

# HBase\_allocation

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## 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 have 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; traditional Chinese: 淘寶網; pinyin: Táobǎowǎng) is a Chinese language web site for online shopping, similar to eBay, Rakuten and Amazon,[2] 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, including special configuration marks, region server allocation, delete and add buttons.



## 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"/> (must be int ) | Special ? <input type="checkbox"/> |            | <a href="#">AddNew</a> |

### 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 special configuration mark.

- Before Add group “2”



### 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:               | 2 <input type="text"/> (must be int ) | Special ? <input checked="" type="checkbox"/> |            | <a href="#">AddNew</a> |

- Add group “2” successfully



## 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: 2</a> | true                                       | (0)                                | (0)        | <input type="button" value="Delete"/>  |
| <a href="#">group: 1</a> | true                                       | (6)                                | (5903)     | <input type="button" value="Delete"/>  |
| <a href="#">group: 0</a> | false                                      | (6)                                | (4675)     | default group                          |
| Add Group:               | <input type="text" value="(must be int)"/> | Special ? <input type="checkbox"/> |            | <input type="button" value="Add/Rev"/> |

### 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.



### Delete a blank group "2"



### List Group

| Group name               | Special Configuration                        | Server num                                    | Region num | Action                                 |
|--------------------------|--|---|------------|--|
| <a href="#">group: 1</a> | true   | (6)   | (5903)     | <input type="button" value="Delete"/>  |
| <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"/> |            | <input type="button" value="Add/Rev"/> |

## 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 include HBase conf fold , lib fold and hbase-XX.jar.

**example:**

[http://\\$master\\_address:60010/showgroup.jsp](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.

The screenshot shows the HBase web interface at <http://dw76.kgb.sqa.cm4:60010/showgroup.jsp>. It features two main sections:

### List Group

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

### RegionServer Group

| Region Server name     | Request num | Region num | Original Group | Update to New Group                     |
|------------------------|-------------|------------|----------------|---|
| dw83.kgb.sqa.cm4,60020 | 0           | 982        | 1              | <a href="#">▼</a>                       |
| dw85.kgb.sqa.cm4,60020 | 0           | 983        | 1              | <a href="#">▼</a>                       |
| dw84.kgb.sqa.cm4,60020 | 0           | 983        | 1              | <a href="#">▼</a>                       |
| dw87.kgb.sqa.cm4,60020 | 0           | 984        | 1              | <a href="#">▼</a>                       |
| dw86.kgb.sqa.cm4,60020 | 0           | 982        | 1              | <a href="#">▼</a>                       |
| dw82.kgb.sqa.cm4,60020 | 0           | 989        | 1              | <a href="#">▼</a>                       |
| dw90.kgb.sqa.cm4,60020 | 82169       | 781        | 0              | <a href="#">▼</a>                       |
| dw93.kgb.sqa.cm4,60020 | 661         | 780        | 0              | 2 <a href="#">▼</a>                     |
| dw91.kgb.sqa.cm4,60020 | 248         | 779        | 0              | <a href="#">▼</a>                       |
| dw92.kgb.sqa.cm4,60020 | 435         | 778        | 0              | <a href="#">▼</a>                       |
| dw88.kgb.sqa.cm4,60020 | 426         | 779        | 0              | <a href="#">▼</a>                       |
| dw89.kgb.sqa.cm4,60020 | 378         | 778        | 0              | <a href="#">▼</a>                       |
|                        |             |            |                | <a href="#">UpdateRegionserverGroup</a> |

Process regions on this region server, Remaining regions number will decrease .

The screenshot shows the HBase web interface at <http://dw76.kgb.sqa.cm4:60010/showgroup.jsp>. It features the 'Show RegionServer Group Information' section with the following details:

**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](#)

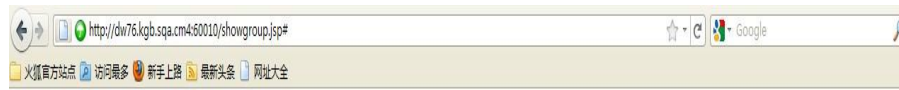
### List Group

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

### RegionServer Group

| Region Server name     | Request num | Region num | Original Group | Update to New Group |
|------------------------|-------------|------------|----------------|---------------------|
| dw83.kgb.sqa.cm4,60020 | 0           | 982        | 1              | <a href="#">▼</a>   |
| dw85.kgb.sqa.cm4,60020 | 0           | 983        | 1              | <a href="#">▼</a>   |

