GreenPlum集群实验室

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整体介绍

链接参考

淘宝数据库内核月报：http://mysql.taobao.org/monthly/2016/01/02/

知乎文章：https://zhuanlan.zhihu.com/p/413663643

知乎文章2：https://zhuanlan.zhihu.com/p/630540673

GP官方文档：https://gp-docs-cn.github.io/docs/admin_guide/highavail/topics/g-overview-of-high-availability-in-greenplum-database.html

架构以及名词解释

Greenplum是一个纯软件的MPP数据库服务器，其系统架构专门用于管理大规模分析型数据仓库或商业智能工作负载。从技术上讲，MPP无共享架构是指具有多个节点的系统，每个节点都有自己的内存、操作系统和磁盘，它们协作执行一项操作。Greenplum使用这种高性能系统架构分配PB级别的数据，并行使用系统的所有资源来处理请求。

Greenplum 6版本基于PostgreSQL 9.4开源数据库，本质上是若干面向磁盘的PostgreSQL数据库实例，共同作为一个内聚的数据库管理系统（DBMS）。大多数情况下，Greenplum在SQL支持、配置选项和最终用户功能方面与PostgreSQL非常相似。用户操作Greenplum数据库就像与常规PostgreSQL交互一样。

Greenplum与PostgreSQL的主要区别为：除了支持Postgres优化器外，还有自己的GPORCA优化器。Greenplum数据库可以使用Append-Optimized存储格式。

Greenplum支持列存储，即逻辑上组织为表的数据，物理上以面向列的格式存储数据。列存储只能与Append-Optimized表一起使用。

Greenplum对PostgreSQL的内部结构进行了修改和补充，以支持数据库的并行结构。例如，对系统目录、优化器、查询执行器和事务管理器组件做过修改和增强，能够在所有并行PostgreSQL数据库实例上同时运行查询。Greenplum依赖Interconnect（内部互连）在网络层支持不同PostgreSQL实例之间的通信，使得系统作为单一逻辑数据库运行。

较之标准PostgreSQL，Greenplum还增加了并行数据装载（外部表）、资源管理、查询优化和存储增强功能。Greenplum开发的许多功能和优化也进入了PostgreSQL社区，促进了PostgreSQL的发展。例如，表分区是Greenplum首先开发的一个特性，现在已成为标准PostgreSQL的一部分。

Greenplum顶层系统架构如图3-1所示。Master是Greenplum数据库系统的入口，是客户端连接并提交SQL语句的数据库实例。Master将其工作与系统中其他叫作Segment的数据库实例进行协调，这些数据库实例负责实际存储和处理用户数据。每个Master和Segment都是一个PostgreSQL数据库实例。
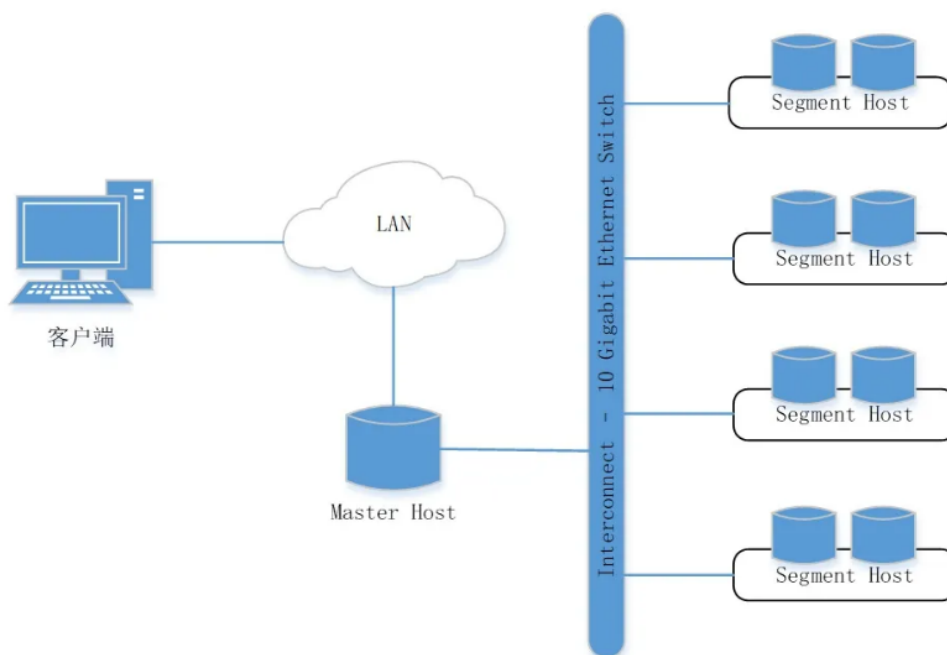
图3-1 Greenplum顶层系统架构

Master

Master是Greenplum的系统入口，它接收客户端连接和SQL查询，并将工作分配给Segment实例。最终用户通过Master与Greenplum数据库交互，就像与典型PostgreSQL数据库交互一样。用户可以使用诸如psql之类的客户端程序或JDBC、ODBC、libpq之类的应用程序编程接口（API）连接到数据库。

Master数据库实例中存储全局系统目录（Global System Catalog）。全局系统目录是一组系统表，其中包含关于Greenplum本身的元数据。Master实例中不包含任何用户数据，用户数据仅驻留在Segment实例中。Master验证客户端连接，处理传入的SQL命令，在Segment之间分配工作负载，协调每个Segment返回的结果，并将最终结果返给客户端程序。

Greenplum数据库使用写前日志（WAL）进行主/备Master镜像。在基于WAL的日志记录中，所有修改都会在应用之前写入日志，以确保任何进程内操作的数据完整性。

Segment

Greenplum的Segment实例是独立的PostgreSQL数据库，每个数据库存储一部分数据并执行一部分查询处理。当用户通过Master连接到数据库并发出查询时，将在每个Segment数据库中创建进程以处理该查询的工作。有关查询过程的更多信息，参见3.3.3节。

用户定义的表及其索引分布在所有可用的Segment中，每个Segment都包含互斥的部分数据（复制表除外，这种表会在每个Segment实例上存储一份完整的数据拷贝）。提供服务的数据库服务器进程在相应的Segment实例下运行。

Segment在称为段主机的服务器上运行。一台段主机通常运行2~8个Segment实例，具体数量取决于CPU核、内存、磁盘、网卡和工作负载。所有段主机的配置应该相同，以避免木桶效应。让Greenplum获得最佳性能的关键是将数据和负载均匀分布到多个能力相同的Segment上，以便所有Segment同时处理任务并同时完成其工作。

Interconnect

Interconnect即内部互连，是Greenplum数据库系统架构中的核心组件，互连指的是Segment在网络间的进程间通信。Interconnect使用标准以太网交换数据，出于性能原因，建议使用万兆网或更快的系统。

默认情况下，Interconnect使用带有流量控制的用户数据报协议（UDPIFC）进行通信，通过网络发送消息。Greenplum软件执行超出UDP提供的数据包验证，这意味着其可靠性相当于传输控制协议（TCP），性能和可扩展性超过TCP。如果将Interconnect改为TCP，Greenplum数据库的可扩展性则限制为1000个Segment实例，UDPIFC作为Interconnect的默认协议不受此限制。

Interconnect实现了对同一集群中多个PostgreSQL实例的高效协同和并行计算，承载了并行查询计划生产、查询分派（QD）、协调节点上查询执行器（QE）的并行工作、数据分布、Pipeline计算、镜像复制、健康探测等诸多任务。

本文节选自《Greenplum构建实时数据仓库实践》，内容发布获得作者和出版社授权。

知乎文章：https://zhuanlan.zhihu.com/p/413663643

GP官方文档：https://gp-docs-cn.github.io/docs/admin_guide/highavail/topics/g-overview-of-high-availability-in-greenplum-database.html

GP总体结构

PostgreSQL 主备同步机制是通过流复制实现，其原理见之前的月报PG主备流复制机制。

Greenplum 是基于PostgreSQL开发的，它的主备也是通过流复制实现，但是Segment节点中的Primary和Mirror之间的数据同步是基于文件级别的同步实现的。为什么Primary和Mirror不能再使用流复制实现呢？主要有两个原因：

1. Append Only表不写WAL日志，所以Append Only表的数据就不能通过XLOG发送到Mirror再Apply；
2. pg_control等文件也是不写WAL日志，也只能通过文件方式同步到Mirror。

Greenplum 的架构采用了MPP 无共享体系。在 MPP 系统中，每个数据节点有自己的CPU、磁盘和内存(Share nothing)，每个节点内的 CPU 不能访问另一个节点的内存。节点之间的信息交互是通过节点互联网络实现的，这个过程一般称为数据重分配(Data Redistribution)。GP master负责协调整个集群，一个数据节点可以配置多个节点实例(Segment Instances)，节点实例并行处理查询(SQL)。

Primary和Mirror同步机制

Primary和Mirror同步的内容主要有两部分，即文件和数据。之所以Primary和Mirror要同步文件，是Primary和Mirror之间可以自动failover，只有两者保持同步才能相互替代，如果只把数据同步过去，pg_control、pg_clog、pg_subtrans 没有同步，那么从Primary切换到Mirror会出现问题。GP master和GP slave却不用担心这些问题，Append Only 表的数据只会存在 Segment，所以WAL日志足够保持GP master和GP slave同步(只要是流复制，pg_control、pg_clog、pg_subtrans 这些文件Slave会自动更新，无需从Master同步)。
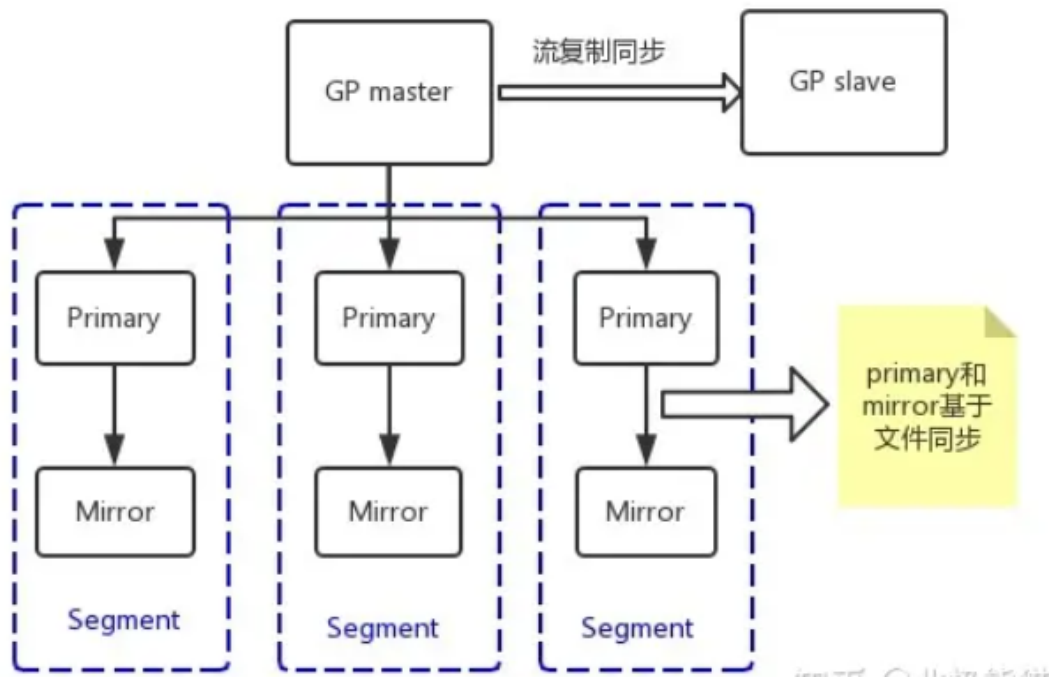
数据同步

当GP master向Primary下发执行计划后，Primary开始执行，如果是DML操作，那么Primary会产生XLOG及更新page。会在 `SlruPhysicalwritePage` 函数中(写数据页)产生FileRepOperationOpen、FileRepOperationWrite、FileRepOperationFlush、FileRepOperationClose等指令消息(消息中包含具体要更新的文件page及内容)，通过primary sender进程向Mirror发送Message，然后Mirror的mirror consumer等进程解析消息，执行变更。XLOG通过 `XLogWrite` 函数(写XLOG)执行同样的操作，把XLOG更新同步过去。

文件同步

Primary会有个recovery进程，这个进程会循环把Primary的 pg_control、pg_clog、pg_subtrans 等文件覆盖到Mirror。同时检查XLOG是否一致，如果不一致以Primary为主，对Mirror进行覆盖。除了把Primary部分文件同步到Mirror之外recovery进程还会将Mirror上面的临时文件删掉。
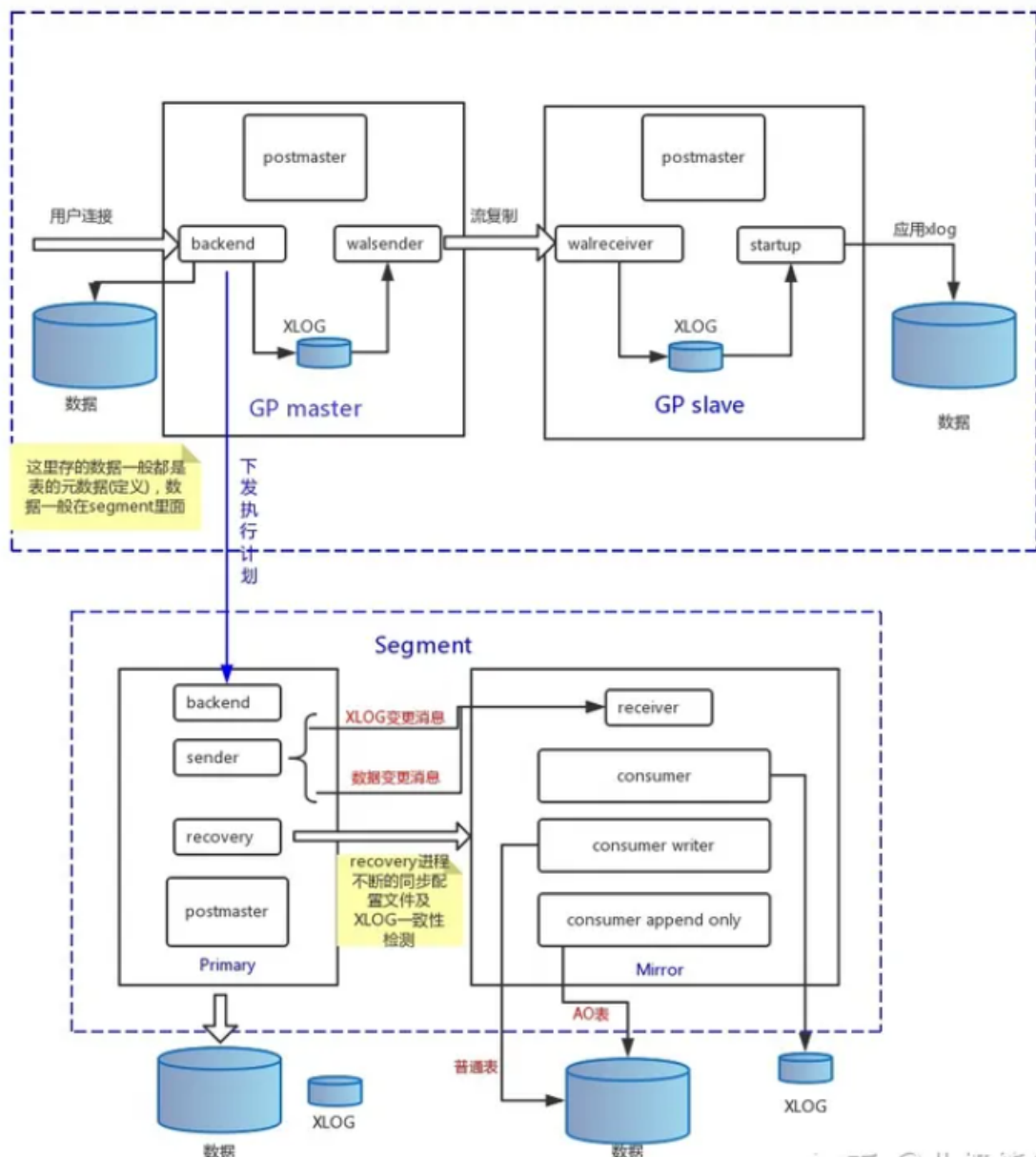
主机规划

主机名	IP地址	节点描述
Mastar-a	192.168.7.136	MASTER节点
Standby-a	192.168.7.137	STANDBY节点
Segment-a	192.168.7.138	SEGMENT节点1
Segment-b	192.168.7.139	SEGMENT节点2

实验准备

虚拟机准备

使用PXE安装 2C2G200G的4台VM虚拟机

Selinux

手动处理selinux为disabled

网络变动&网络测试

停止LB-PXE主机，网卡变更为NAT模拟上网环境并新增vm7仅主机网卡用于内网连接

```
# 查看外网网卡并进行开启测试
[root@Master-a ~]# nmcli connection up 5147eef6-1757-44d2-84f0-c9e780da500b
Connection successfully activated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/2)
[root@Master-a ~]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
System ens33         5147eef6-1757-44d2-84f0-c9e780da500b  ethernet  ens33
Wired connection 1   7722ab4a-dda9-3a6b-8b54-ec8cfaa41e20  ethernet  ens36
[root@Master-a ~]# ping www.baidu.com
PING www.a.shifen.com (39.156.66.18) 56(84) bytes of data.
64 bytes from 39.156.66.18 (39.156.66.18): icmp_seq=1 ttl=128 time=23.5 ms
64 bytes from 39.156.66.18 (39.156.66.18): icmp_seq=2 ttl=128 time=23.3 ms
^C
--- www.a.shifen.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 23.361/23.439/23.517/0.078 ms
[root@Master-a ~]# nmcli connection down ens33
Error: 'ens33' is not an active connection.
Error: no active connection provided.
[root@Master-a ~]# nmcli connection down 5147eef6-1757-44d2-84f0-c9e780da500b
Connection 'System ens33' successfully deactivated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/2)

# 关闭网卡模拟内网
[root@Master-a ~]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
Wired connection 1   7722ab4a-dda9-3a6b-8b54-ec8cfaa41e20  ethernet  ens36
System ens33         5147eef6-1757-44d2-84f0-c9e780da500b  ethernet  --
[root@Master-a ~]# ping www.baidu.com
```

设置主机名

通过nmtui设置主机名

搭建私有YUM源

在standby-a节点上搭建apache httpd yum私有源

```
# 挂载光盘
[root@Standby-a objest]# mount iso/CentOS-7-x86_64-DVD-2003.iso localyum/
mount: /dev/loop0 is write-protected, mounting read-only
[root@Standby-a objest]# cd localyum/
[root@Standby-a localyum]# ls
CentOS_BuildTag EULA  images    LiveOS   repodata                     RPM-GPG-KEY-
CentOS-Testing-7
EFI              GPL  isolinux  Packages RPM-GPG-KEY-CentOS-7  TRANS.TBL
[root@Standby-a localyum]#

# 查看光盘本地源
[root@Standby-a yum.repos.d]# touch local.repo
```

```
[root@Standby-a yum.repos.d]# cat local.repo
[local]
name=Local Yum
baseurl=file:///home/objest/localyum
enable=1
gpgcheck=0
[root@Standby-a yum.repos.d]#

# 其他源临时修改后缀处理
[root@Standby-a yum.repos.d]# rename repo repotmp *
[root@Standby-a yum.repos.d]# ll
total 40
-rw-r--r--. 1 root root 1664 Apr  8  2020 CentOS-Base.repotmp
-rw-r--r--. 1 root root 1309 Apr  8  2020 CentOS-CR.repotmp
-rw-r--r--. 1 root root  649 Apr  8  2020 CentOS-Debuginfo.repotmp
-rw-r--r--. 1 root root  314 Apr  8  2020 CentOS-fasttrack.repotmp
-rw-r--r--. 1 root root  630 Apr  8  2020 CentOS-Media.repotmp
-rw-r--r--. 1 root root 1331 Apr  8  2020 CentOS-Sources.repotmp
-rw-r--r--. 1 root root 7577 Apr  8  2020 CentOS-Vault.repotmp
-rw-r--r--. 1 root root  616 Apr  8  2020 CentOS-x86_64-kernel.repotmp
-rw-r--r--  1 root root   80 Jun  4 22:44 local.repotmp

# 设置光盘源
[root@Standby-a yum.repos.d]# mv local.repotmp local.repo



[root@Standby-a yum.repos.d]#
# 安装httpd
[root@Standby-a yum.repos.d]# yum install -y httpd
[root@Standby-a yum.repos.d]# systemctl start httpd

# 光盘文件复制
[root@Standby-a html]# cp -ra /home/objest/localyum .
[root@Standby-a html]#
[root@Standby-a html]# pwd

# 设置http-repo源
[root@Standby-a yum.repos.d]# cp local.repo localhttp.repo
[root@Standby-a yum.repos.d]# vim local
[root@Standby-a yum.repos.d]# vim localhttp.repo
[root@Standby-a yum.repos.d]#

# 更新yum源缓存
[root@Standby-a yum.repos.d]# yum makecache
```

卸载光盘删除文件设置HTTPD服务自启

init 6 重启机器后删除文件

```
# 删除光盘local相关文件
[root@Standby-a ~]# cd /home/objest/
[root@Standby-a objest]# ls
iso  localyum
[root@Standby-a objest]# rm -rf localyum/
[root@Standby-a objest]# rm -rf iso/
[root@Standby-a objest]#
```

```
# 设置httpd服务开机启动
[root@Standby-a yum.repos.d]# systemctl enable httpd --now
[root@Standby-a yum.repos.d]# yum clean all
Loaded plugins: fastestmirror
Cleaning repos: localhttp
Cleaning up list of fastest mirrors
Other repos take up 51 M of disk space (use --verbose for details)
[root@Standby-a yum.repos.d]# yum makecache

# 清理YUM源
[root@Standby-a yum.repos.d]# yum clean all
Loaded plugins: fastestmirror
Cleaning repos: localhttp
Cleaning up list of fastest mirrors
Other repos take up 51 M of disk space (use --verbose for details)

# 更新YUM源
[root@Standby-a yum.repos.d]# yum makecache
```

