

# Alibaba Cloud

## Resource Orchestration Service Best Practices

Document Version: 20200928

## Legal disclaimer

Alibaba Cloud reminds you to carefully read and fully understand the terms and conditions of this legal disclaimer before you read or use this document. If you have read or used this document, it shall be deemed as your total acceptance of this legal disclaimer.

1. You shall download and obtain this document from the Alibaba Cloud website or other Alibaba Cloud-authorized channels, and use this document for your own legal business activities only. The content of this document is considered confidential information of Alibaba Cloud. You shall strictly abide by the confidentiality obligations. No part of this document shall be disclosed or provided to any third party for use without the prior written consent of Alibaba Cloud.
2. No part of this document shall be excerpted, translated, reproduced, transmitted, or disseminated by any organization, company or individual in any form or by any means without the prior written consent of Alibaba Cloud.
3. The content of this document may be changed because of product version upgrade, adjustment, or other reasons. Alibaba Cloud reserves the right to modify the content of this document without notice and an updated version of this document will be released through Alibaba Cloud-authorized channels from time to time. You should pay attention to the version changes of this document as they occur and download and obtain the most up-to-date version of this document from Alibaba Cloud-authorized channels.
4. This document serves only as a reference guide for your use of Alibaba Cloud products and services. Alibaba Cloud provides this document based on the "status quo", "being defective", and "existing functions" of its products and services. Alibaba Cloud makes every effort to provide relevant operational guidance based on existing technologies. However, Alibaba Cloud hereby makes a clear statement that it in no way guarantees the accuracy, integrity, applicability, and reliability of the content of this document, either explicitly or implicitly. Alibaba Cloud shall not take legal responsibility for any errors or lost profits incurred by any organization, company, or individual arising from download, use, or trust in this document. Alibaba Cloud shall not, under any circumstances, take responsibility for any indirect, consequential, punitive, contingent, special, or punitive damages, including lost profits arising from the use or trust in this document (even if Alibaba Cloud has been notified of the possibility of such a loss).
5. By law, all the contents in Alibaba Cloud documents, including but not limited to pictures, architecture design, page layout, and text description, are intellectual property of Alibaba Cloud and/or its affiliates. This intellectual property includes, but is not limited to, trademark rights, patent rights, copyrights, and trade secrets. No part of this document shall be used, modified, reproduced, publicly transmitted, changed, disseminated, distributed, or published without the prior written consent of Alibaba Cloud and/or its affiliates. The names owned by Alibaba Cloud shall not be used, published, or reproduced for marketing, advertising, promotion, or other purposes without the prior written consent of Alibaba Cloud. The names owned by Alibaba Cloud include, but are not limited to, "Alibaba Cloud", "Aliyun", "HiChina", and other brands of Alibaba Cloud and/or its affiliates, which appear separately or in combination, as well as the auxiliary signs and patterns of the preceding brands, or anything similar to the company names, trade names, trademarks, product or service names, domain names, patterns, logos, marks, signs, or special descriptions that third parties identify as Alibaba Cloud and/or its affiliates.
6. Please directly contact Alibaba Cloud for any errors of this document.

# Document conventions

Style	Description	Example
 <b>Danger</b>	A danger notice indicates a situation that will cause major system changes, faults, physical injuries, and other adverse results.	 <b>Danger:</b> Resetting will result in the loss of user configuration data.
 <b>Warning</b>	A warning notice indicates a situation that may cause major system changes, faults, physical injuries, and other adverse results.	 <b>Warning:</b> Restarting will cause business interruption. About 10 minutes are required to restart an instance.
 <b>Notice</b>	A caution notice indicates warning information, supplementary instructions, and other content that the user must understand.	 <b>Notice:</b> If the weight is set to 0, the server no longer receives new requests.
 <b>Note</b>	A note indicates supplemental instructions, best practices, tips, and other content.	 <b>Note:</b> You can use Ctrl + A to select all files.
>	Closing angle brackets are used to indicate a multi-level menu cascade.	Click <b>Settings&gt; Network&gt; Set network type</b> .
<b>Bold</b>	<b>Bold</b> formatting is used for buttons, menus, page names, and other UI elements.	Click <b>OK</b> .
<b>Courier font</b>	Courier font is used for commands	Run the <code>cd /d C:/window</code> command to enter the Windows system folder.
<i>Italic</i>	Italic formatting is used for parameters and variables.	<code>bae log list --instanceid</code> <i>Instance_ID</i>
[ ] or [a b]	This format is used for an optional value, where only one item can be selected.	<code>ipconfig [-all -t]</code>
{ } or {a b}	This format is used for a required value, where only one item can be selected.	<code>switch {active stand}</code>

# Table of Contents

1. Use an ROS template to deploy WordPress and phpMyAdmin	05
2. Use Ansible ali_ros_stack to deploy an LNMP environment	12
3. Use the Count feature to create multiple resources at a time	24
4. Use the Count feature to deploy large amounts of resources	37

# 1. Use an ROS template to deploy WordPress and phpMyAdmin

This topic describes how to use an Resource Orchestration Service (ROS) template to deploy WordPress and phpMyAdmin.

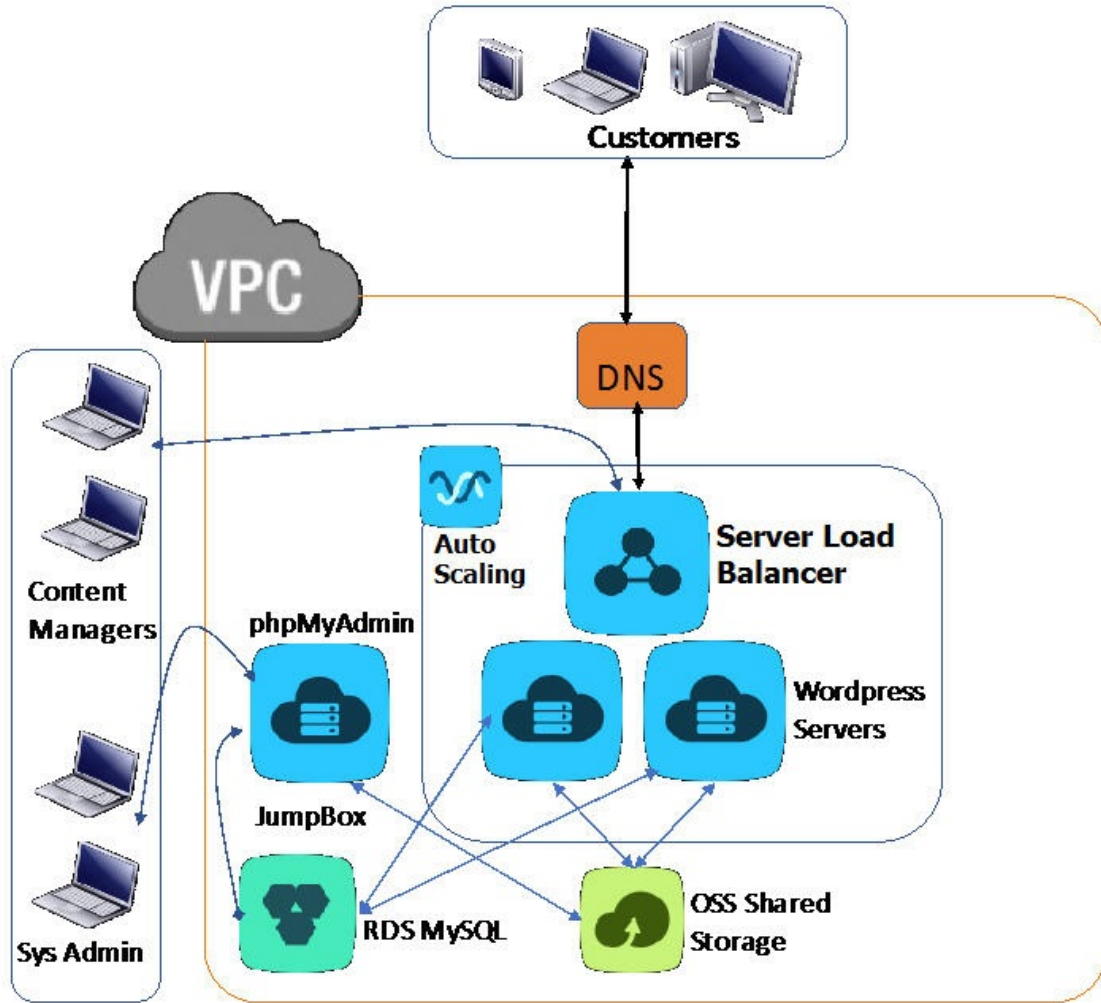
## Background information

If you do not have the technical abilities to build and manage a website in-house but do have a content management team, you can use an ROS template to manage only a simple website. If your website has higher requirements for customization, availability, and scalability, you must use a different solution to manage your website.

The WordPressCluster-phpMyAdmin.ros template that is described in this topic can address high availability and scalability requirements. You can use this template to create a stack that contains resources such as VPCs, SLB instances, Auto Scaling groups, ECS instances, and ApsaraDB for RDS instances. You can also configure Auto Scaling and deploy WordPress and phpMyAdmin to create and configure instances.

## Architecture overview

The following figure shows how to use the WordPressCluster-phpMyAdmin.ros template to create a stack.



The following types of users can access the infrastructure that is shown in the preceding figure:

- End users

End users can access websites that are hosted on WordPress through URLs.

WordPress is deployed on Apache web servers. The root directory for storing files from the web servers is `/wwwroot`. The OSS bucket where the root directory is located is shared by the web servers through OSSFS, which is a FUSE-based file system that is provided by Alibaba Cloud.

RAM users can be granted permissions to access the OSS bucket and attach it to ECS instances.

An ApsaraDB RDS for MySQL database is used to store WordPress content. End users can access the database from web servers through an internal connection string.

