HBase_allocation

- # Catalog

1. Introduction

The HBase allocation tool is designed to help users manage cluster resource among different application and tables.

When we manage a large scale of HBase cluster with many applications running on it, there will be lots of problems. In Taobao[1] there is a cluster for many departments to test their applications performance, these applications are based on HBase. With one cluster which has 12 servers, there will be only one application running exclusively on this server, and many other applications must wait until the previous test finished.

After we add allocation manage function to the cluster, applications can share the cluster and run concurrently. Also if the Test Engineer wants to make sure there is no interference, he/she can move out other tables from this group.

In groups we use table priority to allocate resource, when system is busy; we can make sure high-priority tables are not affected lower-priority tables

[1] Taobao (simplified Chinese: 淘宝网) is a Chinese language web site for online shopping, similar to eBay, Rakuten and Amazon, operated in the People's Republic of China by Alibaba Group.In 2009 Taobao saw advertising revenues of $220 Million.

2. Functions

2.1 Group management

When we build an HBase cluster, there would be a default group called "0", it is used to store "–ROOT-"and ".META." Regions .Users can add a new group, set special-conf mark or not .New group name must be integer, and must not be same with the existing groups. If we set special-conf mark to group, it means that group has different in configuration or jar files .When we move region servers in or out from this groups, system will update change the region servers' configuration with new group conf files and jars, When you want to delete a group, you must make sure that there is no region server in this group .If not, you must move region servers out first.

2.1.1   View groups

http://${master_address}:60010/showgroup.jsp, this page shows all groups' information, including special configuration marks, region server allocation, delete and add buttons.

Figure 1: View group information

2.1.2 Add a new group
Example:

http://${master_address}:60010/showgroup.jsp, when you want to add a new group, you must set the group name and special configuration mark.

Figure 2: Add group "2"

Show Regionserver Group Information

Master,Local logs, Thread Dump, Log Level,Group Information

List Group

Group name	Special Configuration	Server num	Region num	Action
group: 2	true	(0)	(0)	Delete
group: 1	true	(6)	(5903)	Delete
group: 0	false	(6)	(4675)	default group
Add Group:	(must be int)	Special ? ☐		AddNew

Figure 3: Successful

2.1.3   Delete a group
Example:

http://${master_address}:60010/showgroup.jsp,
Delete a group which has region servers, you will get a warning.

Error , This group is not null ,move regionservers to other group first!!

确定

Figure 4: The warning when delete a group with regions

2.2   Region server management
2.2.1   Move region servers between groups
When we move region server to other group, we will check "–ROOT-" and ".META."
region first ,if the region server holding "–ROOT-" or ".META." regions, users can
not move them. When we move a region server out of a group, its regions will be
assigned in other region servers left on this group. If there is no region server
available, users must change the tables' group property first. If we move in or out
a region server from a special configuration group, system will update the region
server's configuration which includes HBase conf fold , lib fold and hbase-XX.jar.

Example:

http://${master_address}:60010/showgroup.jsp, Add a new group "2" ,without special-conf mark, then move a region server dw93.kgb.sqa.cm4,60020 into group "2". Click the "UpdateRegionserverGroup" button.

Figure 5: Move a region server

Figure 6: Process regions on this region server, remaining regions number will decrease

Figure 7: Successful

2.2.2 Move region servers to a special-conf group

Example:

http://${master_address}:60010/showgroup.jsp .