设置hosts并复制其他节点HTTP-YUM源

```
# 设置hosts文件
[root@Standby-a yum.repos.d]# cat /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6
[root@Standby-a yum.repos.d]#
[root@Standby-a yum.repos.d]#
[root@Standby-a yum.repos.d]#
[root@Standby-a yum.repos.d]#
[root@Standby-a yum.repos.d]# cat << EOF >> /etc/hosts
> 192.168.7.136  Master-a
> 192.168.7.137  Standby-a
> 192.168.7.138  Segment-a
> 192.168.7.139  Segment-b
> EOF
[root@Standby-a yum.repos.d]# cat /etc/hosts
127.0.0.1    localhost localhost.localdomain localhost4 localhost4.localdomain4
::1          localhost localhost.localdomain localhost6 localhost6.localdomain6
192.168.7.136  Master-a
192.168.7.137  Standby-a
192.168.7.138  Segment-a
192.168.7.139  Segment-b
[root@Standby-a yum.repos.d]#

# 复制到其他节点hosts文件
[root@Standby-a yum.repos.d]# scp /etc/hosts Master-a:/etc/hosts
The authenticity of host 'master-a (192.168.7.136)' can't be established.
ECDSA key fingerprint is SHA256:ICELL8DOaZ7rN9rWXoqyfr5pz+bw523/FwwHjsi66QM.
ECDSA key fingerprint is MD5:06:6a:e0:62:f0:df:8a:be:2a:3e:95:51:05:f5:bd:da.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'master-a,192.168.7.136' (ECDSA) to the list of known
hosts.
root@master-a's password:
hosts
                                               100%  257   614.0KB/s
00:00
[root@Standby-a yum.repos.d]# scp /etc/hosts Segment-a:/etc/hosts
```

```
The authenticity of host 'segment-a (192.168.7.138)' can't be established.
ECDSA key fingerprint is SHA256:sTgeZrp9dUXMX/wO2qbJKvFurTOqBSbqOWYsoMK2Z1s.
ECDSA key fingerprint is MD5:06:b9:1a:65:b3:12:d8:be:f2:e6:f1:5c:e0:9e:2b:6c.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'segment-a,192.168.7.138' (ECDSA) to the list of
known hosts.
root@segment-a's password:
hosts
                                                    100%  257     78.6KB/s
00:00
[root@Standby-a yum.repos.d]# scp /etc/hosts Segment-b:/etc/hosts
The authenticity of host 'segment-b (192.168.7.139)' can't be established.
ECDSA key fingerprint is SHA256:UNVqysnB3DIdtF5W35IlvIHRN6ZpVB61fu5HjWP/HbM.
ECDSA key fingerprint is MD5:ba:14:8a:f9:36:bc:24:4b:7b:81:51:1a:73:8d:52:d8.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'segment-b,192.168.7.139' (ECDSA) to the list of
known hosts.
root@segment-b's password:
hosts
                                                    100%  257     179.7KB/s
00:00
[root@Standby-a yum.repos.d]#

# 查看hosts文件是否正常 -看一个就行了
[root@Standby-a yum.repos.d]# ssh Master-a "cat /etc/hosts"
root@master-a's password:
Permission denied, please try again.
root@master-a's password:
127.0.0.1   localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6
192.168.7.136   Master-a
192.168.7.137   Standby-a
192.168.7.138   Segment-a
192.168.7.139   Segment-b
[root@Standby-a yum.repos.d]#

# 同步修改其他机器的yum源配置
[root@Standby-a yum.repos.d]# ssh Master-a "cd /etc/yum.repos.d ; rename repo
repotmp * ; ls"
root@master-a's password:
CentOS-Base.repotmp
CentOS-CR.repotmp
CentOS-Debuginfo.repotmp
CentOS-fasttrack.repotmp
CentOS-Media.repotmp
CentOS-Sources.repotmp
CentOS-Vault.repotmp
CentOS-x86_64-kernel.repotmp
[root@Standby-a yum.repos.d]# ssh Segment-a "cd /etc/yum.repos.d ; rename repo
repotmp * ; ls"
root@segment-a's password:
CentOS-Base.repotmp
CentOS-CR.repotmp
CentOS-Debuginfo.repotmp
CentOS-fasttrack.repotmp
CentOS-Media.repotmp
CentOS-Sources.repotmp
CentOS-Vault.repotmp
```

```
CentOS-x86_64-kernel.repotmp
[root@Standby-a yum.repos.d]# ssh Segment-b "cd /etc/yum.repos.d ; rename repo
repotmp * ; ls"
root@segment-b's password:
CentOS-Base.repotmp
CentOS-CR.repotmp
CentOS-Debuginfo.repotmp
CentOS-fasttrack.repotmp
CentOS-Media.repotmp
CentOS-Sources.repotmp
CentOS-Vault.repotmp
CentOS-x86_64-kernel.repotmp
[root@Standby-a yum.repos.d]#

# 复制HTTP源配置
[root@Standby-a yum.repos.d]# scp /etc/yum.repos.d/localhttp.repo Master-
a:/etc/yum.repos.d/localhttp.repo
root@master-a's password:
localhttp.repo
                                                  100%   90    162.7KB/s
00:00
[root@Standby-a yum.repos.d]# scp /etc/yum.repos.d/localhttp.repo Segment-
a:/etc/yum.repos.d/localhttp.repo
root@segment-a's password:
Permission denied, please try again.
root@segment-a's password:
localhttp.repo
                                                  100%   90     51.5KB/s
00:00
[root@Standby-a yum.repos.d]# scp /etc/yum.repos.d/localhttp.repo Segment-
b:/etc/yum.repos.d/localhttp.repo
root@segment-b's password:
localhttp.repo
                                                  100%   90    135.0KB/s
00:00
[root@Standby-a yum.repos.d]#

# 防火墙开放80端口
[root@Standby-a yum.repos.d]# firewall-cmd --list-all
public (active)
  target: default
  icmp-block-inversion: no
  interfaces: ens36
  sources:
  services: dhcpv6-client ssh
  ports:
  protocols:
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:

[root@Standby-a yum.repos.d]# firewall-cmd --permanent --zone=public --add-
service=http
success
[root@Standby-a yum.repos.d]# firewall-cmd --reload
success
```

```
[root@Standby-a yum.repos.d]# firewall-cmd --list-all
public (active)
  target: default
  icmp-block-inversion: no
  interfaces: ens36
  sources:
  services: dhcpv6-client http ssh
  ports:
  protocols:
  masquerade: no
  forward-ports:
  source-ports:
  icmp-blocks:
  rich rules:

[root@Standby-a yum.repos.d]#

# 更新YUM源其他节点
[root@Standby-a yum.repos.d]# ssh Master-a "yum clean all ; yum makecache"
root@master-a's password:
Loaded plugins: fastestmirror
Cleaning repos: localhttp
Cleaning up list of fastest mirrors
Loaded plugins: fastestmirror
Determining fastest mirrors
Metadata Cache Created
[root@Standby-a yum.repos.d]# ssh Segment-a "yum clean all ; yum makecache"
root@segment-a's password:
Loaded plugins: fastestmirror
Cleaning repos: localhttp
Loaded plugins: fastestmirror
Determining fastest mirrors
Metadata Cache Created
[root@Standby-a yum.repos.d]# ssh Segment-b "yum clean all ; yum makecache"
root@segment-b's password:
Loaded plugins: fastestmirror
Cleaning repos: localhttp
Loaded plugins: fastestmirror
Determining fastest mirrors
Metadata Cache Created
[root@Standby-a yum.repos.d]#
```

实验一：搭建3节点一个Master和2个Segment不含Mirror镜像的集群

安装所需依赖

@ M S-a S-b 执行

```
# 安装依赖
yum install vim net-tools psmisc nc rsync lrzsz ntp libzstd openssl-static tree
iotop git

yum install apr apr-util bash bzip2 curl krb5 libcurl libevent libxml2 libyaml
zlib openldap openssh-client openssl openssl-libs perl readline rsync R sed tar
zip krb5-devel
```

系统配置参数计算

@ M S-a S-b 执行

```
# 计算共享内存  - M为例 其他同理
# KERNEL.SHMALL
[root@Master-a /]# echo $(expr $(getconf _PHYS_PAGES) / 2)
232879

# KERNEL.SHMMAX
[root@Master-a /]# echo $(expr $(getconf _PHYS_PAGES) / 2 \* $(getconf
PAGE_SIZE))
953872384
[root@Master-a /]# free
              total        used        free      shared  buff/cache   available
Mem:        1863036      192080     1245768        9780      425188     1510488
Swap:       2097148           0     2097148
[root@Master-a /]#

# 根据计算结果设置参数
[root@Master-a /]# vim /etc/sysctl.conf
[root@Master-a /]# sysctl -p
kernel.shmall = 232879
kernel.shmmax = 953872384
kernel.shmmni = 4096
vm.overcommit_memory = 2
vm.overcommit_ratio = 95
net.ipv4.ip_local_port_range = 10000 65535
kernel.sysrq = 1
kernel.core_uses_pid = 1
kernel.msgmnb = 65536
kernel.msgmax = 65536
kernel.msgmni = 2048
net.ipv4.tcp_syncookies = 1
net.ipv4.conf.default.accept_source_route = 0
net.ipv4.tcp_max_syn_backlog = 4096
net.ipv4.conf.all.arp_filter = 1
net.core.netdev_max_backlog = 10000
net.core.rmem_max = 2097152
net.core.wmem_max = 2097152
vm.swappiness = 10
vm.zone_reclaim_mode = 0
vm.dirty_expire_centisecs = 500
vm.dirty_writeback_centisecs = 100
vm.dirty_background_ratio = 3
vm.dirty_ratio = 10
[root@Master-a /]#
```

好的，这些参数大致可以分为处理内存、网络和内核消息的参数。下面是它们的详细解释：

kernel.shmall：在系统范围内设定共享内存的最大总量（以页为单位）。当创建共享内存段时，系统将它和这个值进行比较。

kernel.shmmax：系统中单个共享内存段的最大大小（以字节为单位）。这个参数也会影响到共享内存的创建。

kernel.shmmni：系统范围内共享内存段的最大数量。

vm.overcommit_memory 和 vm.overcommit_ratio：这些设置决定了系统对内存超量分配的策略。

net.ipv4.ip_local_port_range：这个值设定了TCP和UDP协议能使用的本地端口范围。

kernel.sysrq：延长系统请求的功能，如重新启动、关机、内存转储等。

kernel.core_uses_pid：当启用后，程序跳出核心文件时会在文件名中包含进程ID。

kernel.msgmnb，kernel.msgmax，kernel.msgmni：这些参数调整IPC消息队列的大小和数量。

net.ipv4.tcp_syncookies：当启用时，防止了TCP SYN洪水攻击，但在某些情况下可能会影响正常的TCP链接。

net.ipv4.conf.default.accept_source_route 和 net.ipv4.conf.all.arp_filter：IP选项和ARP协议的处理。

net.ipv4.tcp_max_syn_backlog：为尚未获得对方确认的连接请求设置最大排队数量。

net.core.netdev_max_backlog：接收数据包的最大速率。

net.core.rmem_max 和 net.core.wmem_max：设定网络连接的最大内存缓冲区大小。

vm.swappiness：影响内核交换内存页面的相对权重。

vm.zone_reclaim_mode：设置本地节点内存回收策略。

vm.dirty_expire_centisecs，vm.dirty_writeback_centisecs，vm.dirty_background_ratio，vm.dirty_ratio：调整系统何时对"脏"内存页面进行写回。

以上是对每个参数的简短解释，每个参数的设定都会对系统性能产生影响，需要根据具体的系统环境和应用需求进行设置。

修改Limits限制

@ M S-a S-b 执行

```
# 修改系统配额 M例
[root@Master-a /]# vim /etc/security/limits.d/20-nproc.conf
[root@Master-a /]# cat /etc/security/limits.d/20-nproc.conf
# Default limit for number of user's processes to prevent
# accidental fork bombs.
# See rhbz #432903 for reasoning.

*          soft    nproc     4096
root       soft    nproc     unlimited

# GreenplumDB
*    soft    nofile    65536
*    hard    nofile    65536
*    soft    nproc     131072
*    hard    nproc     131072
[root@Master-a /]#
[root@Master-a /]# vim /etc/security/limits.conf
[root@Master-a /]# tail /etc/security/limits.conf
#ftp            hard    nproc           0
#@student       -       maxlogins       4

# End of file

# GreenplumDB
*    soft    nofile    65536
```

```
*       hard    nofile   65536
*       soft    nproc    131072
*       hard    nproc    131072
[root@Master-a /]#
```

修改SSHD服务相关配置

@ M S-a S-b 执行

```
# 修改SSH相关参数 M例
[root@Master-a /]# vim /etc/ssh/sshd_config
[root@Master-a /]# cat /etc/ssh/sshd_config |grep ^Max
MaxSessions 200
MaxStartups 10:30:1000
[root@Master-a /]#

# 确认字符集 M例
[root@Master-a /]# echo $LANG
en_US.UTF-8
[root@Master-a /]#
```

连接网络同步时间

@ M S-a S-b 执行

```
# 连接网络 - 如果本地有NTP服务器或受时服务器请忽略此步
[root@Master-a /]# date
Thu Jun  6 14:21:21 CST 2024
[root@Master-a /]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
Wired connection 1   7722ab4a-dda9-3a6b-8b54-ec8cfaa41e20  ethernet  ens36
System ens33         5147eef6-1757-44d2-84f0-c9e780da500b  ethernet  --
[root@Master-a /]# nmcli connection up 5147eef6-1757-44d2-84f0-c9e780da500b
Connection successfully activated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/3)
[root@Master-a /]# ping www.baidu.com
PING www.a.shifen.com (39.156.66.14) 56(84) bytes of data.
64 bytes from 39.156.66.14 (39.156.66.14): icmp_seq=1 ttl=128 time=23.7 ms
^C
--- www.a.shifen.com ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 23.718/23.718/23.718/0.000 ms
[root@Master-a /]# ntpdate cn.pool.ntp.org
 6 Jun 14:35:02 ntpdate[125115]: adjust time server 84.16.73.33 offset -0.031644
sec
[root@Master-a /]# date
Thu Jun  6 14:35:08 CST 2024
[root@Master-a /]#

# 关闭网络 - 模拟内网环境
[root@Master-a /]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
System ens33         5147eef6-1757-44d2-84f0-c9e780da500b  ethernet  ens33
Wired connection 1   7722ab4a-dda9-3a6b-8b54-ec8cfaa41e20  ethernet  ens36
[root@Master-a /]# nmcli connection down 5147eef6-1757-44d2-84f0-c9e780da500b
```

```
Connection 'System ens33' successfully deactivated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/3)
[root@Master-a /]# ping www.baidu.com
^C
[root@Master-a /]#
```

设置用户以及用户组

@ M S-a S-b 执行

```
# 创建用户以及用户组 M为例 密码：gpadmin
[root@Master-a /]# groupadd gpadmin
[root@Master-a /]# useradd gpadmin -r -m -g gpadmin
[root@Master-a /]# id gpadmin
uid=997(gpadmin) gid=1000(gpadmin) groups=1000(gpadmin)
[root@Master-a /]# passwd gpadmin
Changing password for user gpadmin.
New password:
BAD PASSWORD: The password is shorter than 8 characters
Retype new password:
passwd: all authentication tokens updated successfully.
[root@Master-a /]#
```

设置gpadmin用户免密登录

@ M S-a S-b 执行

```
# 免密要求 -对自己免密 and 对其他节点免密
# M为例
[root@Master-a /]# su - gpadmin
[gpadmin@Master-a ~]$ ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/home/gpadmin/.ssh/id_rsa):
Created directory '/home/gpadmin/.ssh'.
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/gpadmin/.ssh/id_rsa.
Your public key has been saved in /home/gpadmin/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:InJne3EKn4p82ZLwLtBZBEOsAUp8bD122L4jHO3c2H8 gpadmin@Master-a
The key's randomart image is:
+---[RSA 2048]----+
|..o.+*+          |
|.o +.=+o         |
|. o .o+ . +      |
|      .. + o     |
|  ..oo= S . .    |
|  .o+= O *   . E |
|   . o++B    .   |
|   ...*+.        |
|    o+o.         |
+----[SHA256]-----+
[gpadmin@Master-a ~]$ ssh-copy-id Master-a
/bin/ssh-copy-id: INFO: Source of key(s) to be installed:
"/home/gpadmin/.ssh/id_rsa.pub"
The authenticity of host 'master-a (192.168.7.136)' can't be established.
```

```
ECDSA key fingerprint is SHA256:ICELL8DOaZ7rN9rWXoqyfr5pz+bw523/FwwHjsi66QM.
ECDSA key fingerprint is MD5:06:6a:e0:62:f0:df:8a:be:2a:3e:95:51:05:f5:bd:da.
Are you sure you want to continue connecting (yes/no)? yes
/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out
any that are already installed
/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted
now it is to install the new keys
gpadmin@master-a's password:
Permission denied, please try again.
gpadmin@master-a's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'Master-a'"
and check to make sure that only the key(s) you wanted were added.

[gpadmin@Master-a ~]$ ssh 'Master-a'
Last failed login: Thu Jun  6 14:51:34 CST 2024 from master-a on ssh:notty
There was 1 failed login attempt since the last successful login.
Last login: Thu Jun  6 14:50:38 2024
[gpadmin@Master-a ~]$ exit
logout
Connection to master-a closed.
[gpadmin@Master-a ~]$ ssh-copy-id Segment-a
/bin/ssh-copy-id: INFO: Source of key(s) to be installed:
"/home/gpadmin/.ssh/id_rsa.pub"
The authenticity of host 'segment-a (192.168.7.138)' can't be established.
ECDSA key fingerprint is SHA256:sTgeZrp9dUXMX/wO2qbJKvFurTOqBSbqOWYsoMK2Z1s.
ECDSA key fingerprint is MD5:06:b9:1a:65:b3:12:d8:be:f2:e6:f1:5c:e0:9e:2b:6c.
Are you sure you want to continue connecting (yes/no)? yes
/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out
any that are already installed
/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted
now it is to install the new keys
gpadmin@segment-a's password:
Permission denied, please try again.
gpadmin@segment-a's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'Segment-a'"
and check to make sure that only the key(s) you wanted were added.

[gpadmin@Master-a ~]$ ssh 'Segment-a'
Last failed login: Thu Jun  6 14:52:21 CST 2024 from master-a on ssh:notty
There was 1 failed login attempt since the last successful login.
[gpadmin@Segment-a ~]$ exit
logout
Connection to segment-a closed.
[gpadmin@Master-a ~]$ ssh-copy-id Segment-b
/bin/ssh-copy-id: INFO: Source of key(s) to be installed:
"/home/gpadmin/.ssh/id_rsa.pub"
The authenticity of host 'segment-b (192.168.7.139)' can't be established.
ECDSA key fingerprint is SHA256:UNVqysnB3DIdtF5W35IlvIHRN6ZpVB61fu5HjWP/HbM.
ECDSA key fingerprint is MD5:ba:14:8a:f9:36:bc:24:4b:7b:81:51:1a:73:8d:52:d8.
Are you sure you want to continue connecting (yes/no)? yes
/bin/ssh-copy-id: INFO: attempting to log in with the new key(s), to filter out
any that are already installed
```

```
/bin/ssh-copy-id: INFO: 1 key(s) remain to be installed -- if you are prompted
now it is to install the new keys
gpadmin@segment-b's password:

Number of key(s) added: 1

Now try logging into the machine, with:   "ssh 'Segment-b'"
and check to make sure that only the key(s) you wanted were added.

[gpadmin@Master-a ~]$ ssh 'Segment-b'
[gpadmin@Segment-b ~]$ exit
logout
Connection to segment-b closed.
[gpadmin@Master-a ~]$
```

