# Intellicus Cluster and Load Balancing (Linux)

**Intellicus Web-based Reporting Suite**

intellicus
Enterprise Reporting and
Business Insights Platform


info@intellicus.com
www.intellicus.com

**Dated: March 2014**

## Acknowledgements

Intellicus acknowledges using of third-party libraries to extend support to the functionalities that they provide.

For details, visit: http://www.intellicus.com/acknowledgements.htm

## Contents

# Introduction

You need to implement Clustering and Load Balancing in the following situations:

- When Intellicus server has to handle significantly heavy load
- To create server failure and recovery mechanism

## Clustering

This is a mechanism through which multiple instances of Intellicus server are run and maintained on multiple systems. All these systems form what is known as a Cluster.

## Load Balancing

This is a process of balancing load among servers in a cluster. A component known as Load Balancer takes care of this activity.

## How it works

Multiple machines are networked to form a cluster. Cluster Report Server is installed and run on all the machines. Load Balancers are installed on one or multiple Machines of network. Load Balancer keeps track of load that each of the cluster report server is having.

Report client first communicates with the Load Balancer. Load Balancer keeps track of loads on each of the cluster server instances. So, based on the Load Balancing algorithms it finds the appropriate cluster server on which request should be forwarded, then it sends the IP of the cluster server to the client. Report client sends request to that cluster report server. This process is repeated for every client request.

This way, load is spread across multiple cluster report servers.

# Installation and Configuration

Before going ahead with installation and configuration of clustering and clustering, you need to:

- Install Intellicus.

**Note:**

**Machine Sharability:** This machine needs to be sharable for all machines running server instances.

**Repository Database:** HSQLDB is not used as repository when Intellicus is run in cluster environment.

- Decide the machines on which Load Balancers will be installed.
- Decide the machines on which Cluster Node (to run Intellicus server instance) will be installed.
- Make sure all the machines are on network and are able to access Intellicus shared location.

## Installing Load Balancer on Linux

Intellicus Load Balancer is shipped as a tar file. This file is named as IntellicusLoadBalancerx.x.x.tar.

For example, IntellicusLoadBalancer6.1.1.tar.

Untar the file. For example,

```
tar -xvf IntellicusLoadBalancer6.1.1.tar
```

This process will create a folder - Intellicus. All files get copied inside this folder.

# Configure Load Balancer

In multiple Load Balancer setup, one of the Load Balancers will act as the primary load balancer. All other Load Balancers will act as secondary load balancers.

In the event of failure of the primary load balancer one of the secondary load balancers will take the charge of the primary one.

For all the load balancers, carry out the following configuration tasks:

- Modify system file /etc/hosts
- Specify Cluster Node and Load Balancer related details in RegistryInfo.xml file
- Setup port of the Load Balancer in RegistryConfig.properties file
- Configure report engine

### Modifying system file /etc/hosts

/etc/hosts file needs to have entries to have following information:

- Machine IP
- Loopback address

The entries will read like this:

```
132.158.36.558        server-026c.impetus.co.in        server-026c
localhost.localdomain localhost
127.0.0.1          server-026c.impetus.co.in          server-026c
localhost.localdomain localhost
```

## Configurations in RegistryInfo.xml file

Load Balancer setup places file RegistryInfo.xml in \LoadBalancer\Config folder.

```
<REGISTRYINFO>
      <REGISTRIES>
            <REGISTRY IP="192.168.33.115" PORT="60001"/>
            <REGISTRY IP="192.168.33.115" PORT="60000"/>
      </REGISTRIES>
      <SERVERS>
            <SERVER IP="192.168.33.115" PORT="50000" TASK_PRIORITY="6" TASK_TYPE="ALL" WEIGHTAGE="30"/>
            <SERVER IP="192.168.33.115" PORT="50001" TASK_PRIORITY="4" TASK_TYPE="ALL" WEIGHTAGE="0"/>
            <SERVER IP="192.168.33.115" PORT="50002" TASK_PRIORITY="2" TASK_TYPE="ALL" WEIGHTAGE="30"/>
            <SERVER IP="192.168.33.115" PORT="50003" TASK_PRIORITY="0" TASK_TYPE="ALL" WEIGHTAGE="30"/>
      </SERVERS>
      <CONFIG SVR_PING_TIME="30" REG_PING_TIME="3" TASK_PRIORITY_TYPE="NONE" ALLOCATION_TYPE="ROUNDROBIN"
</REGISTRYINFO>
```

Figure 1: Snapshot of RegistryInfo.xml file

You need to specify the following information in this file:

- Specify details of all cluster nodes

- Specify details of this and other load balancers

### Cluster Node related information

You need to specify the following information about all the cluster nodes in the cluster:

- **SERVER IP:** The IP address of the cluster node.
- **PORT:** The port at which cluster node will listen.
- **TASK PRIORITY:** Specify a positive integer between 1 and 6 both inclusive. Priority 1, 2 is for Low; 3, 4 is for Medium and 5, 6 is for High.
- **TASK TYPE:** Specify the option 'All'.
- **WEIGHTAGE:** Specify percentage of the load that this cluster node should take.