Add a new group "3", with special-conf mark, and then move region server dw84.kgb.sqa.cm4,60020 , dw85.kgb.sqa.cm4,60020 from group "1" to group "3" .
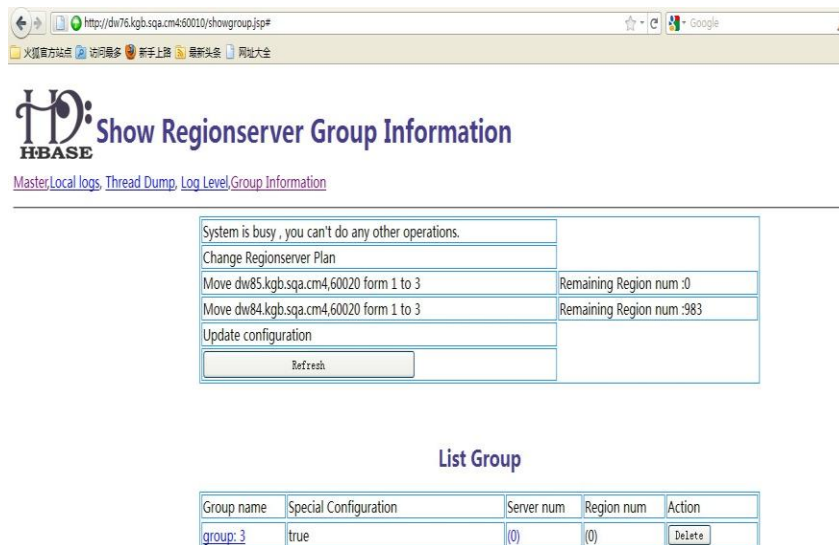

Figure 8: Group information
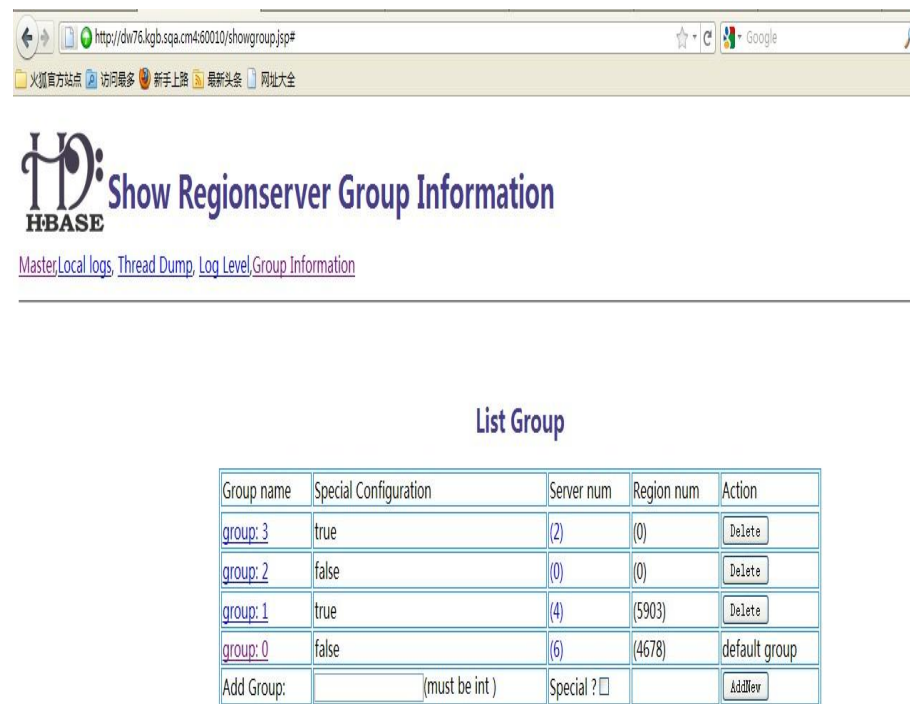
Figure 9: Updating the region servers' configuration

Figure 10: Successful

2.3 Group Information

2.3.1 View Group Information

Group detailed information page lists all its region servers and the information of this server which including server address, table number, region number and table information.

Table information include table name, region number the table has in this group, table priority and table groups attribute. One table can be assigned to several groups but one region server can only be assign to one group. When we create a table without set group property, its regions can be assigned to all groups without

special-conf mark.

