

# HBase\_allocation

•

## Catalog

<b>1. Introduction</b>	1
<b>2. Functions</b>	1
2.1 Group management	1
2.1.1 View groups	1
2.1.2 Add a new group	2
2.1.3 Delete a group	3
2.2 Region server management	3
2.2.1 Move region servers between groups	3
2.2.2 Move region servers to a special-conf group	5
2.3 Group Information	6
2.3.1 View Group Information	6
2.3.2 Balance Group	6
2.4 Table Information	7
2.4.1 Change Group Assignment of Table	7
2.4.2 Change table priority	8
2.4.3 Balance table	8
<b>3. Patches</b>	9
3.1 Full patch	9
3.2 Compiled jar and JSP patch	9
3.3 Integrated gzip file	10

## 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<sup>[1]</sup> 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](http://${master_address}:60010/showgroup.jsp), this page shows all groups' information.



## Show Regionserver Group Information

[Master](#), [Local logs](#), [Thread Dump](#), [Log Level](#), [Group Information](#)

### List Group

Group name	Special Configuration	Server num	Region num	Action
<a href="#">group: 1</a>	true	(6)	(5903)	<a href="#">Delete</a>
<a href="#">group: 0</a>	false	(6)	(4675)	default group
Add Group:	<input type="text" value="(must be int)"/>	Special ? <input type="checkbox"/>		<a href="#">AddNew</a>

Figure 1: View group information

### 2.1.2 Add a new group

#### Example:

[http://\\${master\\_address}:60010/showgroup.jsp](http://${master_address}:60010/showgroup.jsp), when you want to add a new group, you must set the group name and the special-conf mark.



### List Group

Group name	Special Configuration	Server num	Region num	Action
<a href="#">group: 1</a>	true	(6)	(5903)	<a href="#">Delete</a>
<a href="#">group: 0</a>	false	(6)	(4675)	default group
Add Group:	<input type="text" value="2"/> (must be int)	Special ? <input checked="" type="checkbox"/>		<a href="#">AddNew</a>

Figure 2: Add group "2"



## HBASE 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 ? <input type="checkbox"/>		AddNew

Figure 3: Successful

### 2.1.3 Delete a group

#### Example:

[http://\\${master\\_address}:60010/showgroup.jsp](http://${master_address}:60010/showgroup.jsp),

Delete a group which has region servers, you will get a warning.



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 to 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://dw76.kgb.sqa.cm4.60010/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.

Group name	Special Configuration	Server num	Region num	Action
group: 2	false	(0)	(0)	Delete
group: 1	true	(6)	(5903)	Delete
group: 0	false	(6)	(4675)	default group
Add Group:	(must be int)	Special ? <input type="checkbox"/>		AddNew

Region Server name	Request num	Region num	Original Group	Update to New Group
dw83.kgb.sqa.cm4.60020	0	982	1	
dw85.kgb.sqa.cm4.60020	0	983	1	
dw84.kgb.sqa.cm4.60020	0	983	1	
dw87.kgb.sqa.cm4.60020	0	984	1	
dw86.kgb.sqa.cm4.60020	0	982	1	
dw82.kgb.sqa.cm4.60020	0	989	1	
dw90.kgb.sqa.cm4.60020	82169	781	0	
dw93.kgb.sqa.cm4.60020	661	780	0	2
dw91.kgb.sqa.cm4.60020	248	779	0	
dw92.kgb.sqa.cm4.60020	435	778	0	
dw88.kgb.sqa.cm4.60020	426	779	0	
dw89.kgb.sqa.cm4.60020	378	778	0	
				UpdateRegionserverGroup

Figure 5: Move a region server

System is busy, you can't do any other operations.

Change Regionserver Plan  
Move dw93.kgb.sqa.cm4.60020 form 0 to 2  
Remaining Region num :763

Refresh

Group name	Special Configuration	Server num	Region num	Action
group: 2	false	(0)	(0)	Delete
group: 1	true	(6)	(5903)	Delete
group: 0	false	(6)	(4674)	default group
Add Group:	(must be int)	Special ? <input type="checkbox"/>		AddNew

Region Server name	Request num	Region num	Original Group	Update to New Group
dw83.kgb.sqa.cm4.60020	0	982	1	
dw85.kgb.sqa.cm4.60020	0	983	1	

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

Group name	Special Configuration	Server num	Region num	Action
group: 2	false	(1)	(0)	Delete
group: 1	true	(6)	(5903)	Delete
group: 0	false	(5)	(4677)	default group
Add Group:	(must be int)	Special ? <input type="checkbox"/>		AddNew

Figure 7: Successful

## 2.2.2 Move region servers to a special-conf group

**Example:**

[http://\\${master\\_address}:60010/showgroup.jsp](http://${master_address}:60010/showgroup.jsp) .