- System administrators

System administrators can log on to JumpBox (bastion host) through SSH and access a VPC. JumpBox has an elastic IP address (EIP) and is accessible from the Internet.

System administrators can access a VPC through JumpBox and then manage instances within the VPC.

phpMyAdmin is installed on JumpBox and is therefore also accessible through the Internet.

System administrators can use phpMyAdmin to manage their ApsaraDB for RDS databases.

- Content owners

Content owners can log on to the WordPress console through the Internet.

They can manage all service access permissions through security groups based on system configurations.

## Template overview

To download the template, click [WordPressCluster-phpMyAdmin.ros](#).

 **Note** You can reconfigure the ZoneId and ImageId parameters in the template.

The WordPressCluster-phpMyAdmin.ros template enables the system to create and configure resources such as VPCs, SLB instances, VSwitches, NAT gateways, ECS instances, EIPs, Auto Scaling groups, and ApsaraDB for RDS instances.

When you create a stack, configure the following parameters.

**ECS**

\* Available Zone ID  ECS Available Zone ID, [View region and zone info](#)

Image ID  Image ID, represents the image resource to startup one ECS instance, [View image resources](#)

Instance Type  The ECS instance type, go to the product console to ensure the current instance is available, [View instance types](#)

System Disk Category  System disk category: efficient cloud disk(cloud\_efficiency) or SSD cloud disk(cloud\_ssd)

\* Instance Password  The 8-30 long login password of instance, consists of the uppercase, lowercase letter and number. special characters include()~!@#%&\*\_-=|{};':<>.,/?

**RDS**

Instance Class  Database instance type. Refer the RDS database instance type. [View RDS resources type](#)

Engine Version  RDS MySQL Engine Version

Storage Size  Incrementing in every 5G, unit: GB

DB Name  Name of WordPress database

DB Username  Username of WordPress database

\* DB Password  The password of WordPress database consists of 6 to 32 characters of alphanumeric characters, hyphen and underline

The system installs the following applications on JumpBox based on the template: httpd, mysql-client, PHP, OSSFS, phpMyAdmin, and WordPress. The system uses the UserData segment in the ALIYUN::ECS::Instance resource to configure these applications.

The UserData segment contains the following snippet:

```
"ossbucketendpoint=",
{
  "Ref": "OSSBucketEndPoint"
},
"\n",
"DatabaseUser=",
{
```



```
"Ref": "MasterUserName"
},
"\n",
"DatabasePwd=",
{
"Ref": "MasterDBPassword"
},
"\n",
"DatabaseName=",
{
"Ref": "DBName"
},
"\n",
"DatabaseHost=",
{
"Fn::GetAtt": ["Database", "InnerConnectionString"]
},
"\n",
"yum install -y curl httpd mysql-server php php-common php-mysql\n",
"yum install -y php-gd php-imap php-ldap php-odbc php-pear php-xml php-xmlrpc\n",
"yum install -y phpmyadmin\n",
"sed -i \"s%localhost%$DatabaseHost%\" /etc/phpMyAdmin/config.inc.php\n",
"sed -i \"s%Deny,Allow%Allow,Deny%\" /etc/httpd/conf.d/phpMyAdmin.conf\n",
"sed -i \"s%Deny from All%Allow from All%\" /etc/httpd/conf.d/phpMyAdmin.conf\n",
"sed -i \"<RequireAny>/a Require all Granted\" /etc/httpd/conf.d/phpMyAdmin.conf\n",
"chkconfig httpd on\n",
"service httpd stop\n",
"wget
https://github.com/aliyun/ossfs/releases/download/v1.80.3/ossfs_1.80.3_centos6.5_x86_64.rpm\n",
"yum install -y ossfs_1.80.3_centos6.5_x86_64.rpm\n",
"echo $ossbucket:$ossbucketaccesskey:$ossbucketsecret >> /etc/passwd-ossfs\n",
"chmod 600 /etc/passwd-ossfs\n",
"mkdir $ossbucketmountpoint\n",
"chmod -R 755 $ossbucketmountpoint\n",
"echo #This script will automount the ossbucket\n",
"echo umount $ossbucketmountpoint >> /usr/local/bin/ossfs-automount.sh\n",
"echo #Mounting OSS Bucket\n",
"echo ossfs $ossbucket $ossbucketmountpoint -ourl=http://$ossbucketendpoint -o allow_other -o m
p_umask=0022 -oid=48 -ogid=48 >> /usr/local/bin/ossfs-automount.sh\n",
"chmod 755 /usr/local/bin/ossfs-automount.sh\n",
"echo /usr/local/bin/ossfs-automount.sh >> /etc/rc.d/rc.local\n",
```

```
"chmod +x /etc/rc.d/rc.local\n",  
"/usr/local/bin/./ossfs-automount.sh\n",  
"wget http://WordPress.org/latest.tar.gz\n",  
"tar -xzvf latest.tar.gz\n",  
"sed -i \"s%database_name_here%$DatabaseName%\" WordPress/wp-config-sample.php\n",  
"sed -i \"s%username_here%$DatabaseUser%\" WordPress/wp-config-sample.php\n",  
"sed -i \"s%password_here%${DatabasePwd:-$DatabasePwdDef}%\" WordPress/wp-config-sample.php\n",  
"sed -i \"s%localhost%$DatabaseHost%\" WordPress/wp-config-sample.php\n",  
"mv WordPress/wp-config-sample.php WordPress/wp-config.php\n",  
"cp -a WordPress/* $ossbucketmountpoint\n",  
"chmod -R 755 /wwwroot/*\n",  
"rm -rf WordPress*\n",  
"service httpd start\n",  
"done\n"
```

The system uses the UserData segment to deploy WordPress in an OSS bucket. Then, the system attaches the OSS bucket to the web servers that are created by Auto Scaling. This ensures that the latest content from the root directory can be accessed by using all web servers.

The system uses the UserData segment of the Auto Scaling configuration to install and configure httpd, PHP, and ossutil, attach DocumentRoot, and start all services.

The UserData segment of the Auto Scaling configuration contains the following snippet:

```
"DatabaseHost=",
{
  "Fn::GetAtt": ["Database", "InnerConnectionString"]
},
"\n",
"yum install -y curl httpd mysql-server php php-common php-mysql\n",
"yum install -y php-gd php-imap php-ldap php-odbc php-pear php-xml php-xmldrpc\n",
"chkconfig httpd on\n",
"service httpd stop\n",
"DocumentRoot='/var/www/html'\n",
"sed -i \"s%$DocumentRoot%$ossbucketmountpoint%\" /etc/httpd/conf/httpd.conf\n",
"Directory='/var/www'\n",
"sed -i \"s%$Directory%$ossbucketmountpoint%\" /etc/httpd/conf/httpd.conf\n",
"wget https://github.com/aliyun/ossfs/releases/download/v1.80.3/ossfs_1.80.3_centos6.5_x86_64.rpm\n",
"yum install -y ossfs_1.80.3_centos6.5_x86_64.rpm\n",
"echo $ossbucket:$ossbucketaccesskey:$ossbucketsecret >> /etc/passwd-ossfs\n",
"chmod 600 /etc/passwd-ossfs\n",
"mkdir $ossbucketmountpoint\n",
"chmod -R 755 $ossbucketmountpoint\n",
"echo #This script will automount the ossbucket\n",
"echo umount $ossbucketmountpoint >> /usr/local/bin/ossfs-automount.sh\n",
"echo #Mounting OSS Bucket\n",
"echo ossfs $ossbucket $ossbucketmountpoint -ourl=http://$ossbucketendpoint -o allow_oth
er -o mp_umask=0022 -oid=48 -ogid=48 >> /usr/local/bin/ossfs-automount.sh\n",
"chmod 755 /usr/local/bin/ossfs-automount.sh\n",
"echo /usr/local/bin/ossfs-automount.sh >> /etc/rc.d/rc.local\n",
"chmod +x /etc/rc.d/rc.local\n",
"/usr/local/bin/./ossfs-automount.sh\n",
"chmod -R 755 /wwwroot/*\n",
"service httpd start\n",
"done\n"
]
```

## Related topics

- [Create stacks](#)
- [Use sample templates to create stacks](#)
- [Use RAM to control resource access](#)

## 2. Use Ansible `ali_ros_stack` to deploy an LNMP environment

This topic describes how to use the Ansible `ali_ros_stack` module to call the ROS API operations for deploying an LNMP (Linux, NGINX, MySQL, and PHP) environment.

### Prerequisites


Ansible is installed on Linux with `pip3` and configured.