This information needs to be provided as an entry under SERVER tag. Example:

```
<SERVER    IP="132.158.36.558"    PORT="50003"    TASK_PRIORITY="0"
TASK_TYPE="ALL" WEIGHTAGE="30"/>
```

Specify this information for all the cluster nodes.

### Load Balancer related information

You need to specify IP and port of all the load balancers.

- **REGISTRY IP:** IP of the machine where Load Balancer is installed.
- **PORT:** Port at which that Load Balancer will listen.

This information needs to be provided as an entry in REGISTRIES tag. Example:

<REGISTRY IP="132.158.36.558" PORT="60001"/>

## Configurations in RegistryConfig.properties file

Load Balancer setup places file RegistryConfig.properties in \LoadBalancer\Config folder.

Load Balancer reads value stored in REGISTRY_LISTENER_PORT property in RegistryConfig.properties file to know the listener port.

Example: REGISTRY_LISTENER_PORT=60001

## Modify values of following properties

### EMAIL_TO_ADDRESS

An alert through e-mail will be automatically be sent in error conditions like the server shuts down, it reaches not responding state, or goes out of memory. Specify the email ID where the mail should be sent.

### EMAIL_FROM_ADDRESS

An alert through e-mail will be automatically be sent in error conditions like the server shuts down, it reaches not responding state, or goes out of memory. Specify the email ID that should appear as "from" in the mail sent.

### SMTP_SERVER

An alert through e-mail will be automatically be sent in error conditions like the server shuts down, it reaches not responding state, or goes out of memory. Specify the IP of the SMTP server used to send the mail.

# Configure Cluster Report Engine

**Note:** Network File Service (NFS) needs to be configured before Installing Load Balancer.

The directory on server needs to be shared among all the cluster servers. /etc/exports file is modified to achieve this behavior.

If Intellicus is installed in /home/intellicus/intellicus7.1, this file should have entry

/home/intellicus/intellicus7.1 *(rw,no_root_squash,async)

- /home/intellicus/intellicus7.1 - Location to be shared

  * - anyone on the network can access this shared location

- (rw,no_root_squash,async) – Read/Write access

## Start NFS services

### RedHat

Issue following commands to start NFS services in RedHat

```
service nfs start
service portmap start
```

### SUSE

Issue following command to start NFS services in SUSE

```
rcnfs start
```

## Install Cluster Report Server setup

Intellicus ClusterReportServer is shipped as a tar file. This file is named as InstallIntellicusClusterNode7.tar.gz and InstallIntellicusClusterNode7.1_ux64.sh

To unzip run InstallIntellicusClusterNode7.1_ux64.sh

For example

```
.\InstallIntellicusClusterNode7.1_ux64.sh
```

## Install Cluster Java Portal setup

Intellicus ClusterJavaPortal is shipped as a tar file. This file is named as IntellicusPortal7.1_ux64.tar.gz and InstallIntellicusPortal7.1_ux64.sh

To unzip run InstallIntellicusPortal7.1_ux64.sh

For example

```
.\ InstallIntellicusPortal7.1_ux64.sh
```

## Configure each of the Cluster Report Servers

For all the cluster nodes, carry out the following configuration tasks:

- Modifying system file /etc/hosts
- Set path of report server in cluster.properties file
- Set the port of the Cluster node in cluster.properties file
- Set schedule preferences in cluster.properties file
- Make changes in run.sh file

### Modifying system file /etc/hosts

/etc/hosts file needs to have entries to have following information:

- Machine IP
- Loopback address

The entries will read like this:

```
132.158.36.558          server-026c.impetus.co.in          server-026c
localhost.localdomain localhost
127.0.0.1            server-026c.impetus.co.in            server-026c
localhost.localdomain localhost
```

## Configurations in cluster.properties file

Path and IP information of Intellicus Report server is set in cluster.properties file. This file is at path: /ClusterReportEngine/cluster folder.