Greenplum数据库安装

@ M S-a S-b 执行

```
# 上传RPM包到预订位置 M例
[gpadmin@Master-a opt]$ cd /home/gpadmin/
[gpadmin@Master-a ~]$ mkdir soft
[gpadmin@Master-a ~]$ cd soft/
[gpadmin@Master-a soft]$ ll
total 67712
-rw-r--r-- 1 root root 69333396 Jun  6 15:00 greenplum-db-6.13.0-rhel7-
x86_64.rpm
[gpadmin@Master-a soft]$ su -
Password:
Last login: Tue Jun  4 21:35:39 CST 2024 from 192.168.7.1 on pts/0
Last failed login: Wed Jun  5 16:09:13 CST 2024 from standby-a on ssh:notty
There were 3 failed login attempts since the last successful login.
[root@Master-a ~]# cd /home/gpadmin/soft/
[root@Master-a soft]# ls
greenplum-db-6.13.0-rhel7-x86_64.rpm
[root@Master-a soft]#

# 安装数据库 - 如果依赖安装OK这里不会有相关依赖提示
[root@Master-a soft]# yum install ./greenplum-db-6.13.0-rhel7-x86_64.rpm
Loaded plugins: fastestmirror
Examining ./greenplum-db-6.13.0-rhel7-x86_64.rpm: greenplum-db-6-6.13.0-
1.el7.x86_64
Marking ./greenplum-db-6.13.0-rhel7-x86_64.rpm to be installed
Resolving Dependencies
--> Running transaction check
---> Package greenplum-db-6.x86_64 0:6.13.0-1.el7 will be installed
--> Finished Dependency Resolution

Dependencies Resolved

====================================================================================
================================================
 Package                      Arch            Version
Repository                           Size
====================================================================================
================================================
Installing:
```

```
   greenplum-db-6              x86_64                6.13.0-1.el7
   /greenplum-db-6.13.0-rhel7-x86_64                311 M

Transaction Summary
================================================================================
=========================================
Install  1 Package

Total size: 311 M
Installed size: 311 M
Is this ok [y/d/N]: y
Downloading packages:
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : greenplum-db-6-6.13.0-1.el7.x86_64
                                           1/1
  Verifying  : greenplum-db-6-6.13.0-1.el7.x86_64
                                             1/1

Installed:
  greenplum-db-6.x86_64 0:6.13.0-1.el7


Complete!
[root@Master-a soft]#

# 查看安装结果并授权
[root@Master-a soft]# cd /usr/local/
[root@Master-a local]# ll
total 0
drwxr-xr-x.  2 root root   6 Apr 11  2018 bin
drwxr-xr-x.  2 root root   6 Apr 11  2018 etc
drwxr-xr-x.  2 root root   6 Apr 11  2018 games
lrwxrwxrwx   1 root root  30 Jun  6 15:02 greenplum-db -> /usr/local/greenplum-
db-6.13.0
drwxr-xr-x  11 root root 238 Jun  6 15:02 greenplum-db-6.13.0
drwxr-xr-x.  2 root root   6 Apr 11  2018 include
drwxr-xr-x.  2 root root   6 Apr 11  2018 lib
drwxr-xr-x.  2 root root   6 Apr 11  2018 lib64
drwxr-xr-x.  2 root root   6 Apr 11  2018 libexec
drwxr-xr-x.  2 root root   6 Apr 11  2018 sbin
drwxr-xr-x.  5 root root  49 Jun  4 18:29 share
drwxr-xr-x.  2 root root   6 Apr 11  2018 src
[root@Master-a local]# chown -R gpadmin:gpadmin greenplum-db*
[root@Master-a local]# ll
total 0
drwxr-xr-x.  2 root    root      6 Apr 11  2018 bin
drwxr-xr-x.  2 root    root      6 Apr 11  2018 etc
drwxr-xr-x.  2 root    root      6 Apr 11  2018 games
lrwxrwxrwx   1 gpadmin gpadmin  30 Jun  6 15:02 greenplum-db ->
/usr/local/greenplum-db-6.13.0
drwxr-xr-x  11 gpadmin gpadmin 238 Jun  6 15:02 greenplum-db-6.13.0
drwxr-xr-x.  2 root    root      6 Apr 11  2018 include
drwxr-xr-x.  2 root    root      6 Apr 11  2018 lib
drwxr-xr-x.  2 root    root      6 Apr 11  2018 lib64
drwxr-xr-x.  2 root    root      6 Apr 11  2018 libexec
```

```
drwxr-xr-x.  2 root    root      6 Apr 11  2018 sbin
drwxr-xr-x.  5 root    root     49 Jun  4 18:29 share
drwxr-xr-x.  2 root    root      6 Apr 11  2018 src
[root@Master-a local]#
```

初始化前环境变量设置

@ M

```
# 数据库初始化前环境变量设置 -仅在Master节点操作
# 设置实验一节点所需资源
[root@Master-a local]# su - gpadmin
Last login: Thu Jun  6 14:51:57 CST 2024 from master-a on pts/1
[gpadmin@Master-a ~]$ ls
soft
[gpadmin@Master-a ~]$ mkdir conf
[gpadmin@Master-a ~]$ ll
total 0
drwxrwxr-x 2 gpadmin gpadmin  6 Jun  6 15:12 conf
drwxrwxr-x 2 gpadmin gpadmin 50 Jun  6 15:00 soft
[gpadmin@Master-a ~]$ cd conf/
[gpadmin@Master-a conf]$ touch hostlist
[gpadmin@Master-a conf]$ touch seg_hosts
[gpadmin@Master-a conf]$ cat << EOF >> hostlist
> Master-a
> Segment-a
> Segment-b
> EOF
[gpadmin@Master-a conf]$ cat << EOF >> seg_hosts
> Segment-a
> Segment-b
> EOF
[gpadmin@Master-a conf]$ cat hostlist
Master-a
Segment-a
Segment-b
[gpadmin@Master-a conf]$ cat seg_hosts
Segment-a
Segment-b
[gpadmin@Master-a conf]$

# 环境变量引入 - 测试连通性
[gpadmin@Master-a conf]$ source /usr/local/greenplum-db-6.13.0/greenplum_path.sh
[gpadmin@Master-a conf]$ gpssh-exkeys -f hostlist
[STEP 1 of 5] create local ID and authorize on local host
  ... /home/gpadmin/.ssh/id_rsa file exists ... key generation skipped

[STEP 2 of 5] keyscan all hosts and update known_hosts file

[STEP 3 of 5] retrieving credentials from remote hosts
  ... send to Segment-a
  ... send to Segment-b

[STEP 4 of 5] determine common authentication file content

[STEP 5 of 5] copy authentication files to all remote hosts
  ... finished key exchange with Segment-a
```

```
    ... finished key exchange with Segment-b

[INFO] completed successfully
[gpadmin@Master-a conf]$
```

创建数据目录

@ M

```
# 创建数据目录-仅在Master节点操作
[gpadmin@Master-a conf]$ mkdir -p /home/gpadmin/data/master
[gpadmin@Master-a conf]$ cd ~

# 创建用户环境变量
[gpadmin@Master-a ~]$ vim .bashrc
[gpadmin@Master-a ~]$ cat .bashrc
# .bashrc

# Source global definitions
if [ -f /etc/bashrc ]; then
        . /etc/bashrc
fi

# Uncomment the following line if you don't like systemctl's auto-paging
feature:
# export SYSTEMD_PAGER=

# User specific aliases and functions

source /usr/local/greenplum-db/greenplum_path.sh
export PGPORT=5432
export PGUSER=gpadmin
export MASTER_DATA_DIRECTORY=/home/gpadmin/data/master/gpseg-1
export PGDATABASE=gp_sydb
export LD_PRELOAD=/lib64/libz.so.1 ps
[gpadmin@Master-a ~]$

# 在bash脚本中增加环境变量路径
[gpadmin@Master-a ~]$ vim /usr/local/greenplum-db/greenplum_path.sh
[gpadmin@Master-a ~]$ cat /usr/local/greenplum-db/greenplum_path.sh | grep
GPHOME=/
GPHOME=/usr/local/greenplum-db
[gpadmin@Master-a ~]$

# 创建数据文件夹 - 通过免密工具
[gpadmin@Master-a ~]$ gpssh -f /home/gpadmin/conf/hostlist
=> ls
[ Master-a] conf  data  soft
[Segment-a] soft
[Segment-b] soft
=> mkdir data
[ Master-a] mkdir: cannot create directory 'data': File exists
[Segment-a]
[Segment-b]
=> ls
[ Master-a] conf  data  soft
[Segment-a] data  soft
```

```
[Segment-b] data    soft
=> cd data
[ Master-a]
[Segment-a]
[Segment-b]
=> mkdir master
[ Master-a] mkdir: cannot create directory 'master': File exists
[Segment-a]
[Segment-b]
=> mkdir primary
[ Master-a]
[Segment-a]
[Segment-b]
=> mkdir mirror
[ Master-a]
[Segment-a]
[Segment-b]
=> ls
[ Master-a] master       mirror  primary
[Segment-a] master       mirror  primary
[Segment-b] master       mirror  primary
=> pwd
[ Master-a] /home/gpadmin/data
[Segment-a] /home/gpadmin/data
[Segment-b] /home/gpadmin/data
=> exit

[gpadmin@Master-a ~]$
```

测试服务器IO,网络模拟性能

@ M

```
# 检查防火墙 -M为例
[root@Master-a local]# systemctl stop firewalld
[root@Master-a local]# systemctl disable firewalld
Removed symlink /etc/systemd/system/multi-user.target.wants/firewalld.service.
Removed symlink /etc/systemd/system/dbus-org.fedoraproject.FirewallD1.service.
[root@Master-a local]# systemctl status firewalld
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; disabled; vendor
preset: enabled)
   Active: inactive (dead)
     Docs: man:firewalld(1)

Jun 04 21:29:23 localhost.localdomain systemd[1]: Starting firewalld - dynamic
firewall daemon...
Jun 04 21:29:23 localhost.localdomain systemd[1]: Started firewalld - dynamic
firewall daemon.
Jun 06 15:29:27 Master-a systemd[1]: Stopping firewalld - dynamic firewall
daemon...
Jun 06 15:29:28 Master-a systemd[1]: Stopped firewalld - dynamic firewall
daemon.
[root@Master-a local]#

# 测试IO,网络
[root@Master-a local]# su - gpadmin
```

```
Last login: Thu Jun  6 15:25:35 CST 2024 from master-a on pts/4
[gpadmin@Master-a ~]$ gpcheckperf -f /home/gpadmin/conf/hostlist -r N -d /tmp
/usr/local/greenplum-db/bin/gpcheckperf -f /home/gpadmin/conf/hostlist -r N -d
/tmp


------------------
--  NETPERF TEST
------------------
NOTICE: -t is deprecated, and has no effect
NOTICE: -f is deprecated, and has no effect
NOTICE: -t is deprecated, and has no effect
NOTICE: -f is deprecated, and has no effect
NOTICE: -t is deprecated, and has no effect
NOTICE: -f is deprecated, and has no effect
NOTICE: -t is deprecated, and has no effect
NOTICE: -f is deprecated, and has no effect


====================
==   RESULT 2024-06-06T15:32:30.148161
====================
Netperf bisection bandwidth test
Master-a -> Segment-a = 496.510000
Segment-b -> Master-a = 433.330000
Segment-a -> Master-a = 421.970000
Master-a -> Segment-b = 566.860000


Summary:
sum = 1918.67 MB/sec
min = 421.97 MB/sec
max = 566.86 MB/sec
avg = 479.67 MB/sec
median = 496.51 MB/sec


[Warning] connection between Master-a and Segment-a is no good
[Warning] connection between Segment-b and Master-a is no good
[Warning] connection between Segment-a and Master-a is no good
[gpadmin@Master-a ~]$

# 调整SSHD DNS -M为例
[root@Master-a local]# vim /etc/ssh/sshd_config
[root@Master-a local]#
[root@Master-a local]# cat /etc/ssh/sshd_config |grep DNS
UseDNS no
[root@Master-a local]# systemctl restart sshd
[root@Master-a local]#

# 再次测试IO,网络
- 因为是实验环境所用同一个固态  所以直接测Segment节点去掉Master节点
[gpadmin@Master-a ~]$ gpcheckperf -f /home/gpadmin/conf/seg_hosts -r N -d /tmp
/usr/local/greenplum-db/bin/gpcheckperf -f /home/gpadmin/conf/seg_hosts -r N -d
/tmp


------------------
--  NETPERF TEST
------------------
NOTICE: -t is deprecated, and has no effect
NOTICE: -f is deprecated, and has no effect
NOTICE: -t is deprecated, and has no effect
```

```
NOTICE: -f is deprecated, and has no effect


===================
==  RESULT 2024-06-06T15:46:58.245101
===================
Netperf bisection bandwidth test
Segment-a -> Segment-b = 962.680000
Segment-b -> Segment-a = 911.570000


Summary:
sum = 1874.25 MB/sec
min = 911.57 MB/sec
max = 962.68 MB/sec
avg = 937.12 MB/sec
median = 962.68 MB/sec


[gpadmin@Master-a ~]$
```

初始化集群

@ M

```
# 设置初始化集群配置文件 - 不设置mirror
[gpadmin@Master-a ~]$ mkdir gpconfigs
[gpadmin@Master-a ~]$ cp /usr/local/greenplum-
db/docs/cli_help/gpconfigs/gpinitsystem_config /home/gpadmin/gpconfigs/
[gpadmin@Master-a ~]$ cd gpconfigs/
[gpadmin@Master-a gpconfigs]$ ls
gpinitsystem_config
[gpadmin@Master-a gpconfigs]$ vim gpinitsystem_config
[gpadmin@Master-a gpconfigs]$ cat gpinitsystem_config |grep -v "#"
ARRAY_NAME="Greenplum Data Platform"
SEG_PREFIX=gpseg
PORT_BASE=6000
declare -a DATA_DIRECTORY=(/home/gpadmin/data/primary
/home/gpadmin/data/primary)
MASTER_HOSTNAME=Master-a
MASTER_DIRECTORY=/home/gpadmin/data/master
MASTER_PORT=5432
TRUSTED_SHELL=ssh
CHECK_POINT_SEGMENTS=8
ENCODING=UNICODE
DATABASE_NAME=gp_sydb
[gpadmin@Master-a gpconfigs]$

# 新建初始化Seg节点
[gpadmin@Master-a gpconfigs]$ touch hostfile_gpinitsystem
[gpadmin@Master-a gpconfigs]$ cat << EOF >> hostfile_gpinitsystem
> Segment-a
> Segment-b
> EOF
[gpadmin@Master-a gpconfigs]$ cat hostfile_gpinitsystem
Segment-a
Segment-b
[gpadmin@Master-a gpconfigs]$

-- 这里打一个断点，因为即将就要初始化数据库了，创建所有服务器的镜像 M S-a S-b
```

```
# 初始化集群
[gpadmin@Master-a gpconfigs]$ gpinitsystem -c
/home/gpadmin/gpconfigs/gpinitsystem_config -h
/home/gpadmin/gpconfigs/hostfile_gpinitsystem
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking
configuration parameters, please wait...
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Reading Greenplum
configuration file /home/gpadmin/gpconfigs/gpinitsystem_config
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Locale has not
been set in /home/gpadmin/gpconfigs/gpinitsystem_config, will set to default
value
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Locale set to
en_US.utf8
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-
MASTER_MAX_CONNECT not set, will set to default value 250
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking
configuration parameters, Completed
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Commencing multi-
home checks, please wait...
..
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Configuring build
for standard array
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Commencing multi-
home checks, Completed
20240606:16:09:37:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Building primary
segment instance array, please wait...
....
20240606:16:09:39:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking Master
host
20240606:16:09:39:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking new
segment hosts, please wait...
....
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking new
segment hosts, Completed
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum
Database Creation Parameters
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
---------------------
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master
Configuration
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
---------------------
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master instance
name        = Greenplum Data Platform
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master hostname
        = Master-a
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master port
        = 5432
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master instance
dir        = /home/gpadmin/data/master/gpseg-1
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master LOCALE
        = en_US.utf8
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum segment
prefix    = gpseg
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master Database
        = gp_sydb
```

```
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master
connections          = 250
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master buffers
          = 128000kB
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment
connections          = 750
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment buffers
          = 128000kB
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Checkpoint
segments         = 8
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Encoding
          = UNICODE
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Postgres param
file         = Off
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Initdb to be used
        = /usr/local/greenplum-db/bin/initdb
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-GP_LIBRARY_PATH
is         = /usr/local/greenplum-db/lib
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-HEAP_CHECKSUM is
          = on
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-HBA_HOSTNAMES is
          = 0
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Ulimit check
          = Passed
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Array host
connect type    = Single hostname per node
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[1]       = ::1
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[2]       = 192.168.7.136
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[3]       = fe80::116d:c8b0:55ee:d36d
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Standby Master
          = Not Configured
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Number of primary
segments = 2
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Total Database
segments    = 4
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Trusted shell
        = ssh
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Number segment
hosts       = 2
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Mirroring config
          = OFF
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
----------------------
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum Primary
Segment Configuration
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
----------------------
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 6000    Segment-a       /home/gpadmin/data/primary/gpseg0      2
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 6001    Segment-a       /home/gpadmin/data/primary/gpseg1      3
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 6000    Segment-b       /home/gpadmin/data/primary/gpseg2      4
20240606:16:09:42:028836 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 6001    Segment-b       /home/gpadmin/data/primary/gpseg3      5
```

```
Continue with Greenplum creation Yy|Nn (default=N):
> n

-- 这里选择N 终止创建，可以看到因为设置了2个Segment 也就是（）数组内写了 2个
/home/gpadmin/data/primary 所以创建的Segment-Primary共计 4个 各节点为2个

20240606:16:09:57:028836 gpinitsystem:Master-a:gpadmin-[FATAL]:-User abort
requested, Script Exits!
[gpadmin@Master-a gpconfigs]$ ls
gpinitsystem_config  hostfile_gpinitsystem
[gpadmin@Master-a gpconfigs]$ vim gpinitsystem_config
[gpadmin@Master-a gpconfigs]$ cat gpinitsystem_config | grep /home/gpadmin/data
declare -a DATA_DIRECTORY=(/home/gpadmin/data/primary /home/gpadmin/data/primary
/home/gpadmin/data/primary)
MASTER_DIRECTORY=/home/gpadmin/data/master
declare -a MIRROR_DATA_DIRECTORY=(/home/gpadmin/data/mirror
/home/gpadmin/data/mirror /home/gpadmin/data/mirror)
[gpadmin@Master-a gpconfigs]$ gpinitsystem -c
/home/gpadmin/gpconfigs/gpinitsystem_config -h
/home/gpadmin/gpconfigs/hostfile_gpinitsystem
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking
configuration parameters, please wait...
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Reading Greenplum
configuration file /home/gpadmin/gpconfigs/gpinitsystem_config
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Locale has not
been set in /home/gpadmin/gpconfigs/gpinitsystem_config, will set to default
value
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Locale set to
en_US.utf8
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-
MASTER_MAX_CONNECT not set, will set to default value 250
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking
configuration parameters, Completed
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Commencing multi-
home checks, please wait...
..
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Configuring build
for standard array
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Commencing multi-
home checks, Completed
20240606:16:13:07:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Building primary
segment instance array, please wait...
......
20240606:16:13:09:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Building group
mirror array type , please wait...
......
20240606:16:13:11:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking Master
host
20240606:16:13:11:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking new
segment hosts, please wait...
............
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking new
segment hosts, Completed
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum
Database Creation Parameters
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
--------------------
```

```
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master
Configuration
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:----------------
---------------------
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master instance
name        = Greenplum Data Platform
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master hostname
           = Master-a
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master port
           = 5432
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master instance
dir         = /home/gpadmin/data/master/gpseg-1
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master LOCALE
           = en_US.utf8
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum segment
prefix    = gpseg
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master Database
           = gp_sydb
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master
connections         = 250
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master buffers
           = 128000kB
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment
connections         = 750
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment buffers
           = 128000kB
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Checkpoint
segments        = 8
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Encoding
           = UNICODE
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Postgres param
file        = Off
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Initdb to be used
         = /usr/local/greenplum-db/bin/initdb
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-GP_LIBRARY_PATH
is          = /usr/local/greenplum-db/lib
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-HEAP_CHECKSUM is
           = on
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-HBA_HOSTNAMES is
           = 0
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Ulimit check
           = Passed
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Array host
connect type    = Single hostname per node
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[1]       = ::1
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[2]       = 192.168.7.136
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[3]       = fe80::116d:c8b0:55ee:d36d
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Standby Master
           = Not Configured
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Number of primary
segments = 3
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Total Database
segments    = 6
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Trusted shell
           = ssh
```

```
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Number segment
hosts        = 2
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Mirror port base
            = 7000
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Number of mirror
segments   = 3
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Mirroring config
            = ON
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Mirroring type
            = Group
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
----------------------
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum Primary
Segment Configuration
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
----------------------
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 6000    Segment-a        /home/gpadmin/data/primary/gpseg0      2
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 6001    Segment-a        /home/gpadmin/data/primary/gpseg1      3
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 6002    Segment-a        /home/gpadmin/data/primary/gpseg2      4
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 6000    Segment-b        /home/gpadmin/data/primary/gpseg3      5
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 6001    Segment-b        /home/gpadmin/data/primary/gpseg4      6
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 6002    Segment-b        /home/gpadmin/data/primary/gpseg5      7
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
----------------------
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum Mirror
Segment Configuration
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
----------------------
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 7000    Segment-b        /home/gpadmin/data/mirror/gpseg0      8
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 7001    Segment-b        /home/gpadmin/data/mirror/gpseg1      9
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 7002    Segment-b        /home/gpadmin/data/mirror/gpseg2      10
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 7000    Segment-a        /home/gpadmin/data/mirror/gpseg3      11
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 7001    Segment-a        /home/gpadmin/data/mirror/gpseg4      12
20240606:16:13:17:029949 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 7002    Segment-a        /home/gpadmin/data/mirror/gpseg5      13

Continue with Greenplum creation Yy|Nn (default=N):
> n
-- 这里选择N 终止创建，可以看到因为设置了3个Segment 也就是（）数组内写了 3个
/home/gpadmin/data/primary 所以创建的Segment-Primary共计 6个 各节点为3个 ,另外设置了
Mirror镜像节点开启
-- 因为这里为实验环境且需要做实验一：搭建1个Master，2个Segment并设置2个Primary，不设置
Mirror，所以恢复此前配置

20240606:16:13:22:029949 gpinitsystem:Master-a:gpadmin-[FATAL]:-User abort
requested, Script Exits!
[gpadmin@Master-a gpconfigs]$
```

```
# 集群正式创建 - 修改配置
[gpadmin@Master-a gpconfigs]$ vim gpinitsystem_config
[gpadmin@Master-a gpconfigs]$ cat gpinitsystem_config | grep /home/gpadmin/data
declare -a DATA_DIRECTORY=(/home/gpadmin/data/primary
/home/gpadmin/data/primary)
MASTER_DIRECTORY=/home/gpadmin/data/master
#declare -a MIRROR_DATA_DIRECTORY=(/home/gpadmin/data/mirror
/home/gpadmin/data/mirror /home/gpadmin/data/mirror)
[gpadmin@Master-a gpconfigs]$

# 集群创建
[gpadmin@Master-a gpconfigs]$ gpinitsystem -c
/home/gpadmin/gpconfigs/gpinitsystem_config -h
/home/gpadmin/gpconfigs/hostfile_gpinitsystem
20240606:16:19:09:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking
configuration parameters, please wait...
20240606:16:19:09:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Reading Greenplum
configuration file /home/gpadmin/gpconfigs/gpinitsystem_config
20240606:16:19:09:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Locale has not
been set in /home/gpadmin/gpconfigs/gpinitsystem_config, will set to default
value
20240606:16:19:09:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Locale set to
en_US.utf8
20240606:16:19:09:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-
MASTER_MAX_CONNECT not set, will set to default value 250
20240606:16:19:09:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking
configuration parameters, Completed
20240606:16:19:09:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Commencing multi-
home checks, please wait...
..
20240606:16:19:10:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Configuring build
for standard array
20240606:16:19:10:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Commencing multi-
home checks, Completed
20240606:16:19:10:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Building primary
segment instance array, please wait...
....
20240606:16:19:11:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking Master
host
20240606:16:19:11:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking new
segment hosts, please wait...
....
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Checking new
segment hosts, Completed
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum
Database Creation Parameters
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
---------------------
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master
Configuration
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
---------------------
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master instance
name        = Greenplum Data Platform
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master hostname
          = Master-a
```

```
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master port
        = 5432
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master instance
dir       = /home/gpadmin/data/master/gpseg-1
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master LOCALE
        = en_US.utf8
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum segment
prefix   = gpseg
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master Database
        = gp_sydb
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master
connections        = 250
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master buffers
        = 128000kB
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment
connections        = 750
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment buffers
        = 128000kB
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Checkpoint
segments       = 8
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Encoding
        = UNICODE
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Postgres param
file       = Off
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Initdb to be used
        = /usr/local/greenplum-db/bin/initdb
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-GP_LIBRARY_PATH
is         = /usr/local/greenplum-db/lib
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-HEAP_CHECKSUM is
        = on
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-HBA_HOSTNAMES is
        = 0
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Ulimit check
        = Passed
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Array host
connect type    = Single hostname per node
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[1]       = ::1
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[2]       = 192.168.7.136
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Master IP address
[3]       = fe80::116d:c8b0:55ee:d36d
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Standby Master
        = Not Configured
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Number of primary
segments = 2
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Total Database
segments   = 4
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Trusted shell
        = ssh
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Number segment
hosts      = 2
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Mirroring config
        = OFF
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:------------------
----------------------
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum Primary
Segment Configuration
```

```
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
----------------------
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 6000    Segment-a       /home/gpadmin/data/primary/gpseg0       2
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-a
 6001    Segment-a       /home/gpadmin/data/primary/gpseg1       3
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 6000    Segment-b       /home/gpadmin/data/primary/gpseg2       4
20240606:16:19:14:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Segment-b
 6001    Segment-b       /home/gpadmin/data/primary/gpseg3       5

Continue with Greenplum creation Yy|Nn (default=N):
> y
20240606:16:19:16:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Building the
Master instance database, please wait...
20240606:16:19:19:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Starting the
Master in admin mode
20240606:16:19:20:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Commencing
parallel build of primary segment instances
20240606:16:19:20:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Spawning parallel
processes    batch [1], please wait...
....
20240606:16:19:20:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Waiting for
parallel processes batch [1], please wait...
.........
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
-------------------------------
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Parallel process
exit status
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
-------------------------------
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Total processes
marked as completed         = 4
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Total processes
marked as killed            = 0
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Total processes
marked as failed            = 0
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
-------------------------------
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Deleting
distributed backout files
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Removing back out
file
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-No errors
generated from parallel processes
20240606:16:19:29:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Restarting the
Greenplum instance in production mode
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Starting gpstop with
args: -a -l /home/gpadmin/gpAdminLogs -m -d /home/gpadmin/data/master/gpseg-1
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Greenplum Version:
'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
```

```
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Commencing Master
instance shutdown with mode='smart'
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Master segment instance
directory=/home/gpadmin/data/master/gpseg-1
20240606:16:19:29:034239 gpstop:Master-a:gpadmin-[INFO]:-Stopping master segment
and waiting for user connections to finish ...
server shutting down
20240606:16:19:30:034239 gpstop:Master-a:gpadmin-[INFO]:-Attempting forceful
termination of any leftover master process
20240606:16:19:30:034239 gpstop:Master-a:gpadmin-[INFO]:-Terminating processes
for segment /home/gpadmin/data/master/gpseg-1
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Starting gpstart with
args: -a -l /home/gpadmin/gpAdminLogs -d /home/gpadmin/data/master/gpseg-1
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Binary
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Catalog
Version: '301908232'
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance in admin mode
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Setting new master era
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Master Started...
20240606:16:19:30:034263 gpstart:Master-a:gpadmin-[INFO]:-Shutting down master
20240606:16:19:31:034263 gpstart:Master-a:gpadmin-[INFO]:-Commencing parallel
segment instance startup, please wait...
.
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-Process results...
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:------------------------
------------------------------
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-   Successful segment
starts                                            = 4
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-   Failed segment
starts                                                = 0
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-   Skipped segment
starts (segments are marked down in configuration)   = 0
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:------------------------
------------------------------
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-Successfully started 4
of 4 segment instances
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:------------------------
------------------------------
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance Master-a directory /home/gpadmin/data/master/gpseg-1
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-Command pg_ctl reports
Master Master-a instance active
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-Connecting to
dbname='template1' connect_timeout=15
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-No standby master
configured.  skipping...
20240606:16:19:32:034263 gpstart:Master-a:gpadmin-[INFO]:-Database successfully
started
```

```
20240606:16:19:32:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Completed restart
of Greenplum instance in production mode
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Scanning utility
log file for any warning messages
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[WARN]:-
*********************************************************
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[WARN]:-Scan of log file
indicates that some warnings or errors
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[WARN]:-were generated
during the array creation
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Please review
contents of log file
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-
[INFO]:-/home/gpadmin/gpAdminLogs/gpinitsystem_20240606.log
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-To determine
level of criticality
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-These messages
could be from a previous run of the utility
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-that was called
today!
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[WARN]:-
*********************************************************
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Greenplum
Database instance successfully created
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
--------------------------------------
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-To complete the
environment configuration, please
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-update gpadmin
.bashrc file with the following
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-1. Ensure that
the greenplum_path.sh file is sourced
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-2. Add "export
MASTER_DATA_DIRECTORY=/home/gpadmin/data/master/gpseg-1"
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-   to access the
Greenplum scripts for this instance:
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-   or, use -d
/home/gpadmin/data/master/gpseg-1 option for the Greenplum scripts
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-   Example
gpstate -d /home/gpadmin/data/master/gpseg-1
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Script log file =
/home/gpadmin/gpAdminLogs/gpinitsystem_20240606.log
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-To remove
instance, run gpdeletesystem utility
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-To initialize a
Standby Master Segment for this Greenplum instance
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Review options
for gpinitstandby
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-----------------
--------------------------------------
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-The Master
/home/gpadmin/data/master/gpseg-1/pg_hba.conf post gpinitsystem
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-has been
configured to allow all hosts within this new
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-array to
intercommunicate. Any hosts external to this
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-new array must be
explicitly added to this file
```

```
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-Refer to the
Greenplum Admin support guide which is
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-located in the
/usr/local/greenplum-db/docs directory
20240606:16:19:33:031691 gpinitsystem:Master-a:gpadmin-[INFO]:-------------------
-----------------------------------
[gpadmin@Master-a gpconfigs]$

# 验证集群操作
[gpadmin@Master-a gpconfigs]$ psql
psql (9.4.24)
Type "help" for help.

gp_sydb=# \q
[gpadmin@Master-a gpconfigs]$
```