### Procedure

1. Create a file named `create_lnmp.yml` and open it in the visual editor.

```
vi create_lnmp.yml
```

2. In edit mode, copy the following playbook code to the `create_lnmp.yml` file:

 **Note** For more information about the `ali_ros_stack` module parameters, see [Parameters](#).

```
- hosts: localhost
  remote_user: root
  tasks:
    - name: Create LNMP Instance
      ali_ros_stack:
        state: present
        stack_name: create_lnmp_instance
        template: create_lnmp_instance.json
        timeout_in_minutes: 60
        template_parameters:
          ZoneId: cn-beijing-g
          ImageId: centos_7_03_64_20G_alibase_2017****.vhd
          InstancePassword: XXXXXXXX
          SystemDiskCategory: cloud_ssd
          InstanceType: ecs.c5.large
          DBName: MyDatabase
          DBUser: DefaultUser
          DBRootPassword: XXXXXX
          DBPassword: XXXXXX
          NginxDownloadUrl: http://nginx.org/packages/centos/7/noarch/RPMS/nginx-release-centos-7-0.el7.ngx.noarch.rpm
```

3. Save the file and exit the edit mode.

4. Create a file named `create_lnmp_instance.json` and open it in the visual editor.

```
vi create_lnmp_instance.json
```

5. In edit mode, copy the following playbook code to the `create_lnmp_instance.json` file:

```
{
  "Description": "Deploy LNMP(Linux+Nginx+MySQL+PHP) stack on 1 ECS instance. *** WARNING ***
Only support CentOS-7.",
  "Parameters": {
    "NginxDownloadUrl": {
      "Type": "String",
      "Description": {
        "en": "The download path of nginx-*.rpm",
        "en-us": "The download path of nginx-*.rpm.",
      },
      "Label": "Nginx Download Url",
      "Default": "http://nginx.org/packages/centos/7/noarch/RPMS/nginx-release-centos-7-0.el7.n
gx.noarch.rpm"
    },
    "DBPassword": {
      "NoEcho": true,
      "Type": "String",
      "Description": {
        "en": "The MySQL password, consisting of letters, numbers, and underline(_), 6 to 32 characte
rs in length",
        "en-us": "The MySQL password, consisting of letters, numbers, and underline(_), 6 to 32 characte
rs in length",
      },
      "Label": "DB Password",
      "ConstraintDescription": "Consisting of letters, numbers, and underline(_), 6 to 32 characters i
n length",
      "MinLength": 6,
      "MaxLength": 32
    },
    "ZoneId": {
      "Type": "String",
      "AssociationProperty": "ALIYUN::ECS::Instance:ZoneId",
      "Description": {
        "en": "ECS Available Zone ID,</font><a href='https://www.alibabacloud.com/help/doc-detail/
123712.html' target='_blank'><b> View region and zone info</b><font color='blue'></a>",
        "en-us": "ECS Available Zone ID,</font><a href='https://www.alibabacloud.com/help/doc-detail/
```

```
123712.htm?spm=a2c63.l28256.b99.10.19347453Kki9VF' target='_blank'><b> Regions and zones</b>
<font color='blue'></a>",
  },
  "Label": "Available Zone ID"
},
"ImageId": {
  "Type": "String",
  "Description": {
    "en": "Image ID, represents the image resource to startup one ECS instance, <font><a href='h
ttps://www.alibabacloud.com/help/doc-detail/112977.html' target='_blank'><b>View image resour
ces</b></font color='blue'></a>",
    "en-us": "Image ID, represents the image resource to startup one ECS instance, <font><a href='h
ttps://www.alibabacloud.com/help/doc-detail/112977.html' target='_blank'><b>Find an image</b>
</font color='blue'></a>",
  },
  "Label": "Image ID",
  "Default": "cent****"
},
"DBName": {
  "Type": "String",
  "Description": {
    "en": "MySQL database name, [1, 64] English or Chinese characters, must start with a letter or
Chinese in size, can contain numbers, '_' or '.', '-'.",
    "en-us": "The name of the MySQL database.It must be 1 to 64 characters in length and can co
ntain letters, digits, periods (.), underscores (_), and hyphens (-). It must start with a letter." and
hyphens (-).
  },
  "Label": "DB Name",
  "ConstraintDescription": "Must begin with a letter and contain only alphanumeric characters.",
  "MinLength": 1,
  "MaxLength": 64,
  "Default": "MyDatabase"
},
"DBUser": {
  "Type": "String",
  "Description": {
    "en": "Username for MySQL database access.It consists of lowercase letters, numbers and un
derscores (_), and begins with a letter. Not longer than 16 characters.",
    "en-us": "The username used to access the MySQL database. The name can be up to 16 chara
cters in length and can contain letters, digits and underscores (_). It must start with a letter."
  },
}
```

```
"Label": "DB Username",
"ConstraintDescription": "Must begin with a letter and contain only alphanumeric characters.",
"MinLength": 1,
"MaxLength": 16,
"Default": "DefaultUser"
},
"DBRootPassword": {
  "NoEcho": true,
  "Type": "String",
  "Description": {
    "en": "Root password for MySQL, consisting of letters, numbers, and underline(_), 6 to 32 characters in length",
    "en-us": "The root password used to access the MySQL database. The password can be 6-32 characters in length and can contain letters, digits and underscores (_).",
  },
  "Label": "DB Root Password",
  "ConstraintDescription": "Consisting of letters, numbers, and underline(_), 6 to 32 characters in length",
  "MinLength": 6,
  "MaxLength": 32
},
"InstanceType": {
  "Type": "String",
  "Description": {
    "en": "The ECS instance type, go to the product console to ensure the current instance is available, <font><a href='https://www.alibabacloud.com/help/doc-detail/25378.html' target='_blank'><b>View instance types</b></font color='blue'></a>",
    "en-us": "The ECS instance type, go to the product console to ensure the current instance is available, <font><a href='https://www.alibabacloud.com/help/doc-detail/25378.html' target='_blank'><b>Instance families</b></font color='blue'></a>",
  },
  "Label": "Instance Type",
  "Default": "ecs.c5.large"
},
"SystemDiskCategory": {
  "Type": "String",
  "Description": {
    "en": "System disk category: efficient cloud disk(cloud_efficiency) or SSD cloud disk(cloud_ssd)",
    "en-us": "The type of the system disk, which can be ultra disk (cloud_efficiency) or standard SSD (cloud_ssd).",
  }
}
```

```

    },
    "AllowedValues": [
      "cloud_efficiency",
      "cloud_ssd"
    ],
    "Label": "System Disk Category",
    "Default": "cloud_ssd"
  },
  "InstancePassword": {
    "NoEcho": true,
    "Type": "String",
    "Description": {
      "en": "The 8-30 long login password of instance, consists of the uppercase, lowercase letter and number. <br> special characters include ( ) ` ~ ! @ # $ % ^ & * _ - + = | { } [ ] : ; ' < > , . ? / ",
      "en-us": "It must be 8 to 30 characters in length and contain at least three of the following character types: uppercase letters, lowercase letters, digits, and special characters. Special characters include ( ) ` ~ ! @ # $ % ^ & * _ - + = | { } [ ] : ; ' < > , . ? / "
    },
    "AllowedPattern": "[0-9A-Za-z\\_\\-&;<>,%`~!@#\\(\\)\\$\\^\\*\\+\\|\\/\\{\\}\\[\\]\\. \\|? \\|/]+",
    "Label": "Instance Password",
    "ConstraintDescription": "Length 8-30, must contain upper case letters, lower case letters, Numbers, special symbols three; special characters include: ( ) ` ~ ! @ # $ % ^ & * _ - + = | { } [ ] : ; ' < > , . ? / ",
    "MinLength": "8",
    "MaxLength": "30"
  }
},
"ROSTemplateFormatVersion": "2015-09-01",
"Metadata": {
  "ALIYUN::ROS::Interface": {
    "ParameterGroups": [
      {
        "Parameters": [
          "ZoneId",
          "ImageId",
          "InstanceType",
          "SystemDiskCategory",
          "InstancePassword"
        ]
      }
    ],
  }
}