Cluster Report Server setup places file `cluster.properties` in `\ClusterReportEngine\cluster` folder.

### Modify values of following properties

**REPORT_ENGINE_FOLDER**

In REPORT_ENGINE_FOLDER property, specify the drive where Intellicus Report Server is mounted.

For example:

REPORT_ENGINE_FOLDER= /mnt/reportengine

Here, "mnt" is the directory where path of Intellicus directory of Intellicus Report Server is mounted.

REPORT_ENGINE_FOLDER=\\\\193.45.34.24\\intellicus\\ReportEngine

Here, 193.45.34.24 is IP on which Intellicus Report Server is installed.

**Port**

In LISTENER_PORT property, specify the port at which this cluster node will listen.

For example:

LISTENER_PORT = 45400

**DEPLOYMENT_TYPE**

Specify STANDALONE if Intellicus is running as standalone. Specify CLUSTERED if Intellicus is running in the form of a cluster.

Default: CLUSTERED
Example: DEPLOYMENT_TYPE=CLUSTERED

## Making changes in run.sh

Make changes in mount command to specify IP of the machine where Intellicus Report Server is installed.

Example:

```
mount -t nfs 132.158.36.558:/home/intellicus/intellicus7.1 /mnt
```

Where,

- 132.158.36.558- machine ip
- /home/intellicus/intellicus7.1 – shared location
- /mnt – location where shared data is locally mounted (this can be any drive)

Note: If Intellicus is mounted on other than /mnt, you need to make changes in run.sh, shutdown.sh and cluster.properties.

## Making changes in shutdown.sh

In shutdown.sh file specify the path where Intellicus Report Server is mounted.

For example,

```
REPORT_ENGINE_FOLDER=/mnt/reportengine
```

## Configure Cluster Report Servers by Clusterconfig.sh

You can also configure Cluster Report Servers by running Clusterconfig.sh file.

After installation of Cluster Report Server go to ../IntellicusCluster folder and run Clusterconfig.sh file

Example:

```
../IntellicusCluster #./clusterconfig.sh
```

Now it will ask for the path of Shared Report server, press 'y' and press enter key.

It will look like this:

```
intellicus-opensuse:~       /IntellicusCluster # ./clusterconfig.sh
Do you want to configure Cluster Report Engine(y/n):y
*************************************************************
Please do not append forward slash (/) at the end of the path
*************************************************************
Please pass the path of Shared Intellicus:
```

Now enter the path where Shared Intellicus is installed. The path should be up to IntellicusShared folder.

Note: The path must not end with'/'

Example:

```
/root/IntellicusShared
```

# Configure portal Property file

Portal points to Intellicus Report Server. When clustering and load balancing is installed, portal needs to point to load balancers instead of pointing to report server.

This change is made in ReportClient.properties file available on machine on which Intellicus Client (portal) is installed.

When Intellicus is installed in Jakarta, this file is placed at path:

```
/intellicus/Jakarta/webapps/intellicus/client/config/ReportClient
.properties
```

Change values of following properties:

**REGISTRY_ENABLED**

Set this property to TRUE.

For example:

REGISTRY_ENABLED=TRUE

**REGISTRIES**

Specify all IP and port of all of the load balancers separated by only semi colon (no space).

For example:

REGISTRIES=201.90.56.23:60000;201.90.88.95:60002;

Save the file after making changes.

## How Property values are used

When value of REGISTRY_ENABLED is FALSE, it is assumed that clustering does not exist and client sends request to the IP specified in REPORT_ENGINE_IP property.

When value of REGISTRY_ENABLED is set to TRUE, client sends request to the 1st load balancer IP specified in REGISTRIES property.

If that load balancer is not available, client sends request to next load balancer in the list.

At a time multiple load balancers may be active. IP needs to be specified only by primary load balancer.

If the load balancer that client communicates with is not the primary load balancer, then it provides IP of the primary load balancer to the client. (So that from next time all the client requests should go to primary load balancer).

The client then checks if the load balancer IP provided exists in the list specified in REGISTRIES property.

**Note:** If the IP exists or it does not exist but list also has *, client sends the request to that load balancer. If it does not exist in the list; and list does not have *, then the client fallsback to the IP specified in REPORT_ENGINE_IP property.

When client sends request to the primary load balancer, It provides IP of the server where the client should send this request.

Now that the client know server IP, it sends the request to that server.

## Running sequence

There is no pre defined running sequence. Any of the components can be started or stopped at anytime.

