-settings-daemon metacity nautilus gnome-terminal ubuntu-desktop
```

### 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@UM-0-133-ubuntu:/home/ubuntu# vncserver
You will require a password to access your desktops.
Password:
Verify:    file /root/.Xauthority does not exist
New 'UM-0-133-ubuntu:1 (root)' desktop is UM-0-133-ubuntu:1
Creating default startup script /root/.vnc/xstartup
Starting applications specified in /root/.vnc/xstartup
Log file is /root/.vnc/UM-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.

```bash
#!/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.

   `yum groupinstall "Server with GUI" -y`

3. Run the following command to set the default GUI.

   `systemctl set-default graphical`

4. Run the following command to restart the instance.

   `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

Last updated : 2022-03-21 15:19:39

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 a 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

Last updated : 2022-03-21 15:19:39
FAQs

For more information, please see About Service Migration.
Uploading Local Files to CVM
Copying Local Files to CVMs

Last updated: 2022-07-05 17:15:40

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>
<td>Upload by using RDP</td>
</tr>
<tr>
<td></td>
<td>• Upload by using FTP</td>
<td></td>
</tr>
<tr>
<td>macOS</td>
<td></td>
<td>Upload by using MRD</td>
</tr>
</tbody>
</table>

For example, if you want to upload files from your local Windows server to a Linux CVM instance, you can use WinSCP.

**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

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 showing Instances page]

Uploading files
1. Start MRD and click **Add Desktop**, as shown below:

![Add Desktop](image)

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.

```bash
tar xvzf rdesktop-1.8.3.tar.gz
cd rdesktop-1.8.3
```

3. Run the following commands to compile and install rdesktop.

```bash
./configure
make
make install
```

4. After the installation is complete, run the following command to check if rdesktop is successfully installed:

```bash
rdesktop
```

**Uploading files**

1. Run the following command to specify the shared folder:

```bash
```

**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 1.2.3.4.
Connected to 1.2.3.4.
220 Microsoft FTP Service
Name (1.2.3.4: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.
● 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

Last updated: 2022-07-08 18:55:01

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/Inmp0.4.tar.gz root@129.20.0.2:/home/Inmp0.4.tar.gz
```
Note
You can add the `-r` parameter to upload folders. For more information on the `scp` command, run `man scp`.

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.

   ```
   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/lnmp0.4.tar.gz` from the CVM whose public IP is `129.20.0.2` to the same local directory:

   ```
   scp root@129.20.0.2:/home/Inmp0.4.tar.gz /home/Inmp0.4.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 ![Drive Icon] 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.

Run the `nslookup` command on the CVM to resolve the COS domain name. If a private IP is returned, the access is over a private network; otherwise, it is over a public network.

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.

   ```
   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 `100.*.*.*`, 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
Last updated: 2022-04-13 11:01:52

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.

```
wget https://github.com/curu/extundelete/releases/download/v1.0/extundelete
```

    ii. Run the following command to grant file permissions.
chmod a+x extundelete

2. Run the following command to try recovering the data.

```
./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

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:

![Image of disk space filter options]

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:

![Add Roles and Features Wizard](image)

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.

- Enter “Size: > 500 MB” to search the disk for files larger than 500 MB.
- Enter “Size: > 100 MB < 500 MB” to search the disk for files larger than 100 MB but less than 500 MB.
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:

![Uninstall or change a program](image)

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.

   ```bash
   yum --disablerepo="*" --enablerepo="elrepo-kernel" list available
   ```

2. Run the following command to install the latest mainline stable kernel.

   ```bash
   yum --enablerepo=elrepo-kernel install kernel-ml
   ```

**Modifying the grub configuration**

1. Run the following command to open the `/etc/default/grub` file.

   ```bash
   vim /etc/default/grub
   ```

2. Press `i` to switch to the edit mode and change `GRUB_DEFAULT=saved` to `GRUB_DEFAULT=0`.

   ```
   GRUB DISTRIBUTOR="S (Fedora Release '20', release '20.0')"
   GRUB_DEFAULT=0
   GRUB_HIDDEN_TIMEOUT=0
   GRUB_HIDDEN_TIMEOUT_BASE=2
   GRUB_TIMEOUT=20
   GRUB_TIMEOUT_BASE=2
   GRUB_TERMINAL=console
   GRUB_LINENO=3
   ```

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

4. Run the following command to generate the kernel configuration again.

   ```bash
   grub2-mkconfig -o /boot/grub2/grub.cfg
   ```

5. Run the following command to restart the server.

   ```bash
   reboot
   ```

6. Run the following command to check whether the modification is successful.

   ```bash
   uname -r
   ```
Deleting unnecessary kernels

1. Run the following command to view all kernels.

   ```
   rpm -qa | grep kernel
   ```

2. Run the following command to delete the older kernel.

   ```
   yum remove kernel-old_kernel_version
   ```

   For example:

   ```
   yum remove kernel-3.10.0-957.el7.x86_64
   ```

Enabling BBR

1. Run the following command to edit the `/etc/sysctl.conf` file.

   ```
   vim /etc/sysctl.conf
   ```

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

   ```
   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.