Change group successfully



## HBASE Show Regionserver Group Information

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

### List Group

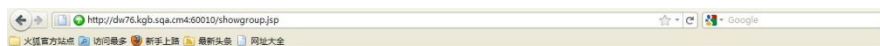
| Group name               | Special Configuration               | Server num                         | Region num | Action                 |
|--------------------------|-------------------------------------|------------------------------------|------------|------------------------|
| <a href="#">group: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

### 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” .



## 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                 |
|--------------------------|-------------------------------------|------------------------------------|------------|------------------------|
| <a href="#">group: 3</a> | true                                | (0)                                | (0)        | <a href="#">Delete</a> |
| <a href="#">group: 2</a> | false                               | (1)                                | (0)        | <a href="#">Delete</a> |
| <a href="#">group: 1</a> | true                                | (6)                                | (5903)     | <a href="#">Delete</a> |
| <a href="#">group: 0</a> | false                               | (5)                                | (4677)     | default group          |
| Add Group:               | <input type="text"/> (must be int ) | Special ? <input type="checkbox"/> |            | <a href="#">AddNew</a> |

Job in progress , update the region servers’ configuration



## HBASE Show Regionserver Group Information

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

|   |                           |
|---|---------------------------|
| System is busy , you can't do any other operations. |                           |
| 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 |
| Update configuration                                |                           |
| <input type="button" value="Refresh"/>              |                           |

### List Group

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

Change group successfully.



## 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                                |
|--------------------------|---|------------------------------------|------------|---------------------------------------|
| <a href="#">group: 3</a> | true  | (2)                                | (0)        | <input type="button" value="Delete"/> |
| <a href="#">group: 2</a> | false                                       | (0)                                | (0)        | <input type="button" value="Delete"/> |
| <a href="#">group: 1</a> | true  | (4)                                | (5903)     | <input type="button" value="Delete"/> |
| <a href="#">group: 0</a> | false                                       | (6)                                | (4678)     | default group                         |
| Add Group:               | <input type="text" value="(must be int )"/> | Special ? <input type="checkbox"/> |            | <input type="button" value="AddNew"/> |

## 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://dw76.kgb.sqa.cm4:60010/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 | <a href="#">dw83.kgb.sqa.cm4,60020</a> | table num:10 | region num:1460 |
| Serverdw87.kgb.sqa.cm4,60020 | <a href="#">dw87.kgb.sqa.cm4,60020</a> | table num:10 | region num:1484 |
| Serverdw86.kgb.sqa.cm4,60020 | <a href="#">dw86.kgb.sqa.cm4,60020</a> | table num:10 | region num:1474 |
| Serverdw82.kgb.sqa.cm4,60020 | <a href="#">dw82.kgb.sqa.cm4,60020</a> | 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           |
|-------------------------------|------------|----------------|---------------|---------------|-----------------|-----------------------------|-------------------------|
| <a href="#">bashtest2</a>     | 82         | 4              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |
| <a href="#">cache_index</a>   | 53         | 5              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |
| <a href="#">cluster_index</a> | 378        | 5              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |
| <a href="#">data_org</a>      | 154        | 5              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |
| <a href="#">pwrite1</a>       | 2048       | 5              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |

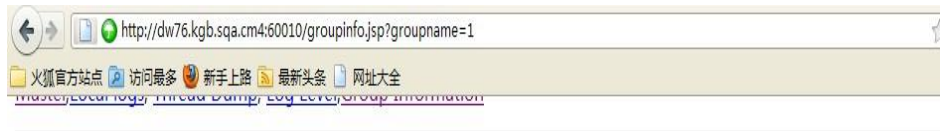
### 2.3.2 Balance Group

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

example:

<http://dw76.kgb.sqa.cm4:60010/groupinfo.jsp?groupname=1>, the region distribution balanced





### Group Detail Information

group: 1

Need balance ? [balance](#)

Server num :4

| Server name                  | Server detail                          | Table num    | Region num      |
|------------------------------|--|--------------|-----------------|
| Serverdw83.kgb.sqa.cm4,60020 | <a href="#">dw83.kgb.sqa.cm4,60020</a> | table num:10 | region num:1475 |
| Serverdw87.kgb.sqa.cm4,60020 | <a href="#">dw87.kgb.sqa.cm4,60020</a> | table num:10 | region num:1476 |
| Serverdw86.kgb.sqa.cm4,60020 | <a href="#">dw86.kgb.sqa.cm4,60020</a> | table num:10 | region num:1476 |
| Serverdw82.kgb.sqa.cm4,60020 | <a href="#">dw82.kgb.sqa.cm4,60020</a> | table num:10 | region num:1476 |