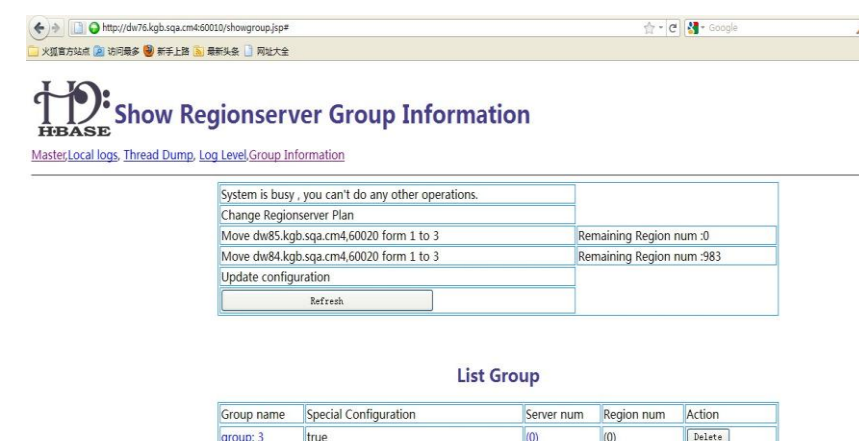
Add a new group “3”, with special-conf mark, and then move region server dw84.kgb.sqa.cm4,60020 , dw85.kgb.sqa.cm4,60020 from group “1” to group “3” .



The screenshot shows the HBase web interface for managing region server groups. The page title is "Show Regionserver Group Information". Below the title are links for "Master/Local logs", "Thread Dump", and "Log Level/Group Information". The main content area is titled "List Group" and contains a table with the following data:

Group name	Special Configuration	Server num	Region num	Action
group: 3	true	(0)	(0)	<a href="#">Delete</a>
group: 2	false	(1)	(0)	<a href="#">Delete</a>
group: 1	true	(6)	(5903)	<a href="#">Delete</a>
group: 0	false	(5)	(4677)	default group
Add Group:	(must be int )	Special ? <input type="checkbox"/>		<a href="#">AddNew</a>

Figure 8: Group information

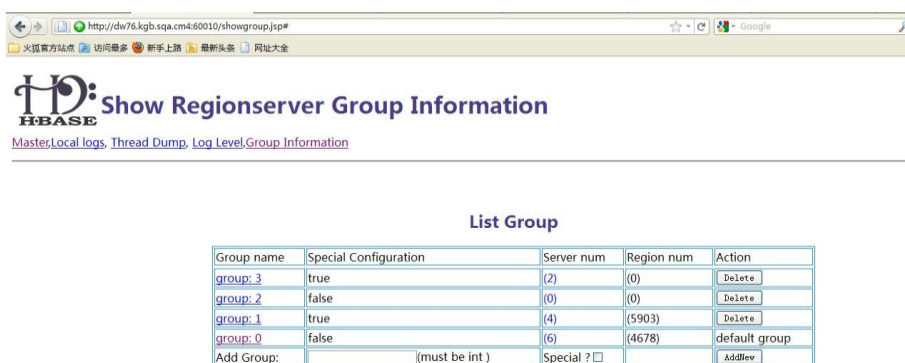


The screenshot shows the HBase web interface after a configuration update. The page title is "Show Regionserver Group Information". Below the title are links for "Master/Local logs", "Thread Dump", and "Log Level/Group Information". The main content area is titled "List Group" and contains a table with the following data:

Group name	Special Configuration	Server num	Region num	Action
group: 3	true	(0)	(0)	<a href="#">Delete</a>

Below the table, there is a message: "System is busy , you can't do any other operations." and a "Refresh" button. The message also includes the following text: "Change Regionserver Plan", "Move dw85.kgb.sqa.cm4,60020 form 1 to 3", "Remaining Region num :0", "Move dw84.kgb.sqa.cm4,60020 form 1 to 3", "Remaining Region num :983", and "Update configuration".

Figure 9: Updating the region servers' configuration



The screenshot shows the HBase web interface after the configuration update is complete. The page title is "Show Regionserver Group Information". Below the title are links for "Master/Local logs", "Thread Dump", and "Log Level/Group Information". The main content area is titled "List Group" and contains a table with the following data:

Group name	Special Configuration	Server num	Region num	Action
group: 3	true	(2)	(0)	<a href="#">Delete</a>
group: 2	false	(0)	(0)	<a href="#">Delete</a>
group: 1	true	(4)	(5903)	<a href="#">Delete</a>
group: 0	false	(6)	(4678)	default group
Add Group:	(must be int )	Special ? <input type="checkbox"/>		<a href="#">AddNew</a>

Figure 10: Successful

## 2.3 Group Information

### 2.3.1 View Group Information

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

Table information includes table name, region number, table priority and table groups attribute. One table can be assigned to several groups but one region server can only be assigned to one group. When we create a table without group property, its regions can be assigned to all groups without special-conf mark.