   ```
   sysctl -p
   ```

5. Run the following commands to verify whether BBR has been successfully enabled.

   ```
   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 10.0.0/16.
- 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.
   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.
   v. Click Ok.

3. In the cmd window, execute the following ping command to check whether the IP address is connected.

   ```
   ping example.com
   ```


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:

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

5. Run the following commands to verify whether the installation was successful:

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

If “Help” appears, the installation was successful.

6. Run the following commands based on the OS type to install iperf:

```
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:

```
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:

```
iperf -s
```

**Companion training server**

Run the following command:

```
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 rxB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:04 PM eth0 1626689.00 8.00 68308.62 1.65 0.00 0.00 0.00
02:41:04 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
02:41:04 PM IFACE rxpck/s txpck/s rxB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:05 PM eth0 1599900.00 1.00 67183.30 0.10 0.00 0.00 0.00
02:41:05 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
02:41:05 PM IFACE rxpck/s txpck/s rxB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:06 PM eth0 1646689.00 1.00 69148.10 0.40 0.00 0.00 0.00
02:41:06 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
02:41:06 PM IFACE rxpck/s txpck/s rxB/s txkB/s rxcmp/s txcmp/s rxcst/s
02:41:07 PM eth0 1605957.00 1.00 67437.67 0.40 0.00 0.00 0.00
02:41:07 PM lo 0.00 0.00 0.00 0.00 0.00 0.00 0.00
```

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>rxB/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 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0.00-300.03 sec 6.88 GBytes 197 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>0.00-300.03 sec 6.45 GBytes 185 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>0.00-300.03 sec 6.40 GBytes 183 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>0.00-300.03 sec 6.19 GBytes 177 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>0.00-300.03 sec 6.82 GBytes 195 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>0.00-300.03 sec 6.70 GBytes 192 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>0.00-300.03 sec 7.04 GBytes 202 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>0.00-300.03 sec 7.02 GBytes 201 Mbits/sec</td>
<td>receiver</td>
<td></td>
</tr>
<tr>
<td>SUM</td>
<td>0.00-300.03 sec 0.00 Bytes 0.00 bits/sec</td>
<td>sender</td>
<td></td>
</tr>
<tr>
<td>SUM</td>
<td>0.00-300.03 sec 53.5 GBytes 1.53 Gbits/sec</td>
<td>receiver</td>
<td></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

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:

```bash
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>

Last updated: 2021-11-01 16:29:57
### 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 zxf 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.

```
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.

```
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 receiving performance.

   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.

```
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

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.

   - Run the following command to modify the `dpdk/app/test-pmd/txonly.c` file.

     ```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 < 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);  
```

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,
```
The result should be as follows:

```
copy_buf_to_pkt(&eth_hdr, sizeof(ether_hdr), pkt, 0);
copy_buf_to_pkt(&pkt_ip_hdr, sizeof(pkt_ip_hdr), pkt,
ssizeof(struct ether_hdr));
copy_buf_to_pkt(&RTT_PER_LCORE(lcore_udp_hdr), sizeof(RTT_PER_LCORE(lcore_udp_hdr)), pkt,
ssizeof(struct ether_hdr) +
ssizeof(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.

  ```
  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_FAL=y
  CONFIG_RTE_MAX_LCORE=128
  CONFIG_RTE_MAX_NUMA_NODES=8
  **CONFIG_RTE_MAX_MEMSEG=1024**
  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_FAL=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.

