

# **IPCluster**

## **Manual**

**Version 3.0.0.0**

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# 1 History

## Version 3.0.0.0

- Compiled with VS2010. Added new VS2010 runtime.
- Bugfix: IPCluster did not find the correct adapter by the mac-address, if there was more than one interface with the same mac-address
- New licensing by license file
- Needs Dotnet framework 4.0

## Version 2.0.0.0

Compiled with VS2005SP1. Added new VS2005 runtime.

## Version 1.1.3.6

Bugfix: When a quorum is going offline, the active cluster may do a deactivate/activate/deactivate/activate sequence.

## Version 1.1.3.5

Improved debugging  
Added missing dll's

## Version 1.1.3.4

1. Improved debugging

## Version 1.1.3.3

1. New 'logfilter' parameter in ipcluster.ini

## Version 1.1.3.2

1. New command 'ipdel' to remove the cluster ip addresses

## Version 1.1.3.1

1. Bug:
  1. Configure ipcluster with a quorum device
  2. Run ipcluster on one node: 'ipcluster debug'
  3. wait till the node becomes the active one
  4. check by ipconfig /all
  5. remove the LAN cable
  6. check by ipconfig /all-> the node is staying active although alone on the network  
Bugfix: ipcluster now checking the quorum device (if any) also in the active state
2. New parameter 'verbose'
3. Added FAQ How to disable media sense
4. Cluster-IP address removed at startup
5. holdtime doubled at startup
6. New command line arg *ipdel*

## Version 1.1.3.0

1. The holdtime can now be down to 2xtimeout (former 3xtimeout)
2. Serialnumber needed for licensing

## Version 1.1.2.0

1. Bugfix: Non existing MAC address was not detected
2. All parameters in one ini-file. The ipcluster.cfg and license.txt files are no longer used.

## Version 1.1.1.0

1. Changed dongle support

## Version 1.1.0.0

1 .Added dongle support

Version 1.0.0.1

1. Fixed configuration bug when using a second ip-address

## 2 Contents

1	History.....	2
2	Contents .....	3
3	Figures.....	4
4	Definitions.....	4
5	Preface.....	4
6	IP-Cluster Installation .....	4
6.1	System Requirements .....	4
6.2	ipcluster command line parameters .....	5
6.3	Installation Instructions .....	6
6.4	Uninstallation Instructions.....	6
6.5	Licensing .....	6
7	Configuration .....	8
7.1	ipcluster.ini.....	8
7.1.1	verbose .....	8
7.1.2	priority.....	8
7.1.3	hellotime.....	8
7.1.4	retry .....	8
7.1.5	timeout.....	8
7.1.6	holdtime.....	9
7.1.7	port .....	9
7.1.8	mac .....	9
7.1.9	ipaddr .....	9
7.1.10	ipmask .....	9
7.1.11	mac2 .....	9
7.1.12	ipaddr2 .....	9
7.1.13	ipmask2 .....	9
7.1.14	quorumip .....	9
7.1.15	nhello.....	9
7.1.16	helloN.....	10
7.1.17	logfilter.....	10
8	Administration.....	11
8.1	Manual failover .....	11
9	Diagnostics.....	11
10	Failover on LAN .....	11
11	Examples.....	12
11.1	Standalone test .....	12
11.2	Simple ping test.....	12
11.3	Simple LAN with IIS 5.0 failover .....	14
11.4	Redundant LAN with Intel Pro/100+ dual NIC's.....	16
12	VLAN.....	16
13	FAQ.....	16
13.1	Started application showing no window .....	16
13.2	How to disable LAN media sense .....	16
13.3	Some commands in activate/deactivate.cmd are terminated prematurely.....	16
13.4	Ipcluster cannot add ip address in debug mode .....	17

### 3 Figures

Figure 1 Ping test ..... 12  
Figure 2 Simple LAN ..... 14  
Figure 3 Redundant LAN ..... 16

### 4 Definitions

Abbreviation	Description
<b>SCM</b>	Service Control Manager
<b>LAN</b>	Local Area Network
<b>WAN</b>	Wide Area Network
<b>cluster</b>	A set of cooperating computers
<b>node</b>	A computer
<b>cluster node</b>	One node in a cluster
<b>cluster ip address</b>	A virtual ip-address, which is active only on one of the cluster nodes
<b>VLAN</b>	Virtual LAN