### To run load balancer

Report Server is located in the /Intellicus/LoadBalancer/bin folder. To start the Load Balancer, run the file runLB.sh.

```
./runLB.sh
```

**Note:** The load balancer that boots first, becomes primary load balancer. If primary load balancer fails, any of the secondary load balancers will become primary load balancer.

### To stop load balancer

Run the file shutdownLB.sh. This file is available in Intellicus/LoadBalancer/bin folder.

```
./shutdownLB.sh
```

### To run Cluster node

Intellicus Cluster Report Server is located in the /Intellicus/ClusterReportEngine/bin folder. To start the Cluster Report Server, run the file run.sh.

```
./run.sh
```

### To stop cluster node

Run the file shutdown.sh. This file is located in the Intellicus/ClusterReportEngine/bin folder.

```
./shutdown.sh
```

# Load Balancer page on Portal

When Intellicus deployed in a cluster is up and running, all further changes can be made in the environment from the **Cluster** page on Portal.

To get the **Cluster** page , click **Administration** menu pad > **Configure** option > **Cluster** tab.

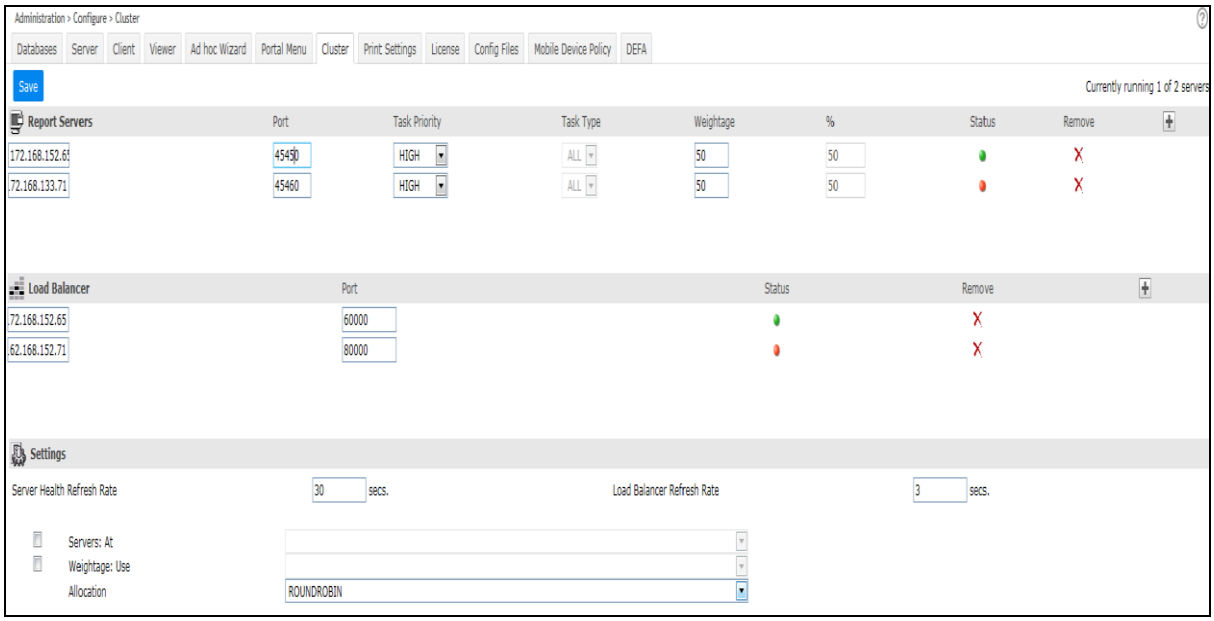


Figure 2: Cluster page on Portal

Use this page to Configure

- Cluster nodes (Report Servers)
- Load Balancers
- Settings

The information being set here is updated in the respective files on all cluster nodes, load balancers and client machines at a regular interval.

## Cluster Nodes (Report Servers)

You can do following activities related to report servers:

- Add a server
- Remove a server
- Change server properties

### Adding a server

1. Click icon appearing on the right side of the tab header.
2. Specify values in the empty row that is added at the end of the list.
3. Click **Save** button to save the information.