**Example:**

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

Group Detail Information

group: 1

Need balance ? [balance](#)

Server num :4

Server name	Server detail	Table num	Region num
Serverdw83.kgb.sqa.cm4.60020	dw83.kgb.sqa.cm4.60020	table num:10	region num:1460
Serverdw87.kgb.sqa.cm4.60020	dw87.kgb.sqa.cm4.60020	table num:10	region num:1484
Serverdw86.kgb.sqa.cm4.60020	dw86.kgb.sqa.cm4.60020	table num:10	region num:1474
Serverdw82.kgb.sqa.cm4.60020	dw82.kgb.sqa.cm4.60020	table num:10	region num:1485

Table detail info in this group

Total Table num:10  
Total Region num:5903  
If you want change table group ,new groups must be int ,and must be split with ","

The priority of table you want to change must between 1 and 10 ,and small num means high priority.

Table name	Region num	Table Priority	Belong Groups	Change Groups	Change Priority	Submit	Table Balance
bashtest2	82	4	1,			<a href="#">ChangeTable</a>	<a href="#">balance</a>
cache_index	53	5	1,			<a href="#">ChangeTable</a>	<a href="#">balance</a>
cluster_index	378	5	1,			<a href="#">ChangeTable</a>	<a href="#">balance</a>
data_org	154	5	1,			<a href="#">ChangeTable</a>	<a href="#">balance</a>
pwrite1	2048	5	1,			<a href="#">ChangeTable</a>	<a href="#">balance</a>

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](http://${master_address}:60010/groupinfo.jsp?groupname=1), the region distribution after group balance

Group Detail Information

group: 1

Need balance ? [balance](#)

Server num :4

Server name	Server detail	Table num	Region num
Serverdw83.kgb.sqa.cm4.60020	dw83.kgb.sqa.cm4.60020	table num:10	region num:1475
Serverdw87.kgb.sqa.cm4.60020	dw87.kgb.sqa.cm4.60020	table num:10	region num:1476
Serverdw86.kgb.sqa.cm4.60020	dw86.kgb.sqa.cm4.60020	table num:10	region num:1476
Serverdw82.kgb.sqa.cm4.60020	dw82.kgb.sqa.cm4.60020	table num:10	region num:1476

Figure 12: Balance regions in group



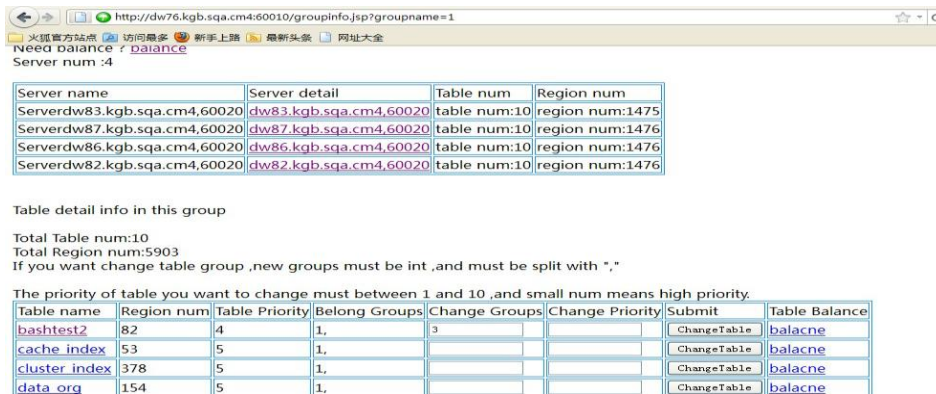
## 2.4 Table Information

### 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](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.



Server name Server detail Table num Region num

Serverdw83.kgb.sqa.cm4.60020	dw83.kgb.sqa.cm4.60020	table num:10	region num:1475
Serverdw87.kgb.sqa.cm4.60020	dw87.kgb.sqa.cm4.60020	table num:10	region num:1476
Serverdw86.kgb.sqa.cm4.60020	dw86.kgb.sqa.cm4.60020	table num:10	region num:1476
Serverdw82.kgb.sqa.cm4.60020	dw82.kgb.sqa.cm4.60020	table num:10	region num:1476

Table detail info in this group

Total Table num:10  
Total Region num:5903  
If you want change table group ,new groups must be int ,and must be split with “,”

The priority of table you want to change must between 1 and 10 ,and small num means high priority.