```



```
"Label": {
  "default": "ECS"
}
},
{
  "Parameters": [
    "DBName",
    "DBUser",
    "DBPassword",
    "DBRootPassword"
  ],
  "Label": {
    "default": "DATABASE"
  }
},
{
  "Parameters": [
    "NginxDownloadUrl"
  ],
  "Label": {
    "default": "Nginx"
  }
}
],
"TemplateTags": [
  "Deploy LNMP(Linux+Nginx+MySQL+PHP) stack on 1 ECS instance."
]
}
},
"Outputs": {
  "NginxWebsiteURL": {
    "Description": "URL for newly created Nginx home page.",
    "Value": {
      "Fn::Join": [
        "",
        [
          "http://",
          {
            "Fn::GetAtt": [
              "WebServer",
              "PublicIp"
            ]
          }
        ]
      ]
    }
  }
}
```

```
    ]
  },
  ":80/test.php"
]
}
}
},
"Resources": {
  "VSwitch": {
    "Type": "ALIYUN::ECS::VSwitch",
    "Properties": {
      "VpcId": {
        "Fn::GetAtt": [
          "Vpc",
          "VpcId"
        ]
      },
      "ZoneId": {
        "Ref": "ZoneId"
      },
      "CidrBlock": "192.168.1.0/24"
    }
  },
  "WebServerConditionHandle": {
    "Type": "ALIYUN::ROS::WaitConditionHandle"
  },
  "WebServer": {
    "Type": "ALIYUN::ECS::Instance",
    "Properties": {
      "InternetMaxBandwidthOut": 80,
      "IoOptimized": "optimized",
      "VpcId": {
        "Fn::GetAtt": [
          "Vpc",
          "VpcId"
        ]
      },
      "UserData": {
        "Fn::Replace": [
          {
```

```
{
  "ros-notify": {
    "Fn::GetAtt": [
      "WebServerConditionHandle",
      "CurlCli"
    ]
  }
},
{
  "Fn::Join": [
    "",
    [
      "#! /bin/bash \n",
      "NginxUrl=",
      {
        "Ref": "NginxDownloadUrl"
      },
      "\n",
      "dbname=",
      {
        "Ref": "DBName"
      },
      "\n",
      "dbuser=",
      {
        "Ref": "DBUser"
      },
      "\n",
      "dbpassword=",
      {
        "Ref": "DBPassword"
      },
      "\n",
      "dbrootpassword=",
      {
        "Ref": "DBRootPassword"
      },
      "\n",
      "export HOME=/root \n",
      "export HOSTNAME=`hostname` \n",
      "systemctl stop firewalld.service \n",
```

```
"systemctl disable firewalld.service \n",
"sed -i 's/^SELINUX=/# SELINUX=/' /etc/selinux/config \n",
"sed -i '/# SELINUX=/a SELINUX=disabled' /etc/selinux/config \n",
"setenforce 0 \n",
"yum install yum-priorities -y \n",
"yum -y install aria2 \n",
"aria2c $NginxUrl \n",
"rpm -ivh nginx-*.rpm \n",
"yum -y install nginx \n",
"systemctl start nginx.service \n",
"systemctl enable nginx.service \n",
"yum -y install php-fpm \n",
"systemctl start php-fpm.service \n",
"systemctl enable php-fpm.service \n",
"sed -i '/FastCGI/,htaccess/s/ #/ /' /etc/nginx/conf.d/default.conf \n",
"sed -i '/FastCGI/s/^ / #/' /etc/nginx/conf.d/default.conf \n",
"sed -i '/htaccess/s/^ / #/' /etc/nginx/conf.d/default.conf \n",
"sed -i '/SCRIPT_FILENAME/s/\\scripts/\\usr\\share\\nginx\\html/\\/' /etc/nginx/c
onf.d/default.conf \n",
"yum -y install mariadb mariadb-server \n",
"systemctl start mariadb.service \n",
"systemctl enable mariadb.service \n",
"yum -y install php php-mysql php-gd libjpeg* php-ldap php-odbc php-pear php-xml php
-xmlrpc php-mbstring php-bcmath php-mhash php-mcrypt \n",
"MDSRING=`find / -name mbstring.so` \n",
"echo extension=$MDSRING >> /etc/php.ini \n",
"systemctl restart mariadb.service \n",
"mysqladmin -u root password \"$dbrootpassword\" \n",
"$(mysql $dbname -u root --password=\"$dbrootpassword\" >/dev/null 2>&1 </dev/nul
l); (( $? != 0 )) \n",
"echo CREATE DATABASE $dbname \\\; > /tmp/setup.mysql \n",
"echo GRANT ALL ON $dbname. * TO \"$dbuser\"@\"localhost\" IDENTIFIED BY \"$dbpas
sword\" \\\; >> /tmp/setup.mysql \n",
"mysql -u root --password=\"$dbrootpassword\" < /tmp/setup.mysql \n",
"$(mysql $dbname -u root --password=\"$dbrootpassword\" >/dev/null 2>&1 </dev/nul
l); (( $? != 0 )) \n",
"cd /root \n",
"systemctl restart php-fpm.service \n",
"systemctl restart nginx.service \n",
"echo \\\<? php > /usr/share/nginx/html/test.php \n",
"echo \\\$conn=mysql_connect\\(\"127.0.0.1\", \"$dbuser\", \"$dbpassword\")\\; >>
```

```
/usr/share/nginx/html/test.php \n",
    "echo if \\(\\$conn\\){ >> /usr/share/nginx/html/test.php \n",
    "echo  echo \\\"LNMP platform connect to mysql is successful\\! \\\"\\\"; >> /usr/share/
nginx/html/test.php \n",
    "echo }else{ >> /usr/share/nginx/html/test.php \n",
    "echo echo \\\"LNMP platform connect to mysql is failed\\! \\\"\\\"; >> /usr/share/nginx
/html/test.php \n",
    "echo } >> /usr/share/nginx/html/test.php \n",
    "echo phpinfo\\(\\)\\\"; >> /usr/share/nginx/html/test.php \n",
    "echo \\? \\> >> /usr/share/nginx/html/test.php \n",
    "ros-notify -d {'data\" : \"Install LNMP stack.\"}'\n"
  ]
}
}
}
},
"SecurityGroupId": {
  "Ref": "SecurityGroup"
},
"VSwitchId": {
  "Ref": "VSwitch"
},
"ImageId": {
  "Ref": "ImageId"
},
"InstanceType": {
  "Ref": "InstanceType"
},
"SystemDiskCategory": {
  "Ref": "SystemDiskCategory"
},
"Password": {
  "Ref": "InstancePassword"
}
}
},
"WebServerWaitCondition": {
  "Type": "ALIYUN::ROS::WaitCondition",
  "DependsOn": "WebServer",
  "Properties": {
    "Timeout": 1800
```

```
    "Timeout": 1800,  
    "Count": 1,  
    "Handle": {  
      "Ref": "WebServerConditionHandle"  
    }  
  }  
},  
"Vpc": {  
  "Type": "ALIYUN::ECS::VPC",  
  "Properties": {  
    "CidrBlock": "192.168.0.0/16"  
  }  
},  
"SecurityGroup": {  
  "Type": "ALIYUN::ECS::SecurityGroup",  
  "Properties": {  
    "VpcId": {  
      "Ref": "Vpc"  
    }  
  },  
  "SecurityGroupIngress": [  
    {  
      "PortRange": "-1/-1",  
      "Priority": 1,  
      "SourceCidrIp": "0.0.0.0/0",  
      "IpProtocol": "all",  
      "NicType": "intranet"  
    }  
  ],  
  "SecurityGroupEgress": [  
    {  
      "PortRange": "-1/-1",  
      "Priority": 1,  
      "IpProtocol": "all",  
      "DestCidrIp": "0.0.0.0/0",  
      "NicType": "intranet"  
    }  
  ]  
}  
}
```

6. Save the file and exit the edit mode.
7. Run the Ansible playbook to deploy an LNMP environment.

```
ansible-playbook create_lnmp.yml
```

# 3. Use the Count feature to create multiple resources at a time

In Resource Orchestration Service (ROS), you can use the Count feature to create multiple resources at a time.

## Context

ALIYUN::VPC::EIP is used to apply for an elastic IP address (EIP). To apply for multiple EIPs, you must specify multiple ALIYUN::VPC::EIP resources in a template. However, this makes the template verbose. In this case, you can use the Count feature to create multiple resources at a time. For more information about the Count feature, see [Count](#).

The Count feature is used in this topic to create multiple ECS instances and EIPs, and bind the EIPs to the ECS instances. The following resources are created in the examples:

- One VPC
- One VSwitch
- One security group
- Two pay-as-you-go ECS instances
- Two EIPs

## Procedure

1. Log on to the [ROS console](#).
2. In the left-side navigation pane, click **Stacks**.
3. In the upper-left corner, select the region where the target stack resides from the drop-down list.
4. On the **Stacks** page, click **Create Stack**.
5. In the **Select Template** step of the **Create Stack** wizard, click **Select an Existing Template** in the **Specify Template** section.
6. Set **Template Import Method** to **Enter Template Content**. Enter the template content, and then click **Next**.



Resource Orchestration Service (ROS) / Stacks / Create Stack

## ← Create Stack

- 1 Select Template
- 2 Configure Template Parameters
- 3 Configure Stack (Optional)
- 4 Check and Confirm (Optional)

Specify Template

A template is a JSON or YAML file that describes the resources and properties of a stack.

Select an Existing Template  Use a Sample Template

\* Template Import Method

Use URL  Enter Template Content  My Templates  Upload Template

\* Template Content

[Use Cloud Toolkit to Develop or Edit the Template](#)

```
119     "Fn::GetAtt": [
120         "Servers",
121         "InstanceIds"
122     ]
123 }
124 },
125 "AllocationIds": {
126     "Value": {
127         "Ref": "Eip"
128     }
129 },
130 "EipAddresses": {
131     "Value": {
```

Next Cancel Save Template

The following code provides an example on the template content.

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "Count": {
      "Type": "Number",
      "Default": 2
    },
    "ZoneId": {
      "Type": "String"
    },
    "InstanceType": {
      "Type": "String",
      "Default": "ecs.c6.large"
    },
    "Password": {
      "Type": "String",
      "Default": "Abc1****",
      "NoEcho": true
    }
  },
  "Resources": {
```

```
resources: {
  "Vpc": {
    "Type": "ALIYUN::ECS::VPC",
    "Properties": {
      "CidrBlock": "10.0.0.0/8",
      "VpcName": "test-resource-count"
    }
  },
  "VSwitch": {
    "Type": "ALIYUN::ECS::VSwitch",
    "Properties": {
      "CidrBlock": "10.0.10.0/24",
      "ZoneId": {
        "Ref": "ZoneId"
      },
      "VpcId": {
        "Ref": "Vpc"
      }
    }
  },
  "SecurityGroup": {
    "Type": "ALIYUN::ECS::SecurityGroup",
    "Properties": {
      "SecurityGroupName": "test-resource-count",
      "VpcId": {
        "Ref": "Vpc"
      }
    }
  },
  "Eip": {
    "Type": "ALIYUN::VPC::EIP",
    "Count": {
      "Ref": "Count"
    },
    "Properties": {
      "Bandwidth": 5
    }
  },
  "Servers": {
    "Type": "ALIYUN::ECS::InstanceGroup",
    "Properties": {
```

```
"ImageId": "centos_7",
"InstanceType": {
  "Ref": "InstanceType"
},
"VpcId": {
  "Ref": "Vpc"
},
"VSwitchId": {
  "Ref": "VSwitch"
},
"SecurityGroupId": {
  "Ref": "SecurityGroup"
},
"Password": {
  "Ref": "Password"
},
"AllocatePublicIP": false,
"MaxAmount": {
  "Ref": "Count"
}
},
"EipBind": {
  "Type": "ALIYUN::VPC::EIPAssociation",
  "Count": {
    "Ref": "Count"
  },
},
"Properties": {
  "InstanceId": {
    "Fn::Select": [
      {
        "Ref": "ALIYUN::Index"
      },
      {
        "Fn::GetAtt": [
          "Servers",
          "InstanceIds"
        ]
      }
    ]
  }
}
},
}
```

```
"AllocationId": {
  "Fn::Select": [
    {
      "Ref": "ALIYUN::Index"
    },
    {
      "Ref": "Eip"
    }
  ]
}
},
"Outputs": {
  "InstanceIds": {
    "Value": {
      "Fn::GetAtt": [
        "Servers",
        "InstanceIds"
      ]
    }
  },
  "AllocationIds": {
    "Value": {
      "Ref": "Eip"
    }
  },
  "EipAddresses": {
    "Value": {
      "Fn::GetAtt": [
        "Eip",
        "EipAddress"
      ]
    }
  }
}
}
```

The following description provides details of the template:

- Set the Count parameter to 2 to create two EIPs. The value indicates that two EIPs are created using the Count feature. ROS preprocesses the template to generate two resources named Eip[0] and Eip[1].