查看集群状态

@ M

```
# 查看集群状态
[gpadmin@Master-a gpconfigs]$ gpstate
20240606:16:23:29:034674 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args:
20240606:16:23:29:034674 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240606:16:23:29:034674 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240606:16:23:29:034674 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240606:16:23:29:034674 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-Greenplum instance
status summary
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Master instance
                         = Active
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Master standby
                          = No master standby configured
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Total segment
instance count from metadata     = 4
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Primary Segment
Status
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segments                        = 4
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment valid (at master)       = 4
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment failures (at master)     = 0
```

```
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid files missing    = 0
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid files found      = 4
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid PIDs missing     = 0
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid PIDs found       = 4
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
/tmp lock files missing         = 0
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
/tmp lock files found           = 4
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number
postmaster processes missing      = 0
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-    Total number
postmaster processes found        = 4
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Mirror Segment
Status
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:-   Mirrors not
configured on this array
20240606:16:23:30:034674 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
[gpadmin@Master-a gpconfigs]$

# 停止集群
[gpadmin@Master-a gpconfigs]$ gpstop
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-Starting gpstop with
args:
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-Greenplum Version:
'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:---------------------
---------------------
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-Master instance
parameters
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:---------------------
---------------------
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Master Greenplum
instance process active PID   = 34317
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Database
                        = template1
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Master port
                         = 5432
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Master directory
                        = /home/gpadmin/data/master/gpseg-1
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Shutdown mode
                        = smart
```

```
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Timeout
                          = 120
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Shutdown Master
standby host                    = Off
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-----------------------
---------------------
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-Segment instances that
will be shutdown:
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-----------------------
---------------------
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Host         Datadir
                          Port   Status
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg0   6000   u
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg1   6001   u
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg2   6000   u
20240606:16:23:58:034770 gpstop:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg3   6001   u

Continue with Greenplum instance shutdown Yy|Nn (default=N):
> y
20240606:16:24:00:034770 gpstop:Master-a:gpadmin-[INFO]:-Commencing Master
instance shutdown with mode='smart'
20240606:16:24:00:034770 gpstop:Master-a:gpadmin-[INFO]:-Master segment instance
directory=/home/gpadmin/data/master/gpseg-1
20240606:16:24:00:034770 gpstop:Master-a:gpadmin-[INFO]:-Stopping master segment
and waiting for user connections to finish ...
server shutting down
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Attempting forceful
termination of any leftover master process
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Terminating processes
for segment /home/gpadmin/data/master/gpseg-1
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-No standby master host
configured
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Targeting dbid [2, 3,
4, 5] for shutdown
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Commencing parallel
segment instance shutdown, please wait...
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-0.00% of jobs completed
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-100.00% of jobs
completed
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-----------------------
----------------------------
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-   Segments stopped
successfully      = 4
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-   Segments with errors
during stop   = 0
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-----------------------
----------------------------
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Successfully shutdown 4
of 4 segment instances
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Database successfully
shutdown with no errors reported
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Cleaning up leftover
gpmmon process
```

```
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-No leftover gpmmon
process found
20240606:16:24:01:034770 gpstop:Master-a:gpadmin-[INFO]:-Cleaning up leftover
gpsmon processes
20240606:16:24:02:034770 gpstop:Master-a:gpadmin-[INFO]:-No leftover gpsmon
processes on some hosts. not attempting forceful termination on these hosts
20240606:16:24:02:034770 gpstop:Master-a:gpadmin-[INFO]:-Cleaning up leftover
shared memory
[gpadmin@Master-a gpconfigs]$

# 开启集群
[gpadmin@Master-a gpconfigs]$ gpstart
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Starting gpstart with
args:
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Binary
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Catalog
Version: '301908232'
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance in admin mode
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Setting new master era
20240606:16:24:30:034921 gpstart:Master-a:gpadmin-[INFO]:-Master Started...
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Shutting down master
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:---------------------
----
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Master instance
parameters
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:---------------------
----
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Database
  = template1
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Master Port
  = 5432
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Master directory
  = /home/gpadmin/data/master/gpseg-1
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Timeout
  = 600 seconds
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Master standby
  = Off
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:---------------------
----------------
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-Segment instances that
will be started
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:---------------------
----------------
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-  Host       Datadir
                          Port
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-  Segment-a
/home/gpadmin/data/primary/gpseg0   6000
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-  Segment-a
/home/gpadmin/data/primary/gpseg1   6001
```

```
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/primary/gpseg2    6000
20240606:16:24:31:034921 gpstart:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/primary/gpseg3    6001

Continue with Greenplum instance startup Yy|Nn (default=N):
> y
20240606:16:24:32:034921 gpstart:Master-a:gpadmin-[INFO]:-Commencing parallel
segment instance startup, please wait...
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-Process results...
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-   Successful segment
starts                                                = 4
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-   Failed segment
starts                                                   = 0
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-   Skipped segment
starts (segments are marked down in configuration)   = 0
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-Successfully started 4
of 4 segment instances
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance Master-a directory /home/gpadmin/data/master/gpseg-1
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-Command pg_ctl reports
Master Master-a instance active
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-Connecting to
dbname='template1' connect_timeout=15
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-No standby master
configured.  skipping...
20240606:16:24:33:034921 gpstart:Master-a:gpadmin-[INFO]:-Database successfully
started
[gpadmin@Master-a gpconfigs]$
```

配置连接白名单

@ M

尝试连接，使用Navicat进行连接
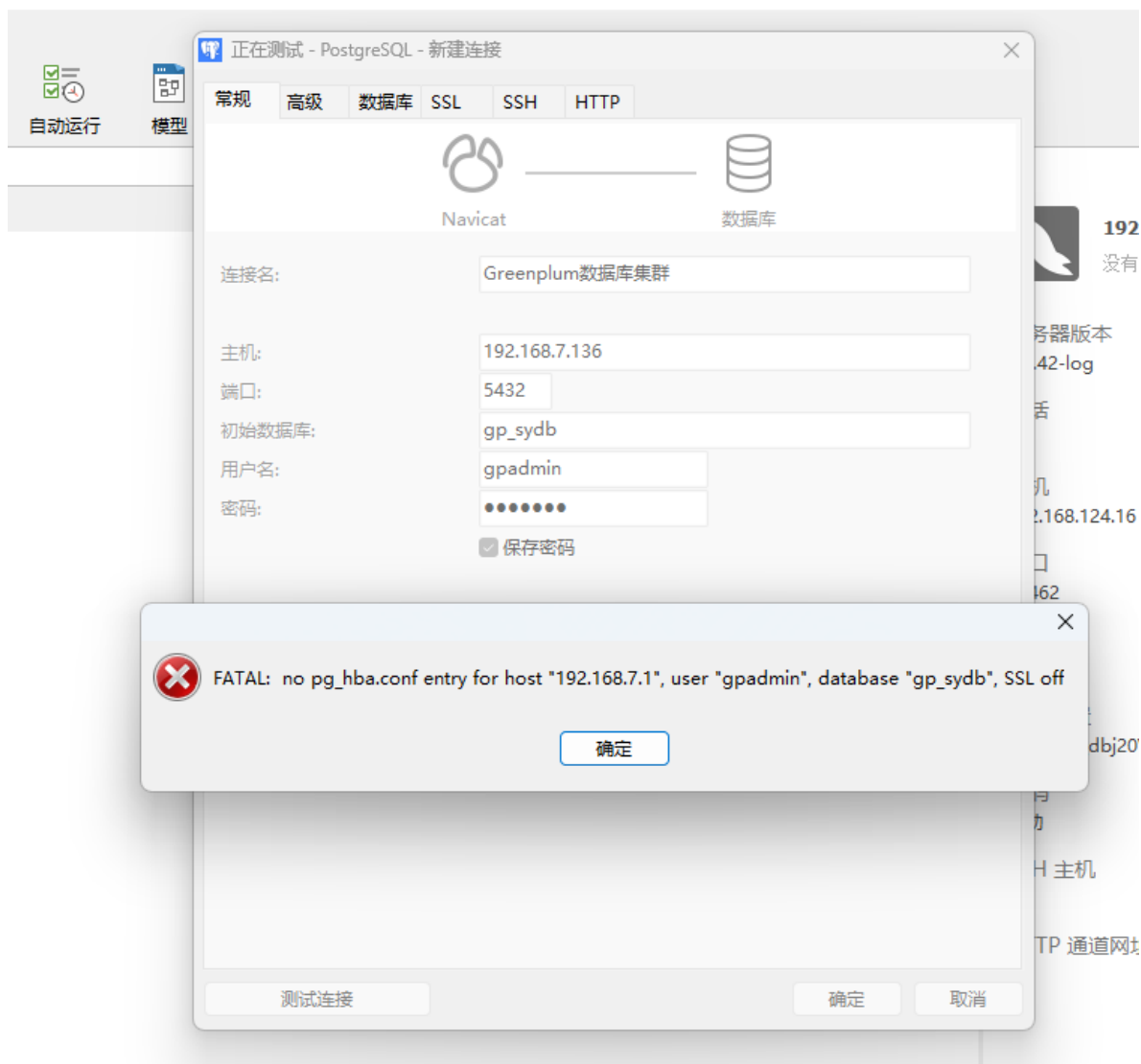
报错提示连接被拒绝，且提示了被拒绝的IP

```
# 增加白名单
[gpadmin@Master-a gpconfigs]$ cd /home/gpadmin/data/master/
[gpadmin@Master-a master]$ ls
gpseg-1
[gpadmin@Master-a master]$ cd gpseg-1/
[gpadmin@Master-a gpseg-1]$ ls
base        gpsegconfig_dump    pg_clog         pg_hba.conf    pg_logical
 pg_replslot    pg_stat      pg_tblspc        PG_VERSION
 postgresql.conf
global    gpssh.conf        pg_distributedlog  pg_ident.conf  pg_multixact
 pg_serial    pg_stat_tmp   pg_twophase        pg_xlog
postmaster.opts
gpperfmon  internal.auto.conf  pg_dynshmem       pg_log        pg_notify
pg_snapshots  pg_subtrans  pg_utilitymodedtmredo  postgresql.auto.conf
 postmaster.pid
[gpadmin@Master-a gpseg-1]$ vim pg_hba.conf
[gpadmin@Master-a gpseg-1]$ tail pg_hba.conf
local    all         gpadmin          ident
host     all         gpadmin          127.0.0.1/28     trust
host     all         gpadmin          192.168.7.136/32      trust
host     all         gpadmin          ::1/128      trust
host     all         gpadmin          fe80::116d:c8b0:55ee:d36d/128       trust
local    replication gpadmin          ident
host     replication gpadmin          samehost      trust
```

```
host     replication gpadmin         192.168.7.136/32        trust
# ACL
host     all        gpadmin         192.168.7.1/32          trust
[gpadmin@Master-a gpseg-1]$


# 重载数据库配置
[gpadmin@Master-a gpseg-1]$ gpstop -u
20240606:16:30:19:035411 gpstop:Master-a:gpadmin-[INFO]:-Starting gpstop with
args: -u
20240606:16:30:19:035411 gpstop:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240606:16:30:19:035411 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240606:16:30:19:035411 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240606:16:30:19:035411 gpstop:Master-a:gpadmin-[INFO]:-Greenplum Version:
'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240606:16:30:19:035411 gpstop:Master-a:gpadmin-[INFO]:-Signalling all
postmaster processes to reload
[gpadmin@Master-a gpseg-1]$
```

再次连接测试

提示连接成功

查看数据库

以上完成了实验一，结果满足预期

END

实验二：在原有集群基础上扩容2个 Segment_instance_primary不含Mirror

原理

扩容分为横向扩容，和纵向扩容。

横向扩容为： 增加segment节点也就是物理主机节点，随着增加了物理主机节点segment同时也会生成 segment实例，如果不进行设置默认是与原始集群保持一致的。

纵向扩容为： 所谓纵向扩容即为增加segment实例，而不是新增机器。

当原始集群的内存和磁盘充足时可以考虑先进行纵向扩容，来进行扩容结果的验证，多为查询等。

确认环境情况

```
[gpadmin@Master-a root]$ gpstate
20240611:11:09:12:001608 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args:
20240611:11:09:12:001608 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
```

```
20240611:11:09:12:001608 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:11:09:12:001608 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240611:11:09:12:001608 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-Greenplum instance
status summary
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:----------------------
--------------------------------
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Master instance
                         = Active
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Master standby
                          = No master standby configured
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total segment
instance count from metadata    = 4
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:----------------------
--------------------------------
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Primary Segment
Status
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:----------------------
--------------------------------
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segments                        = 4
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment valid (at master)       = 4
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment failures (at master)    = 0
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files missing    = 0
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files found      = 4
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs missing     = 0
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs found       = 4
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files missing         = 0
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files found           = 4
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes missing     = 0
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes found       = 4
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:----------------------
-----------------------------
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Mirror Segment
Status
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:----------------------
-----------------------------
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:-   Mirrors not
configured on this array
20240611:11:09:13:001608 gpstate:Master-a:gpadmin-[INFO]:----------------------
-----------------------------
[gpadmin@Master-a root]$
```

```
gpstart, gplogfilter[gpadmin@Master-a root]$ gpstate -s
20240611:11:22:15:001700 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args: -s
20240611:11:22:15:001700 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240611:11:22:15:001700 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:11:22:15:001700 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240611:11:22:15:001700 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:--Master Configuration
& Status
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Master host
         = Master-a
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Master postgres
process ID    = 1591
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Master data
directory        = /home/gpadmin/data/master/gpseg-1
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Master port
         = 5432
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Master current role
         = dispatch
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Greenplum
initsystem version   = 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Greenplum current
version       = PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Postgres version
         = 9.4.24
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Master standby
         = No master standby configured
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-Segment Instance
Status Report
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Segment Info
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Hostname
         = Segment-a
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Address
          = Segment-a
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Datadir
         = /home/gpadmin/data/primary/gpseg0
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Port
         = 6000
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Status
```

```
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      PID
                 = 1540
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Configuration
reports status as    = Up
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Database status
                 = Up
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Segment Info
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Hostname
                 = Segment-a
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Address
                 = Segment-a
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Datadir
                 = /home/gpadmin/data/primary/gpseg1
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Port
                 = 6001
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Status
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      PID
                 = 1539
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Configuration
reports status as    = Up
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Database status
                 = Up
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Segment Info
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Hostname
                 = Segment-b
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Address
                 = Segment-b
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Datadir
                 = /home/gpadmin/data/primary/gpseg2
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Port
                 = 6000
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Status
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      PID
                 = 1539
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Configuration
reports status as    = Up
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Database status
                 = Up
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Segment Info
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Hostname
                 = Segment-b
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Address
                 = Segment-b
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Datadir
                 = /home/gpadmin/data/primary/gpseg3
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Port
                 = 6001
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-   Status
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      PID
                 = 1540
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-      Configuration
reports status as    = Up
```

```
20240611:11:22:16:001700 gpstate:Master-a:gpadmin-[INFO]:-        Database status
                          = Up
[gpadmin@Master-a root]$
```