```
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.

```
vim dpdk/app/test-pmd/txonly.c
```

Press `i` to enter the edit mode.

```
#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

```
yum install numactl-devel
```

6. Run the following command in the `dpdk/` directory to close KNI.

```
subj -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.

```
sed -i "s/\(^WERROR_FLAGS += -Wundef -Wwrite-strings\)/\1 -Wno-address-of-pack ed-member/g" ./mk/toolchain/gcc/rte.vars.mk
```

```
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.

```
make defconfig
```

```
make -j
```

### Configuring huge pages

Run the following command to configure huge pages.

```
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:

```
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.

```
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:

```
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=1
   ```
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 Bandwidth Test Result](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:

\[
\text{Bandwidth} = \text{PPS} \times \text{packet length} \times 8 \text{bit/B} \times 10^{-9}
\]

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.
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:

```
bssid 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 specified USB/IP port:localhost:specified USB/IP port root@your_host
```

For example, if the USB/IP port is port 3240 and the CVM IP address is 192.168.15.24, run the following command:

```
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):
```

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

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

Given that RDP 8.0 and subsequent versions all support the RemoteFX USB Redirection feature, it follows that Windows Server 2012 and later versions are all compatible with the RemoteFX USB Redirection feature. If your local computer’s operating system is Windows Server 2008 R2, it is advisable to upgrade to a higher supported version to ensure the system’s optimal performance.

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 gedit.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:

![Image of pop-up window with Disabled selected and OK button highlighted]

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:

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 > RemoteFX USB Redirection** and double-click **Allow RDP redirection of other supported RemoteFX 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 **Run** 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 provide 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.

Note:
For more information on instance specifications, see Instance Types.

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:

Show All

Sample 1: optimizing the deep learning framework TensorFlow* with Intel®

Expand & collapse

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.

```
Note
The version 2.4.0 or later is recommended to obtain the latest features and optimization.
```

```
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.

```
lscpu | grep "Core(s) per socket" | cut -d':' -f2 | xargs
```

2. Set the optimization parameters using either method:

- Set the runtime parameters. Add the following configurations in the environment variable file:

```
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*

©2013-2022 Tencent Cloud. All rights reserved. Page 312 of 336
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 OMP_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"
     ```
export KMP_BLOCKTIME=1
export KMP_SETTINGS=1

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](image)

**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>FP32 Accuracy Baseline</td>
</tr>
<tr>
<td>tensorflow 2.4.0</td>
<td>inception_resnet_v2</td>
<td>80.38%</td>
<td>80.40%</td>
<td>-0.02%</td>
</tr>
<tr>
<td>tensorflow 2.4.0</td>
<td>mobilenetv1</td>
<td>73.29%</td>
<td>70.96%</td>
<td>3.28%</td>
</tr>
<tr>
<td>tensorflow 2.4.0</td>
<td>ssd_resnet50_v1</td>
<td>37.98%</td>
<td>38.00%</td>
<td>-0.05%</td>
</tr>
<tr>
<td>tensorflow 2.4.0</td>
<td>mask_rcnn_inception_v2</td>
<td>28.62%</td>
<td>28.73%</td>
<td>-0.38%</td>
</tr>
<tr>
<td>tensorflow 2.4.0</td>
<td>vgg16</td>
<td>72.11%</td>
<td>70.89%</td>
<td>1.72%</td>
</tr>
<tr>
<td>tensorflow 2.4.0</td>
<td>vgg19</td>
<td>72.36%</td>
<td>71.01%</td>
<td>1.90%</td>
</tr>
<tr>
<td>pytorch 1.5.0+cpu</td>
<td>resnet50</td>
<td>75.96%</td>
<td>76.13%</td>
<td>-0.23%</td>
</tr>
<tr>
<td>pytorch 1.5.0+cpu</td>
<td>resnext101_32x8d</td>
<td>79.12%</td>
<td>79.31%</td>
<td>-0.24%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_base_mrpc</td>
<td>88.90%</td>
<td>88.73%</td>
<td>0.19%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_base_cola</td>
<td>59.06%</td>
<td>58.84%</td>
<td>0.37%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_base_STS-B</td>
<td>88.40%</td>
<td>89.27%</td>
<td>-0.97%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_base_sst-2</td>
<td>91.51%</td>
<td>91.86%</td>
<td>-0.37%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_base_rte</td>
<td>69.31%</td>
<td>69.68%</td>
<td>-0.37%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_large_mrpc</td>
<td>87.45%</td>
<td>88.33%</td>
<td>-0.99%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_large_squad</td>
<td>92.85%</td>
<td>93.05%</td>
<td>-0.21%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_large_qnli</td>
<td>91.20%</td>
<td>91.82%</td>
<td>-0.68%</td>
</tr>
<tr>
<td>pytorch 1.6.0a0+24aac32</td>
<td>bert_large_rte</td>
<td>71.84%</td>
<td>72.56%</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>pytorch</td>
<td>1.6.0a0+24aac32</td>
<td>bert_large_cola</td>
<td>62.74%</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.