```
{
  "Eip": {
    "Type": "ALIYUN::VPC::EIP",
    "Count": {
      "Ref": "Count"
    },
    "Properties": {
      "Bandwidth": 5
    }
  }
}
```

- Set the Count parameter to 2 to create two ECS instances. Set the MaxAmount property of the ALIYUN::ECS::InstanceGroup resource to Count to create two ECS instances.

```
{
  "Servers": {
    "Type": "ALIYUN::ECS::InstanceGroup",
    "Properties": {
      "ImageId": "centos_7",
      "InstanceType": {
        "Ref": "InstanceType"
      },
      "VpcId": {
        "Ref": "Vpc"
      },
      "VSwitchId": {
        "Ref": "VSwitch"
      },
      "SecurityGroupId": {
        "Ref": "SecurityGroup"
      },
      "Password": {
        "Ref": "Password"
      },
      "AllocatePublicIP": false,
      "MaxAmount": {
        "Ref": "Count"
      }
    }
  }
}
```

- Create two EipBind resources. You can use the ALIYUN::Index pseudo parameter to bind the EIPs to the ECS instances in sequence.

Set the Count parameter to 2 to create two EipBind resources. ROS preprocesses the template to generate two resources named EipBind[0] and EipBind[1]. The ALIYUN::Index resource is used for the Count parameter. The Count value is replaced with the index value when ROS preprocesses the template. In the following example, the ECS instances are bound with the EIPs in sequence. The first ECS instance is bound with Eip[0], and the second ECS instance is bound with Eip[1].

```
{
  "EipBind": {
    "Type": "ALIYUN::VPC::EIPAssociation",
    "Count": {
      "Ref": "Count"
    },
    "Properties": {
      "InstanceId": {
        "Fn::Select": [
          {
            "Ref": "ALIYUN::Index"
          },
          {
            "Fn::GetAtt": [
              "Servers",
              "InstanceIds"
            ]
          }
        ]
      }
    },
    "AllocationId": {
      "Fn::Select": [
        {
          "Ref": "ALIYUN::Index"
        },
        {
          "Ref": "Eip"
        }
      ]
    }
  }
}
```

7. In the **Configure Template Parameters** step of the Create Stack wizard, set **Stack Name** and **Parameters**, and then click **Next**.
8. In the **Configure Stack** step of the Create Stack wizard, set **Stack Policy**, **Rollback on Failure**, **Timeout Period**, **Deletion Protection**, **RAM Role**, and **Tags**, and then click **Next**. If no resources are created or updated within the time limit specified by **Timeout Period**, the system considers the operation to have failed. Based on the **Rollback on Failure** configuration, the system then determines whether to roll back to the status before the resource was created or updated.

9. In the **Check and Confirm** step of the Create Stack wizard, click **Create**.

## Result

After the stack is created, you can click the **Resources** tab on the stack details page to view the resource information after preprocessing.

You can also click the **Template** tab on the stack details page to view the template information after preprocessing.

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "Count": {
      "Default": 2,
      "Type": "Number"
    },
    "Password": {
      "Default": "Abc12345",
      "NoEcho": true,
      "Type": "String"
    },
    "InstanceType": {
      "Default": "ecs.c6.large",
      "Type": "String"
    },
    "ZoneId": {
      "Type": "String"
    }
  },
  "Resources": {
    "Vpc": {
      "Type": "ALIYUN::ECS::VPC",
      "Properties": {
        "VpcName": "test-resource-count",
        "CidrBlock": "10.0.0.0/8"
      }
    },
    "VSwitch": {
      "Type": "ALIYUN::ECS::VSwitch",
      "Properties": {
        "VpcId": {
          "Ref": "Vpc"
        }
      }
    }
  }
}
```



```
"CidrBlock": "10.0.10.0/24",
"ZoneId": {
  "Ref": "ZoneId"
}
},
"SecurityGroup": {
  "Type": "ALIYUN::ECS::SecurityGroup",
  "Properties": {
    "VpcId": {
      "Ref": "Vpc"
    },
    "SecurityGroupName": "test-resource-count"
  }
},
"Eip[0]": {
  "Type": "ALIYUN::VPC::EIP",
  "Properties": {
    "Bandwidth": 5
  }
},
"Eip[1]": {
  "Type": "ALIYUN::VPC::EIP",
  "Properties": {
    "Bandwidth": 5
  }
},
"Servers": {
  "Type": "ALIYUN::ECS::InstanceGroup",
  "Properties": {
    "VpcId": {
      "Ref": "Vpc"
    },
    "MinAmount": {
      "Ref": "Count"
    },
    "SecurityGroupId": {
      "Ref": "SecurityGroup"
    },
    "ImageId": "centos_7",
    "AllocatePublicIP": false
  }
}
```

```
"AllocatePublicIP": false,
"VSwitchId": {
  "Ref": "VSwitch"
},
>Password": {
  "Ref": "Password"
},
"InstanceType": {
  "Ref": "InstanceType"
},
"MaxAmount": {
  "Ref": "Count"
}
},
"EipBind[0]": {
  "Type": "ALIYUN::VPC::EIPAssociation",
  "Properties": {
    "InstanceId": {
      "Fn::Select": [
        0,
        {
          "Fn::GetAtt": [
            "Servers",
            "InstanceIds"
          ]
        }
      ]
    }
  ]
},
  "AllocationId": {
    "Ref": "Eip[0]"
  }
},
"EipBind[1]": {
  "Type": "ALIYUN::VPC::EIPAssociation",
  "Properties": {
    "InstanceId": {
      "Fn::Select": [
        1,
        {
```

```
    "Fn::GetAtt": [
      "Servers",
      "InstanceIds"
    ]
  }
]
},
"AllocationId": {
  "Ref": "Eip[1]"
}
}
},
"Outputs": {
  "AllocationIds": {
    "Value": [
      {
        "Ref": "Eip[0]"
      },
      {
        "Ref": "Eip[1]"
      }
    ]
  },
  "InstanceIds": {
    "Value": {
      "Fn::GetAtt": [
        "Servers",
        "InstanceIds"
      ]
    }
  },
  "EipAddresses": {
    "Value": [
      {
        "Fn::GetAtt": [
          "Eip[0]",
          "EipAddress"
        ]
      }
    ]
  },
  {
```

```
    "Fn::GetAtt": [  
      "Eip[1]",  
      "EipAddress"  
    ]  
  }  
]  
}  
}  
}
```

# 4. Use the Count feature to deploy large amounts of resources

In Resource Orchestration Service (ROS), you can use the Count feature to create multiple resources in complex or dynamic scenarios. This topic describes how to use the Count feature to deploy large amounts of resources.

## Scale-out scenarios

The Count feature is used in this topic to create a large number of pay-as-you-go ECS instances. 3,000 ECS instances are created in this example. The following table includes details about the required 36,183 resources.

Resource	Number	Description
ALIYUN::ECS::NetworkInterface	9,000	One ECS instance must be bound with three elastic network interfaces (ENIs).
ALIYUN::ECS::NetworkInterfaceAttachment	9,000	This resource is used to bind ENIs to VPC-type instances.
ALIYUN::VPC::EIP	9,000	An elastic IP address (EIP) must be associated with one ENI.
ALIYUN::VPC::EIPAssociation	9,000	This resource is used to associate EIPs with ENIs.
ALIYUN::ECS::InstanceGroup	3	One ALIYUN::ECS::InstanceGroup resource can contain up to 1,000 ECS instances.
ALIYUN::VPC::CommonBandwidthPackage	90	100 EIPs are added to one EIP bandwidth plan.
ALIYUN::VPC::CommonBandwidthPackageIp	90	This resource is used to add EIPs to EIP bandwidth plans.

One stack can contain up to 300 resources. To deploy 36,183 resources, you can use a combination of nested stacks and the Count feature

## Solution 1: basic solution

First, use sub-stacks to create specified resources and use parent stacks to integrate the resources. Assume that the number of ECS instances is M.

- Sub-stack A is used to create ECS instances, and associate EIPs with ENIs.

Assume that the number of ECS instances in Sub-stack A is N. N is greater than or equal to 0 but less than or equal to 20. A maximum of 241 resources can be created in Sub-stack A, which is calculated as  $1 + 240 = 241$ .

- One ALIYUN::ECS::InstanceGroup resource is created for 20 ECS instances.


- A maximum of total ENIs and EIPs is 240, which is calculated as  $20 \times 12 = 240$ .
- Sub-stack B is used to create EIP bandwidth plans, and add EIPs to EIP bandwidth plans.  
Sub-stack B contains three EIP bandwidth plans and can contain up to six resources, which is calculated as  $(1 + 1) \times 3 = 6$ .
  - The number of EIP bandwidth plans is three because one ECS instance is associated with three EIPs that link three networks.
  - Because 100 EIPs are added to one EIP bandwidth plans, one Sub-stack B can contain up to 300 EIPs. Because Sub-stack A can contain 60 EIPs, one Sub-stack B corresponds to five Sub-stack A.
- A parent stack is used to integrate sub-stacks.

The total number of resources is 180, which is calculated as  $150 + 30 = 180$ . A single stack can contain the 180 resources.

- The number of Sub-stack A is calculated based on the following expression:  $(M + 20 - 1) // 20$ . The maximum value is 150. The output resources of each five Sub-stack A are the input resources of one Sub-stack B. N is set to 0 for some Sub-stack A because the number of Sub-stack A must be a multiple of 5. Taken together, the number of Sub-stack A is calculated based on the following expression:  $((M + 20 - 1) // 20 + 4) // 5 \times 5$ . The maximum value is 150.
- The number of Sub-stack B is a fifth of the number of Sub-stack A, which is calculated as  $((M + 20 - 1) // 20 + 4) // 5$ . The maximum value is 30.