## 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.

http://dw76.kgb.sqa.cm4:60010/groupinfo.jsp?groupname=1

Need balance ? [balance](#)

Server num :4

| Server name                  | Server detail                          | Table num    | Region num      |
|------------------------------|--|--------------|-----------------|
| Serverdw83.kgb.sqa.cm4,60020 | <a href="#">dw83.kgb.sqa.cm4,60020</a> | table num:10 | region num:1475 |
| Serverdw87.kgb.sqa.cm4,60020 | <a href="#">dw87.kgb.sqa.cm4,60020</a> | table num:10 | region num:1476 |
| Serverdw86.kgb.sqa.cm4,60020 | <a href="#">dw86.kgb.sqa.cm4,60020</a> | table num:10 | region num:1476 |
| Serverdw82.kgb.sqa.cm4,60020 | <a href="#">dw82.kgb.sqa.cm4,60020</a> | 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           |
|-------------------------------|------------|----------------|---------------|---------------|-----------------|-----------------------------|-------------------------|
| <a href="#">bashtest2</a>     | 82         | 4              | 1,            | 3             |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |
| <a href="#">cache_index</a>   | 53         | 5              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |
| <a href="#">cluster_index</a> | 378        | 5              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |
| <a href="#">data_org</a>      | 154        | 5              | 1,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |

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

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

http://dw76.kgb.sqa.cm4:60010/groupinfo.jsp?groupname=3

Need balance ? [balance](#)

Server num :2

#### Group Detail Information

group: 3

Need balance ? [balance](#)

Server num :2

| Server name                  | Server detail                          | Table num   | Region num    |
|------------------------------|--|-------------|---------------|
| Serverdw85.kgb.sqa.cm4,60020 | <a href="#">dw85.kgb.sqa.cm4,60020</a> | table num:1 | region num:36 |
| Serverdw84.kgb.sqa.cm4,60020 | <a href="#">dw84.kgb.sqa.cm4,60020</a> | 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           |
|---------------------------|------------|----------------|---------------|---------------|-----------------|-----------------------------|-------------------------|
| <a href="#">bashtest2</a> | 82         | 4              | 3,            |               |                 | <a href="#">ChangeTable</a> | <a href="#">balacne</a> |

## 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://dw76.kgb.sqa.cm4:60010/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 | <a href="#">dw85.kgb.sqa.cm4,60020</a> | table num:1 | region num:35 |
| Serverdw84.kgb.sqa.cm4,60020 | <a href="#">dw84.kgb.sqa.cm4,60020</a> | 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           |
|---------------------------|------------|----------------|---------------|---------------|-----------------|-------------|-------------------------|
| <a href="#">bashtest2</a> | 82         | 1              | 3,            |               |                 | ChangeTable | <a href="#">balacne</a> |

#### 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://dw76.kgb.sqa.cm4:60010/dotablebalance.jsp?tablename=pwrite1>



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

Warning, System is busy

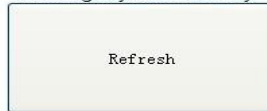
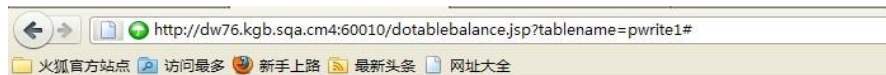


Table name :pwrite1

| Servename              | 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)      |

After balanced



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

Table name :pwrite1

Table is balanced already ,[Back to Home](#)

| Servename              | region num |
|------------------------|------------|
| dw86.kgb.sqa.cm4,60020 | (512)      |
| dw82.kgb.sqa.cm4,60020 | (512)      |
| dw83.kgb.sqa.cm4,60020 | (512)      |
| dw87.kgb.sqa.cm4,60020 | (512)      |

### 3. Patches

When get into hbase fold , you can patch our patch file PriorityAndGroupInfo.patch.

Assume PriorityAndGroupInfo.patch 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
ls -l ../PriorityAndGroupInfo.patch
patch -p1 < ../PriorityAndGroupInfo.patch
cd hbase-webapps/master/
chmod +x *.sh
```

Because move regionserver configuration must restart server ,and scp file between servers ,

there are 2 shell script , we must chmod permission manually.At the same time ,we modify master.jsp to add an anchor link to our showgroup.jsp.

Also ,you can use hbase-0.90.2.jar directly and then patch GroupInfoWeb.patch for jsp  
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
```