### 5 Preface

IPCluster is a ip-failover software product for Windows NT4.0/2000/XP/2003/7/2008, which allows running two or more computer nodes as a redundant IP cluster for IP based applications, e.g. WebServers, OPC-Servers. You define a virtual IP address for the cluster, the cluster ip-address, but only one node activates the cluster ip-address at any time. A service *ipcluster* running on each cluster node monitors the cluster ip-address, an optional additional ip-address (the quorum) and all other cluster nodes. A cluster node is either active or inactive. If a cluster node goes active, it binds the cluster ip-address to one of its NIC's and an additional ip-address to another or the same NIC. After binding the ip-addresses, a command file is executed, which allows starting or stopping of applications or doing other actions. A cluster node goes inactive either by shutting down the machine or stopping the *ipcluster* service. If the cluster service on the active node is stopped, the ip-addresses is removed from the NIC's. Before removing the ip-addresses, another command file is executed. This effectively allows the redundant deployment of ip-based applications on two or more computers for additional redundancy.

### 6 IP-Cluster Installation

#### 6.1 System Requirements

The IPCluster service requires the following minimum computer setup:

- PC-compatible Intel X86 or above processor (Pentium-class recommended)
- 64 MB total system memory (128 MB recommended)
- 10 MB of free disk space
- Microsoft Windows 2000, XP, 2003, 7, 2008
- Dotnet Framework 4.0
- Visual C++ runtime for visual studio 2010 (included in the setup)

## 6.2 ipcluster command line parameters

Parameter	Description
<b>show</b>	Shows all installed NIC's and their MAC addresses
<b>info</b>	Shows the configuration and version
<b>install</b>	Installs ipcluster as a service
<b>remove</b>	Uninstalls ipcluster
<b>debug</b>	Runs ipcluster as an application for testing purpose
<b>ipdel</b>	Removes the cluster ip addresses
<b>-?</b>	Help

### 6.3 Installation Instructions

When you install IPCluster, you must use an account that is member of the Administrator group. Installation is done by running the setup file. The setup will install the following files:

File	Description
ipcluster.pdf	This manual
ipcluster.exe	The ip-cluster service
sclicense.exe	License Manager
cpplic.dll	C++ License DLL
ipcluster.ini	A sample configuration file
ipcluster.license	30 days test license
activate.cmd	Sample activation script. This script is executed after the cluster ip-address has been activated. Do not run lengthy operation in this script, because ipcluster will terminate the script after 30 seconds. See the FAQ section for more information.
deactivate.cmd	Sample deactivation script. This script is executed before the cluster ip-address is deactivated. Do not run lengthy operation in this script, because ipcluster will terminate the script after 30 seconds. See the FAQ section for more information.
vs2010_vccredist_x86.exe	Microsoft visual c++ runtime 2010

If you want ipcluster to run as a service you have to install by

*ipcluster install*

at the command line. This will setup the IPCluster service as manual startup under the system account. If you want to service to startup automatic or under to run under another account, you can change this through the operating systems service applet.