Second, define templates.

- Sub-stack A
  - `Eni[0]`, `Eni[1]`, and `Eni[2]` are bound to `Servers[0]`. `Eni[3]`, `Eni[4]`, and `Eni[5]` are bound to `Servers[1]`. By that analogy, `Eni[3 × i]`, `Eni[3 × i + 1]`, and `Eni[3 × i + 2]` are bound to `Servers[i]`, where `i` is greater than or equal to 0 but less than or equal to `N-1`.
  - `Eip-ChinaTelecom[i]` is associated with `Eni[3 × i]`, `Eip-ChinaUnicom[i]` is associated with `Eni[3 × i + 1]`, and `Eip-ChinaMobile[i]` is associated with `Eni[3 × i + 2]`, where `i` is greater than or equal to 0 but less than or equal to `N-1`. This way, one ECS instance is associated with three EIPs that belong to separate Internet Service Providers (ISPs).

 **Note** ChinaTelecom, ChinaUnicom, and ChinaMobile are used as ISPs in this example.

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "NumberOfEcs": {
      "Type": "Number",
      "MinValue": 0,
      "MaxValue": 20
    }
  },
  "Conditions": {
    "NonEmpty": {
```

```
"Fn::Not": {
  "Fn::Equals": [
    0,
    {
      "Ref": "NumberOfEcs"
    }
  ]
},
"Resources": {
  "Servers": {
    "Type": "ALIYUN::ECS::InstanceGroup",
    "Condition": "NonEmpty",
    "Properties": {
      "MinAmount": {
        "Ref": "NumberOfEcs"
      },
      "MaxAmount": {
        "Ref": "NumberOfEcs"
      }
    }
  },
  "Eni": {
    "Type": "ALIYUN::ECS::NetworkInterface",
    "Count": {
      "Fn::Calculate": [
        "{0}*3",
        0,
        [
          {
            "Ref": "NumberOfEcs"
          }
        ]
      ]
    },
    "Properties": null
  },
  "EniBinder": {
    "Type": "ALIYUN::ECS::NetworkInterfaceAttachment",
    "Count": {
```

```
"Fn::Calculate": [
  "{0}*3",
  0,
  [
    {
      "Ref": "NumberOfEcs"
    }
  ]
],
"Properties": {
  "InstanceId": {
    "Fn::Select": [
      {
        "Fn::Calculate": [
          "{0}/3",
          0,
          {
            "Ref": "ALIYUN::Index"
          }
        ]
      },
      {
        "Fn::GetAtt": [
          "Servers",
          "InstanceIds"
        ]
      }
    ]
  },
  "NetworkInterfaceId": {
    "Fn::Select": [
      {
        "Ref": "ALIYUN::Index"
      },
      {
        "Ref": "Eni"
      }
    ]
  }
}
```



```
,
},
"Eip-ChinaTelecom": {
  "Type": "ALIYUN::VPC::EIP",
  "Count": {
    "Ref": "NumberOfEcs"
  },
  "Properties": {
    "Isp": "ChinaTelecom"
  }
},
"Eip-ChinaTelecom-Binder": {
  "Type": "ALIYUN::VPC::EIPAssociation",
  "Count": {
    "Ref": "NumberOfEcs"
  },
  "Properties": {
    "InstanceId": {
      "Fn::Select": [
        {
          "Fn::Calculate": [
            "{0}*3",
            0,
            [
              {
                "Ref": "ALIYUN::Index"
              }
            ]
          ]
        },
        {
          "Ref": "Eni"
        }
      ]
    },
    "AllocationId": {
      "Fn::Select": [
        {
          "Ref": "ALIYUN::Index"
        }
      ]
    }
  }
}
```


```
        "Ref": "Eip-ChinaTelecom"
      }
    ]
  }
}
},
"Eip-ChinaUnicom": {
  "Type": "ALIYUN::VPC::EIP",
  "Count": {
    "Ref": "NumberOfEcs"
  },
  "Properties": {
    "Isp": "ChinaUnicom"
  }
},
"Eip-ChinaUnicom-Binder": {
  "Type": "ALIYUN::VPC::EIPAssociation",
  "Count": {
    "Ref": "NumberOfEcs"
  },
  "Properties": {
    "InstanceId": {
      "Fn::Select": [
        {
          "Fn::Calculate": [
            "{0}*3+1",
            0,
            [
              {
                "Ref": "ALIYUN::Index"
              }
            ]
          ]
        },
        {
          "Ref": "Eni"
        }
      ]
    },
    "AllocationId": {
      "Fn::Select": [
```

```
    {
      "Ref": "ALIYUN::Index"
    },
    {
      "Ref": "Eip-ChinaUnicom"
    }
  ]
}
},
"Eip-ChinaMobile": {
  "Type": "ALIYUN::VPC::EIP",
  "Count": {
    "Ref": "NumberOfEcs"
  },
  "Properties": {
    "Isp": "ChinaMobile"
  }
},
"Eip-ChinaMobile-Binder": {
  "Type": "ALIYUN::VPC::EIPAssociation",
  "Count": {
    "Ref": "NumberOfEcs"
  },
  "Properties": {
    "InstanceId": {
      "Fn::Select": [
        {
          "Fn::Calculate": [
            "{0}*3+2",
            0,
            [
              {
                "Ref": "ALIYUN::Index"
              }
            ]
          ]
        }
      ]
    },
    "Ref": "Eni"
  }
}
```

```
    ],
  },
  "AllocationId": {
    "Fn::Select": [
      {
        "Ref": "ALIYUN::Index"
      },
      {
        "Ref": "Eip-ChinaMobile"
      }
    ]
  }
},
"Outputs": {
  "Eips-ChinaTelecom": {
    "Value": {
      "Ref": "Eip-ChinaTelecom"
    }
  },
  "Eips-ChinaUnicom": {
    "Value": {
      "Ref": "Eip-ChinaUnicom"
    }
  },
  "Eips-ChinaMobile": {
    "Value": {
      "Ref": "Eip-ChinaMobile"
    }
  }
}
}
```

- Sub-stack B

This is a standard template. The EIP of ChinaTelecom is added to the EIP bandwidth plan of ChinaTelecom. The EIP of ChinaUnicom is added to the EIP bandwidth plan of ChinaUnicom. The EIP of ChinaMobile is added to the EIP bandwidth plan of ChinaMobile.

 **Note** ChinaTelecom, ChinaUnicom, and ChinaMobile are used in this example.

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "Eips-ChinaTelecom": {
      "Type": "Json"
    },
    "Eips-ChinaUnicom": {
      "Type": "Json"
    },
    "Eips-ChinaMobile": {
      "Type": "Json"
    }
  },
  "Resources": {
    "CommonBandwidthPackage-ChinaTelecom": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackage",
      "Properties": null
    },
    "CommonBandwidthPackage-ChinaTelecom-IpBinder": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackageIp",
      "Properties": {
        "Eips": {
          "Ref": "Eips-ChinaTelecom"
        },
        "BandwidthPackageId": {
          "Ref": "CommonBandwidthPackage-ChinaTelecom"
        }
      }
    },
    "CommonBandwidthPackage-ChinaUnicom": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackage",
      "Properties": null
    },
    "CommonBandwidthPackage-ChinaUnicom-IpBinder": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackageIp",
      "Properties": {
        "Eips": {
          "Ref": "Eips-ChinaUnicom"
        },
        "BandwidthPackageId": {
          "Ref": "CommonBandwidthPackage-ChinaUnicom"
        }
      }
    }
  }
}
```

```
    }
  }
},
"CommonBandwidthPackage-ChinaMobile": {
  "Type": "ALIYUN::VPC::CommonBandwidthPackage",
  "Properties": null
},
"CommonBandwidthPackage-ChinaMobile-IpBinder": {
  "Type": "ALIYUN::VPC::CommonBandwidthPackageIp",
  "Properties": {
    "Eips": {
      "Ref": "Eips-ChinaMobile"
    },
    "BandwidthPackageId": {
      "Ref": "CommonBandwidthPackage-ChinaMobile"
    }
  }
}
}
}
```

- Parent stack

Templates for nested stacks must be provided by means of URLs. Add the templates of two sub-stacks to the specified OSS bucket. Assume that the template URL of Sub-stack A is `oss://templates/resources-a`, and the template path of Sub-stack B is `oss://templates/resources-b`.

- Resource A is Sub-stack A.

The `NumberOfEcs` value is calculated based on the following expression:  $(1 - ((\{1\} + 1) / ((\{0\} + 19) / 20 + 1) + 999) / 1000) \times (((\{0\} - 20 \times \{1\}) / 20 + \{0\}) / (\{0\} + 1) \times (20 - (\{0\} - \{0\} / 20 \times 20)) + (\{0\} - \{0\} / 20 \times 20))$ . The following items describe the calculation methods:

- Limits: `Fn::Calculate` only supports five operators including addition (+), subtraction (-), multiplication (x), floating division (/), and integer division (//).

- Value extraction rules: Starting from group 0, 20 resources are taken from M resources each time. If the number of resources is less than 20, all of the remaining resources are taken. If no resources are left, the NumberOfEcs value is 0. The following examples describe the values taken by the NumberOfEcs parameter in Sub-stack A:
  - When the value of M is 1, the Count parameter of Sub-stack A must be set to 5, and the NumberOfEcs values are 1, 0, 0, 0, 0 in sequence.
  - When the value of M is 20, the Count parameter of Sub-stack A must be set to 5, and the NumberOfEcs values are 20, 0, 0, 0, 0 in sequence.
  - When the value of M is 99, the Count parameter of Sub-stack A must be set to 5, and the NumberOfEcs values are 20, 20, 20, 20, 19 in sequence.
  - When the value of M is 100, the Count parameter of Sub-stack A must be set to 5, and the NumberOfEcs values are 20, 20, 20, 20, 20 in sequence.
  - When the value of M is 101, the Count parameter of Sub-stack A must be set to 10, and the NumberOfEcs values are 20, 20, 20, 20, 20, 1, 0, 0, 0, 0 in sequence.
- Math tips:
  - Tip 1: How do I turn the sequence 0, 1, 2, ... into 0, 1, 1, ...?