由此分析gp版本为6.13 ，且pg数据库为9.4版本，mirror未开启镜像，seg主机节点数量2，seg实例数量为4，seg分布为2台seg数据节点对应2个seg实例。

创建测试数据

```
# 创建一个UTF-8的数据库
CREATE DATABASE test_database WITH OWNER = gpadmin ENCODING = 'UTF-8';

# 创建一个测试表
CREATE TABLE table_test(
  ID  INT PRIMARY KEY   NOT NULL,
  NAME       TEXT  NOT NULL,
  AGE        INT   NOT NULL,
  ADDRESS    CHAR(50),
  SALARY      REAL
);

# 写入随机测试数据500w
DO $$
DECLARE
  batch_size INTEGER := 500000;
  num_batches INTEGER := 10;
BEGIN
  FOR i IN 1..num_batches LOOP
    INSERT INTO table_test (ID, NAME, AGE, ADDRESS, SALARY)
    SELECT
      g.key,
      repeat(chr(int4(random() * 26 + 65)), 16),
      (random() * 36)::integer,
      NULL,
      (random() * 10000)::integer
    FROM (
      SELECT generate_series((i-1)*batch_size + 1, i*batch_size) AS key
    ) g;
  END LOOP;
END $$;

# 查看数据结果
test_database=# select count(1) from table_test;
  count
---------
 5000000
(1 row)

test_database=#

# 查看数据
test_database=# select * from table_test limit 5;
 id |        name       | age | address | salary
----+-------------------+-----+---------+--------
  1 | XXXXXXXXXXXXXXXX  |  20 |         |   5555
 12 | KKKKKKKKKKKKKKKK  |  33 |         |   6319
 15 | YYYYYYYYYYYYYYYY  |   6 |         |   7837
```

```
 20 | IIIIIIIIIIIIIII |  23 |          |   7650
 23 | PPPPPPPPPPPPPPP |   3 |          |   9389
(5 rows)

test_database=#
```

可以看到已经生成了500w数据

查看数据分布

```
test_database=# SELECT gp_segment_id,count(1) FROM table_test
GROUP BY gp_segment_id
ORDER BY gp_segment_id;
 gp_segment_id |  count
---------------+---------
             0 | 1249354
             1 | 1249079
             2 | 1250529
             3 | 1251038
(4 rows)

test_database=#
```

可以看到数据目前分配在 4个segment 实例上，分别有124w数据

纵向扩容-Segment_instance_primary

```
#  创建扩容实例文件
[gpadmin@Master-a ~]$ cd /home/gpadmin/
[gpadmin@Master-a ~]$ mkdir expand_segment_instance
[gpadmin@Master-a ~]$ cd expand_segment_instance/
[gpadmin@Master-a expand_segment_instance]$ cp ../conf/seg_hosts
expand_segment_indtance_hosts
[gpadmin@Master-a expand_segment_instance]$ cat expand_segment_indtance_hosts
Segment-a
Segment-b
[gpadmin@Master-a expand_segment_instance]$

#  生成扩容计划
扩容计划 - 在每个segment-node节点 新增2个segment_instance实例 路径与之前保持一致
[gpadmin@Master-a expand_segment_instance]$ gpexpand -f
expand_segment_indtance_hosts
20240611:14:00:38:002323 gpexpand:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240611:14:00:38:002323 gpexpand:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:14:00:38:002323 gpexpand:Master-a:gpadmin-[INFO]:-Querying gpexpand
schema for current expansion state

System Expansion is used to add segments to an existing GPDB array.
gpexpand did not detect a System Expansion that is in progress.

Before initiating a System Expansion, you need to provision and burn-in
```

```
the new hardware.  Please be sure to run gpcheckperf to make sure the
new hardware is working properly.

Please refer to the Admin Guide for more information.

Would you like to initiate a new System Expansion Yy|Nn (default=N):
> y

** No hostnames were given that do not already exist in the **
** array. Additional segments will be added existing hosts. **

    By default, new hosts are configured with the same number of primary
    segments as existing hosts.  Optionally, you can increase the number
    of segments per host.

    For example, if existing hosts have two primary segments, entering a value
    of 2 will initialize two additional segments on existing hosts, and four
    segments on new hosts.  In addition, mirror segments will be added for
    these new primary segments if mirroring is enabled.


How many new primary segments per host do you want to add? (default=0):
> 2
Enter new primary data directory 1:
> /home/gpadmin/data/primary
Enter new primary data directory 2:
> /home/gpadmin/data/primary


Generating configuration file...

20240611:14:02:03:002323 gpexpand:Master-a:gpadmin-[INFO]:-Generating input
file...

Input configuration file was written to 'gpexpand_inputfile_20240611_140203'.

Please review the file and make sure that it is correct then re-run
with: gpexpand -i gpexpand_inputfile_20240611_140203

20240611:14:02:03:002323 gpexpand:Master-a:gpadmin-[INFO]:-Exiting...
[gpadmin@Master-a expand_segment_instance]$ ls
expand_segment_indtance_hosts  gpexpand_inputfile_20240611_140203
[gpadmin@Master-a expand_segment_instance]$ cat
gpexpand_inputfile_20240611_140203
Segment-a|Segment-a|6002|/home/gpadmin/data/primary/gpseg4|6|4|p
Segment-a|Segment-a|6003|/home/gpadmin/data/primary/gpseg5|7|5|p
Segment-b|Segment-b|6002|/home/gpadmin/data/primary/gpseg6|8|6|p
Segment-b|Segment-b|6003|/home/gpadmin/data/primary/gpseg7|9|7|p
[gpadmin@Master-a expand_segment_instance]$

# 扩容计划执行 - 失败
[gpadmin@Master-a expand_segment_instance]$ gpexpand -i
gpexpand_inputfile_20240611_140203
20240611:14:03:05:002353 gpexpand:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
```

```
20240611:14:03:05:002353 gpexpand:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:14:03:05:002353 gpexpand:Master-a:gpadmin-[INFO]:-Querying gpexpand
schema for current expansion state
20240611:14:03:05:002353 gpexpand:Master-a:gpadmin-[INFO]:-Heap checksum setting
consistent across cluster
20240611:14:03:05:002353 gpexpand:Master-a:gpadmin-[INFO]:-Syncing Greenplum
Database extensions
20240611:14:03:06:002353 gpexpand:Master-a:gpadmin-[INFO]:-The packages on
Segment-a are consistent.
20240611:14:03:06:002353 gpexpand:Master-a:gpadmin-[INFO]:-The packages on
Segment-b are consistent.
20240611:14:03:06:002353 gpexpand:Master-a:gpadmin-[INFO]:-Locking catalog
20240611:14:03:06:002353 gpexpand:Master-a:gpadmin-[INFO]:-Locked catalog
20240611:14:03:06:002353 gpexpand:Master-a:gpadmin-[INFO]:-Creating segment
template
20240611:14:03:08:002353 gpexpand:Master-a:gpadmin-[INFO]:-Copying
postgresql.conf from existing segment into template
20240611:14:03:08:002353 gpexpand:Master-a:gpadmin-[INFO]:-Copying pg_hba.conf
from existing segment into template
20240611:14:03:08:002353 gpexpand:Master-a:gpadmin-[INFO]:-Creating schema tar
file
20240611:14:03:09:002353 gpexpand:Master-a:gpadmin-[INFO]:-Distributing template
tar file to new hosts
20240611:14:03:10:002353 gpexpand:Master-a:gpadmin-[INFO]:-Configuring new
segments (primary)
20240611:14:03:10:002353 gpexpand:Master-a:gpadmin-[INFO]:-{'Segment-a':
'/home/gpadmin/data/primary/gpseg4:6002:true:false:6:4::-1:,/home/gpadmin/data/p
rimary/gpseg5:6003:true:false:7:5::-1:', 'Segment-b':
'/home/gpadmin/data/primary/gpseg6:6002:true:false:8:6::-1:,/home/gpadmin/data/p
rimary/gpseg7:6003:true:false:9:7::-1:'}
20240611:14:03:13:002353 gpexpand:Master-a:gpadmin-[ERROR]:-gpexpand failed:
ExecutionError: 'Error Executing Command: ' occurred.  Details: 'ssh -o
StrictHostKeyChecking=no -o ServerAliveInterval=60 Segment-a ".
/usr/local/greenplum-db/greenplum_path.sh; env GPSESSID=0000000000 GPERA=None
$GPHOME/bin/pg_ctl -D /home/gpadmin/data/primary/gpseg4 -l
/home/gpadmin/data/primary/gpseg4/pg_log/startup.log -w -t 600 -o \" -p 6002 -c
gp_role=utility -M \" start 2>&1"'  cmd had rc=1 completed=True halted=False
  stdout='waiting for server to start.... stopped waiting
pg_ctl: could not start server
Examine the log output.
'
  stderr=''

Exiting...
20240611:14:03:13:002353 gpexpand:Master-a:gpadmin-[ERROR]:-Please run 'gpexpand
-r' to rollback to the original state.
20240611:14:03:13:002353 gpexpand:Master-a:gpadmin-[INFO]:-Shutting down
gpexpand...
[gpadmin@Master-a expand_segment_instance]$ ls
expand_segment_indtance_hosts  gpexpand_inputfile_20240611_140203
 gpexpand_schema.tar
[gpadmin@Master-a expand_segment_instance]$

# 查看失败原因以及日志
```

```
[root@Segment-a pg_log]# tail -f
/home/gpadmin/data/primary/gpseg4/pg_log/startup.log
2024-06-11 14:03:07.917118
CST,,,p3085,th1574885504,,,,0,,,seg4,,,,,"FATAL","XX000","could not create
semaphores: No space left on device","Failed system call was semget(6002001, 17,
03600).","This error does *not* mean that you have run out of disk space.  It
occurs when either the system limit for the maximum number of semaphore sets
(SEMMNI), or the system wide maximum number of semaphores (SEMMNS), would be
exceeded.  You need to raise the respective kernel parameter.  Alternatively,
reduce PostgreSQL's consumption of semaphores by reducing its max_connections
parameter.
The PostgreSQL documentation contains more information about configuring your
system for PostgreSQL.",,,,,,"InternalIpcSemaphoreCreate","pg_sema.c",126,1
0xbf0dac postgres errstart (elog.c:557)
2    0x9fc6c8 postgres PGSemaphoreCreate (pg_sema.c:113)
3    0xa74291 postgres InitProcGlobal (proc.c:259)
4    0xa60005 postgres CreateSharedMemoryAndSemaphores (ipci.c:290)
5    0xa10d6b postgres PostmasterMain (postmaster.c:1337)
6    0x6b5f21 postgres main (main.c:205)
7    0x7f405a9c4555 libc.so.6 __libc_start_main + 0xf5
8    0x6c1c7c postgres <symbol not found> + 0x6c1c7c

# 判断故障原因
故障疑似为系统参数不足以支撑此次扩容

# 故障分析
查看系统信号
[root@Segment-a pg_log]# ipcs -ls

------ Semaphore Limits --------
max number of arrays = 128
max semaphores per array = 250
max semaphores system wide = 32000
max ops per semop call = 32
semaphore max value = 32767

# 修改系统信号
@ ALL
[gpadmin@Master-a expand_segment_instance]$ ipcs -ls

------ Semaphore Limits --------
max number of arrays = 128
max semaphores per array = 250
max semaphores system wide = 32000
max ops per semop call = 32
semaphore max value = 32767

[root@Segment-a pg_log]# cat  /etc/sysctl.conf  | grep kernel.sem
kernel.sem = 250 64000 100 256
[root@Segment-a pg_log]#
[root@Master-a ~]# sysctl -p
[root@Segment-a pg_log]# ipcs -ls

------ Semaphore Limits --------
max number of arrays = 256
max semaphores per array = 250
max semaphores system wide = 64000
max ops per semop call = 100
```

```
semaphore max value = 32767

# 回滚扩容计划
[gpadmin@Master-a expand_segment_instance]$ ll
total 171608
-rw-rw-r-- 1 gpadmin gpadmin        20 Jun 11 13:56
expand_segment_indtance_hosts
-rw-rw-r-- 1 gpadmin gpadmin       260 Jun 11 14:02
gpexpand_inputfile_20240611_140203
-rw-rw-r-- 1 gpadmin gpadmin 175718400 Jun 11 14:03 gpexpand_schema.tar
[gpadmin@Master-a expand_segment_instance]$ gpexpand -r
20240611:14:15:14:002624 gpexpand:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240611:14:15:14:002624 gpexpand:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:14:15:14:002624 gpexpand:Master-a:gpadmin-[INFO]:-Rolling back building
of new segments
20240611:14:15:14:002624 gpexpand:Master-a:gpadmin-[INFO]:-Rolling back segment
template build
20240611:14:15:14:002624 gpexpand:Master-a:gpadmin-[INFO]:-Rollback complete.
[gpadmin@Master-a expand_segment_instance]$ ll
total 8
-rw-rw-r-- 1 gpadmin gpadmin  20 Jun 11 13:56 expand_segment_indtance_hosts
-rw-rw-r-- 1 gpadmin gpadmin 260 Jun 11 14:02 gpexpand_inputfile_20240611_140203
[gpadmin@Master-a expand_segment_instance]$

# 执行扩容计划
[gpadmin@Master-a expand_segment_instance]$ gpexpand -i
gpexpand_inputfile_20240611_140203
20240611:14:15:47:002681 gpexpand:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240611:14:15:47:002681 gpexpand:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:14:15:47:002681 gpexpand:Master-a:gpadmin-[INFO]:-Querying gpexpand
schema for current expansion state
20240611:14:15:47:002681 gpexpand:Master-a:gpadmin-[INFO]:-Heap checksum setting
consistent across cluster
20240611:14:15:47:002681 gpexpand:Master-a:gpadmin-[INFO]:-Syncing Greenplum
Database extensions
20240611:14:15:48:002681 gpexpand:Master-a:gpadmin-[INFO]:-The packages on
Segment-a are consistent.
20240611:14:15:48:002681 gpexpand:Master-a:gpadmin-[INFO]:-The packages on
Segment-b are consistent.
20240611:14:15:48:002681 gpexpand:Master-a:gpadmin-[INFO]:-Locking catalog
20240611:14:15:48:002681 gpexpand:Master-a:gpadmin-[INFO]:-Locked catalog
20240611:14:15:48:002681 gpexpand:Master-a:gpadmin-[INFO]:-Creating segment
template
20240611:14:15:49:002681 gpexpand:Master-a:gpadmin-[INFO]:-Copying
postgresql.conf from existing segment into template
20240611:14:15:49:002681 gpexpand:Master-a:gpadmin-[INFO]:-Copying pg_hba.conf
from existing segment into template
```

```
20240611:14:15:49:002681 gpexpand:Master-a:gpadmin-[INFO]:-Creating schema tar
file
20240611:14:15:50:002681 gpexpand:Master-a:gpadmin-[INFO]:-Distributing template
tar file to new hosts
20240611:14:15:51:002681 gpexpand:Master-a:gpadmin-[INFO]:-Configuring new
segments (primary)
20240611:14:15:51:002681 gpexpand:Master-a:gpadmin-[INFO]:-{'Segment-a':
'/home/gpadmin/data/primary/gpseg4:6002:true:false:6:4::-1:,/home/gpadmin/data/p
rimary/gpseg5:6003:true:false:7:5::-1:', 'Segment-b':
'/home/gpadmin/data/primary/gpseg6:6002:true:false:8:6::-1:,/home/gpadmin/data/p
rimary/gpseg7:6003:true:false:9:7::-1:'}
20240611:14:15:53:002681 gpexpand:Master-a:gpadmin-[INFO]:-Cleaning up temporary
template files
20240611:14:15:54:002681 gpexpand:Master-a:gpadmin-[INFO]:-Cleaning up databases
in new segments.
20240611:14:15:54:002681 gpexpand:Master-a:gpadmin-[INFO]:-Unlocking catalog
20240611:14:15:54:002681 gpexpand:Master-a:gpadmin-[INFO]:-Unlocked catalog
20240611:14:15:54:002681 gpexpand:Master-a:gpadmin-[INFO]:-Creating expansion
schema
20240611:14:15:54:002681 gpexpand:Master-a:gpadmin-[INFO]:-Populating
gpexpand.status_detail with data from database template1
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-Populating
gpexpand.status_detail with data from database postgres
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-Populating
gpexpand.status_detail with data from database gp_sydb
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-Populating
gpexpand.status_detail with data from database test_db
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-Populating
gpexpand.status_detail with data from database test_database
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-
********************************************
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-Initialization of the
system expansion complete.
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-To begin table
expansion onto the new segments
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-rerun gpexpand
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-
********************************************
20240611:14:15:55:002681 gpexpand:Master-a:gpadmin-[INFO]:-Exiting...

# 查看集群状态
[gpadmin@Master-a expand_segment_instance]$ gpstate
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args:
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-Greenplum instance
status summary
```

```
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Master instance
                         = Active
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Master standby
                         = No master standby configured
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total segment
instance count from metadata     = 8
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Primary Segment
Status
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segments                         = 8
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment valid (at master)        = 8
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment failures (at master)     = 0
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files missing     = 0
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files found       = 8
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs missing      = 0
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs found        = 8
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files missing          = 0
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files found            = 8
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes missing     = 0
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes found       = 8
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Mirror Segment
Status
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Mirrors not
configured on this array
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:-   Cluster Expansion
                         = In Progress
20240611:14:16:08:002847 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
[gpadmin@Master-a expand_segment_instance]$
```

可以看到扩容成功 为segment_instance 为 8 个，各增加2个。

数据重分布

```
# 查看调整前数据分布
```

```
test_database=# SELECT gp_segment_id,count(1) FROM table_test
GROUP BY gp_segment_id
ORDER BY gp_segment_id;
 gp_segment_id |  count
---------------+---------
             0 | 1249354
             1 | 1249079
             2 | 1250529
             3 | 1251038
(4 rows)

test_database=#

# 进行数据重分布 -超时时间1小时
[gpadmin@Master-a expand_segment_instance]$ gpexpand -d 1:00:00
20240611:14:20:00:003108 gpexpand:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240611:14:20:00:003108 gpexpand:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240611:14:20:00:003108 gpexpand:Master-a:gpadmin-[INFO]:-Querying gpexpand
schema for current expansion state
20240611:14:20:00:003108 gpexpand:Master-a:gpadmin-[INFO]:-Expanding
test_database.public.table_test
20240611:14:20:03:003108 gpexpand:Master-a:gpadmin-[INFO]:-Finished expanding
test_database.public.table_test
20240611:14:20:05:003108 gpexpand:Master-a:gpadmin-[INFO]:-EXPANSION COMPLETED
SUCCESSFULLY
20240611:14:20:05:003108 gpexpand:Master-a:gpadmin-[INFO]:-Exiting...
[gpadmin@Master-a expand_segment_instance]$

# 查看调整后数据分布
test_database=# SELECT gp_segment_id,count(1) FROM table_test
GROUP BY gp_segment_id
ORDER BY gp_segment_id;
 gp_segment_id | count
---------------+--------
             0 | 623840
             1 | 625310
             2 | 625583
             3 | 625607
             4 | 625369
             5 | 624097
             6 | 624808
             7 | 625386
(8 rows)

test_database=#
调整后，数据平均分布之0-7节点中，各有62w左右。
```

以上完成了实验二，结果满足预期

END

实验三：在原有集群基础上扩容与primary数量相同的 Segment_instance_mirror

参考链接

墨天轮： https://www.modb.pro/db/1726419354244440064

CSDN： https://blog.csdn.net/weixin_42633805/article/details/120641386

原理

greenplum目前只允许添加mirror，而不允许删除mirror，所以在添加镜像前，最好对gp做一下备份

确认环境情况

```
# 查看集群环境
gp_sydb=# select dbid,content,role,port,hostname,address from
gp_segment_configuration order by dbid;
 dbid | content | role | port | hostname  |  address
------+---------+------+------+-----------+-----------
    1 |      -1 | p    | 5432 | Master-a  | Master-a
    2 |       0 | p    | 6000 | Segment-a | Segment-a
    3 |       1 | p    | 6001 | Segment-a | Segment-a
    4 |       2 | p    | 6000 | Segment-b | Segment-b
    5 |       3 | p    | 6001 | Segment-b | Segment-b
    6 |       4 | p    | 6002 | Segment-a | Segment-a
    7 |       5 | p    | 6003 | Segment-a | Segment-a
    8 |       6 | p    | 6002 | Segment-b | Segment-b
    9 |       7 | p    | 6003 | Segment-b | Segment-b
(9 rows)

gp_sydb=#

# 关闭集群  进行VM镜像备份
gpstop

# 开启集群  查看状态
gpstart
[gpadmin@Master-a gpseg-1]$ gpstate
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args:
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
Segments...
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-Greenplum instance
status summary
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:----------------------
-----------------------------
```

```
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Master instance
                              = Active
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Master standby
                              = No master standby configured
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total segment
instance count from metadata      = 8
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Primary Segment
Status
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total primary
segments                          = 8
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total primary
segment valid (at master)         = 8
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total primary
segment failures (at master)      = 0
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid files missing   = 0
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid files found     = 8
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid PIDs missing    = 0
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
postmaster.pid PIDs found      = 8
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
/tmp lock files missing        = 0
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number of
/tmp lock files found          = 8
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number
postmaster processes missing      = 0
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Total number
postmaster processes found        = 8
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Mirror Segment
Status
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Mirrors not
configured on this array
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:-    Cluster Expansion
                              = In Progress
20240612:14:51:08:047501 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
[gpadmin@Master-a gpseg-1]$
```