cd val

Run the following commands to convert the raw data to the TFrecord format using the `prepare_dataset.sh` script.

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.


6. Run the following commands to tune inference.

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.

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 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**: converts 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`
2. Run the following command to install the software packages required by the SGX runtime:

```bash
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-logic libsgx-qe3-logic 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:

```bash
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 EPI

Use the Vim editor to modify `/etc/sgx_default_qcnl.conf` as follows:

```bash
# 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:

```bash
# PCCS server address
# To accept insecure HTTPS cert, set this option to FALSE
USE_SECURE_CERT=TRUE
```

Sample configuration for the Shanghai region:

```bash
# PCCS server address
# To accept insecure HTTPS cert, set this option to FALSE
USE_SECURE_CERT=TRUE
```

Sample configuration for the Guangzhou region:

```bash
# 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:

```
source /opt/intel/sgxsdk/environment
```

2. Run the following command to compile the sample code SampleEnclave:

```
cd /opt/intel/sgxsdk/SampleCode/SampleEnclave && make
```

3. Run the following command to run the complied executable file:

```
./app
```

If a result in the following figure is returned, the enclave is started.

```
[root@VM-8-14-centos SampleEnclave]# ./app
Checksum(0x0x0x7ff6cb9b49a30, 100) = 0x0x0x4143
Info: executing thread synchronization, please wait...
Info: SampleEnclave successfully returned.
Enter a character before exit ...
```

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:

```
source /opt/intel/sgxsdk/environment
```
2. Run the following commands in sequence to install Git and download the Intel SGX DCAP code tree:

```
-- Cloud Virtual Machine --
©2013-2022 Tencent Cloud. All rights reserved.
Page 326 of 336

2. Run the following commands in sequence to install Git and download the Intel SGX DCAP code tree:

   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:

      cd /root/SGXDataCenterAttestationPrimitives/SampleCode/QuoteGenerationSample

   ii. Compile QuoteGenerationSample:

      make

   iii. Run QuoteGenerationSample to generate a quote:

      ./app

4. Run the following command to compile the sample code of the quote verifier QuoteVerificationSample:

   cd /root/SGXDataCenterAttestationPrimitives/SampleCode/QuoteVerificationSample && make

5. Run the following command to sign the QuoteVerificationSample enclave:

   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:

   ./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.

```bash
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:

```bash
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:

   ```sh
   [root@VM-11-3-centos ~]# ndctl create-namespace -r region0 -m devdax
   {
   "dev": "namespace0.0",
   "mode": "devdax",
   "map": "dev",
   "size": "61.04 GiB (65.54 GB)",
   "uuid": "71cc3e1b-7178e0b7-24707142b8792912",
   "daxregion": {
   "id": 0,
   "size": "61.04 GiB (65.54 GB)",
   "align": 2097152,
   "devices": [
   {
   "chardev": "dax0.0",
   "size": "61.04 GiB (65.54 GB)",
   "target_node": 0,
   "mode": "devdax"
   }
   ]
   }
   "align": 2097152
   }
   
   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.

   ```bash
   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:

```
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

Last updated: 2023-05-08 17:56:27

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.

   ```bash
   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:

  ```bash
  yum install python3
  ```
For a CVM instance on Ubuntu or Debian, run the following command to install Python:

```
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:

```
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!')
```python
except TencentCloudSDKException as err:
    print(err)
```

- **SecretId and SecretKey**: Use the SecretId and SecretKey of the created sub-user mentioned in Prerequisites.
- **areia**: 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.