You can use the  $F(x, t) = (x + t) // (t + 1)$  expression where t is greater than or equal to Max(x). When x is set to 0, F(0) is equal to 0. When x is greater than or equal to 1, F(x) is equal to 1 because F(x) must be greater than or equal to 1. F(x) is calculated based on the following expression:  $F(x) = (x + t) // (t + 1) \leq (x + \text{Max}(x)) // (\text{Max}(x) + 1) \leq (\text{Max}(x) + \text{Max}(x)) // (\text{Max}(x) + 1) < 2$ .
  - Tip 2: How do I turn the sequence 0, 1 into P, Q?

Assume that x is set to 0 or 1 in the  $G(x, P, Q) = x \times (Q - P) + P$  expression. When x is set to 0, f(0) is equal to P. When x is set to 1, f(1) is equal to Q.
  - Tip 3: How are the remainders of M and N calculated?

You can use the following expression:  $M \% N = M - M // N \times N$ .

- Expression:

Create the following definitions:  $N = 20$ ,  $U = (M + N - 1) // N$ , and  $V = (U + 4) // 5 \times 5$ . In the definitions,  $U$  indicates the number of Sub-stack A before it is counted as a multiple of 5, and  $V$  indicates the actual number of Sub-stack A after it is counted as a multiple of 5.

Assume that  $i$  is the number that corresponds to the ALIYUN::Index pseudo parameter. The values of  $f(i)$  are calculated by using the  $f(i) = (M - N \times i) // N$  expression based on the following conditions:  $0 \leq i < V$ ,  $U = 6$ , and  $V = 10$ . When  $M$  is set to 101, the following  $f(i)$  values are obtained:  $f(0) = 5$ ,  $f(1) = 4$ ,  $f(2) = 3$ ,  $f(3) = 2$ ,  $f(4) = 1$ ,  $f(5) = 0$ ,  $f(6) = -1$ ,  $f(7) = -2$ ,  $f(8) = -3$ , and  $f(9) = -4$ .

- $0 \leq i < U$

The sequence {5, 4, 3, 2, 1, 0} can be turned into {1, 1, 1, 1, 1, 0} by using Tip 1.

In the case of  $t = M \geq \text{Max}(f(i))$ ,  $g(i)$  is calculated based on the following expression:  $g(i) = F(f(i), M) = ((M - N \times i) // N + M) // (M + 1)$ . This is a sequence function. You can turn the sequence into {20, 20, 20, 20, 20, 1} by using Tip 2. The values in the new sequence are the values of the NumberOfEcs parameter in the case of  $0 \leq i < U$ .

In the case of  $P = M \% N$  and  $Q = N$ ,  $h(i)$  is calculated based on the following expression:  $h(i) = G(g(i), M \% N, N) = (((M - N \times i) // N + M) // (M + 1)) \times (N - (M - M // N \times N)) + (M - M // N \times N)$ .

- $i \geq U$

In the case of  $0 \leq i < U$ , the value is 1. In the case of  $i \geq U$ , the value is 0. For  $k(i) = (i + 1) // (U + 1)$ , the value is 0 in the case of  $0 \leq i < U$ , and the value is greater than or equal to 1 in the case of  $i \geq U$ .

You can turn the values into the sequence of 0 and 1 by using Tip 1. The maximum value of  $k(i)$  can be calculated based on the following expression:  $\text{Max}(k(i)) = V // (U + 1) = (U + 4) // 5 \times 5 // (U + 1) \leq 4$ .  $t$  can be set to 4, but it is set to 999 in this example.

The new sequence is calculated based on the following expression:  $p(i) = 1 - F(k(i), 999) = 1 - ((i + 1) // ((M + N - 1) // N + 1) + 999) // 1000$ . In the case of  $0 \leq i < U$ , the value is 1. In the case of  $i \geq U$ , the value is 0.

The final sequence is calculated based on the following expression:  $q(i) = p(i) \times h(i) = (1 - ((i + 1) // ((M + N - 1) // N + 1) + 999) // 1000) \times (((M - N \times i) // N + M) // (M + 1)) \times (N - (M - M // N \times N)) + (M - M // N \times N)$ . In the case of  $M = \{0\}$ ,  $i = \{1\}$ , and  $N = 20$ ,  $q(i)$  is calculated based on the following expression:  $(1 - ((\{1\} + 1) // ((\{0\} + 19) // 20 + 1) + 999) // 1000) \times (((\{0\} - 20 \times \{1\}) // 20 + \{0\}) // (\{0\} + 1) \times (20 - (\{0\} - \{0\}) // 20 \times 20)) + (\{0\} - \{0\} // 20 \times 20)$ .

- Resource B is Sub-stack B.

Sub-stack B[i] uses the outputs of  $A[5 \times i]$ ,  $A[5 \times i + 1]$ ,  $A[5 \times i + 2]$ ,  $A[5 \times i + 3]$ , and  $A[5 \times i + 4]$  as the input.

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "NumberOfEcs": {
      "Type": "Number",
      "MinValue": 0
    }
  }
}
```



```
,
},
"Resources": {
  "A": {
    "Type": "ALIYUN::ROS::Stack",
    "Count": {
      "Fn::Calculate": [
        "(((0)+ 19)//20+4)//5*5",
        0,
        [
          {
            "Ref": "NumberOfEcs"
          }
        ]
      ]
    },
    "Properties": {
      "TemplateURL": "oss://templates/resources-a",
      "Parameters": {
        "NumberOfEcs": {
          "Fn::Calculate": [
            "(1-(((1)+ 1)//(((0)+ 19)//20+ 1)+999)//1000)*(((0)-20*{1})//20+{0})//({0)+ 1)*(20-({0}-{0})//20
*20))+({0}-{0})//20*20)",
            0,
            [
              {
                "Ref": "NumberOfEcs"
              },
              {
                "Ref": "ALIYUN::Index"
              }
            ]
          ]
        }
      }
    }
  },
  "B": {
    "Type": "ALIYUN::ROS::Stack",
    "Count": {
      "Fn::Calculate": [
```

```
    "({0}+19)//20+4)//5",
    0,
    [
      {
        "Ref": "NumberOfEcs"
      }
    ]
  ]
},
"Properties": {
  "TemplateURL": "oss://templates/resources-b",
  "Parameters": {
    "Eips-ChinaTelecom": {
      "Fn::ListMerge": [
        {
          "Fn::Select": [
            {
              "Fn::Calculate": [
                "5*{0}",
                0,
                [
                  {
                    "Ref": "ALIYUN::Index"
                  }
                ]
              ]
            },
            {
              "Fn::GetAtt": [
                "A",
                "Eips-ChinaTelecom"
              ]
            }
          ]
        },
        {
          "Fn::Select": [
            {
              "Fn::Calculate": [
                "5*{0}+1",
                0,
```

```
[
  {
    "Ref": "ALIYUN::Index"
  }
]
},
{
  "Fn::GetAtt": [
    "A",
    "Eips-ChinaTelecom"
  ]
}
],
{
  "Fn::Select": [
    {
      "Fn::Calculate": [
        "5*{0}+2",
        0,
        [
          {
            "Ref": "ALIYUN::Index"
          }
        ]
      ]
    }
  ],
  "Fn::GetAtt": [
    "A",
    "Eips-ChinaTelecom"
  ]
}
],
{
  "Fn::Select": [
    {
      "Fn::Calculate": [
        "5*{0}+2"
```



```
    }  
  }  
}  
}
```

One Sub-stack B must correspond to five Sub-stack A. You can use a slice object constructed by Start:Stop:Step notation in Fn::Select to dynamically select multiple elements from a list.

You can use the Fn::Min function to simplify expressions. The following code shows the new template:

```
{  
  "ROSTemplateFormatVersion": "2015-09-01",  
  "Parameters": {  
    "NumberOfEcs": {  
      "Type": "Number",  
      "MinValue": 0  
    }  
  },  
  "Resources": {  
    "A": {  
      "Type": "ALIYUN::ROS::Stack",  
      "Count": {  
        "Fn::Calculate": [  
          "({0}+19)//20",  
          0,  
          [  
            {  
              "Ref": "NumberOfEcs"  
            }  
          ]  
        ]  
      }  
    },  
    "Properties": {  
      "TemplateURL": "oss://templates/resources-a",  
      "Parameters": {  
        "NumberOfEcs": {  
          "Fn::Min": [  
            20,  
            {  
              "Fn::Calculate": [  
                "{0}-{1}*20",  
                0
```

```
    ],
    [
      {
        "Ref": "NumberOfEcs"
      },
      {
        "Ref": "ALIYUN::Index"
      }
    ]
  ]
}
}
}
},
"B": {
  "Type": "ALIYUN::ROS::Stack",
  "Count": {
    "Fn::Calculate": [
      "(((0)+19)//20+4)//5",
      0,
      [
        {
          "Ref": "NumberOfEcs"
        }
      ]
    ]
  },
  "Properties": {
    "TemplateURL": "oss://templates/resources-b",
    "Parameters": {
      "Eips-ChinaTelecom": {
        "Fn::ListMerge": [
          {
            "Fn::Select": [
              {
                "Fn::Replace": [
                  {
                    "Start": {
                      "Fn::Calculate": [
```