创建镜像配置文件

因为实验为扩容当前节点增加mirror镜像实例，所以不进行文件夹创建
```
# 查看文件夹结构
[gpadmin@Master-a gpseg-1]$ cd /home/gpadmin/conf/
[gpadmin@Master-a conf]$ ls
hostlist  seg_hosts
```

```
[gpadmin@Master-a conf]$ gpssh -f seg_hosts
=> pwd
[Segment-b] /home/gpadmin
[Segment-a] /home/gpadmin
=> cd data
[Segment-b]
[Segment-a]
=> ls
[Segment-b] master      mirror  primary
[Segment-a] master      mirror  primary
=> exit

[gpadmin@Master-a conf]$
根据之前的规划 是创建了mirror文件夹，现在进行mirror构建

# 生成Mirror镜像配置文件
[gpadmin@Master-a ~]$ mkdir expand_mirrors
[gpadmin@Master-a ~]$ cd expand_mirrors/
[gpadmin@Master-a expand_mirrors]$ cp
../expand_segment_instance/expand_segment_indtance_hosts expand_mirror_hostss
[gpadmin@Master-a expand_mirrors]$ cat expand_mirror_hostss
Segment-a
Segment-b
[gpadmin@Master-a expand_mirrors]$
```

构建与Primary的Mirror1:1数量实例

```
# 创建镜像配置文件
[gpadmin@Master-a expand_mirrors]$ gpaddmirrors -o mirror_config_file
20240612:15:09:18:087939 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting
gpaddmirrors with args: -o mirror_config_file
20240612:15:09:18:087939 gpaddmirrors:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:09:18:087939 gpaddmirrors:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:15:09:18:087939 gpaddmirrors:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:15:09:19:087939 gpaddmirrors:Master-a:gpadmin-[INFO]:-Heap checksum
setting consistent across cluster
Enter mirror segment data directory location 1 of 4 >
/home/gpadmin/data/mirror
Enter mirror segment data directory location 2 of 4 >
/home/gpadmin/data/mirror
Enter mirror segment data directory location 3 of 4 >
/home/gpadmin/data/mirror
Enter mirror segment data directory location 4 of 4 >
/home/gpadmin/data/mirror
20240612:15:10:05:087939 gpaddmirrors:Master-a:gpadmin-[INFO]:-Configuration
file output to mirror_config_file successfully.
[gpadmin@Master-a expand_mirrors]$ cat
expand_mirror_hostss  mirror_config_file
[gpadmin@Master-a expand_mirrors]$ cat
expand_mirror_hostss  mirror_config_file
[gpadmin@Master-a expand_mirrors]$ cat mirror_config_file
```

```
0|Segment-b|7000|/home/gpadmin/data/mirror/gpseg0
1|Segment-b|7001|/home/gpadmin/data/mirror/gpseg1
4|Segment-b|7002|/home/gpadmin/data/mirror/gpseg4
5|Segment-b|7003|/home/gpadmin/data/mirror/gpseg5
2|Segment-a|7000|/home/gpadmin/data/mirror/gpseg2
3|Segment-a|7001|/home/gpadmin/data/mirror/gpseg3
6|Segment-a|7002|/home/gpadmin/data/mirror/gpseg6
7|Segment-a|7003|/home/gpadmin/data/mirror/gpseg7
[gpadmin@Master-a expand_mirrors]$
```

!!!!!!!!!!!!!!!!!!!!!!!!!!!!
非常重要的内容
要确认一下信号是否设置正确!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!

信号测试结果
```
[root@Master-a ~]# ipcs -ls

------ Semaphore Limits --------
max number of arrays = 8192
max semaphores per array = 250
max semaphores system wide = 2048000
max ops per semop call = 200
semaphore max value = 32767

[root@Master-a ~]#
```
必须与此数据一致，否则会需要处理集群源数据,如果故障参考故障排查

查看进度
```
[gpadmin@Master-a expand_mirrors]$ gpstate -e
20240612:16:52:27:047267 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args: -e
20240612:16:52:27:047267 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:16:52:27:047267 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:16:52:27:047267 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:16:52:27:047267 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240612:16:52:28:047267 gpstate:Master-a:gpadmin-[INFO]:---------------------
-----------------------------
20240612:16:52:28:047267 gpstate:Master-a:gpadmin-[INFO]:-Segment Mirroring
Status Report
20240612:16:52:28:047267 gpstate:Master-a:gpadmin-[INFO]:---------------------
-----------------------------
20240612:16:52:28:047267 gpstate:Master-a:gpadmin-[INFO]:-All segments are
running normally
[gpadmin@Master-a expand_mirrors]$
```

查看mirror在集群状态
```
[gpadmin@Master-a expand_mirrors]$ gpstate -m
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args: -m
```

```
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:---------------------
----------------------------------------
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:--Current GPDB mirror
list and status
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:--Type = Group
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:---------------------
----------------------------------------
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Mirror      Datadir
                          Port    Status     Data Status
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/mirror/gpseg0   7000    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/mirror/gpseg1   7001    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/mirror/gpseg2   7000    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/mirror/gpseg3   7001    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/mirror/gpseg4   7002    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/mirror/gpseg5   7003    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/mirror/gpseg6   7002    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/mirror/gpseg7   7003    Passive    Synchronized
20240612:16:53:05:048774 gpstate:Master-a:gpadmin-[INFO]:---------------------
----------------------------------------
[gpadmin@Master-a expand_mirrors]$

# 查看状态 - 正常
test_database=# select * from gp_segment_configuration;
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |           datadir
------+---------+------+----------------+------+-------+-----+----------+----
-------+---------------------------------
    1 |      -1 | p    | p              | n    | u     | 5432 | Master-a  |
Master-a  | /home/gpadmin/data/master/gpseg-1
    8 |       6 | p    | p              | s    | u     | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
   16 |       6 | m    | m              | s    | u     | 7002 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg6
    4 |       2 | p    | p              | s    | u     | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
   14 |       2 | m    | m              | s    | u     | 7000 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg2
    5 |       3 | p    | p              | s    | u     | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
   15 |       3 | m    | m              | s    | u     | 7001 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg3
```

```
 9 |      7 | p   | p           | s    | u     | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
  17 |      7 | m   | m           | s    | u     | 7003 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg7
   6 |      4 | p   | p           | s    | u     | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
  12 |      4 | m   | m           | s    | u     | 7002 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg4
   7 |      5 | p   | p           | s    | u     | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
  13 |      5 | m   | m           | s    | u     | 7003 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg5
   2 |      0 | p   | p           | s    | u     | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
  10 |      0 | m   | m           | s    | u     | 7000 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg0
   3 |      1 | p   | p           | s    | u     | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
  11 |      1 | m   | m           | s    | u     | 7001 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg1
(17 rows)

test_database=#
```

以上完成了实验三，虽然坎坷，结果满足预期

END

故障排查

构建镜像失败提示无法执行GPCTL

报错提示:
[WARNING]:-Failed to start segment. The fault prober will shortly mark it as down. Segment: Segment-a:/home/gpadmin/data/mirror/gpseg2:content=2:dbid=14:role=m:preferred_role=m:mode=n:status=d: REASON: PG_CTL failed.

执行镜像实例构建
[gpadmin@Master-a expand_mirrors]$ gpaddmirrors -i mirror_config_file
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting gpaddmirrors with args: -i mirror_config_file
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-local Greenplum Version: 'postgres (Greenplum Database) 6.13.0 build commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-master Greenplum Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Obtaining Segment details from master...
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Heap checksum setting consistent across cluster
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Greenplum Add Mirrors Parameters
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:--

```
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Greenplum master
data directory        = /home/gpadmin/data/master/gpseg-1
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Greenplum master
port                  = 5432
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Parallel batch
limit                 = 16
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 1 of 8
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host         = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address      = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory    = /home/gpadmin/data/primary/gpseg0
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port         = 6000
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host         = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address      = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg0
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7000
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 2 of 8
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host         = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address      = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory    = /home/gpadmin/data/primary/gpseg1
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port         = 6001
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host         = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address      = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg1
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7001
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 3 of 8
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host         = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address      = Segment-a
```

```
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg4
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6002
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory   = /home/gpadmin/data/mirror/gpseg4
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port        = 7002
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 4 of 8
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host        = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg5
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6003
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory   = /home/gpadmin/data/mirror/gpseg5
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port        = 7003
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 5 of 8
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host        = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg2
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6000
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory   = /home/gpadmin/data/mirror/gpseg2
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port        = 7000
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 6 of 8
```

```
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host       = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg3
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port       = 6001
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address      = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg3
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7001
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 7 of 8
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host       = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg6
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port       = 6002
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address      = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg6
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7002
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 8 of 8
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host       = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-b
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg7
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port       = 6003
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address      = Segment-a
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory     = /home/gpadmin/data/mirror/gpseg7
```

```
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port        = 7003
20240612:15:11:29:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------

Continue with add mirrors procedure Yy|Nn (default=N):
> y
20240612:15:11:47:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting to
modify pg_hba.conf on primary segments to allow replication connections
20240612:15:11:51:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Successfully
modified pg_hba.conf on primary segments to allow replication connections
20240612:15:11:51:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-8 segment(s) to
add
20240612:15:11:51:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Validating remote
directories
20240612:15:11:51:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Configuring new
segments
Segment-a (dbid 14): pg_basebackup: base backup completed
Segment-a (dbid 15): pg_basebackup: base backup completed
Segment-a (dbid 16): pg_basebackup: base backup completed
Segment-a (dbid 17): pg_basebackup: base backup completed
Segment-b (dbid 10): pg_basebackup: base backup completed
Segment-b (dbid 11): pg_basebackup: base backup completed
Segment-b (dbid 12): pg_basebackup: base backup completed
Segment-b (dbid 13): pg_basebackup: base backup completed
20240612:15:11:58:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Updating
configuration with new mirrors
20240612:15:11:58:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Updating mirrors
20240612:15:11:58:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting mirrors
20240612:15:11:58:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-era is
2dd251f5aa8fec81_240612145053
20240612:15:11:58:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Commencing
parallel segment instance startup, please wait...
...
20240612:15:12:01:092839 gpaddmirrors:Master-a:gpadmin-[INFO]:-Process
results...
20240612:15:12:01:092839 gpaddmirrors:Master-a:gpadmin-[WARNING]:-Failed to
start segment.  The fault prober will shortly mark it as down. Segment: Segment-
b:/home/gpadmin/data/mirror/gpseg0:content=0:dbid=10:role=m:preferred_role=m:mod
e=n:status=d: REASON: PG_CTL failed.
20240612:15:12:01:092839 gpaddmirrors:Master-a:gpadmin-[WARNING]:-Failed to
start segment.  The fault prober will shortly mark it as down. Segment: Segment-
b:/home/gpadmin/data/mirror/gpseg4:content=4:dbid=12:role=m:preferred_role=m:mod
e=n:status=d: REASON: PG_CTL failed.
20240612:15:12:01:092839 gpaddmirrors:Master-a:gpadmin-[WARNING]:-Failed to
start segment.  The fault prober will shortly mark it as down. Segment: Segment-
b:/home/gpadmin/data/mirror/gpseg5:content=5:dbid=13:role=m:preferred_role=m:mod
e=n:status=d: REASON: PG_CTL failed.
20240612:15:12:01:092839 gpaddmirrors:Master-a:gpadmin-[WARNING]:-Failed to
start segment.  The fault prober will shortly mark it as down. Segment: Segment-
a:/home/gpadmin/data/mirror/gpseg3:content=3:dbid=15:role=m:preferred_role=m:mod
e=n:status=d: REASON: PG_CTL failed.
20240612:15:12:01:092839 gpaddmirrors:Master-a:gpadmin-[WARNING]:-Failed to
start segment.  The fault prober will shortly mark it as down. Segment: Segment-
a:/home/gpadmin/data/mirror/gpseg7:content=7:dbid=17:role=m:preferred_role=m:mod
e=n:status=d: REASON: PG_CTL failed.
```

```
20240612:15:12:01:092839 gpaddmirrors:Master-a:gpadmin-[WARNING]:-Failed to
start segment.  The fault prober will shortly mark it as down. Segment: Segment-
a:/home/gpadmin/data/mirror/gpseg2:content=2:dbid=14:role=m:preferred_role=m:mod
e=n:status=d: REASON: PG_CTL failed.
[gpadmin@Master-a expand_mirrors]$ ls
expand_mirror_hostss   mirror_config_file
[gpadmin@Master-a expand_mirrors]$
```

可以看到提示无法实现 PG_CTL
进入到 Segment 节点中查看 gpsegx 的 PG_LOG start.LOG 查看具体的报错

```
2024-06-12 16:34:05.817353
CST,,,p77223,th935487616,,,,0,,,seg2,,,,,"FATAL","XX000","could not create
semaphores: No space left on device","Failed system call was semget(7000001, 17,
03600).","This error does *not* mean that you have run out of disk space.  It
occurs when either the system limit for the maximum number of semaphore sets
(SEMMNI), or the system wide maximum number of semaphores (SEMMNS), would be
exceeded.  You need to raise the respective kernel parameter.  Alternatively,
reduce PostgreSQL's consumption of semaphores by reducing its max_connections
parameter.
The PostgreSQL documentation contains more information about configuring your
system for PostgreSQL.",,,,,,"InternalIpcSemaphoreCreate","pg_sema.c",126,1
0xbf0dac postgres errstart (elog.c:557)
2    0x9fc6c8 postgres PGSemaphoreCreate (pg_sema.c:113)
3    0xa74291 postgres InitProcGlobal (proc.c:259)
4    0xa60005 postgres CreateSharedMemoryAndSemaphores (ipci.c:290)
5    0xa10d6b postgres PostmasterMain (postmaster.c:1337)
6    0x6b5f21 postgres main (main.c:205)
7    0x7fa3347fd555 libc.so.6 __libc_start_main + 0xf5
8    0x6c1c7c postgres <symbol not found> + 0x6c1c7c
```

调整信号
```
[gpadmin@Segment-b pg_log]$ cat /etc/sysctl.conf |grep sem
kernel.sem = 250 2048000 200 8192
[gpadmin@Segment-b pg_log]$
```

报错解决

构建镜像提示镜像已经存在无法进行构建

报错提示：
```
[ERROR]:-gpaddmirrors error: GPDB physical mirroring cannot be added.  The
cluster is already configured with Mirrors.
```

查看镜像状态
```
[gpadmin@Master-a expand_mirrors]$ gpstate -e
20240612:15:15:13:101135 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args: -e
20240612:15:15:13:101135 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:15:13:101135 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:15:15:13:101135 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
```

```
20240612:15:15:13:101135 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[WARNING]:-pg_stat_replication
shows no standby connections
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[WARNING]:-pg_stat_replication
shows no standby connections
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[WARNING]:-pg_stat_replication
shows no standby connections
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[WARNING]:-pg_stat_replication
shows no standby connections
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[WARNING]:-pg_stat_replication
shows no standby connections
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[WARNING]:-pg_stat_replication
shows no standby connections
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-Segment Mirroring
Status Report
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-Unsynchronized Segment
Pairs
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Current Primary
Port   Mirror     Port
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a
6000   Segment-b   7000
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b
6000   Segment-a   7000
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b
6001   Segment-a   7001
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a
6002   Segment-b   7002
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a
6003   Segment-b   7003
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b
6003   Segment-a   7003
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:---------------------
------------------------------
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-Downed Segments (may
include segments where status could not be retrieved)
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment      Port
Config status   Status
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b   7000
Down           Down in configuration
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a   7000
Down           Down in configuration
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a   7001
Down           Down in configuration
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b   7002
Down           Down in configuration
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-b   7003
Down           Down in configuration
20240612:15:15:14:101135 gpstate:Master-a:gpadmin-[INFO]:-   Segment-a   7003
Down           Down in configuration
[gpadmin@Master-a expand_mirrors]$
```

再次添加

```
[gpadmin@Master-a expand_mirrors]$ gpaddmirrors -i mirror_config_file
20240612:15:25:01:122900 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting
gpaddmirrors with args: -i mirror_config_file
20240612:15:25:01:122900 gpaddmirrors:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:25:01:122900 gpaddmirrors:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:15:25:01:122900 gpaddmirrors:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:15:25:01:122900 gpaddmirrors:Master-a:gpadmin-[INFO]:-Heap checksum
setting consistent across cluster
20240612:15:25:01:122900 gpaddmirrors:Master-a:gpadmin-[ERROR]:-gpaddmirrors
error: GPDB physical mirroring cannot be added.  The cluster is already
configured with Mirrors.
[gpadmin@Master-a expand_mirrors]$
提示已经有，那就重启一下集群

# 查看M状态
[gpadmin@Master-a expand_mirrors]$ gpstate -m
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args: -m
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:---------------------
----------------------------------------
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:--Current GPDB mirror
list and status
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:--Type = Group
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:---------------------
----------------------------------------
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:-  Mirror      Datadir
                        Port   Status    Data Status
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[WARNING]:-Segment-b
/home/gpadmin/data/mirror/gpseg0   7000   Failed                    <<<<<<<<
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:-  Segment-b
/home/gpadmin/data/mirror/gpseg1   7001   Passive   Synchronized
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[WARNING]:-Segment-a
/home/gpadmin/data/mirror/gpseg2   7000   Failed                    <<<<<<<<
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[WARNING]:-Segment-a
/home/gpadmin/data/mirror/gpseg3   7001   Failed                    <<<<<<<<
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[WARNING]:-Segment-b
/home/gpadmin/data/mirror/gpseg4   7002   Failed                    <<<<<<<<
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[WARNING]:-Segment-b
/home/gpadmin/data/mirror/gpseg5   7003   Failed                    <<<<<<<<
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:-  Segment-a
/home/gpadmin/data/mirror/gpseg6   7002   Passive   Synchronized
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[WARNING]:-Segment-a
/home/gpadmin/data/mirror/gpseg7   7003   Failed                    <<<<<<<<
```

```
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[INFO]:------------------------
----------------------------------------
20240612:15:26:52:127197 gpstate:Master-a:gpadmin-[WARNING]:-6 segment(s)
configured as mirror(s) have failed
[gpadmin@Master-a expand_mirrors]$
```