Example:

http://${master_address}:60010/groupinfo.jsp?groupname=1 ,Take group "1" for example. It has 4 region servers ,10 tables and 5903 regions.
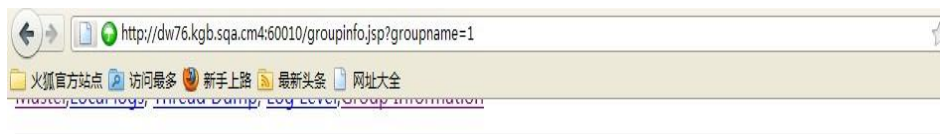

Figure 11: View region server and table information of one group

2.3.2   Balance Group

We provide a page to balance all regions belong to this group.

Example:

http://${master_address}:60010/groupinfo.jsp?groupname=1 , the region distribution balanced
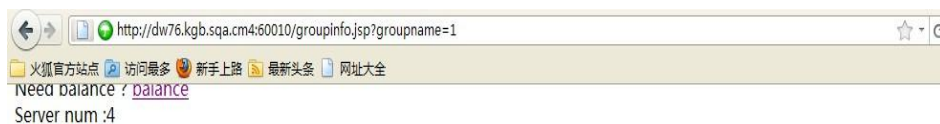
Figure 12: Balance regions in group

2.4 Table Information

2.4.1 Change Group Assignment of Table

We can change table group property dynamically. If assign table to more than one group, separate group name by ",".

Example:

http://${master_address}:60010/groupinfo.jsp?groupname=1,   change table bashtest2's group attribute from group "1" to group "3". Write 3 in "Change Groups" input box, then click "ChangeTable" button. It may take a while, because this process including disable and enable table.

Figure 12: Change table's group property

After change, bashtest2 has moved to group "3".

http://${master_address}:60010/groupinfo.jsp?groupname=3

Figure 13: Table's group attribute has been changed from '1' to '3'

2.4.2 Change table priority

We can change table priority in this page. New priority must between 0 and 10, and small number means higher priority.

About table priority performance, please see Performance of Table priority.pdf

Also you can change table priority use client API, for example:

```
hAdmin.disableTable(tablename);
HTableDescriptor hdesc= hAdmin.getTableDescriptor(Bytes.toBytes(tablename));
hdesc.setValue(Bytes.toBytes("priority"), Bytes.toBytes(pristr));
hAdmin.modifyTable(Bytes.toBytes(tablename), hdesc);
hAdmin.enableTable(tablename);
```

Example:

http://${master_address}:60010/groupinfo.jsp?groupname=3, change table bashtesh2 priority from 4 to 1.Write 1 in change priority blank, then click "ChangeTable" button.

Figure 14: Table's priority has been changed from 4 to 1

2.4.3 Balance table

Besides balance in group level, we provide table level balance.

Example:

In groupinfo page, click balance button at the end of table "pweite1".
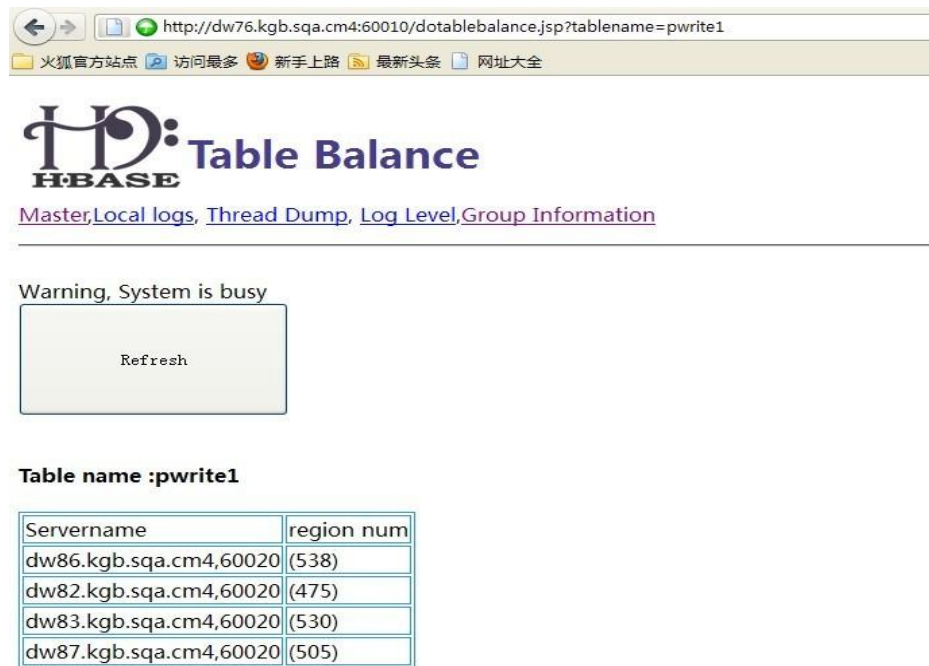http:// ${master_address}:60010/dotablebalance.jsp?tablename=pwrite1