```
        "5*{0}",
        0,
        [
            {
                "Ref": "ALIYUN::Index"
            }
        ]
    ],
    },
    "Stop": {
        "Fn::Calculate": [
            "5*({0}+1)",
            0,
            [
                {
                    "Ref": "ALIYUN::Index"
                }
            ]
        ]
    },
    "Start:Stop"
]
},
{
    "Fn::GetAtt": [
        "A",
        "Eips-ChinaTelecom"
    ]
}
]
}
}
}
}
}
}
}
}
}
```

## Solution 2: optimized solution

Reallocate the resources:

- Add ALIYUN::VPC::CommonBandwidthPackageIp resources to Sub-stack A.
- Add ALIYUN::VPC::CommonBandwidthPackage resources to Sub-stack B. You need to use the Count feature for the number of resources in Sub-stack B but not for the number of Sub-stack A. Sub-stack B provides the list of IDs of EIP bandwidth plans and passes the list to Sub-stack A.

Use dynamic parameters:

- Replace the maximum number of ECS instances (20) with the MaxNumberOfEcsPerStack parameter.
- Replace the maximum number of EIPs per EIP bandwidth plan (100) with the MaxNumberOfEipPerBandwidthPackage parameter.
- When you create Sub-stack A in a parent stack, set EipIndexOffset to ALIYUN::Index × MaxNumberOfEcsPerStack.
- In Sub-stack A, use the ALIYUN::VPC::CommonBandwidthPackageIp resource to group EIPs, and then add separate groups to separate EIP bandwidth plans.

The following section shows the optimized templates.

- Sub-stack A

Set A to EipIndexOffset, B to NumberOfEcs, C to MaxNumberOfEipPerBandwidthPackage, and i to ALIYUN::Index. The  $A//C$  expression indicates the number of EIP bandwidth plans with which the first EIP in the stack will be associated. The  $(A + B - 1)//C$  expression indicates the number of EIP bandwidth plans to which the last EIP in the stack will be added. Therefore, CommonBandwidthPackage-ChinaTelecom-IpBinder.Count is equal to  $((A + B - 1)//C - A//C) + 1$ .

CommonBandwidthPackage-ChinaTelecom-IpBinder.BandwidthPackageId is equal to CommonBandwidthPackage-ChinaTelecom-List[A//C + i]. The following solution to distributing Eip-ChinaTelecom from its group to CommonBandwidthPackage-ChinaTelecom-IpBinder is taken into global consideration:

The global number is within  $[(A//C + i) \times C, (A//C + i + 1) \times C]$  and is subject to CommonBandwidthPackage-ChinaTelecom-IpBinder[(A//C + i)]. To turn the global number into a local number, you only need to use the  $[(A//C + i) \times C - A, (A//C + i + 1) \times C - A]$  expression to minus the offset. Note that the range must be within  $[0, B]$ . Therefore, the result is  $[\text{Max}((A//C + i) \times C - A, 0), \text{Min}((A//C + i + 1) \times C - A, B)]$ .

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "NumberOfEcs": {
      "Type": "Number",
      "MinValue": 1
    },
    "MaxNumberOfEipPerBandwidthPackage": {
      "Type": "Number",
      "MinValue": 1
    }
  }
}
```



```
    },
    "EipIndexOffset": {
      "Type": "Number"
    },
    "CommonBandwidthPackage-ChinaTelecom-List": {
      "Type": "Json"
    },
    "CommonBandwidthPackage-ChinaUnicom-List": {
      "Type": "Json"
    },
    "CommonBandwidthPackage-ChinaMobile-List": {
      "Type": "Json"
    }
  },
  "Conditions": {
    "NonEmpty": {
      "Fn::Not": {
        "Fn::Equals": [
          0,
          {
            "Ref": "NumberOfEcs"
          }
        ]
      }
    }
  },
  "Resources": {
    "CommonBandwidthPackage-ChinaTelecom-IpBinder": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackageIp",
      "Count": {
        "Fn::Calculate": [
          "(((0)+{1}-1)//{2}-{0}://{2})+1",
          0,
          [
            {
              "Ref": "EipIndexOffset"
            },
            {
              "Ref": "NumberOfEcs"
            }
          ]
        ]
      }
    }
  }
}
```

```
        {
          "Ref": "MaxNumberOfEipPerBandwidthPackage"
        }
      ]
    ]
  },
  "Properties": {
    "Eips": {
      "Fn::Select": [
        {
          "Fn::Replace": [
            {
              "Start": {
                "Fn::Max": [
                  0,
                  {
                    "Fn::Calculate": [
                      "({0}://{2}+{1})*{2}-{0}",
                      0,
                      [
                        {
                          "Ref": "EipIndexOffset"
                        },
                        {
                          "Ref": "ALIYUN::Index"
                        },
                        {
                          "Ref": "MaxNumberOfEipPerBandwidthPackage"
                        }
                      ]
                    ]
                  }
                ]
              }
            }
          ],
          "Stop": {
            "Fn::Min": [
              {
                "Ref": "NumberOfEcs"
              },
              {
                "Fn::Calculate": [
```

```
        "{0}/{2}+{1}+1)*{2}-{0}",
        0,
        [
            {
                "Ref": "EipIndexOffset"
            },
            {
                "Ref": "ALIYUN::Index"
            },
            {
                "Ref": "MaxNumberOfEipPerBandwidthPackage"
            }
        ]
    ]
}
]
}
},
"Start:Stop"
]
},
{
    "Ref": "Eip-ChinaTelecom"
}
]
},
"BandwidthPackageId": {
    "Fn::Select": [
        {
            "Fn::Calculate": [
                "{0}/{2}+{1}",
                0,
                [
                    {
                        "Ref": "EipIndexOffset"
                    },
                    {
                        "Ref": "ALIYUN::Index"
                    },
                    {
                        "Ref": "MaxNumberOfEipPerBandwidthPackage"
                    }
                ]
            ]
        }
    ]
}
```

```
    }
  ]
}
},
{
  "Ref": "CommonBandwidthPackage-ChinaTelecom-List"
}
]
}
}
}
}
}
```

- Sub-stack B

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "Count": {
      "Type": "Number"
    }
  },
  "Resources": {
    "CommonBandwidthPackage-ChinaTelecom": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackage",
      "Count": {
        "Ref": "Count"
      },
      "Properties": null
    },
    "CommonBandwidthPackage-ChinaUnicom": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackage",
      "Count": {
        "Ref": "Count"
      },
      "Properties": null
    },
    "CommonBandwidthPackage-ChinaMobile": {
      "Type": "ALIYUN::VPC::CommonBandwidthPackage",
      "Count": {
```

```
        "Ref": "Count"
      },
      "Properties": null
    }
  },
  "Outputs": {
    "CommonBandwidthPackage-ChinaTelecom-List": {
      "Value": {
        "Ref": "CommonBandwidthPackage-ChinaTelecom"
      }
    },
    "CommonBandwidthPackage-ChinaUnicom-List": {
      "Value": {
        "Ref": "CommonBandwidthPackage-ChinaUnicom"
      }
    },
    "CommonBandwidthPackage-ChinaMobile-List": {
      "Value": {
        "Ref": "CommonBandwidthPackage-ChinaMobile"
      }
    }
  }
}
```

- Parent stack

```
{
  "ROSTemplateFormatVersion": "2015-09-01",
  "Parameters": {
    "NumberOfEcs": {
      "Type": "Number",
      "MinValue": 0
    },
    "MaxNumberOfEcsPerStack": {
      "Type": "Number",
      "MinValue": 1,
      "Default": 20
    },
    "MaxNumberOfEipPerBandwidthPackage": {
      "Type": "Number",
      "MinValue": 1,
      "Default": 100
    }
  }
}
```

```
    }
  },
  "Resources": {
    "B": {
      "Type": "ALIYUN::ROS::Stack",
      "Properties": {
        "TemplateURL": "oss://templates/resources-b",
        "Parameters": {
          "Count": {
            "Fn::Calculate": [
              "({0}+{1}-1)//{1}",
              0,
              [
                {
                  "Ref": "NumberOfEcs"
                },
                {
                  "Ref": "MaxNumberOfEipPerBandwidthPackage"
                }
              ]
            ]
          }
        }
      }
    },
    "A": {
      "Type": "ALIYUN::ROS::Stack",
      "Count": {
        "Fn::Calculate": [
          "({0}+{1}-1)//{1}",
          0,
          [
            {
              "Ref": "NumberOfEcs"
            },
            {
              "Ref": "MaxNumberOfEcsPerStack"
            }
          ]
        ]
      }
    }
  }
}
```

```
"Properties": {
  "TemplateURL": "oss://templates/resources-a",
  "Parameters": {
    "NumberOfEcs": {
      "Fn::Min": [
        {
          "Ref": "MaxNumberOfEcsPerStack"
        },
        {
          "Fn::Calculate": [
            "{0}-{1}*{2}",
            0,
            [
              {
                "Ref": "NumberOfEcs"
              },
              {
                "Ref": "ALIYUN::Index"
              },
              {
                "Ref": "MaxNumberOfEcsPerStack"
              }
            ]
          ]
        }
      ]
    },
    "MaxNumberOfEipPerBandwidthPackage": {
      "Ref": "MaxNumberOfEipPerBandwidthPackage"
    },
    "EipIndexOffset": {
      "Fn::Calculate": [
        "{0}*{1}",
        0,
        [
          {
            "Ref": "MaxNumberOfEcsPerStack"
          },
          {
            "Ref": "ALIYUN::Index"
          }
        ]
      ]
    }
  }
}
```

```
    }
  ]
]
},
"CommonBandwidthPackage-ChinaTelecom-List": {
  "Fn::GetAtt": [
    "B",
    "CommonBandwidthPackage-ChinaTelecom-List"
  ]
},
"CommonBandwidthPackage-ChinaUnicom-List": {
  "Fn::GetAtt": [
    "B",
    "CommonBandwidthPackage-ChinaUnicom-List"
  ]
},
"CommonBandwidthPackage-ChinaMobile-List": {
  "Fn::GetAtt": [
    "B",
    "CommonBandwidthPackage-ChinaMobile-List"
  ]
}
}
}
}
}
```