关闭集群
```
[gpadmin@Master-a expand_mirrors]$ gpstop
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-Starting gpstop with
args:
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-Greenplum Version:
'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:------------------------
---------------------
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-Master instance
parameters
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:------------------------
---------------------
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Master Greenplum
instance process active PID   = 47045
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Database
                     = template1
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Master port
                      = 5432
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Master directory
                     = /home/gpadmin/data/master/gpseg-1
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Shutdown mode
                      = smart
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Timeout
                      = 120
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Shutdown Master
standby host                 = Off
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:------------------------
---------------------
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-Segment instances that
will be shutdown:
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:------------------------
---------------------
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Host        Datadir
                    Port    Status
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg0   6000    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/mirror/gpseg0    7000    d
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg1   6001    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/mirror/gpseg1    7001    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg2   6000    u
```

```
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-a
/home/gpadmin/data/mirror/gpseg2    7000    d
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/primary/gpseg3    6001    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-a
/home/gpadmin/data/mirror/gpseg3    7001    d
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-a
/home/gpadmin/data/primary/gpseg4    6002    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/mirror/gpseg4    7002    d
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-a
/home/gpadmin/data/primary/gpseg5    6003    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/mirror/gpseg5    7003    d
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/primary/gpseg6    6002    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-a
/home/gpadmin/data/mirror/gpseg6    7002    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/primary/gpseg7    6003    u
20240612:15:28:58:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segment-a
/home/gpadmin/data/mirror/gpseg7    7003    d


Continue with Greenplum instance shutdown Yy|Nn (default=N):
> y
20240612:15:29:00:001059 gpstop:Master-a:gpadmin-[INFO]:-Commencing Master
instance shutdown with mode='smart'
20240612:15:29:00:001059 gpstop:Master-a:gpadmin-[INFO]:-Master segment instance
directory=/home/gpadmin/data/master/gpseg-1
20240612:15:29:00:001059 gpstop:Master-a:gpadmin-[INFO]:-Stopping master segment
and waiting for user connections to finish ...
server shutting down
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-Attempting forceful
termination of any leftover master process
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-Terminating processes
for segment /home/gpadmin/data/master/gpseg-1
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-No standby master host
configured
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-Targeting dbid [2, 10,
3, 11, 4, 14, 5, 15, 6, 12, 7, 13, 8, 16, 9, 17] for shutdown
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-Commencing parallel
primary segment instance shutdown, please wait...
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-0.00% of jobs completed
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-100.00% of jobs
completed
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-Commencing parallel
mirror segment instance shutdown, please wait...
20240612:15:29:01:001059 gpstop:Master-a:gpadmin-[INFO]:-0.00% of jobs completed
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-100.00% of jobs
completed
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:---------------------
-----------------------------
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segments stopped
successfully                              = 16
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-    Segments with errors
during stop                       = 0
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-
```

```
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[WARNING]:-Segments that are
currently marked down in configuration   = 6     <<<<<<<<
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-         (stop was
still attempted on these segments)
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:----------------------
-----------------------------
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-Successfully shutdown
16 of 16 segment instances
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-Database successfully
shutdown with no errors reported
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-Cleaning up leftover
gpmmon process
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-No leftover gpmmon
process found
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-Cleaning up leftover
gpsmon processes
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-No leftover gpsmon
processes on some hosts. not attempting forceful termination on these hosts
20240612:15:29:02:001059 gpstop:Master-a:gpadmin-[INFO]:-Cleaning up leftover
shared memory
[gpadmin@Master-a expand_mirrors]$ gpstate
20240612:15:29:11:001760 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args:
20240612:15:29:11:001760 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:29:11:001760 gpstate:Master-a:gpadmin-[CRITICAL]:-gpstate failed.
(Reason='could not connect to server: Connection refused
        Is the server running on host "localhost" (::1) and accepting
        TCP/IP connections on port 5432?
could not connect to server: Connection refused
        Is the server running on host "localhost" (127.0.0.1) and accepting
        TCP/IP connections on port 5432?
') exiting...
[gpadmin@Master-a expand_mirrors]$

# 启动集群
[gpadmin@Master-a expand_mirrors]$ gpstart
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Starting gpstart with
args:
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Binary
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Catalog
Version: '301908232'
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance in admin mode
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Setting new master era
20240612:15:29:51:003113 gpstart:Master-a:gpadmin-[INFO]:-Master Started...
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Shutting down master
```

```
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[WARNING]:-Skipping startup of
segment marked down in configuration: on Segment-b directory
/home/gpadmin/data/mirror/gpseg0 <<<<<
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[WARNING]:-Skipping startup of
segment marked down in configuration: on Segment-a directory
/home/gpadmin/data/mirror/gpseg2 <<<<<
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[WARNING]:-Skipping startup of
segment marked down in configuration: on Segment-a directory
/home/gpadmin/data/mirror/gpseg3 <<<<<
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[WARNING]:-Skipping startup of
segment marked down in configuration: on Segment-b directory
/home/gpadmin/data/mirror/gpseg4 <<<<<
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[WARNING]:-Skipping startup of
segment marked down in configuration: on Segment-b directory
/home/gpadmin/data/mirror/gpseg5 <<<<<
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[WARNING]:-Skipping startup of
segment marked down in configuration: on Segment-a directory
/home/gpadmin/data/mirror/gpseg7 <<<<<
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:----------------------
----
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Master instance
parameters
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:----------------------
----
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Database
  = template1
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Master Port
   = 5432
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Master directory
  = /home/gpadmin/data/master/gpseg-1
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Timeout
   = 600 seconds
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Master standby
  = Off
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:----------------------
----------------
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-Segment instances that
will be started
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:----------------------
----------------
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Host        Datadir
                         Port    Role
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg0   6000    Primary
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg1   6001    Primary
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/mirror/gpseg1    7001    Mirror
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg2   6000    Primary
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg3   6001    Primary
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg4   6002    Primary
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg5   6003    Primary
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg6   6002    Primary
```

```
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-    Segment-a
/home/gpadmin/data/mirror/gpseg6    7002    Mirror
20240612:15:29:52:003113 gpstart:Master-a:gpadmin-[INFO]:-    Segment-b
/home/gpadmin/data/primary/gpseg7   6003    Primary

Continue with Greenplum instance startup Yy|Nn (default=N):
> y
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:-Commencing parallel
primary and mirror segment instance startup, please wait...
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:-Process results...
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:-    Successful segment
starts                                                     = 10
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:-    Failed segment
starts                                                     = 0
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[WARNING]:-Skipped segment
starts (segments are marked down in configuration)   = 6    <<<<<<<<
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:-Successfully started
10 of 10 segment instances, skipped 6 other segments
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[WARNING]:-
****************************************************************************
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[WARNING]:-There are 6
segment(s) marked down in the database
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[WARNING]:-To recover from
this current state, review usage of the gprecoverseg
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[WARNING]:-management utility
which will recover failed segment instance databases.
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[WARNING]:-
****************************************************************************
20240612:15:30:09:003113 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance Master-a directory /home/gpadmin/data/master/gpseg-1
20240612:15:30:10:003113 gpstart:Master-a:gpadmin-[INFO]:-Command pg_ctl reports
Master Master-a instance active
20240612:15:30:10:003113 gpstart:Master-a:gpadmin-[INFO]:-Connecting to
dbname='template1' connect_timeout=15
20240612:15:30:10:003113 gpstart:Master-a:gpadmin-[INFO]:-No standby master
configured.  skipping...
20240612:15:30:10:003113 gpstart:Master-a:gpadmin-[WARNING]:-Number of segments
not attempted to start: 6
20240612:15:30:10:003113 gpstart:Master-a:gpadmin-[INFO]:-Check status of
database with gpstate utility
[gpadmin@Master-a expand_mirrors]$ gpstate
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args:
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
```

```
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-Greenplum instance
status summary
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Master instance
                                   = Active
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Master standby
                                   = No master standby configured
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total segment
instance count from metadata              = 16
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:----------------------
------------------------------
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Primary Segment
Status
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:----------------------
------------------------------
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segments                                     = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment valid (at master)               = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment failures (at master)            = 0
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files missing            = 0
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files found              = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs missing             = 0
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs found               = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files missing                 = 0
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files found                   = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes missing               = 0
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes found                 = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:----------------------
-----------------------------
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Mirror Segment
Status
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:----------------------
-----------------------------
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total mirror
segments                                     = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total mirror
segment valid (at master)               = 2
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[WARNING]:-Total mirror
segment failures (at master)            = 6
 <<<<<<<
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[WARNING]:-Total number of
postmaster.pid files missing            = 6
 <<<<<<<
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files found              = 2
```

```
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[WARNING]:-Total number of
postmaster.pid PIDs missing                     = 6
  <<<<<<<
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs found                       = 2
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[WARNING]:-Total number of
/tmp lock files missing                         = 6
  <<<<<<<
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files found                           = 2
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[WARNING]:-Total number
postmaster processes missing                    = 6
  <<<<<<<
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes found                      = 2
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number mirror
segments acting as primary segments   = 0
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Total number mirror
segments acting as mirror segments    = 8
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:-   Cluster Expansion
                                    = In Progress
20240612:15:30:30:004640 gpstate:Master-a:gpadmin-[INFO]:---------------------
-------------------------------
[gpadmin@Master-a expand_mirrors]$
[gpadmin@Master-a expand_mirrors]$
```

依然不对 mirror数据不正确

```
# 删除mirror
gp_sydb=# set allow_system_table_mods='on';
SET

gp_sydb=# select * from gp_segment_configuration;
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |             datadir
------+---------+------+----------------+------+--------+------+----------+----
-------+----------------------------------
    1 |      -1 | p    | p              | n    | u      | 5432 | Master-a  |
Master-a  | /home/gpadmin/data/master/gpseg-1
    2 |       0 | p    | p              | n    | u      | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
    4 |       2 | p    | p              | n    | u      | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
    5 |       3 | p    | p              | n    | u      | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
    6 |       4 | p    | p              | n    | u      | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
    7 |       5 | p    | p              | n    | u      | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
    9 |       7 | p    | p              | n    | u      | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
   10 |       0 | m    | m              | n    | d      | 7000 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg0
   12 |       4 | m    | m              | n    | d      | 7002 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg4
```

```
   13 |       5 | m    | m              | n    | d       | 7003 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg5
   14 |       2 | m    | m              | n    | d       | 7000 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg2
   15 |       3 | m    | m              | n    | d       | 7001 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg3
   17 |       7 | m    | m              | n    | d       | 7003 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg7
    3 |       1 | p    | p              | s    | u       | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
   11 |       1 | m    | m              | s    | u       | 7001 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg1
    8 |       6 | p    | p              | s    | u       | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
   16 |       6 | m    | m              | s    | u       | 7002 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg6
(17 rows)

gp_sydb=#

gp_sydb=# delete from gp_segment_configuration  where dbid between 10 and 17;
DELETE 8

gp_sydb=# select * from gp_segment_configuration;
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |          datadir
------+---------+------+----------------+------+--------+------+----------+----
-------+----------------------------------
    1 |      -1 | p    | p              | n    | u       | 5432 | Master-a  |
Master-a  | /home/gpadmin/data/master/gpseg-1
    2 |       0 | p    | p              | n    | u       | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
    4 |       2 | p    | p              | n    | u       | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
    5 |       3 | p    | p              | n    | u       | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
    6 |       4 | p    | p              | n    | u       | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
    7 |       5 | p    | p              | n    | u       | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
    9 |       7 | p    | p              | n    | u       | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
    3 |       1 | p    | p              | s    | u       | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
    8 |       6 | p    | p              | s    | u       | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
(9 rows)

gp_sydb=#

# 删除物理节点
[gpadmin@Segment-a pg_log]$ cd ~/data/
[gpadmin@Segment-a data]$ ls
master  mirror  primary
[gpadmin@Segment-a data]$ cd mirror/l
[gpadmin@Segment-a mirror]$ s
gpseg2  gpseg3  gpseg6  gpseg7
[gpadmin@Segment-a mirror]$ cd gpseg2
```

```
[gpadmin@Segment-a gpseg2]$ ls
backup_label  global              pg_clog            pg_dynshmem  pg_ident.conf
 pg_logical    pg_notify    pg_serial      pg_stat      pg_subtrans  pg_twophase
         PG_VERSION  postgresql.auto.conf  recovery.conf
base          internal.auto.conf  pg_distributedlog  pg_hba.conf   pg_log
pg_multixact  pg_replslot  pg_snapshots   pg_stat_tmp   pg_tblspc
 pg_utilitymodedtmredo  pg_xlog        postgresql.conf
[gpadmin@Segment-a gpseg2]$ cd ..cd ..
[gpadmin@Segment-a mirror]$ ls
gpseg2  gpseg3  gpseg6  gpseg7
[gpadmin@Segment-a mirror]$ rm -rf gpseg*
[gpadmin@Segment-a mirror]$ pwd
/home/gpadmin/data/mirror
[gpadmin@Segment-a mirror]$

[root@Segment-b ~]# su gpadmin
[gpadmin@Segment-b root]$ cd ~/data/
[gpadmin@Segment-b data]$ ls
master  mirror  primary
[gpadmin@Segment-b data]$ cd mirror/
[gpadmin@Segment-b mirror]$ ls
gpseg0  gpseg1  gpseg4  gpseg5
[gpadmin@Segment-b mirror]$ rm -rf gpseg*
[gpadmin@Segment-b mirror]$ pwd
/home/gpadmin/data/mirror
[gpadmin@Segment-b mirror]$
```

以上报错解决

构建镜像提示镜像Mirror无数据或数据异常

报错提示:
```
[CRITICAL]:-gpstate failed. (Reason='Invalid GpArray: Master: Master-
a:/home/gpadmin/data/master/gpseg-
1:content=-1:dbid=1:role=p:preferred_role=p:mode=n:status=u
Standby: Not Configured
Segment Pairs: (Primary: Segment-
a:/home/gpadmin/data/primary/gpseg0:content=0:dbid=2:role=p:preferred_role=p:mod
e=n:status=u, Mirror: None)

# 重建Mirror
[gpadmin@Master-a expand_mirrors]$ gpstate -m
20240612:16:08:23:088584 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args: -m
20240612:16:08:23:088584 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:16:08:23:088584 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:16:08:23:088584 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:16:08:23:088584 gpstate:Master-a:gpadmin-[CRITICAL]:-gpstate failed.
(Reason='Invalid GpArray: Master: Master-a:/home/gpadmin/data/master/gpseg-
1:content=-1:dbid=1:role=p:preferred_role=p:mode=n:status=u
Standby: Not Configured
```

```
Segment Pairs: (Primary: Segment-
a:/home/gpadmin/data/primary/gpseg0:content=0:dbid=2:role=p:preferred_role=p:mod
e=n:status=u, Mirror: None)
(Primary: Segment-
a:/home/gpadmin/data/primary/gpseg1:content=1:dbid=3:role=p:preferred_role=p:mod
e=s:status=u, Mirror: None)
(Primary: Segment-
b:/home/gpadmin/data/primary/gpseg2:content=2:dbid=4:role=p:preferred_role=p:mod
e=n:status=u, Mirror: None)
(Primary: Segment-
b:/home/gpadmin/data/primary/gpseg3:content=3:dbid=5:role=p:preferred_role=p:mod
e=n:status=u, Mirror: None)
(Primary: Segment-
a:/home/gpadmin/data/primary/gpseg4:content=4:dbid=6:role=p:preferred_role=p:mod
e=n:status=u, Mirror: None)
(Primary: Segment-
a:/home/gpadmin/data/primary/gpseg5:content=5:dbid=7:role=p:preferred_role=p:mod
e=n:status=u, Mirror: None)
(Primary: Segment-
b:/home/gpadmin/data/primary/gpseg6:content=6:dbid=8:role=p:preferred_role=p:mod
e=s:status=u, Mirror: None)
(Primary: Segment-
b:/home/gpadmin/data/primary/gpseg7:content=7:dbid=9:role=p:preferred_role=p:mod
e=n:status=u, Mirror: None)') exiting...
[gpadmin@Master-a expand_mirrors]$

# 原数据处理
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |              datadir
------+---------+------+----------------+------+--------+------+----------+----
-------+------------------------------------
    1 |      -1 | p    | p              | n    | u      | 5432 | Master-a  |
Master-a  | /home/gpadmin/data/master/gpseg-1
    2 |       0 | p    | p              | n    | u      | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
    3 |       1 | p    | p              | s    | u      | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
    4 |       2 | p    | p              | n    | u      | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
    5 |       3 | p    | p              | n    | u      | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
    6 |       4 | p    | p              | n    | u      | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
    7 |       5 | p    | p              | n    | u      | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
    8 |       6 | p    | p              | s    | u      | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
    9 |       7 | p    | p              | n    | u      | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
(9 rows)

gp_sydb=# UPDATE gp_segment_configuration SET mode='n', status='u' WHERE
role='p';
UPDATE 9

gp_sydb=# SELECT * FROM gp_segment_configuration ORDER BY content, role;
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |              datadir
```

```
------+---------+-----+---------------+-----+--------+-----+----------+----
-------+-----------------------------------
    1 |      -1 | p   | p             | n   | u      | 5432 | Master-a |
Master-a  | /home/gpadmin/data/master/gpseg-1
    2 |       0 | p   | p             | n   | u      | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
    3 |       1 | p   | p             | n   | u      | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
    4 |       2 | p   | p             | n   | u      | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
    5 |       3 | p   | p             | n   | u      | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
    6 |       4 | p   | p             | n   | u      | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
    7 |       5 | p   | p             | n   | u      | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
    8 |       6 | p   | p             | n   | u      | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
    9 |       7 | p   | p             | n   | u      | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
(9 rows)

gp_sydb=#

[gpadmin@Master-a root]$ gpstart
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Starting gpstart with
args:
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Gathering information
and validating the environment...
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Binary
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Greenplum Catalog
Version: '301908232'
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance in admin mode
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Greenplum
Master catalog information
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Setting new master era
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Master Started...
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Shutting down master
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:---------------------
----
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Master instance
parameters
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:---------------------
----
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Database
  = template1
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Master Port
  = 5432
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Master directory
  = /home/gpadmin/data/master/gpseg-1
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Timeout
  = 600 seconds
```

```
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Master standby
  = Off
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:---------------------
----------------
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-Segment instances that
will be started
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:---------------------
----------------
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Host        Datadir
                          Port
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg0   6000
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg1   6001
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg2   6000
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg3   6001
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg4   6002
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-a
/home/gpadmin/data/primary/gpseg5   6003
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg6   6002
20240612:16:32:48:003342 gpstart:Master-a:gpadmin-[INFO]:-   Segment-b
/home/gpadmin/data/primary/gpseg7   6003

Continue with Greenplum instance startup Yy|Nn (default=N):
> y
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-Commencing parallel
segment instance startup, please wait...
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-Process results...
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:---------------------
-----------------------------
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-   Successful segment
starts                                      = 8
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-   Failed segment
starts                                      = 0
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-   Skipped segment
starts (segments are marked down in configuration)   = 0
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:---------------------
-----------------------------
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-Successfully started 8
of 8 segment instances
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:---------------------
-----------------------------
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-Starting Master
instance Master-a directory /home/gpadmin/data/master/gpseg-1
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-Command pg_ctl reports
Master Master-a instance active
20240612:16:32:50:003342 gpstart:Master-a:gpadmin-[INFO]:-Connecting to
dbname='template1' connect_timeout=15
20240612:16:32:51:003342 gpstart:Master-a:gpadmin-[INFO]:-No standby master
configured.  skipping...
20240612:16:32:51:003342 gpstart:Master-a:gpadmin-[INFO]:-Database successfully
started
[gpadmin@Master-a root]$ gpstate
```

```
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-Starting gpstate with
args:
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-Gathering data from
segments...
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-Greenplum instance
status summary
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Master instance
                          = Active
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Master standby
                          = No master standby configured
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total segment
instance count from metadata     = 8
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Primary Segment
Status
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segments                          = 8
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment valid (at master)        = 8
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total primary
segment failures (at master)     = 0
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files missing   = 0
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid files found     = 8
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs missing    = 0
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
postmaster.pid PIDs found      = 8
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files missing        = 0
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number of
/tmp lock files found          = 8
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes missing      = 0
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Total number
postmaster processes found        = 8
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Mirror Segment
Status
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:----------------------
-------------------------------
```

```
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Mirrors not
configured on this array
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:--------------------
-------------------------------
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:-   Cluster Expansion
                            = In Progress
20240612:16:32:55:003749 gpstate:Master-a:gpadmin-[INFO]:--------------------
-------------------------------
[gpadmin@Master-a root]$


# 重置
test_database=#
test_database=# set allow_system_table_mods='on';
SET

test_database=# select * from gp_segment_configuration;
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |           datadir
------+---------+------+----------------+------+--------+------+-----------+----
-------+----------------------------------
    1 |      -1 | p    | p              | n    | u      | 5432 | Master-a  |
Master-a  | /home/gpadmin/data/master/gpseg-1
    2 |       0 | p    | p              | n    | u      | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
    4 |       2 | p    | p              | n    | u      | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
    5 |       3 | p    | p              | n    | u      | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
    7 |       5 | p    | p              | n    | u      | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
    9 |       7 | p    | p              | n    | u      | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
    3 |       1 | p    | p              | n    | u      | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
   10 |       0 | m    | m              | n    | d      | 7000 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg0
   11 |       1 | m    | m              | n    | d      | 7001 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg1
   13 |       5 | m    | m              | n    | d      | 7003 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg5
   14 |       2 | m    | m              | n    | d      | 7000 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg2
   15 |       3 | m    | m              | n    | d      | 7001 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg3
   17 |       7 | m    | m              | n    | d      | 7003 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg7
    8 |       6 | p    | p              | s    | u      | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
   16 |       6 | m    | m              | s    | u      | 7002 | Segment-a |
Segment-a | /home/gpadmin/data/mirror/gpseg6
    6 |       4 | p    | p              | s    | u      | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
   12 |       4 | m    | m              | s    | u      | 7002 | Segment-b |
Segment-b | /home/gpadmin/data/mirror/gpseg4
(17 rows)
```

```
test_database=# delete from gp_segment_configuration  where dbid between 10 and
17;
DELETE 8

test_database=# select * from gp_segment_configuration;
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |             datadir
------+---------+------+----------------+------+--------+------+-----------+----
-------+-----------------------------------
    1 |      -1 | p    | p              | n    | u      | 5432 | Master-a  |
Master-a  | /home/gpadmin/data/master/gpseg-1
    2 |       0 | p    | p              | n    | u      | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
    4 |       2 | p    | p              | n    | u      | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
    5 |       3 | p    | p              | n    | u      | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
    7 |       5 | p    | p              | n    | u      | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
    9 |       7 | p    | p              | n    | u      | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
    3 |       1 | p    | p              | n    | u      | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
    8 |       6 | p    | p              | s    | u      | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
    6 |       4 | p    | p              | s    | u      | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
(9 rows)

test_database=# UPDATE gp_segment_configuration SET mode='n', status='u' WHERE
role='p';
UPDATE 9

test_database=# SELECT * FROM gp_segment_configuration ORDER BY content, role;
 dbid | content | role | preferred_role | mode | status | port | hostname  |
 address  |             datadir
------+---------+------+----------------+------+--------+------+-----------+----
-------+-----------------------------------
    1 |      -1 | p    | p              | n    | u      | 5432 | Master-a  |
Master-a  | /home/gpadmin/data/master/gpseg-1
    2 |       0 | p    | p              | n    | u      | 6000 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg0
    3 |       1 | p    | p              | n    | u      | 6001 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg1
    4 |       2 | p    | p              | n    | u      | 6000 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg2
    5 |       3 | p    | p              | n    | u      | 6001 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg3
    6 |       4 | p    | p              | n    | u      | 6002 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg4
    7 |       5 | p    | p              | n    | u      | 6003 | Segment-a |
Segment-a | /home/gpadmin/data/primary/gpseg5
    8 |       6 | p    | p              | n    | u      | 6002 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg6
    9 |       7 | p    | p              | n    | u      | 6003 | Segment-b |
Segment-b | /home/gpadmin/data/primary/gpseg7
(9 rows)
```

```
test_database=#

# 删除物理文件

# 重新构建mirror镜像
[gpadmin@Master-a expand_mirrors]$ gpaddmirrors -i mirror_config_file
20240612:16:50:18:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting
gpaddmirrors with args: -i mirror_config_file
20240612:16:50:18:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-local Greenplum
Version: 'postgres (Greenplum Database) 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source'
20240612:16:50:18:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-master Greenplum
Version: 'PostgreSQL 9.4.24 (Greenplum Database 6.13.0 build
commit:4f1adf8e247a9685c19ea02bcaddfdc200937ecd Open Source) on x86_64-unknown-
linux-gnu, compiled by gcc (GCC) 6.4.0, 64-bit compiled on Dec 18 2020 22:31:16'
20240612:16:50:18:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Obtaining Segment
details from master...
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Heap checksum
setting consistent across cluster
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Greenplum Add
Mirrors Parameters
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Greenplum master
data directory        = /home/gpadmin/data/master/gpseg-1
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Greenplum master
port                  = 5432
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Parallel batch
limit                 = 16
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 1 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host         = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address      = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory    = /home/gpadmin/data/primary/gpseg0
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port         = 6000
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host         = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address      = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg0
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7000
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 2 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host         = Segment-a
```

```
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg1
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6001
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg1
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7001
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 3 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host        = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg4
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6002
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg4
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7002
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 4 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host        = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg5
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6003
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg5
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7003
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:----------------
----------------------------------------
```

```
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 5 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host        = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg2
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6000
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory   = /home/gpadmin/data/mirror/gpseg2
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port        = 7000
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 6 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host        = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg3
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6001
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory   = /home/gpadmin/data/mirror/gpseg3
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port        = 7001
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 7 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host        = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address     = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory   = /home/gpadmin/data/primary/gpseg6
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port        = 6002
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host        = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address     = Segment-a
```

```
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg6
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7002
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror 8 of 8
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance host         = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance address      = Segment-b
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance directory    = /home/gpadmin/data/primary/gpseg7
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Primary
instance port         = 6003
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance host         = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance address      = Segment-a
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance directory    = /home/gpadmin/data/mirror/gpseg7
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-   Mirror
instance port         = 7003
20240612:16:50:19:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-----------------
----------------------------------------

Continue with add mirrors procedure Yy|Nn (default=N):
> y
20240612:16:50:23:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting to
modify pg_hba.conf on primary segments to allow replication connections
20240612:16:50:26:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Successfully
modified pg_hba.conf on primary segments to allow replication connections
20240612:16:50:26:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-8 segment(s) to
add
20240612:16:50:26:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Validating remote
directories
20240612:16:50:26:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Configuring new
segments
Segment-a (dbid 14): pg_basebackup: base backup completed
Segment-a (dbid 15): pg_basebackup: base backup completed
Segment-a (dbid 16): pg_basebackup: base backup completed
Segment-a (dbid 17): pg_basebackup: base backup completed
Segment-b (dbid 10): pg_basebackup: base backup completed
Segment-b (dbid 11): pg_basebackup: base backup completed
Segment-b (dbid 12): pg_basebackup: base backup completed
Segment-b (dbid 13): pg_basebackup: base backup completed
20240612:16:50:32:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Updating
configuration with new mirrors
20240612:16:50:32:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Updating mirrors
20240612:16:50:32:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Starting mirrors
20240612:16:50:32:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-era is
2dd251f5aa8fec81_240612164941
20240612:16:50:32:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Commencing
parallel segment instance startup, please wait...
20240612:16:50:34:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Process
results...
```

```
20240612:16:50:34:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-
***************************************************************
20240612:16:50:34:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Mirror segments
have been added; data synchronization is in progress.
20240612:16:50:34:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Data
synchronization will continue in the background.
20240612:16:50:34:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-Use  gpstate -s
 to check the resynchronization progress.
20240612:16:50:34:042403 gpaddmirrors:Master-a:gpadmin-[INFO]:-
***************************************************************
[gpadmin@Master-a expand_mirrors]$

报错解决
```