Figure 14: Before balance
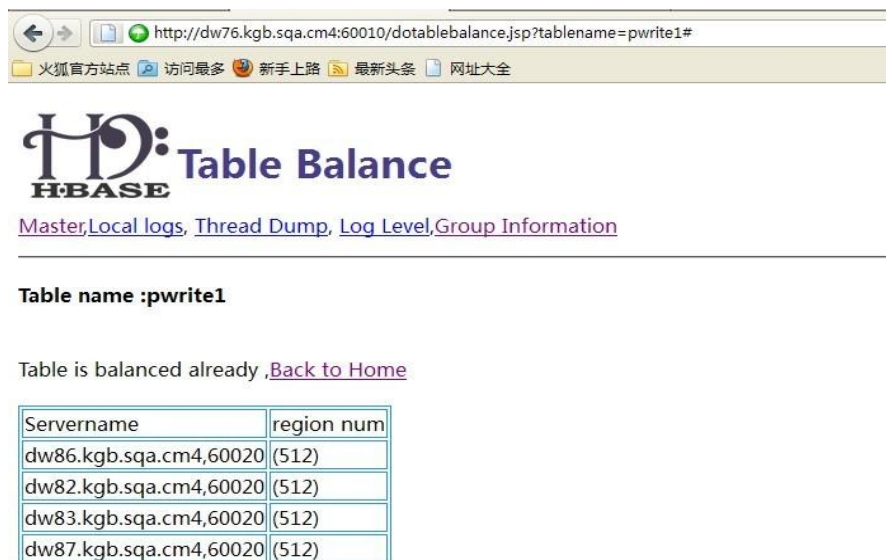
Figure 15: After balance

3. Patches

There are three ways to add this features, you can get the required components from
https://github.com/ICT-Ope/HBase_allocation/

3.1 Full patch

In "fullpatch" fold, the file "PriorityAndGroupInfo.patch" is used to patch all JSP and java
source code to HBase source code. After patched, user must compile the source code and
replace the hbase-**.jar

When region servers move in or out special-conf groups, system needs to copy configuration
files between servers and restart region servers to obtain the new configuration. So there
are 2 shell scripts must be changed permission manually.

Example:

```
tar zxvf hbase-0.90.2.tar.gz
cd hbase-0.90.2
ls –l   ../ PriorityAndGroupInfo.patch
patch -p1 < ../PriorityAndGroupInfo.patch
cd hbase-webapps/master/
chmod +x *.sh
```

3.2 Compiled jar and JSP patch

In "Jarandwebpatch" fold, there are compiled jar hbase-0.90.2.jar and the JSP patch.

Example:

Assume GroupInfoWeb.patch , our modified hbase-0.90.2.jar   and   original
hbase-0.90.2.tar.gz are in the same directory.

```
tar zxvf hbase-0.90.2.tar.gz
cd hbase-0.90.2
cp ../hbase-0.90.2.jar .
cp ../hbase-0.90.2.jar ./lib
ls –l    ../ GroupInfoWeb.patch
patch -p1 < ../ GroupInfoWeb.patch
cd hbase-webapps/master/
chmod +x *.sh
```

3.3 Integrated gzip file

In the hbase-0.90.2 fold we placed an integrated gzib file, It's all prepared, you only need to extract it and deploy it like deploy HBase.