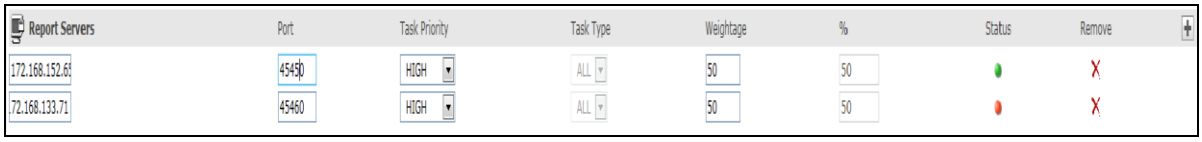


Figure 3: Adding a server in cluster

### Details on Report Servers tab

- **Report Servers:** IP of the server.
- **Port:** Port at which the server is running.
- **Task Priority:** Set a value among **High**, **Medium** and **Low**.
- **Task Type:** In present version of Intellicus is it set at **ALL** and cannot be changed.
- **Weightage:** A positive integer indicating the number of tasks (out of all the requests) that should be allocated to this server.
- **%:** Weightage is auto-converted into percent and placed here.
- **Status:** A red icon indicates that that the server is presently down. A green icon indicates that the server is presently up.
- **Remove:** Click the button to remove this server.

### Changing properties of server

To change any of the information, replace the existing values with new values for a server and click **Save** button.

### Removing a server

1. Click the button on respective server row.
2. To proceed with the deletion, click **OK**.
3. Click **Save**.

Selected server is removed.

## Load Balancers

You can do following activities related to load balancers:

- Add a load balancer
- Remove a load balancer
- Change load balancer properties

### Adding a load balancer

1. Click icon appearing on the right side of the tab header.
2. Specify values in the empty row that is added at the end of the list.
3. Click **Save** button to save the information.

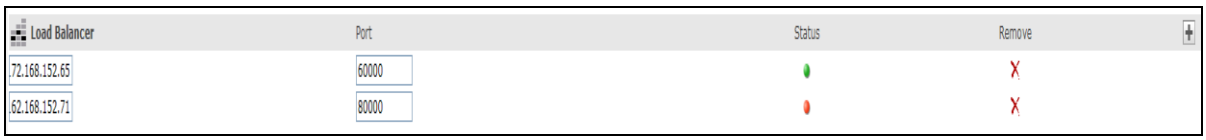


Figure 4: Adding a Load Balancer

### Details on Load Balancer tab

- **Load Balancer:** IP of load balancer.
- **Port:** Port at which the load balancer is running.
- **Status:** A red icon indicates that that the load balancer is presently down. A green icon indicates that the load balancer is presently up.
- **Remove:** Click the button to remove this load balancer.

### Changing properties of load balancer

To change any of the information, replace the existing values with new values for a load balancer and click **Save** button.

### Deleting load balancer

1. Click the ✕ button on respective load balancer row.
2. To proceed with the deletion, click **OK**.
3. Click **Save**.

Selected load balancer is removed.

## Settings

These settings are applicable to all Load balancers and Cluster nodes. The values set here decides the way load balancing will take place in this deployment.

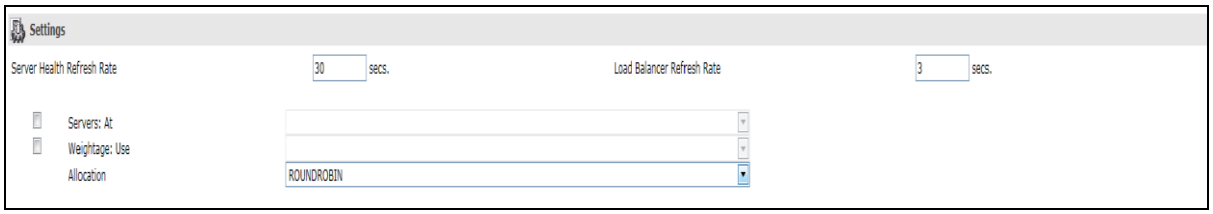


Figure 5: Settings on Cluster page

### Details on Settings tab

- **Server Health Refresh Rate:** The time interval after which primary load balancer will check if all the servers are in running state or not and the load that they are handling.
- **Load Balancer Refresh Rate:** The time interval after which load balancer will check if all the load balancers are up or not.
- **Servers: At:** Check this check box and select *Exact Priority* to allocate tasks set for respective server. Select *Upto Priority* to allocate tasks set for the set category and higher.
- **Weightage: Use:** Select this checkbox and select *Specified Weight Only* to allocate tasks as per set weightage. Select *Server Health Only* to allocate tasks based on server health (actual load on respective server).
- **Allocation:** Select the way tasks should be allocated to servers. Select *Random* to allocate tasks as per random logic. Select *Round robin* scheduling to allocate tasks one by one to servers.

After making changes click **Save** button to save the changes.