### 6.4 Uninstallation Instructions

First stop the service by

```
net stop ipcluster
```

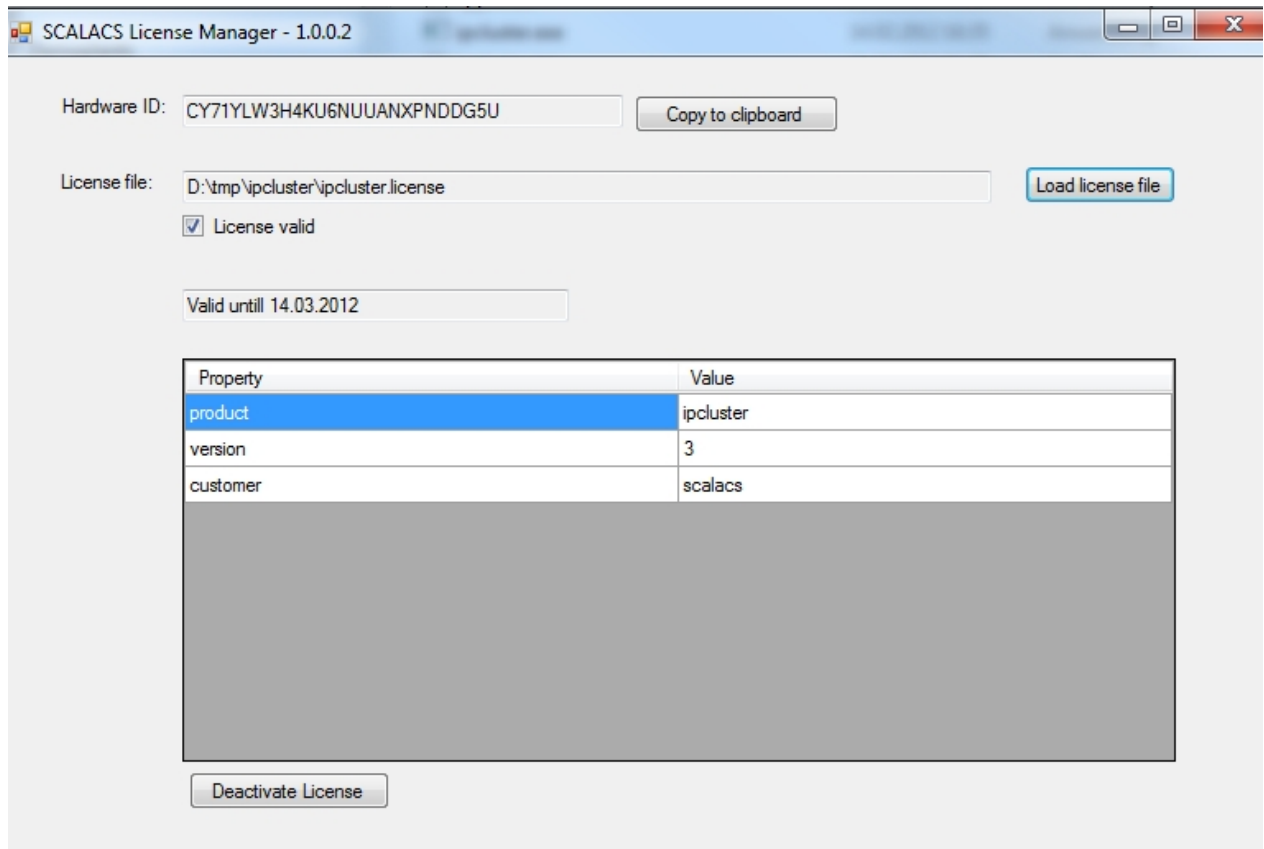
Next uninstall the service by

```
ipcluster remove
```

As the last step delete the installation directory.

### 6.5 Licensing

Licensing is done by the license file *ipcluster.license*. The download package contains a license file which allows testing the software for 30 days. After the 30 days the software will refuse to run. Start the license manager *sclicense.exe* to view the license.



## 7 Configuration

### 7.1 ipcluster.ini

The cluster configuration is simply done through the ini file *ipcluster.ini* file, which is unique for each cluster node. After changing the configuration you have to restart the cluster service by executing

```
net stop ipcluster
net start ipcluster
```

Example:

```
[ipcluster]
verbose=0
priority=80
hellotime=5
timeout=10
retry=3
holdtime=30
port=31215
mac=00 30 84 26 C8 23
ipaddr=192.168.200.111
ipmask=255.255.255.0
mac2=
ipaddr2=
ipmask2=
quorumip=
nhello=2
hello1=192.168.200.7
hello2=192.168.200.31
logfilter=*
```

#### 7.1.1 verbose

0=no verbose logging (default)  
1=verbose logging. Used for debugging purpose

#### 7.1.2 priority

Each cluster node has to be assigned a unique priority from 1 to 100, where 100 is the highest priority. If no node is active, the node with the highest priority will go active.

#### 7.1.3 hellotime

This is the interval in seconds from 1 to 600 a node will send hello messages. See also the description of the hello item.