实验四：新增2个Segment物理Node节点并建立与其他Segment_instance相同的primary与mirror实例

创建虚拟机VM

通过Laboratory PXE宿主机，生出2个虚拟机，命名为Segment-c、Segment-d

初始化SengmentCandD

SELINUX

selinux 修改为 disabled

修改主机名

使用nmtui调整主机名后重新登陆

调整网络模拟内网环境

网络调整为自动获取DHCP并模拟断网情况

```
Last login: Fri Jun 14 18:12:55 2024
[root@localhost ~]# nmtui
[root@localhost ~]# exit
logout
SSH connection has been disconnected.
Wait for 3 second to Reconnecting...
Last login: Fri Jun 14 18:17:20 2024 from 192.168.7.99
[root@Segment-c ~]#
[root@Segment-c ~]# nmcli connection show
NAME                UUID                                  TYPE      DEVICE
Wired connection 1  218bc651-24b6-3133-849b-36cc6b2fc5b1  ethernet  ens36
System ens33        6f53f999-8d62-4716-93fc-b2a34371a79e  ethernet  --
[root@Segment-c ~]# ping www.baidu.com
^C
[root@Segment-c ~]# nmcli connection up 6f53f999-8d62-4716-93fc-b2a34371a79e
Connection successfully activated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/2)
[root@Segment-c ~]# nmcli connection show
NAME                UUID                                  TYPE      DEVICE
System ens33        6f53f999-8d62-4716-93fc-b2a34371a79e  ethernet  ens33
Wired connection 1  218bc651-24b6-3133-849b-36cc6b2fc5b1  ethernet  ens36
```

```
[root@Segment-c ~]# ping www.baidu.com
PING www.a.shifen.com (39.156.66.18) 56(84) bytes of data.
64 bytes from 39.156.66.18 (39.156.66.18): icmp_seq=1 ttl=128 time=24.8 ms
64 bytes from 39.156.66.18 (39.156.66.18): icmp_seq=2 ttl=128 time=25.1 ms
^C
--- www.a.shifen.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 24.895/24.999/25.103/0.104 ms
[root@Segment-c ~]# nmcli connection down 6f53f999-8d62-4716-93fc-b2a34371a79e
Connection 'System ens33' successfully deactivated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/2)
[root@Segment-c ~]# ping www.baidu.com
^C
[root@Segment-c ~]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
Wired connection 1  218bc651-24b6-3133-849b-36cc6b2fc5b1  ethernet  ens36
System ens33         6f53f999-8d62-4716-93fc-b2a34371a79e  ethernet  --
[root@Segment-c ~]#


[root@localhost ~]# nmtui
[root@localhost ~]# exit
logout
SSH connection has been disconnected.
Wait for 3 second to Reconnecting...
Last login: Fri Jun 14 18:17:02 2024 from 192.168.7.99
[root@Segment-d ~]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
Wired connection 1  9e51d6c6-873d-3f9d-a219-250702c1dda7  ethernet  ens36
System ens33         1947a30a-4b91-4a41-90d7-dbb0c87a479f  ethernet  --
[root@Segment-d ~]# ping www.baidu.com
^C
[root@Segment-d ~]# nmcli connection up 1947a30a-4b91-4a41-90d7-dbb0c87a479f
Connection successfully activated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/2)
[root@Segment-d ~]# ping www.baidu.com
PING www.a.shifen.com (39.156.66.14) 56(84) bytes of data.
64 bytes from 39.156.66.14 (39.156.66.14): icmp_seq=1 ttl=128 time=23.1 ms
^C
--- www.a.shifen.com ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 23.119/23.119/23.119/0.000 ms
[root@Segment-d ~]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
System ens33         1947a30a-4b91-4a41-90d7-dbb0c87a479f  ethernet  ens33
Wired connection 1  9e51d6c6-873d-3f9d-a219-250702c1dda7  ethernet  ens36
[root@Segment-d ~]# nmcli connection down 1947a30a-4b91-4a41-90d7-dbb0c87a479f
Connection 'System ens33' successfully deactivated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/2)
[root@Segment-d ~]# ping www.baidu.com
^C
[root@Segment-d ~]# nmcli connection show
NAME                 UUID                                  TYPE      DEVICE
Wired connection 1  9e51d6c6-873d-3f9d-a219-250702c1dda7  ethernet  ens36
System ens33         1947a30a-4b91-4a41-90d7-dbb0c87a479f  ethernet  --
[root@Segment-d ~]#
```

修改hosts文件

```
# 在Standby-a 节点上新增hosts文件
[root@Standby-a ~]# cat /etc/hosts
127.0.0.1   localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6
192.168.7.136  Master-a
192.168.7.137  Standby-a
192.168.7.138  Segment-a
192.168.7.139  Segment-b
[root@Standby-a ~]# cat << EOF >> /etc/hosts
> 192.168.7.141  Segment-c
> 192.168.7.140  Segment-d
> EOF
[root@Standby-a ~]# cat /etc/hosts
127.0.0.1   localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 localhost6.localdomain6
192.168.7.136  Master-a
192.168.7.137  Standby-a
192.168.7.138  Segment-a
192.168.7.139  Segment-b
192.168.7.141  Segment-c
192.168.7.140  Segment-d
[root@Standby-a ~]#

# 复制到其他节点
[root@Standby-a ~]# scp /etc/hosts Master-a:/etc/hosts
root@master-a's password:
hosts
                                          100%  307   493.8KB/s   00:00
[root@Standby-a ~]# scp /etc/hosts Segment-a:/etc/hosts
root@segment-a's password:
hosts
                                          100%  307   305.4KB/s   00:00
[root@Standby-a ~]# scp /etc/hosts Segment-b:/etc/hosts
root@segment-b's password:
hosts
                                          100%  307   320.8KB/s   00:00
[root@Standby-a ~]# scp /etc/hosts Segment-c:/etc/hosts
The authenticity of host 'segment-c (192.168.7.141)' can't be established.
ECDSA key fingerprint is SHA256:GLOzhVa4h3m9pvgy7RlImPqrJsKQqu6MKOfVM4Mt/OE.
ECDSA key fingerprint is MD5:e7:7e:03:19:6e:1b:61:a9:41:11:a1:e2:d7:4e:e8:72.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'segment-c,192.168.7.141' (ECDSA) to the list of
known hosts.
root@segment-c's password:
hosts
                                          100%  307   869.7KB/s   00:00
[root@Standby-a ~]# scp /etc/hosts Segment-d:/etc/hosts
The authenticity of host 'segment-d (192.168.7.140)' can't be established.
ECDSA key fingerprint is SHA256:I1f3uAfaIdL9/v9+FfzOQhluYIWG1sHOf+BP4euLdPg.
ECDSA key fingerprint is MD5:10:a4:29:ab:1e:97:35:67:ff:ad:3f:8a:d9:e2:be:a2.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'segment-d,192.168.7.140' (ECDSA) to the list of
known hosts.
root@segment-d's password:
```

```
hosts
                                              100%  307   661.6KB/s   00:00
[root@Standby-a ~]#
```

关联本地YUM源

```
# 新增segment节点注释原有yum源
[root@Standby-a ~]# ssh Segment-c "cd /etc/yum.repos.d ; rename repo repotmp * ;
ls"
root@segment-c's password:
CentOS-Base.repotmp
CentOS-CR.repotmp
CentOS-Debuginfo.repotmp
CentOS-fasttrack.repotmp
CentOS-Media.repotmp
CentOS-Sources.repotmp
CentOS-Vault.repotmp
CentOS-x86_64-kernel.repotmp
[root@Standby-a ~]# ssh Segment-d "cd /etc/yum.repos.d ; rename repo repotmp * ;
ls"
root@segment-d's password:
CentOS-Base.repotmp
CentOS-CR.repotmp
CentOS-Debuginfo.repotmp
CentOS-fasttrack.repotmp
CentOS-Media.repotmp
CentOS-Sources.repotmp
CentOS-Vault.repotmp
CentOS-x86_64-kernel.repotmp
[root@Standby-a ~]#

# 复制本地yum源文件并执行构建
[root@Standby-a ~]# scp /etc/yum.repos.d/localhttp.repo Segment-
c:/etc/yum.repos.d/localhttp.repo
root@segment-c's password:
Permission denied, please try again.
root@segment-c's password:
localhttp.repo
                                              100%   90   135.8KB/s   00:00
[root@Standby-a ~]# scp /etc/yum.repos.d/localhttp.repo Segment-
d:/etc/yum.repos.d/localhttp.repo
root@segment-d's password:
localhttp.repo
                                              100%   90   137.8KB/s   00:00
[root@Standby-a ~]# ssh Segment-c "yum clean all ; yum makecache"
root@segment-c's password:
Loaded plugins: fastestmirror
Cleaning repos: localhttp
Loaded plugins: fastestmirror
Determining fastest mirrors
Metadata Cache Created
[root@Standby-a ~]# ssh Segment-d "yum clean all ; yum makecache"
root@segment-d's password:
Loaded plugins: fastestmirror
Cleaning repos: localhttp
Loaded plugins: fastestmirror
Determining fastest mirrors
```

```
Metadata Cache Created
[root@Standby-a ~]#
```

关闭防火墙（实验环境）

```
# 关闭两个新增节点的防火墙
[root@Standby-a ~]# ssh Segment-c "systemctl stop firewalld ; systemctl disabled
firewalld ; systemctl status firewalld"
root@segment-c's password:
Unknown operation 'disabled'.
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; vendor
preset: enabled)
   Active: inactive (dead) since Fri 2024-06-14 18:49:49 CST; 6ms ago
     Docs: man:firewalld(1)
  Process: 724 ExecStart=/usr/sbin/firewalld --nofork --nopid $FIREWALLD_ARGS
(code=exited, status=0/SUCCESS)
 Main PID: 724 (code=exited, status=0/SUCCESS)

Jun 14 18:12:29 localhost.localdomain systemd[1]: Starting firewalld - dynamic
firewall daemon...
Jun 14 18:12:29 localhost.localdomain systemd[1]: Started firewalld - dynamic
firewall daemon.
Jun 14 18:49:48 Segment-c systemd[1]: Stopping firewalld - dynamic firewall
daemon...
Jun 14 18:49:49 Segment-c systemd[1]: Stopped firewalld - dynamic firewall
daemon.
[root@Standby-a ~]# ssh Segment-d "systemctl stop firewalld ; systemctl disabled
firewalld ; systemctl status firewalld"
root@segment-d's password:
Unknown operation 'disabled'.
● firewalld.service - firewalld - dynamic firewall daemon
   Loaded: loaded (/usr/lib/systemd/system/firewalld.service; enabled; vendor
preset: enabled)
   Active: inactive (dead) since Fri 2024-06-14 10:50:07 CST; 5ms ago
     Docs: man:firewalld(1)
  Process: 714 ExecStart=/usr/sbin/firewalld --nofork --nopid $FIREWALLD_ARGS
(code=exited, status=0/SUCCESS)
 Main PID: 714 (code=exited, status=0/SUCCESS)

Jun 14 18:12:16 localhost.localdomain systemd[1]: Starting firewalld - dynamic
firewall daemon...
Jun 14 18:12:17 localhost.localdomain systemd[1]: Started firewalld - dynamic
firewall daemon.
Jun 14 10:50:06 Segment-d systemd[1]: Stopping firewalld - dynamic firewall
daemon...
Jun 14 10:50:07 Segment-d systemd[1]: Stopped firewalld - dynamic firewall
daemon.
[root@Standby-a ~]#
```

取消SSHD-DNS缓存加速连接

```
# 设置standby节点取消sshd-DNS缓存
[root@Standby-a ~]# sed -i "s/#UseDNS yes/UseDNS no/g" /etc/ssh/sshd_config
[root@Standby-a ~]# cat /etc/ssh/sshd_config | grep DNS
UseDNS no
```

```
[root@Standby-a ~]# systemctl restart sshd

# 复刻其他2个SegmentCandD节点
[root@Standby-a ~]# ssh Segment-c "sed -i "s/#UseDNS yes/UseDNS no/g"
/etc/ssh/sshd_config ; cat /etc/ssh/sshd_config | grep DNS ; systemctl restart
sshd"
root@segment-c's password:
sed: -e expression #1, char 9: unterminated `s' command
#UseDNS yes
[root@Standby-a ~]# ssh Segment-c "sed -i 's/#UseDNS yes/UseDNS no/g'
/etc/ssh/sshd_config ; cat /etc/ssh/sshd_config | grep DNS ; systemctl restart
sshd"
root@segment-c's password:
Permission denied, please try again.
root@segment-c's password:
UseDNS no
[root@Standby-a ~]# ssh Segment-d "sed -i 's/#UseDNS yes/UseDNS no/g'
/etc/ssh/sshd_config ; cat /etc/ssh/sshd_config | grep DNS ; systemctl restart
sshd"
root@segment-d's password:
UseDNS no
[root@Standby-a ~]#

# 测试连接速度
重新连接测试速度
```

数据库安装前准备工作

参考实验一思路 简略处理

底层依赖安装

```
# yum 依赖进行安装
[root@Segment-c ~]# yum install vim net-tools psmisc nc rsync lrzsz ntp libzstd
openssl-static tree iotop git

[root@Segment-c ~]# yum install apr apr-util bash bzip2 curl krb5 libcurl
libevent libxml2 libyaml zlib openldap openssh-client openssl openssl-libs perl
readline rsync R sed tar zip krb5-devel

[root@Segment-d ~]# yum install vim net-tools psmisc nc rsync lrzsz ntp libzstd
openssl-static tree iotop git

[root@Segment-d ~]# yum install apr apr-util bash bzip2 curl krb5 libcurl
libevent libxml2 libyaml zlib openldap openssh-client openssl openssl-libs perl
readline rsync R sed tar zip krb5-devel
```

同步系统参数配置文件

```
# 从master 同步至segment c and d
[root@Master-a ~]# scp /etc/sysctl.conf Segment-c:/etc/sysctl.conf
The authenticity of host 'segment-c (192.168.7.141)' can't be established.
ECDSA key fingerprint is SHA256:GLOzhVa4h3m9pvgy7RlImPqrJsKQqu6MKOfVM4Mt/OE.
ECDSA key fingerprint is MD5:e7:7e:03:19:6e:1b:61:a9:41:11:a1:e2:d7:4e:e8:72.
Are you sure you want to continue connecting (yes/no)? yes
```

```
Warning: Permanently added 'segment-c,192.168.7.141' (ECDSA) to the list of
known hosts.
root@segment-c's password:
sysctl.conf
                                                   100% 1151     2.4MB/s   00:00
[root@Master-a ~]# scp /etc/security/limits.conf Segment-
c:/etc/security/limits.conf
root@segment-c's password:
limits.conf
                                                   100% 2555     5.9MB/s   00:00
[root@Master-a ~]# scp /etc/security/limits.d/20-nproc.conf Segment-
c:/etc/security/limits.d/20-nproc.conf
root@segment-c's password:
20-nproc.conf
                                                   100%  324    756.4KB/s   00:00
[root@Master-a ~]# scp /etc/sysctl.conf Segment-d:/etc/sysctl.conf
The authenticity of host 'segment-d (192.168.7.140)' can't be established.
ECDSA key fingerprint is SHA256:I1f3uAfaIdL9/v9+FfzOQhluYIWG1sHOf+BP4euLdPg.
ECDSA key fingerprint is MD5:10:a4:29:ab:1e:97:35:67:ff:ad:3f:8a:d9:e2:be:a2.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'segment-d,192.168.7.140' (ECDSA) to the list of
known hosts.
root@segment-d's password:
sysctl.conf
                                                   100% 1151     2.0MB/s   00:00
[root@Master-a ~]# scp /etc/security/limits.conf Segment-
d:/etc/security/limits.conf
root@segment-d's password:
limits.conf
                                                   100% 2555     5.0MB/s   00:00
[root@Master-a ~]# scp /etc/security/limits.d/20-nproc.conf Segment-
d:/etc/security/limits.d/20-nproc.conf
root@segment-d's password:
20-nproc.conf
                                                   100%  324    698.8KB/s   00:00
[root@Master-a ~]#
```

同步时间

```
# 同步时间后模拟断网
[root@Segment-c ~]# nmcli connection show
NAME                UUID                                  TYPE      DEVICE
Wired connection 1  218bc651-24b6-3133-849b-36cc6b2fc5b1  ethernet  ens36
System ens33        6f53f999-8d62-4716-93fc-b2a34371a79e  ethernet  --
[root@Segment-c ~]# nmcli connection up 6f53f999-8d62-4716-93fc-b2a34371a79e
Connection successfully activated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/3)
[root@Segment-c ~]# ping www.baidu.com
PING www.a.shifen.com (39.156.66.18) 56(84) bytes of data.
64 bytes from 39.156.66.18 (39.156.66.18): icmp_seq=1 ttl=128 time=24.8 ms
64 bytes from 39.156.66.18 (39.156.66.18): icmp_seq=2 ttl=128 time=24.6 ms
^C
--- www.a.shifen.com ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1001ms
rtt min/avg/max/mdev = 24.661/24.767/24.874/0.190 ms
[root@Segment-c ~]# ntpdate cn.pool.ntp.org
```

```
14 Jun 11:40:41 ntpdate[2138]: adjust time server 139.199.215.251 offset
0.019672 sec
[root@Segment-c ~]# date
Fri Jun 14 11:40:45 CST 2024
[root@Segment-c ~]# date
Fri Jun 14 11:40:59 CST 2024
[root@Segment-c ~]# nmcli connection down 6f53f999-8d62-4716-93fc-b2a34371a79e
Connection 'System ens33' successfully deactivated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/3)
[root@Segment-c ~]#


[root@Segment-d ~]# nmcli connection show
NAME                 UUID                                   TYPE      DEVICE
Wired connection 1   9e51d6c6-873d-3f9d-a219-250702c1dda7   ethernet  ens36
System ens33         1947a30a-4b91-4a41-90d7-dbb0c87a479f   ethernet  --
[root@Segment-d ~]# nmcli connection up
Error: neither a valid connection nor device given.
[root@Segment-d ~]# nmcli connection up 1947a30a-4b91-4a41-90d7-dbb0c87a479f
Connection successfully activated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/3)
[root@Segment-d ~]# ntpdate cn.pool.ntp.org
14 Jun 11:47:20 ntpdate[2121]: adjust time server 202.112.29.82 offset 0.099432
sec
[root@Segment-d ~]# nmcli connection down 1947a30a-4b91-4a41-90d7-dbb0c87a479f
Connection 'System ens33' successfully deactivated (D-Bus active path:
/org/freedesktop/NetworkManager/ActiveConnection/3)
[root@Segment-d ~]#
```

实验五：通过expand进行缩容，并进行数据重分布

Loding …

实验六：新增Standby，HA高可用热备节点

Loding …

实验七：大数据量导入

Loding …

实验八：数据备份&数据恢复...

Loding …

实验九：数据库账户密码&权限认证相关

Loding …

实验十：数据库版本更新

Loding …