

## DC service BATCH command balancing

The hce-node balancing feature for parallel tasks processing on multi-host systems used for the parallel BATCH items processing on set of hce-node instances started on different hosts (typical multi-host and multi-node cluster with shard type of data and tasks balancing). The r-cluster configured for multi-host or even on single-host system can to produce parallelism for one batch. The BATCH task contains items. If number of items more than number of nodes in r-cluster set of items can be processed in parallel on different nodes of r-type cluster. This can be done using the special configuration of the hce-node nodes. The environment variables are used to propagate information about total number of nodes in the cluster - DRCE\_NODES\_TOTAL and this node number - DRCE\_NODE\_NUMBER. If this variables configured and set for the r-cluster hce-nodes tasks the default rtc-preprocessor.py that is first module in the sequence of data processing for the BATCH command splits the income Batch object with range of items defined as number of items per node. For example, if the DRCE\_NODES\_TOTAL=3 and number of items in the Batch is 10 – the number of items for the first node will be - 3, for second – 3 and for third – 4. Each of three nodes receives the same income Batch with 10 items, but after rtc-preprocessor.py the Batch of each node will be truncated up to range of items – 3+3+4. Note, that rtc-pre-processor.py module that is used for the real-time BATCH command execution will not split the Batch if number of items is less than two and the DC service will send request on synchronous DRCE task execution to the r-cluster router with the balancing mode resource-usage to prevent multiplication of the request to all nodes. So, if Batch contains only one item it will be propagated in to the hce-node r-cluster only to one node and executed without the parallelism.

After each hce-node returns results of parallel processed batches the DC service doing the merging of unique items and returns response for the BATCH command.

## Single host installation

The default single-host installation has 4 nodes for the r-cluster that supposes the parallel execution of the processing of set of Batch items if number of Batch items greater than one. The real time of execution of the Batch expected less than sum of times of processing of each Batch items in case of the CPU has more than one kernel.

## Several hosts installation

In several hosts installation cluster data hce-nodes can be configured one per physical node or several. In case of one per physical node the parallelism will be reached on per-host level only. In case of several nodes will be configured on one host and several hosts will be used the parallelism will be reached additionally inside the same host but several processes. Note, that using one level (default) cluster infrastructure for several hosts and several nodes per host nodes are competitors for CPU resources on the same host and on the different with one prioritized queue. More flexible behavior can be done by usage of two levels cluster hierarchy – first for the nodes and second – for each node. This solution supposes configuration with one manager node for hosts

## The hce-node PHP management single-host configuration

The hce-node configuration file c112\_localhost\_r0\_cfg.sh:

```
MANAGER_MODE="smanager"
```

The hce-node ini files: node\_pool\_r1.ini:  
env\_vars={"DRCE\_NODE\_NUMBER": "1", "DRCE\_NODES\_TOTAL": "4"}  
The hce-node ini files: node\_pool\_r2.ini:  
env\_vars={"DRCE\_NODE\_NUMBER": "2", "DRCE\_NODES\_TOTAL": "4"}  
The hce-node ini files: node\_pool\_r3.ini:  
env\_vars={"DRCE\_NODE\_NUMBER": "3", "DRCE\_NODES\_TOTAL": "4"}  
The hce-node ini files: node\_pool\_r4.ini:  
env\_vars={"DRCE\_NODE\_NUMBER": "4", "DRCE\_NODES\_TOTAL": "4"}