Table name	Region num	Table Priority	Belong Groups	Change Groups	Change Priority	Submit	Table Balance
bashtest2	82	4	1,	3		ChangeTable	balacne
cache_index	53	5	1,			ChangeTable	balacne
cluster_index	378	5	1,			ChangeTable	balacne
data_org	154	5	1,			ChangeTable	balacne

Figure 12: Change table's group property

The table bashtest2 has been moved to group “3”.

[http://\\${master\\_address}:60010/groupinfo.jsp?groupname=3](http://${master_address}:60010/groupinfo.jsp?groupname=3)



Group Detail Information

group: 3

Need balance ? [balance](#)  
Server num :2

Server name Server detail Table num Region num

Serverdw85.kgb.sqa.cm4.60020	dw85.kgb.sqa.cm4.60020	table num:1	region num:36
Serverdw84.kgb.sqa.cm4.60020	dw84.kgb.sqa.cm4.60020	table num:1	region num:46

Table detail info in this group

Total Table num:1  
Total Region num:82  
If you want change table group ,new groups must be int ,and must be split with “,”

The priority of table you want to change must between 1 and 10 ,and small num means high priority.

Table name	Region num	Table Priority	Belong Groups	Change Groups	Change Priority	Submit	Table Balance
bashtest2	82	4	3,			ChangeTable	balacne

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(priority));
hAdmin.modifyTable(Bytes.toBytes(tablename), hdesc);
hAdmin.enableTable(tablename);
```

Example:

[http://\\${master\\_address}:60010/groupinfo.jsp?groupname=3](http://${master_address}:60010/groupinfo.jsp?groupname=3), change table bashtest2 priority from 4 to 1. Write 1 in change priority blank, then click "ChangeTable" button.

Group Detail Information

group: 3

Need balance ? [balance](#)

Server num :2

Server name	Server detail	Table num	Region num
Serverdw85.kgb.sqa.cm4,60020	dw85.kgb.sqa.cm4,60020	table num:1	region num:35
Serverdw84.kgb.sqa.cm4,60020	dw84.kgb.sqa.cm4,60020	table num:1	region num:47

Table detail info in this group

Total Table num:1  
Total Region num:82  
If you want change table group ,new groups must be int ,and must be split with ","

The priority of table you want to change must between 1 and 10 ,and small num means high priority.

Table name	Region num	Table Priority	Belong Groups	Change Groups	Change Priority	Submit	Table Balance
bashtest2	82	1	3,			ChangeTable	balance

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 "pwrite1".

[http:// \\${master\\_address}:60010/dotablebalance.jsp?tablename=pwrite1](http:// ${master_address}:60010/dotablebalance.jsp?tablename=pwrite1)

Table Balance

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

Warning, System is busy

Refresh

Table name :pwrite1

Servername	region num
dw86.kgb.sqa.cm4,60020	(538)
dw82.kgb.sqa.cm4,60020	(475)
dw83.kgb.sqa.cm4,60020	(530)
dw87.kgb.sqa.cm4,60020	(505)

Figure 14: Before balance

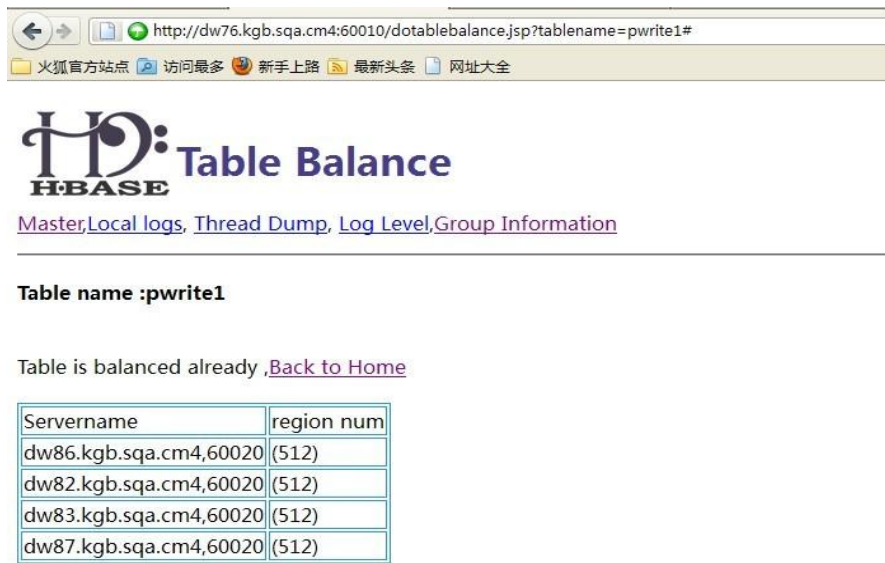


Figure 15: After balance

### 3. Patches

There are three ways to add this features, you can get the required components from [https://github.com/ICT-Ope/HBase\\_allocation/](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.