#### 7.1.4 retry

The number of retries from 1 to 600 of hello messages and ICMP ping's

#### 7.1.5 timeout

The timeout in seconds from 2 to 600 for hello messages and ICMP ping's

#### 7.1.6 holdtime

This parameter in seconds from 1 to 6000 defines the time a node will go active after

- no hello messages with higher priority from other nodes have been received
- and the cluster ip-address can not be reached through an ICMP ping
- and the quorumip is reachable (if defined)

the holdtime can not be shorter than 2xtimeout.

#### 7.1.7 port

The cluster nodes communicate through a tcp port, which is defined here.

#### 7.1.8 mac

This is the MAC address (six hex addresses separated by a blank) of the NIC adapter the cluster ip-address should be bound to. You can find the MAC-address by entering 'ipconfig /all' or 'ipcluster show' in the command line

#### 7.1.9 ipaddr

The cluster ip-address. This is bound to the NIC defined by the *mac* parameter on the active node.

#### 7.1.10 ipmask

The cluster ip-address net mask.

#### 7.1.11 mac2

This is the MAC address (six hex addresses separated by a blank) of an optional second NIC adapter the cluster ip-address2 should be bound to. You can find the MAC-address by entering 'ipconfig /all' or 'ipcluster show' in the command line.

#### 7.1.12 ipaddr2

The optional second cluster ip-address. This is bound to the NIC defined by the *mac2* parameter on the active node.

#### 7.1.13 ipmask2

The optional cluster ip-address net mask for *ipaddr2*.

#### 7.1.14 quorumip

This is an optional ip-address, which defines the ip-address of a device which must always be reachable in order to go active. It is most usefull if you have got no redundant network path between cluster nodes and avoids a false activation of a node if its disconnected from the network (split brain syndrome). This may be the ip-address of a hub/switch/router/printerserver or another reliable device, which you can assume to be of higher availability than a PC.

If a node is active and the quorum can not be reached (e.g. LAN cable detached) the node will go inactive.

#### 7.1.15 nhello

Number of following hello entries.

### 7.1.16 helloN

N-th hello entry. ( $1 \leq N \leq n_{\text{Hello}}$ ). Every cluster node must send at least one hello message to each other cluster node. The hello parameter is an ip-address of the destination cluster node. If you have several networks paths from one node to another node, you may specify more then one hello message with different ip-addresses for one destination node to make use of the additional redundancy. The *hellotime* parameter (see above) sets the intervall at which hello messages are beeing sent.

### 7.1.17 logfilter

The logfilter tells ipcluster what information to write to the logfile. The filter it is a semicolon separated string of log-keys.

Key	Description
<b>Sclic</b>	Show licensing details
<b>Screg</b>	Show registry access

Example:

```
logfilter=sclic;screg
```

## 8 Administration

Administration is done by the W2K/NT build in *net.exe* program and the command line program *cladmin.exe*. You may start *cladmin.exe* on any node in the network.

### 8.1 Manual failover

Assuming there are two node in a cluster, node-A and node-B, both running the ipcluster service and node-A is the active one. To make node-B the active one, you have the following options:

1. shutdown node-A
2. remove network connection from node-A
3. stop the ipcluster service on node-A

Stopping the ipcluster service on node-A is done by executing *net stop ipcluster* on node-A. You may use the NT/W2K resource kit tool *sc.exe*, which allows remote starting/stopping of services.

Starting ipcluster on server 'server1': `sc \\server1 start ipcluster`  
Stopping ipcluster on server 'server1': `sc \\server1 stop ipcluster`

## 9 Diagnostics

The IPCluster service writes all activity to the *ipcluster\_YYYYMMDDN.log* files in the installation directory. Important information is also written into the application event log. The cluster service will show a trace window, if you allow the service to interact with the desktop. This can be enabled in the service applet. You should enable this feature only for diagnostic purpose, because the cluster service will be terminated if you logoff when interaction with the desktop is allowed. Since windows7 this feature is not available.

## 10 Failover on LAN

On a LAN, *IPCLUSTER* can failover servers without any additional network addressing concerns. During failover the server assumes the cluster IP address. After the server has taken over the cluster IP address, it sends out an ARP reply broadcast so that all machines on the LAN will send packets to the new server. This reconfiguration can be completely transparent to the clients, if they do not break connections before.

## 11 Examples

### 11.1 Standalone test

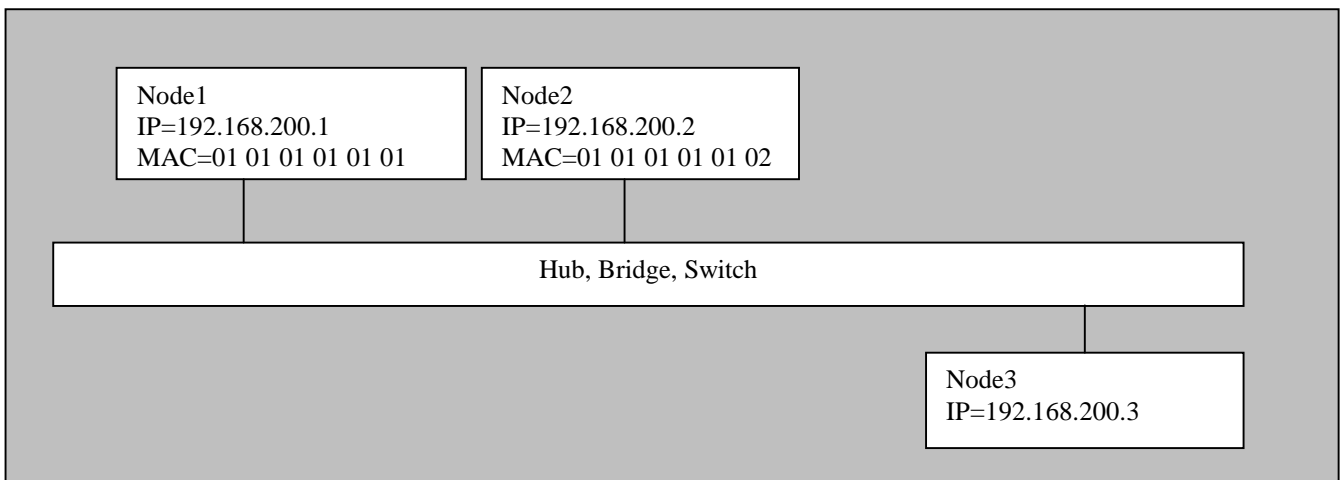
You can test ipcluster on a single node without any installation.

```
[ipcluster]
priority=50
hellotime=5
timeout=10
retry=3
holdtime=30
port=31215
mac=01 01 01 01 01 01
ipaddr=192.168.200.100
ipmask=255.255.255.0
nhello=0
```

In the command line simply start 'ipcluster debug'. This allows ipcluster to run without installing as a service.

### 11.2 Simple ping test

The following configuration has two computers attached with one NIC on one LAN.



**Figure 1 Ping test**

Let the cluster ip-address be 192.168.200.100. The cluster configuration is:

#### Node1:

```
[ipcluster]
priority=50
hellotime=5
timeout=10
retry=3
holdtime=30
port=31215
mac=01 01 01 01 01 01
ipaddr=192.168.200.100
```

```
ipmask=255.255.255.0  
nhello=1  
hello1=192.168.200.2
```

Let activate.cmd and deactivate.cmd be empty.

### Node2:

```
[ipcluster]  
priority=60  
hellotime=5  
timeout=10  
retry=3  
holdtime=30  
port=31215  
mac=02 02 02 02 02 02  
ipaddr=192.168.200.100  
ipmask=255.255.255.0  
nhello=1  
hello1=192.168.200.1
```

Let activate.cmd and deactivate.cmd be empty.

Try the following test:

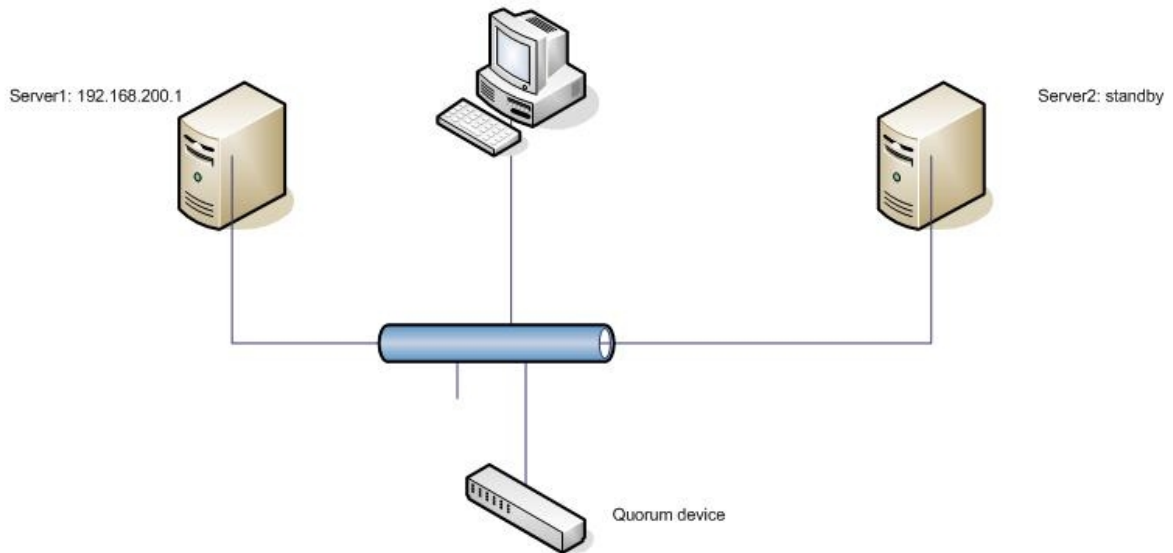
- Start ipcluster on Node1 and wait till its active
- Start ipcluster on Node2
- Start 'ping -t 192.168.200.100' on Node3. The ping report no errors
- Remove LAN cable from Node1. The ping will report errors.
- After holdtime seconds Node2 will go active. The ping will go on without errors.

You can check on Node3 which MAC address is used for 192.168.200.100 by executing 'arp -a'. You will notice that the MAC address will change to the MAC address of Node2 right after Node2 goes active.

### 11.3 Simple LAN with IIS 5.0 failover

The following configuration has two computers attached with one NIC on one LAN.

Simple LAN with a SWITCH as quorum device  
Cluster-IP address=192.168.200.1



**Figure 2 Simple LAN**

Let the cluster ip-address be 192.168.200.100. The cluster configuration is:

#### Node1:

```
[ipcluster]
priority=50
hellotime=5
timeout=10
retry=3
holdtime=30
port=31215
mac=01 01 01 01 01 01
ipaddr=192.168.200.100
ipmask=255.255.255.0
quorumip=192.168.200.99
nhello=1
hello1=192.168.200.2
```

```
activate.cmd
    iisreset /start
deactivate.cmd
    iisreset /stop
```

#### Node2:

```
[ipcluster]
priority=60
hellotime=5
```

```
timeout=10  
retry=3  
holdtime=30  
port=31215  
mac=02 02 02 02 02 02  
ipaddr=192.168.200.100  
ipmask=255.255.255.0  
quorumip=192.168.200.99  
nhello=1  
hello1=192.168.200.1
```

```
activate.cmd  
    iisreset /start  
deactivate.cmd  
    iisreset /stop
```

Try the following test:

- Switch off Node1 and Node2
- Switch on both machines at the same time
- Node2 will go active, because it has the higher priority.
- Switch of Node2
- Node1 will go active after the holdtime of 30 seconds
- Switch Node2 on again
- Node1 stays active, because Node2 sees the cluster ip-address

## 11.4 Redundant LAN with Intel Pro/100+ dual NIC's

The following redundant LAN setup with Intel Pro/100+ does not need the quorumip. Make shure you use the MAC address of the virtual failover adapter and not of the physical NIC's.

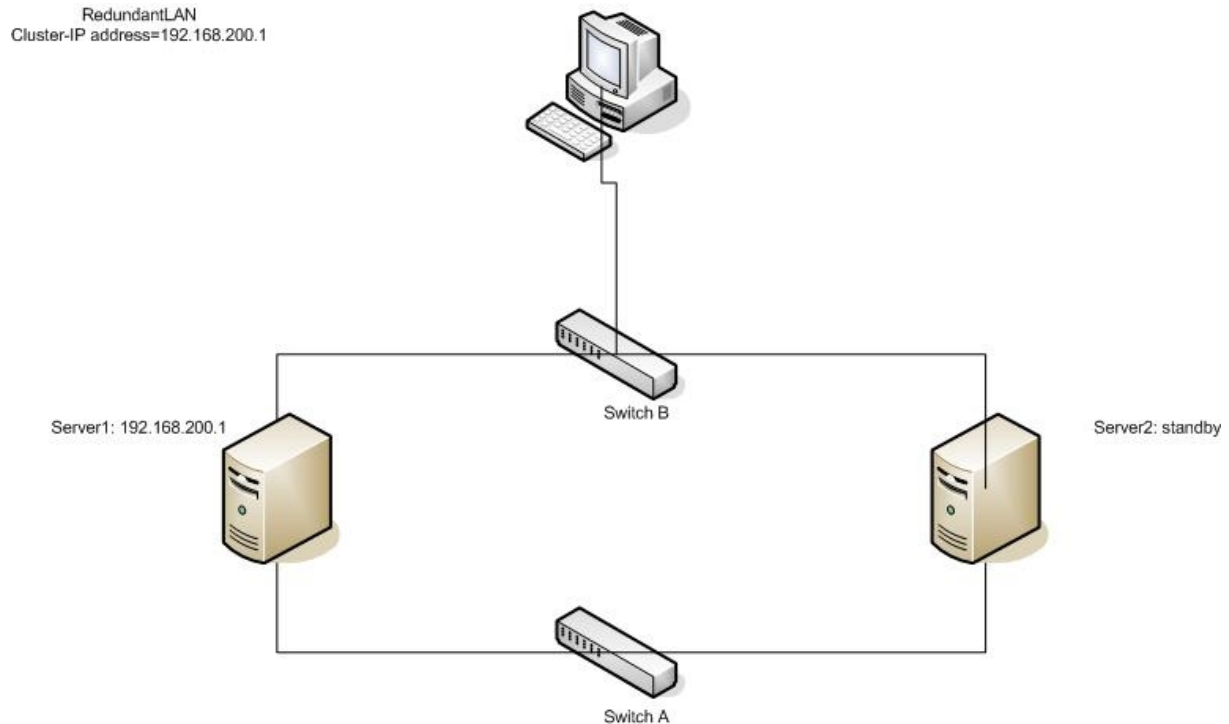


Figure 3 Redundant LAN

## 12 VLAN

A VLAN is a set of devices appearing to be local to each other, but are separated physically. The routers/switches hide the true location of the devices. The cluster nodes are on the same ip subnet, regardless of the actual network distance between the nodes.

## 13 FAQ

### 13.1 Started application showing no window

The ipcluster service runs in the context of a non interactive desktop. If you start another process from this parent process, the child will run in the same non visible desktop. Change the ipcluster service settings.

### 13.2 How to disable LAN media sense

HKEY\_LOCAL\_MACHINE\System\CurrentControlSet\Services\Tcpip\Parameters

Add the following registry value:

Value Name: DisableDHCPMediaSense

Data Type: REG\_DWORD -Boolean

Value Data Range: 0, 1 (False, True) Default: 0 (False)

### 13.3 Some commands in activate/deactivate.cmd are terminated prematurely

The scripts *activate.cmd* and *deactivate.cmd* will be terminated by ipcluster if they run longer than 30 seconds. If you want to start something which lasts longer, put all commands in a seconds script e.g. *activate2.cmd*, and start *activate2.cmd* from *activate.cmd* by

```
'start activate2.cmd'
```

The same applies to *deactivate.cmd*.

#### 13.4 Ipcluster cannot add ip address in debug mode

This error message may appear if you are running ipcluster in debug mode (ipcluster debug) under Windows Vista/7/2008. With the User Account Control (UAC) enabled by default in Windows Vista/7/2008 you need to use an elevated Command Prompt:

