OSCAR

Open Source Cluster Application Resources

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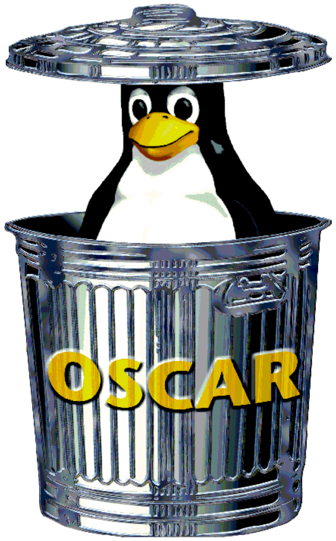
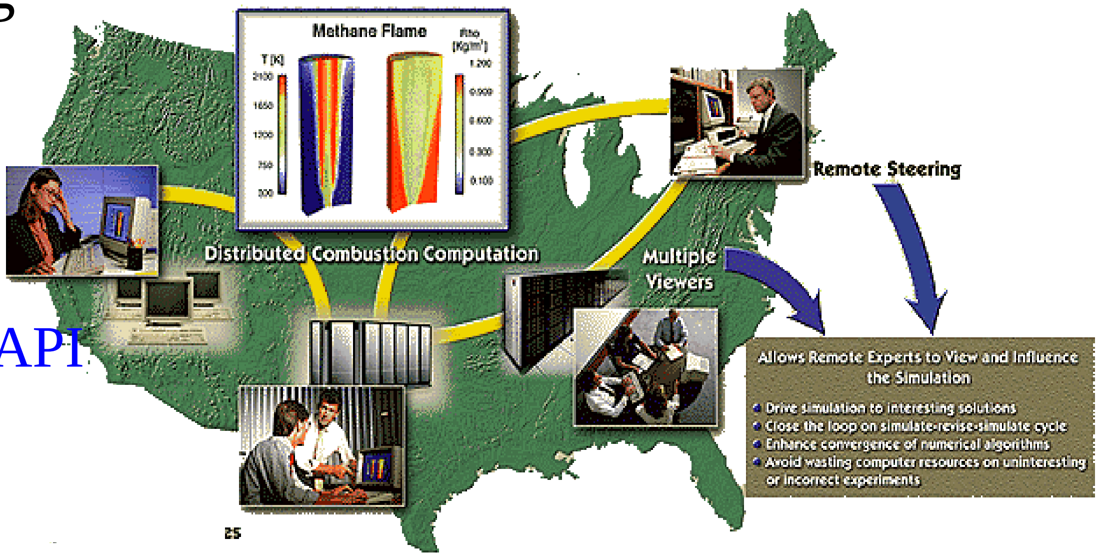


Workshop on: Operating Systems, Tools and Methods for
High Performance Computing on Linux Clusters
EDF R&D – Clamart (France)
October 7, 2003

ORNL CS Research

Significant impact and world-wide influence on Parallel computing and the Science enabled by it

- Track record of developing very popular software
  - PVM – 400,000
  - OSCAR – 112,922
  - Cumulvs - 300
- Influencing Standards
  MPI, BLAS, LAPACK, PAPI
- Enabling Science
  PVM, MPI, enote, etc.
  are widely used in
  education, research, and industry

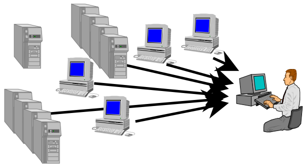


Allows Remote Experts to View and Influence the Simulation

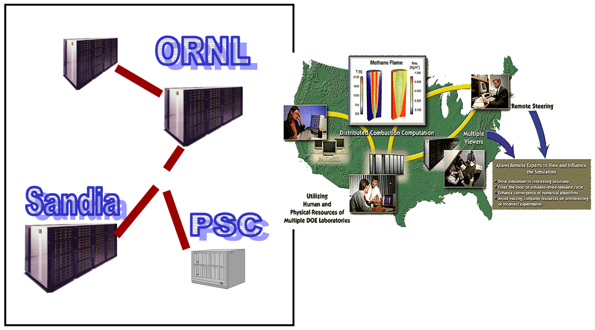
- Drive simulation to interesting solutions
- Close the loop on simulate-revise-simulate cycle
- Enhance convergence of numerical algorithms
- Avoid wasting computer resources on uninteresting or incorrect experiments

Goal is to accelerate the process of Scientific Discovery

Over Ten years of leadership in heterogeneous distributed computing

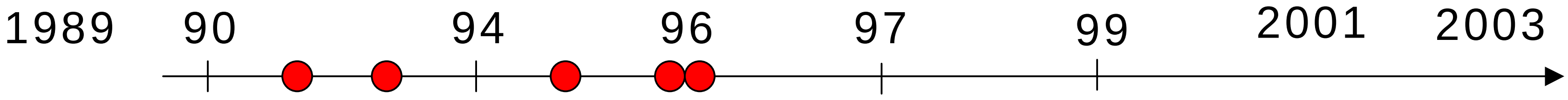


Networks of Workstations


ORNL
Sandia
PSC
Methane Flame
Distributed Combustion Computation
Remote Steering
Multiple Viewers
Utilizing Human and Physical Resources of Multiple DOE Laboratories

Wide-area GRID experiments

PC Clusters



Gordon Bell Award

(1st of many won using PVM)

PVM R&D 100

SCxx Challenge Awards

AMSE Award

NetSolve R&D 100

OSCAR becomes most popular cluster software

OSCAR will pass 113,000 downloads

Impact of our research has been recognized by numerous awards

● SC92
SC93
SC95
SC96 (2)

1st release April 01

Scalable Systems Software
for Terascale Computer Centers

www.scidac.org/ScalableSystems

Problem

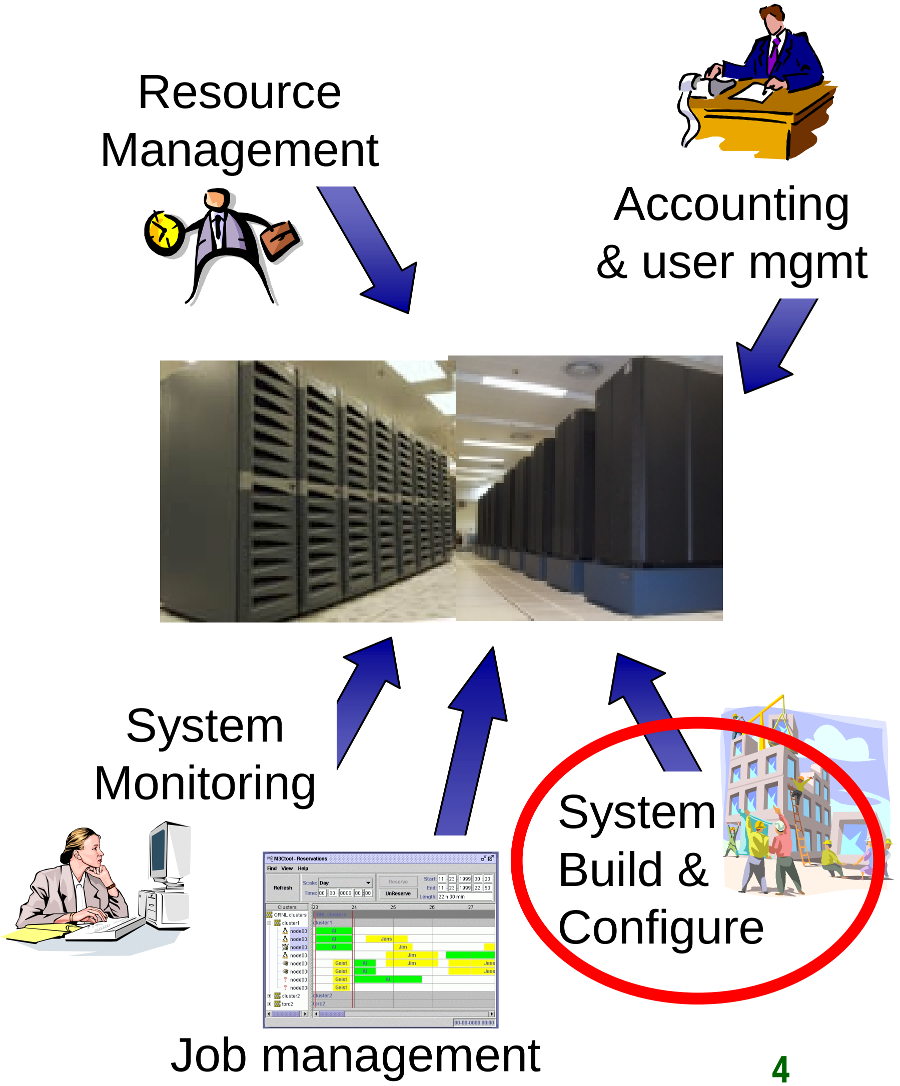
- Computer centers use incompatible, ad hoc set of systems tools
- Present tools are not designed to scale to multi-Teraflop systems

Solution

- Collectively (with industry) define standard interfaces between systems components for interoperability
- Create scalable, standardized management tools for efficiently running our large computing centers

Impact

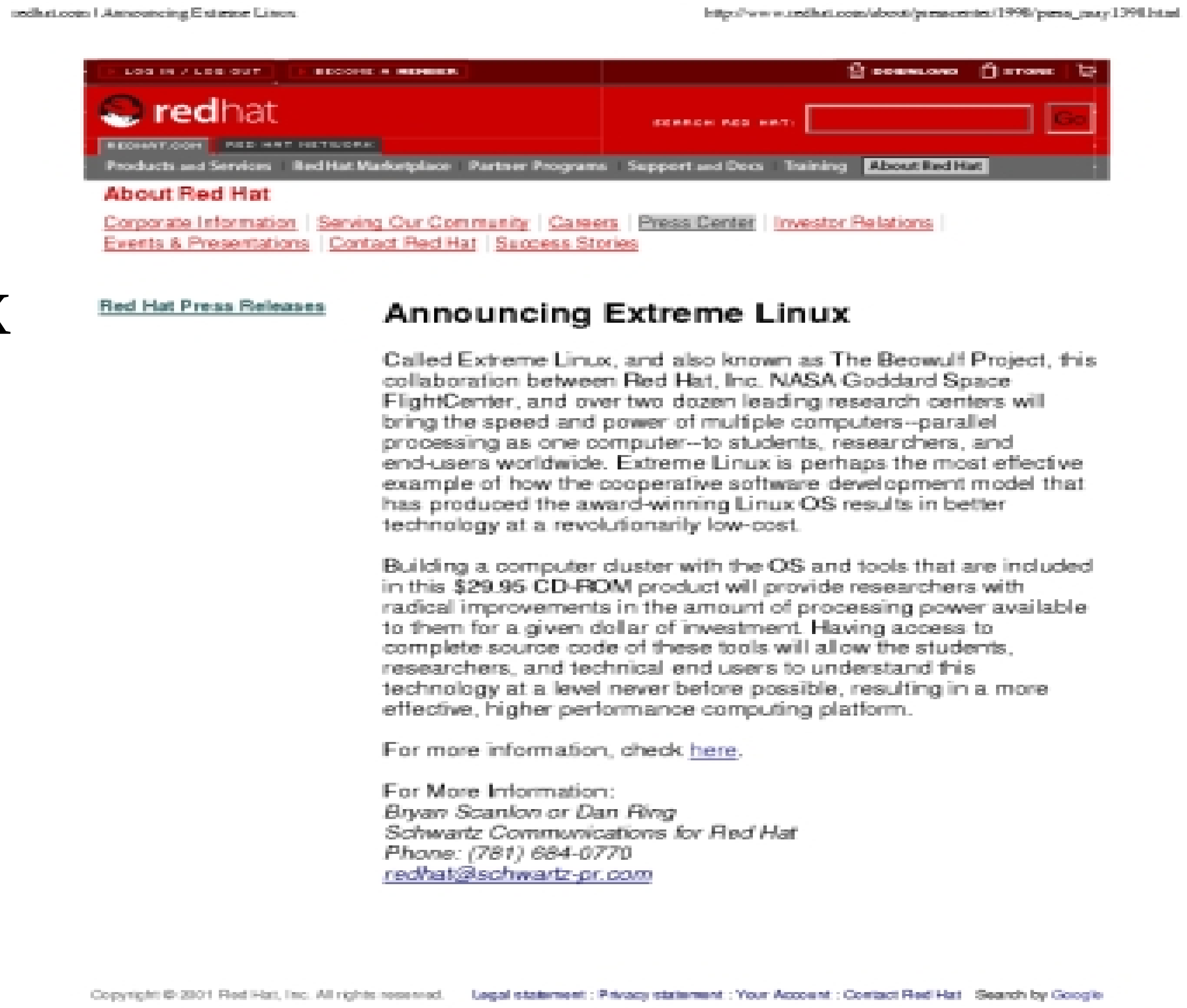
- Revolutionize the way system software is designed and used.



OSCAR - the beginning

First cluster “distro”

- Extreme Linux
- May 13, 1998
- $29.95 CD



redhat.com | Announcing Extreme Linux
http://www.redhat.com/about/presscenter/1998/press_may1398.html
LOG IN / LOG OUT
BECOME A MEMBER
DOWNLOAD
STORE
redhat
SEARCH RED HAT:
Go
REDHAT.COM
RED HAT NETWORK
Products and Services | Red Hat Marketplace | Partner Programs | Support and Docs | Training | About Red Hat
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Events & Presentations | Contact Red Hat | Success Stories
Red Hat Press Releases

Announcing Extreme Linux

Called Extreme Linux, and also known as The Beowulf Project, this collaboration between Red Hat, Inc. NASA Goddard Space FlightCenter, and over two dozen leading research centers will bring the speed and power of multiple computers--parallel processing as one computer--to students, researchers, and end-users worldwide. Extreme Linux is perhaps the most effective example of how the cooperative software development model that has produced the award-winning Linux OS results in better technology at a revolutionarily low-cost.

Building a computer cluster with the OS and tools that are included in this $29.95 CD-ROM product will provide researchers with radical improvements in the amount of processing power available to them for a given dollar of investment. Having access to complete source code of these tools will allow the students, researchers, and technical end users to understand this technology at a level never before possible, resulting in a more effective, higher performance computing platform.

For more information, check here.

For More Information:
Bryan Scanlon or Dan Ring
Schwartz Communications for Red Hat
Phone: (781) 684-0770
redhat@schwartz-pr.com

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OSCAR Background

- Meeting back in April 2000
  - Cluster assembly is time consuming & repetitive
  - Nice to offer a toolkit to automate
  - First public release in April 2001

- Use “best practices” for HPC clusters
  - Leverage wealth of open source components
  - Target modest size cluster (single network switch)

- Form umbrella organization to oversee
  - Open Cluster Group

Open Cluster Group

- Informal group formed to make cluster computing more practical for HPC research and development

- Membership is open, direct by steering committee
  - Research/Academic
  - Industry

- Current active working groups
  - OSCAR
  - Thin-OSCAR (diskless)
  - HA-OSCAR (high availability)

OSCAR 2003 Core Organizations

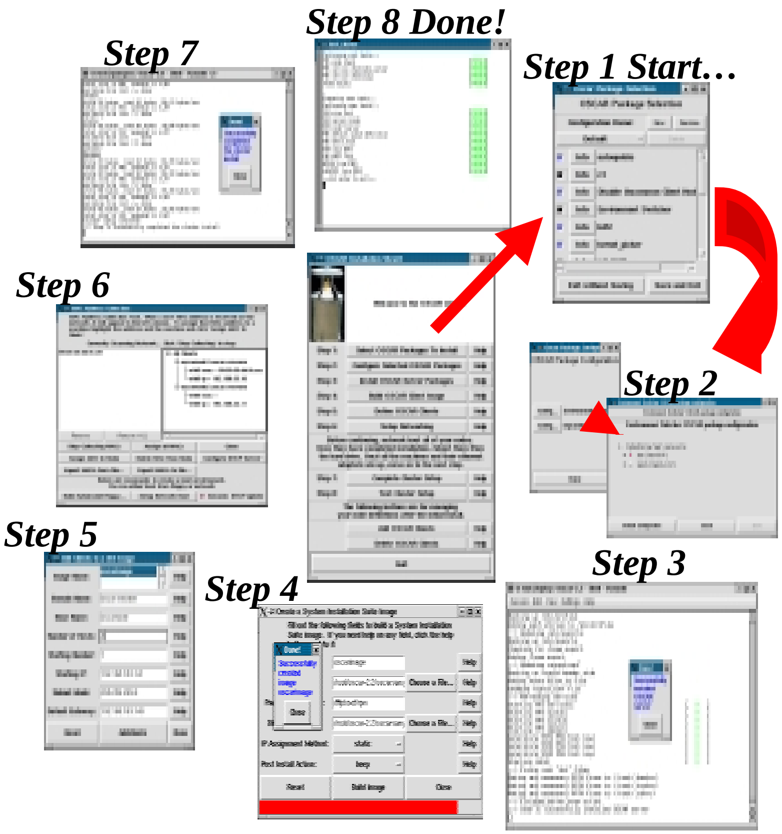
- Dell
- IBM
- Intel
- MSC.Software
- Bald Guy Software

- Indiana University
- NCSA
- Oak Ridge National Laboratory
- Université de Sherbrooke

Open Source Cluster Application Resources

What is OSCAR?

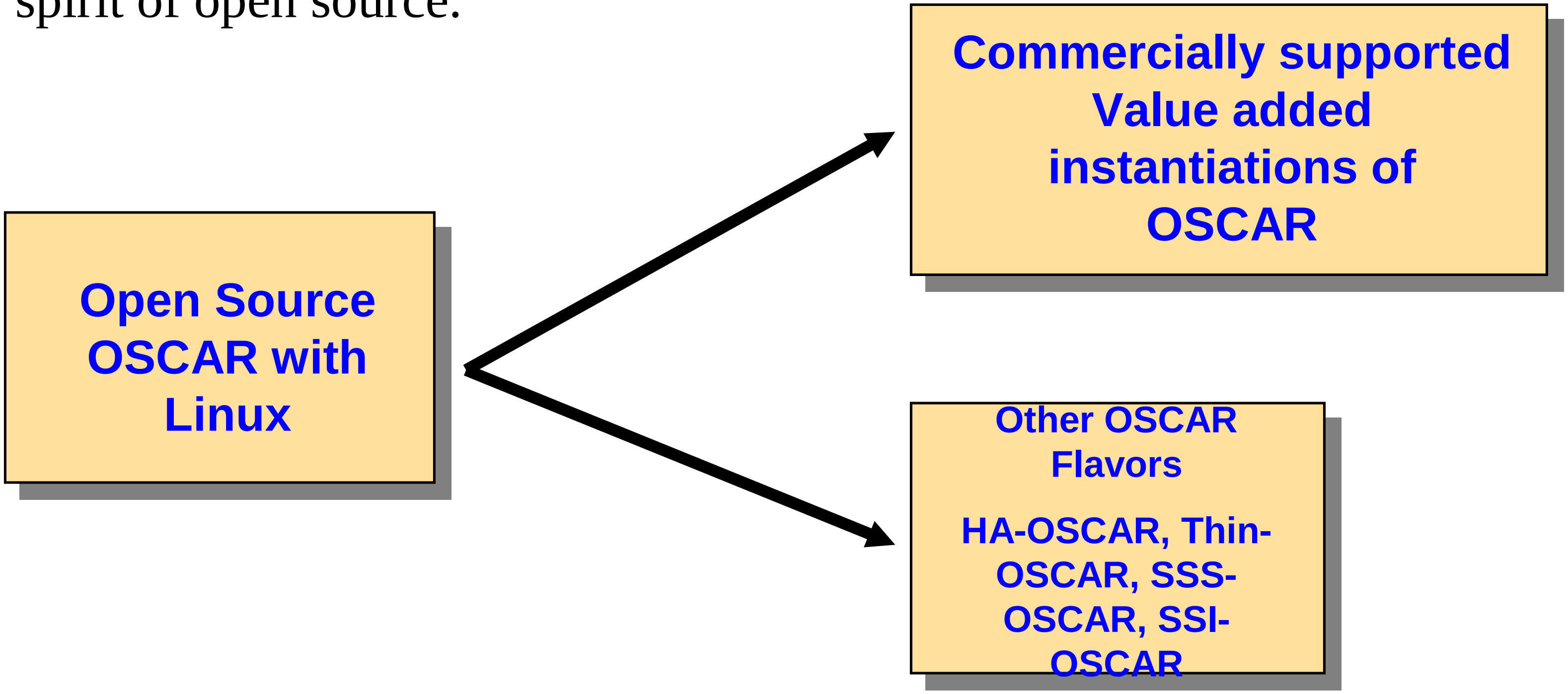
- Framework for cluster installation configuration and management
- Common used cluster tools
- Wizard based cluster software installation
  - Operating system
  - Cluster environment
    - Administration
    - Operation



- Automatically configures cluster components
- Increases consistency among cluster builds
- Reduces time to build / install a cluster
- Reduces need for expertise

The OSCAR strategy

- OSCAR is a snap-shot of best-known-methods for building, programming and using clusters of a “reasonable” size.
- To bring uniformity to clusters, foster commercial versions of OSCAR, and make clusters more broadly acceptable.
- Consortium of research, academic & industry members cooperating in the spirit of open source.



Open Source OSCAR with Linux

Commercially supported Value added instantiations of OSCAR

Other OSCAR Flavors

HA-OSCAR, Thin-OSCAR, SSS-OSCAR, SSI-OSCAR

OSCAR Components

- Administration/Configuration
  - SIS, C3, OPIUM, Kernel-Picker, NTPconfig cluster services (dhcp, nfs, ...)
  - Security: Pfilter, OpenSSH

- HPC Services/Tools
  - Parallel Libs: MPICH, LAM/MPI, PVM
  - OpenPBS/MAUI
  - HDF5
  - Ganglia, Clumon, … [monitoring systems]
  - *Other 3rd party OSCAR Packages*

- Core Infrastructure/Management
  - System Installation Suite (SIS), Cluster Command & Control (C3), Env-Switcher,
  - OSCAR DAtabase (ODA), OSCAR Package Downloader (OPD)

System Installation Suite (SIS)

Enhancement suite to the *SystemImager* tool.

Adds *SystemInstaller* and *SystemConfigurator*

- SystemInstaller – interface to installation, includes a stand-alone GUI – Tksis. Allows for description based image creation.
- SystemImager – base tool used to construct & distribute machine images.
- SystemConfigurator – extension that allows for on-the-fly style configurations once the install reaches the node, e.g. '/etc/modules.conf'.

System Installation Suite (SIS)

- Used in OSCAR to install nodes
  - partitions, formats and installs nodes

- Construct “image” of compute node on headnode
  - Directory structure that **is** what the node will contain
  - This is a “virtual”, `chroot`–able environment

    /var/lib/systemimager/images/oscarimage/etc/

    …/usr/

- Use `rsync` to copy only differences in files, so can be used for cluster management
  - maintain image and sync nodes to image

C3 Power Tools

- Command-line interface for cluster system administration and parallel user tools.

- Parallel execution `cexec`
  - Execute across a single cluster or multiple clusters at same time

- Scatter/gather operations `cpush/cget`
  - Distribute or fetch files for all node(s)/cluster(s)

- Used throughout OSCAR and as underlying mechanism for tools like OPIUM's *useradd* enhancements.

C3 Power Tools

Example to run hostname on all nodes of default cluster:

```
$ cexec hostname
```

Example to push an RPM to /tmp on the first 3 nodes

```
$ cpush :1-3 helloworld-1.0.i386.rpm /tmp
```

Example to get a file from node1 and nodes 3-6

```
$ cget :1,3-6 /tmp/results.dat  /tmp
```

* Can leave off the destination with cget and will use the same location as source.

Switcher

- Switcher provides a clean interface to edit environment without directly tweaking .dot files.
  - e.g. PATH, MANPATH, path for ‘mpicc’, etc.

- Edit/Set at both system and user level.

- Leverages existing *Modules* system

- Changes are made to future shells
  - To help with “*foot injuries*” while making shell edits
  - Modules already offers facility for current shell manipulation, but no persistent changes.

OSCAR DAtabase (ODA)

- Used to store OSCAR cluster data
- Currently uses MySQL as DB engine
- User and program friendly interface for database access
- Capability to extend database commands as necessary.

OSCAR Package Downloader (OPD)

Tool to download and extract OSCAR Packages.

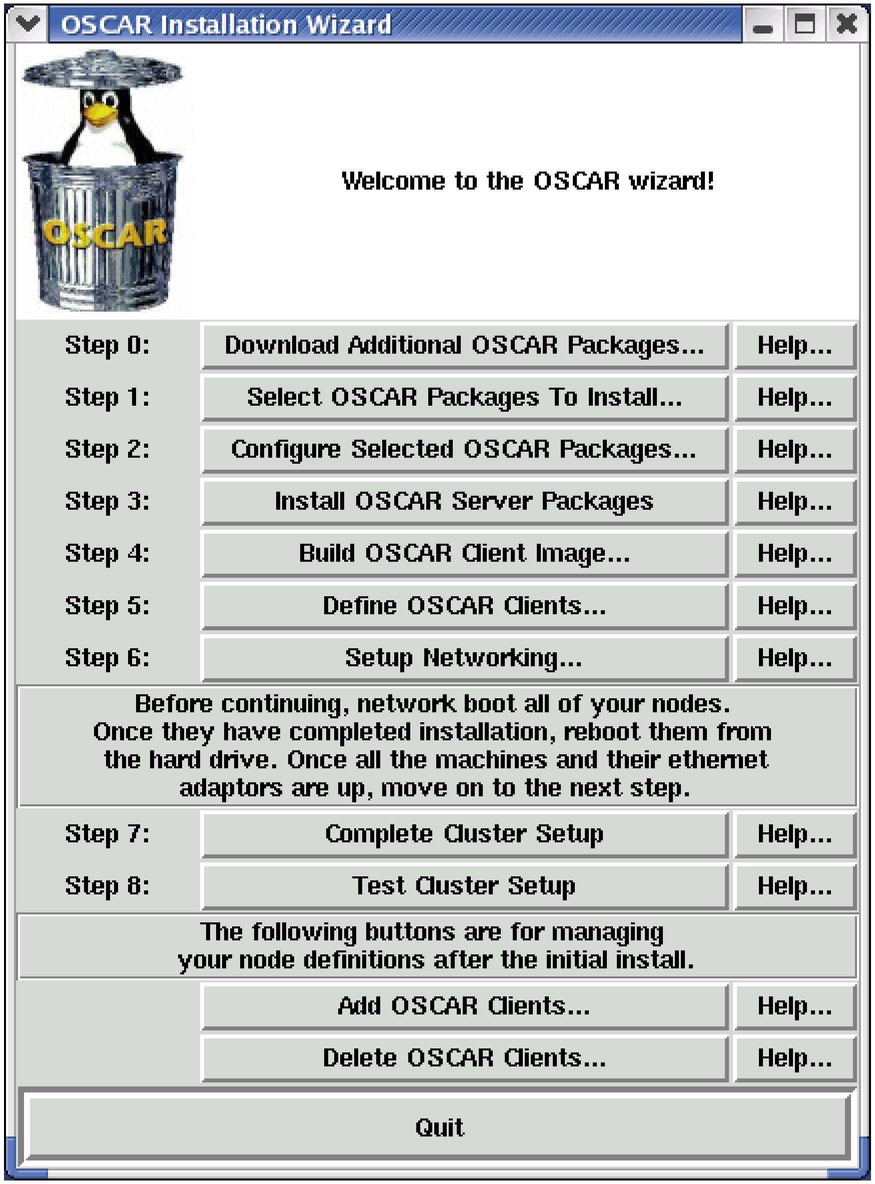
- Can be used for timely package updates
- Packages that are not included, i.e. “3rd Party”
- Distribute packages with licensing constraints.

OSCAR Installation

Server Installation and Configuration

- Install Linux on server machine (cluster head node)
  - workstation install w/ software development tools
  - 57-page installation document!
    - (quick install available)
- Download copy of OSCAR and unpack on server
- Configure and install OSCAR on server
  - readies the wizard install process
- Configure server Ethernet adapters
  - public
  - private
- Launch OSCAR Installer (wizard)

OSCAR Wizard



Welcome to the OSCAR wizard!

Step 0: Download Additional OSCAR Packages... Help...

Step 1: Select OSCAR Packages To Install... Help...

Step 2: Configure Selected OSCAR Packages... Help...

Step 3: Install OSCAR Server Packages Help...

Step 4: Build OSCAR Client Image... Help...

Step 5: Define OSCAR Clients... Help...

Step 6: Setup Networking... Help...

Before continuing, network boot all of your nodes.
Once they have completed installation, reboot them from
the hard drive. Once all the machines and their ethernet
adaptors are up, move on to the next step.

Step 7: Complete Cluster Setup Help...

Step 8: Test Cluster Setup Help...

The following buttons are for managing
your node definitions after the initial install.

Add OSCAR Clients... Help...

Delete OSCAR Clients... Help...

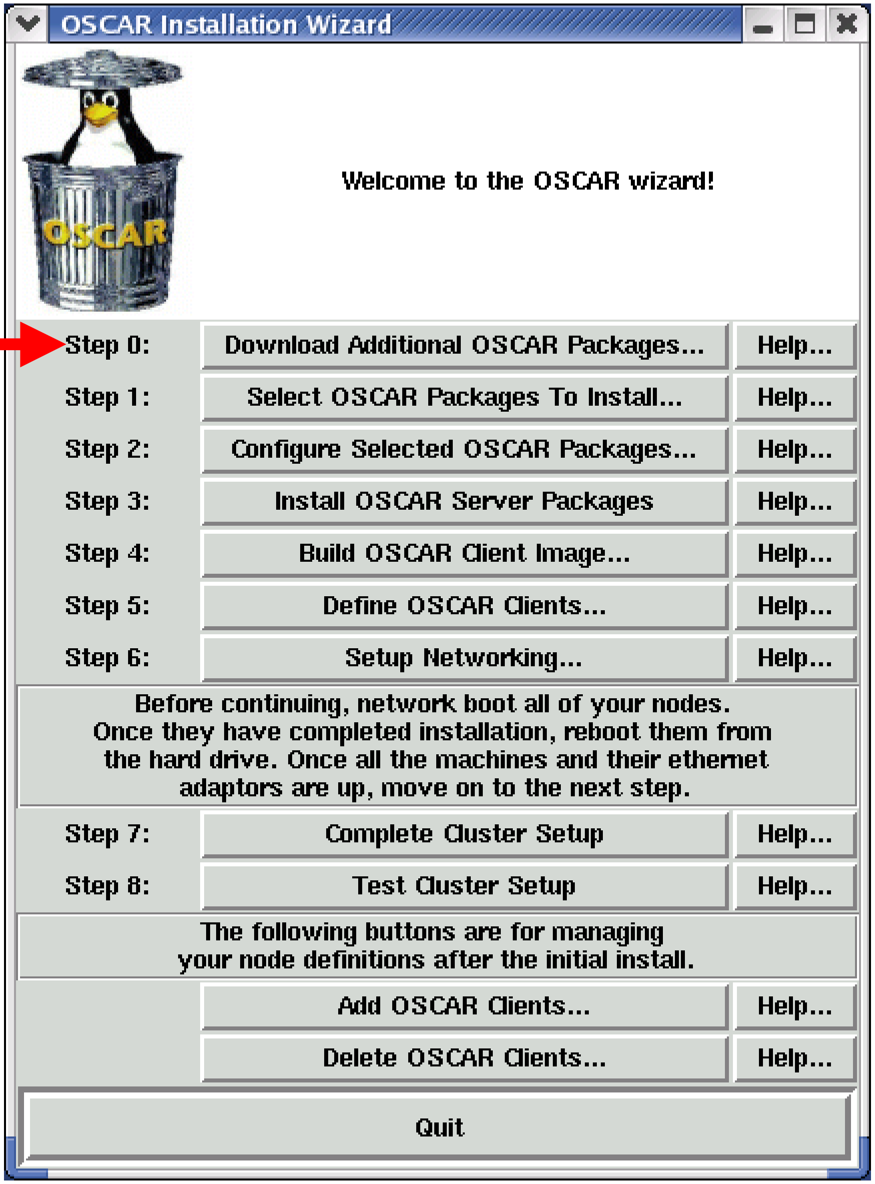
Quit

Step 0

Enables you to download additional packages

OPD – Oscar Package Downloader does download

OPDer – GUI frontend to OPD



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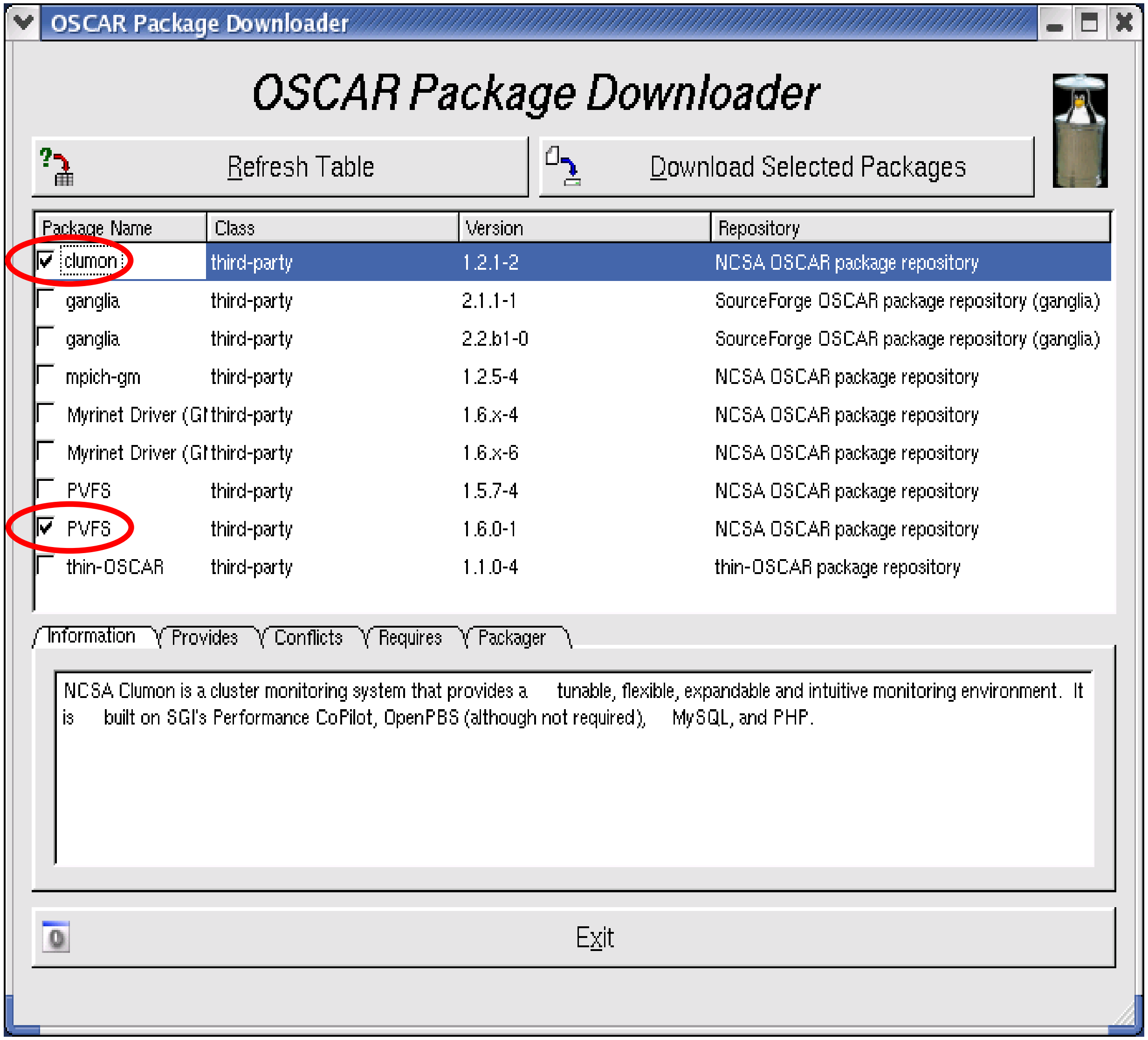
OPDer

clumon and PVFS selected for download



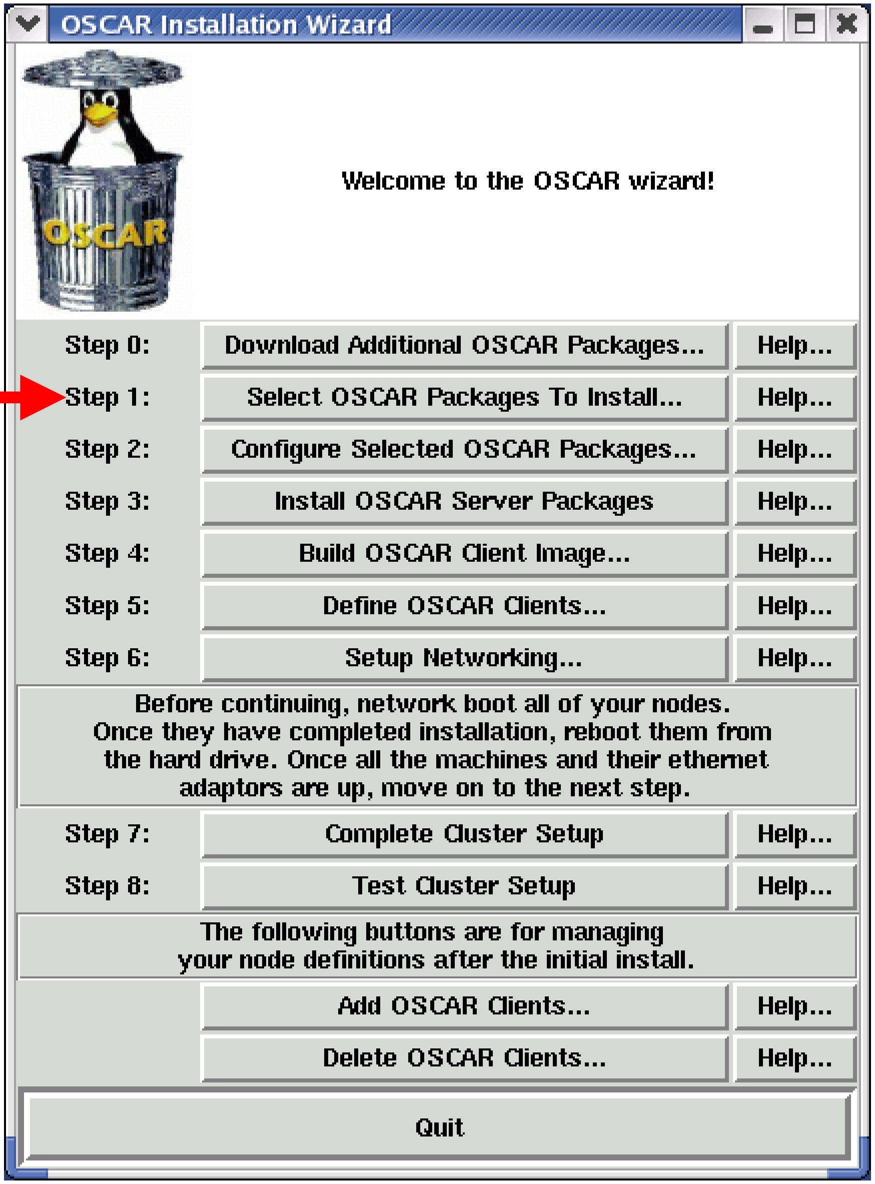
Package Name	Class	Version	Repository
☑ clumon	third-party	1.2.1-2	NCSA OSCAR package repository
□ ganglia	third-party	2.1.1-1	SourceForge OSCAR package repository (ganglia)
□ ganglia	third-party	2.2.b1-0	SourceForge OSCAR package repository (ganglia)
□ mpich-gm	third-party	1.2.5-4	NCSA OSCAR package repository
□ Myrinet Driver (GI	third-party	1.6.x-4	NCSA OSCAR package repository
□ Myrinet Driver (GI	third-party	1.6.x-6	NCSA OSCAR package repository
□ PVFS	third-party	1.5.7-4	NCSA OSCAR package repository
☑ PVFS	third-party	1.6.0-1	NCSA OSCAR package repository
□ thin-OSCAR	third-party	1.1.0-4	thin-OSCAR package repository

NCSA Clumon is a cluster monitoring system that provides a tunable, flexible, expandable and intuitive monitoring environment. It is built on SGI's Performance CoPilot, OpenPBS (although not required), MySQL, and PHP.

Step 1

Create your own flavor of cluster distribution

Select OSCAR packages to install.



OSCAR Installation Wizard

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Step 8: Test Cluster Setup Help...

The following buttons are for managing
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Add OSCAR Clients... Help...

Delete OSCAR Clients... Help...

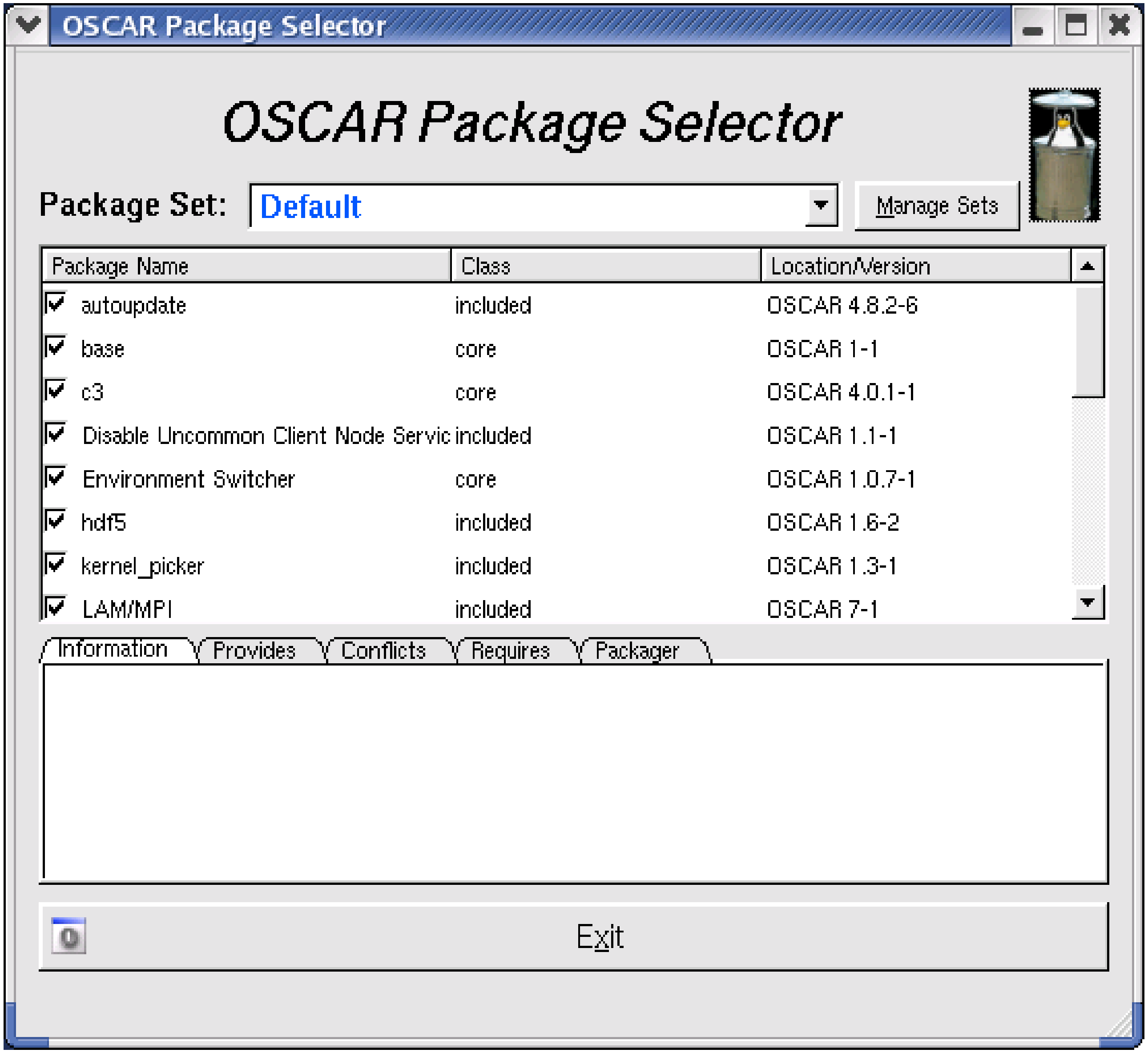
Quit

Package Selector

Core packages are automatically selected for you and can not “unselect”

Download does not equal installation!

Packages downloaded with OPDer are selected for installation here



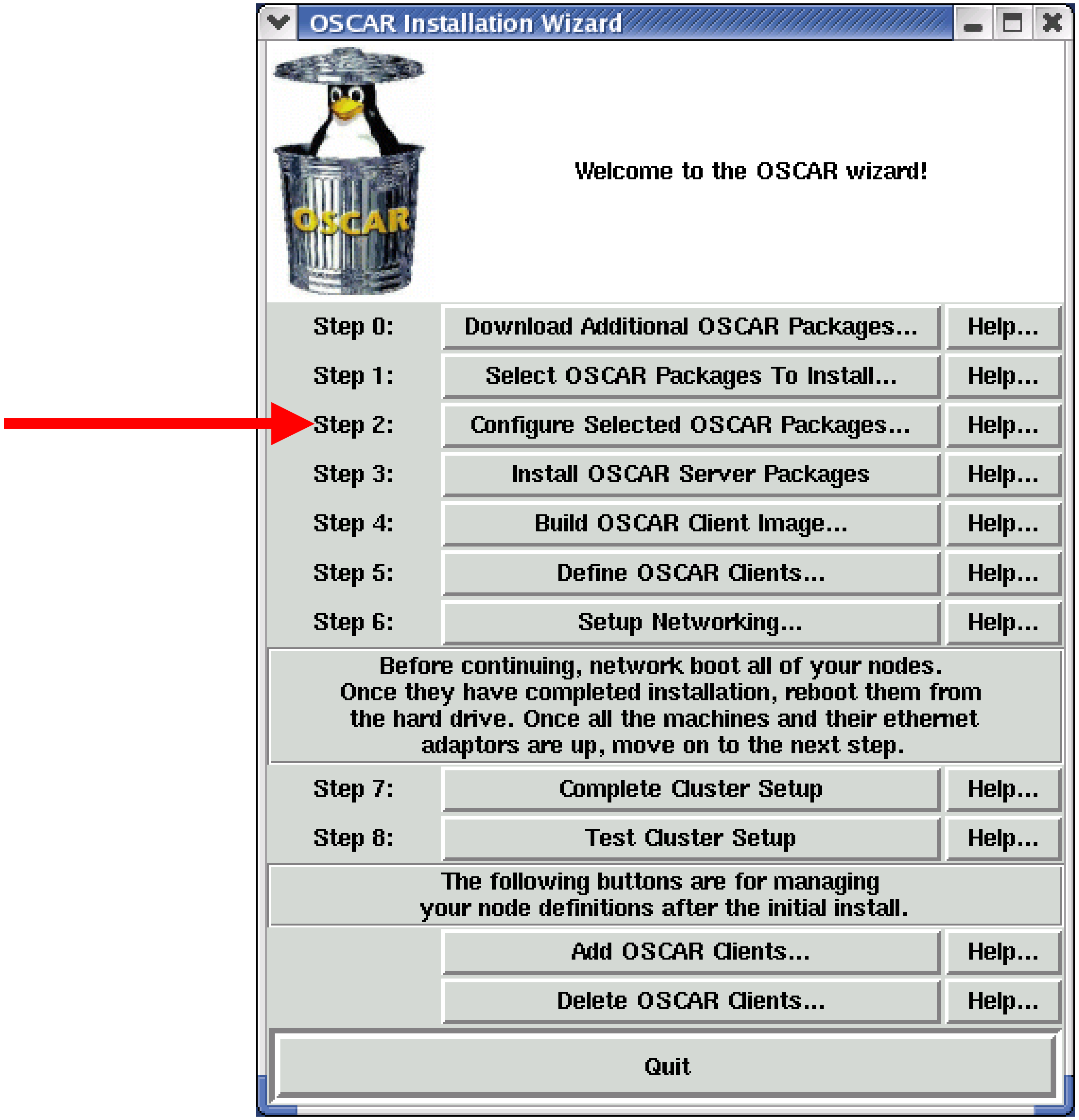
OSCAR Package Selector

Package Set: Default

Package Name	Class	Location/Version
☑ autoupdate	included	OSCAR 4.8.2-6
☑ base	core	OSCAR 1-1
☑ c3	core	OSCAR 4.0.1-1
☑ Disable Uncommon Client Node Servic	included	OSCAR 1.1-1
☑ Environment Switcher	core	OSCAR 1.0.7-1
☑ hdf5	included	OSCAR 1.6-2
☑ kernel_picker	included	OSCAR 1.3-1
☑ LAM/MPI	included	OSCAR 7-1

Step 2

Configure OSCAR packages that require special configuration tasks



OSCAR Installation Wizard

Welcome to the OSCAR wizard!

Step 0:	Download Additional OSCAR Packages...	Help...
Step 1:	Select OSCAR Packages To Install...	Help...
Step 2:	Configure Selected OSCAR Packages...	Help...
Step 3:	Install OSCAR Server Packages	Help...
Step 4:	Build OSCAR Client Image...	Help...
Step 5:	Define OSCAR Clients...	Help...
Step 6:	Setup Networking...	Help...

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Step 7:	Complete Cluster Setup	Help...
Step 8:	Test Cluster Setup	Help...

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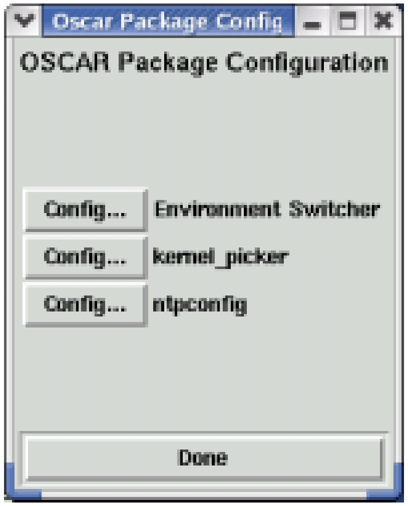
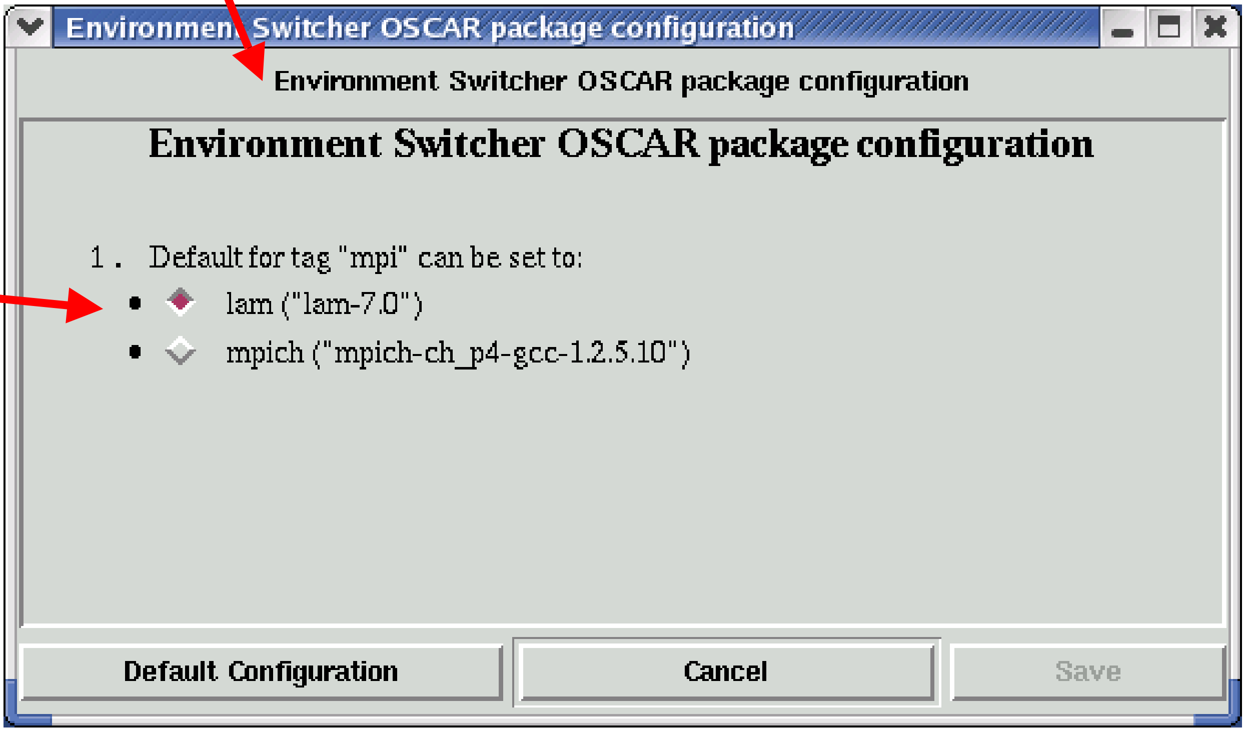
Add OSCAR Clients...	Help...
Delete OSCAR Clients...	Help...

Quit

Package configuration



Environment Switcher does configuration for default MPI use


Environment Switcher OSCAR package configuration
Environment Switcher OSCAR package configuration
Default Configuration
Cancel
Save

Environment Switcher OSCAR package configuration

1 . Default for tag "mpi" can be set to:

- ◆ lam ("lam-7.0")
- ◇ mpich ("mpich-ch_p4-gcc-1.2.5.10")

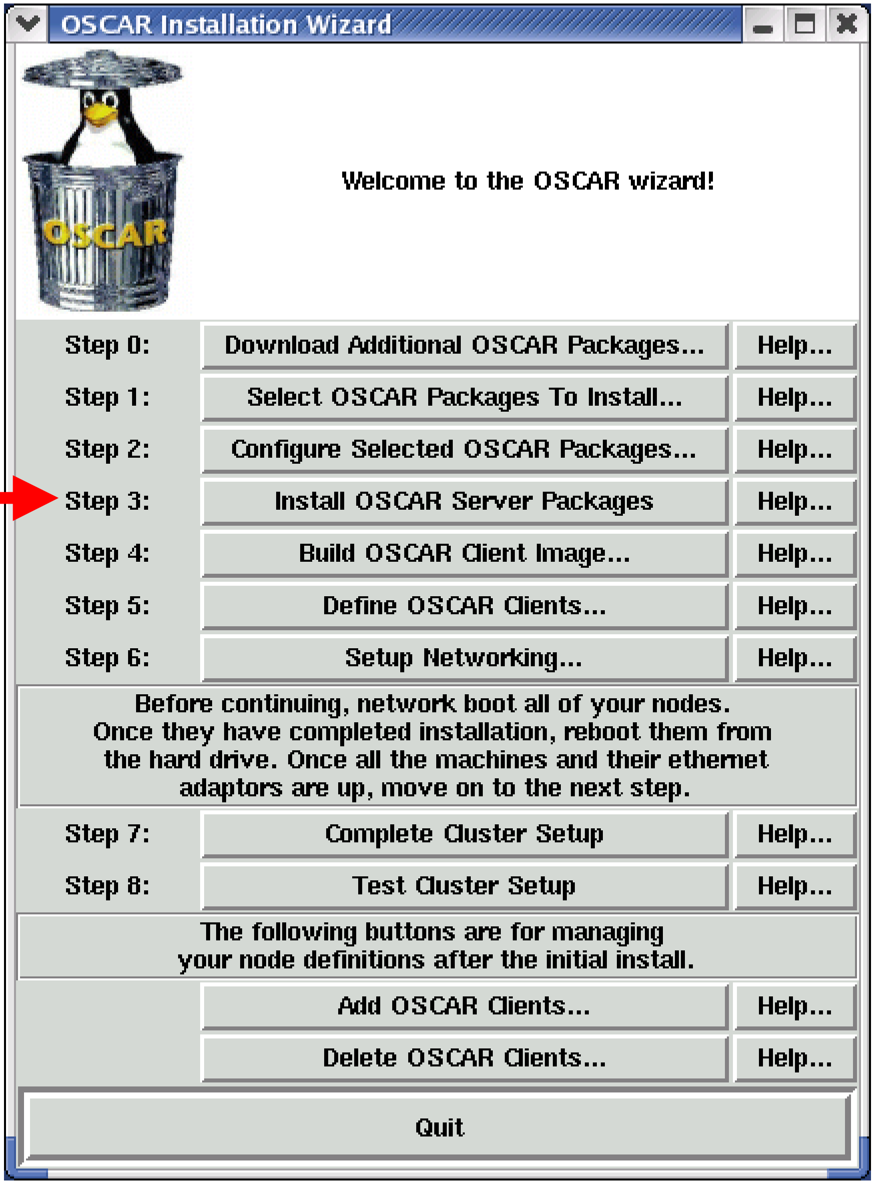
make selection

Step 3

Install OSCAR Server (cluster head node) specific packages on cluster head node

May take a few minutes

Wait for button…



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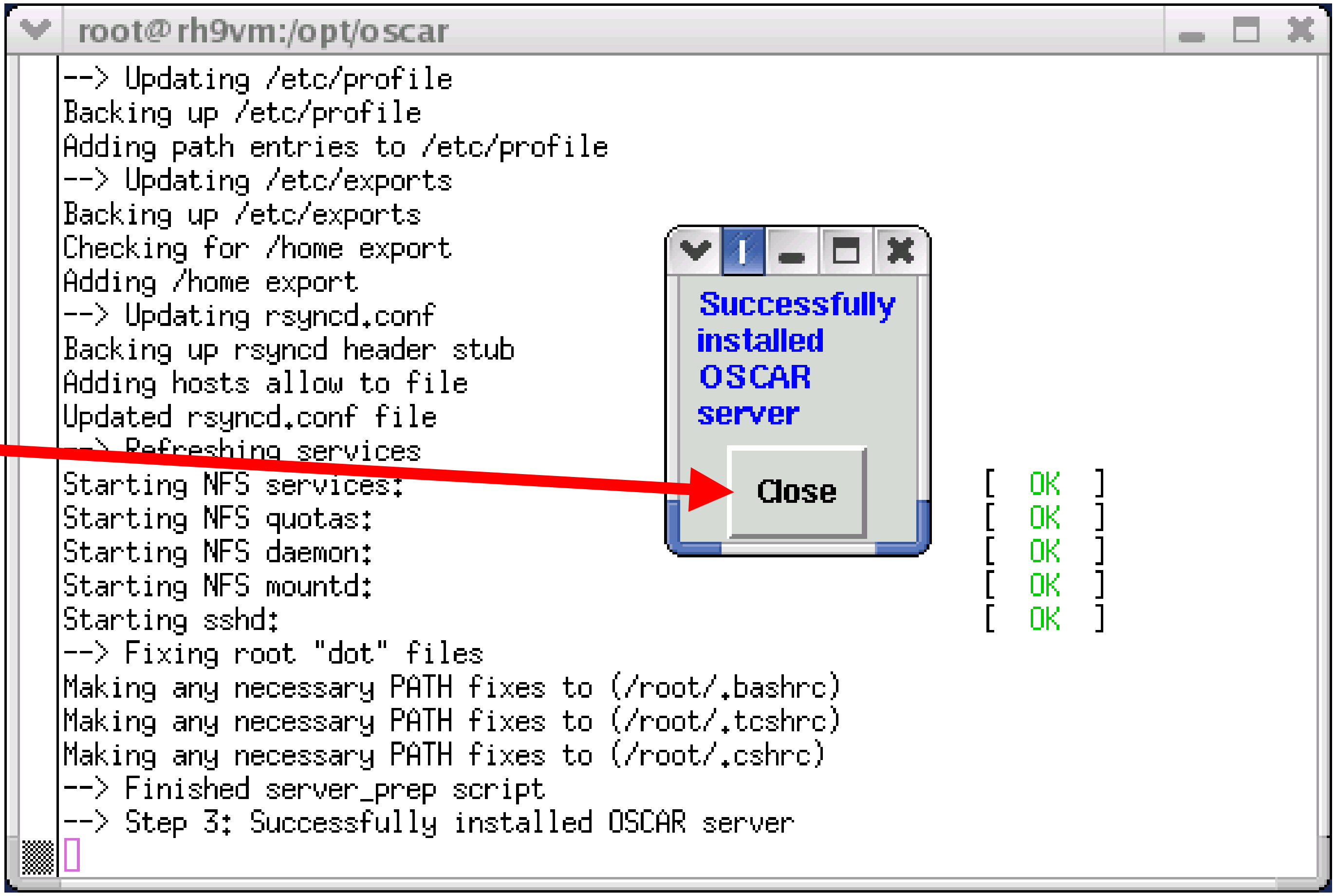
Install server packages



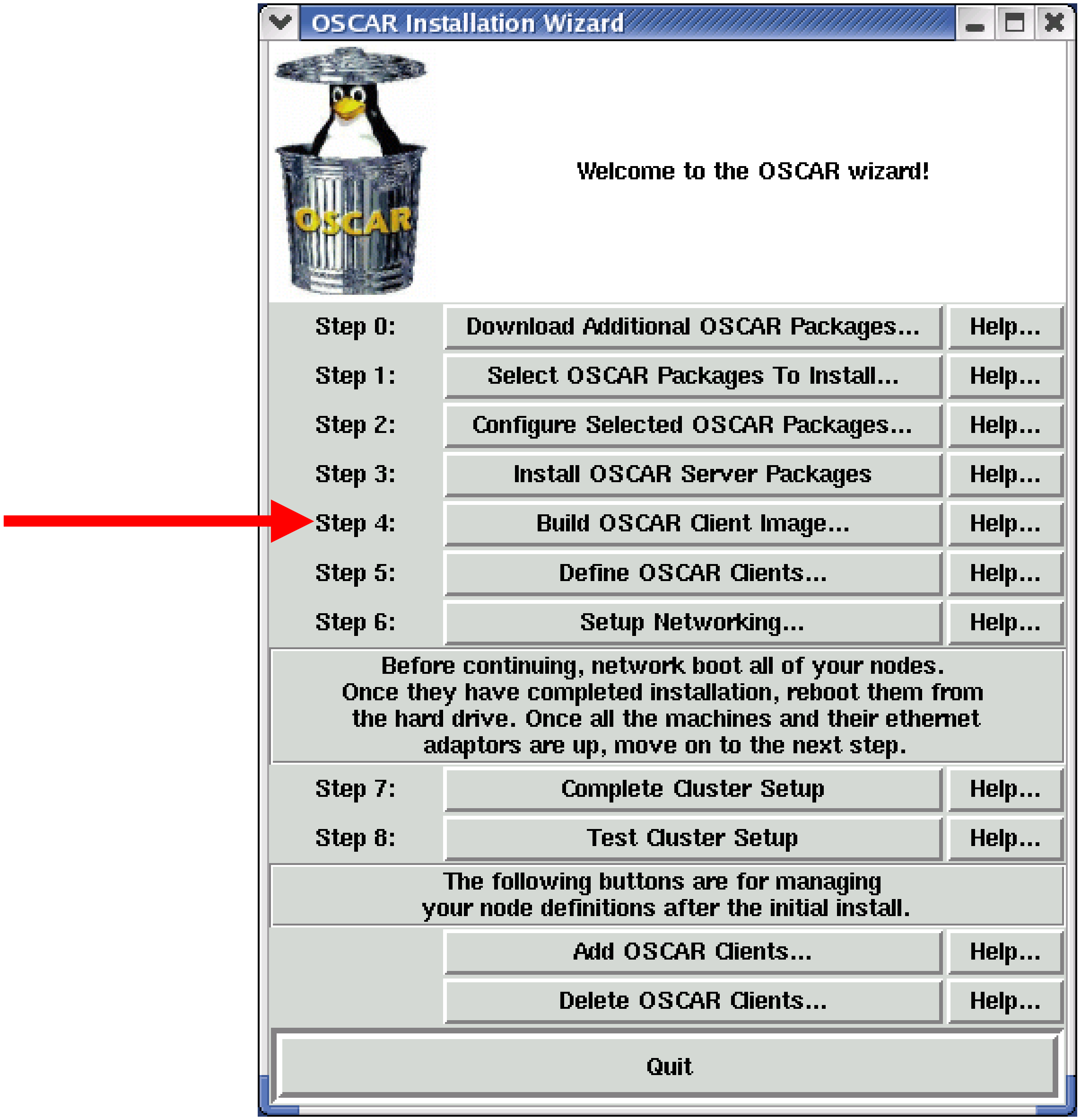
```
--> Updating /etc/profile
Backing up /etc/profile
Adding path entries to /etc/profile
--> Updating /etc/exports
Backing up /etc/exports
Checking for /home export
Adding /home export
--> Updating rsyncd.conf
Backing up rsyncd header stub
Adding hosts allow to file
Updated rsyncd.conf file
--> Refreshing services
Starting NFS services:                                        [  OK  ]
Starting NFS quotas:                                          [  OK  ]
Starting NFS daemon:                                          [  OK  ]
Starting NFS mountd:                                          [  OK  ]
Starting sshd:                                                [  OK  ]
--> Fixing root "dot" files
Making any necessary PATH fixes to (/root/.bashrc)
Making any necessary PATH fixes to (/root/.tcshrc)
Making any necessary PATH fixes to (/root/.cshrc)
--> Finished server_prep script
--> Step 3: Successfully installed OSCAR server
```

Successfully installed OSCAR server

success

Step 4

Specify and build system image for client (compute) nodes



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Step 8: Test Cluster Setup Help...

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Delete OSCAR Clients... Help...

Quit

Build image configure

name your image

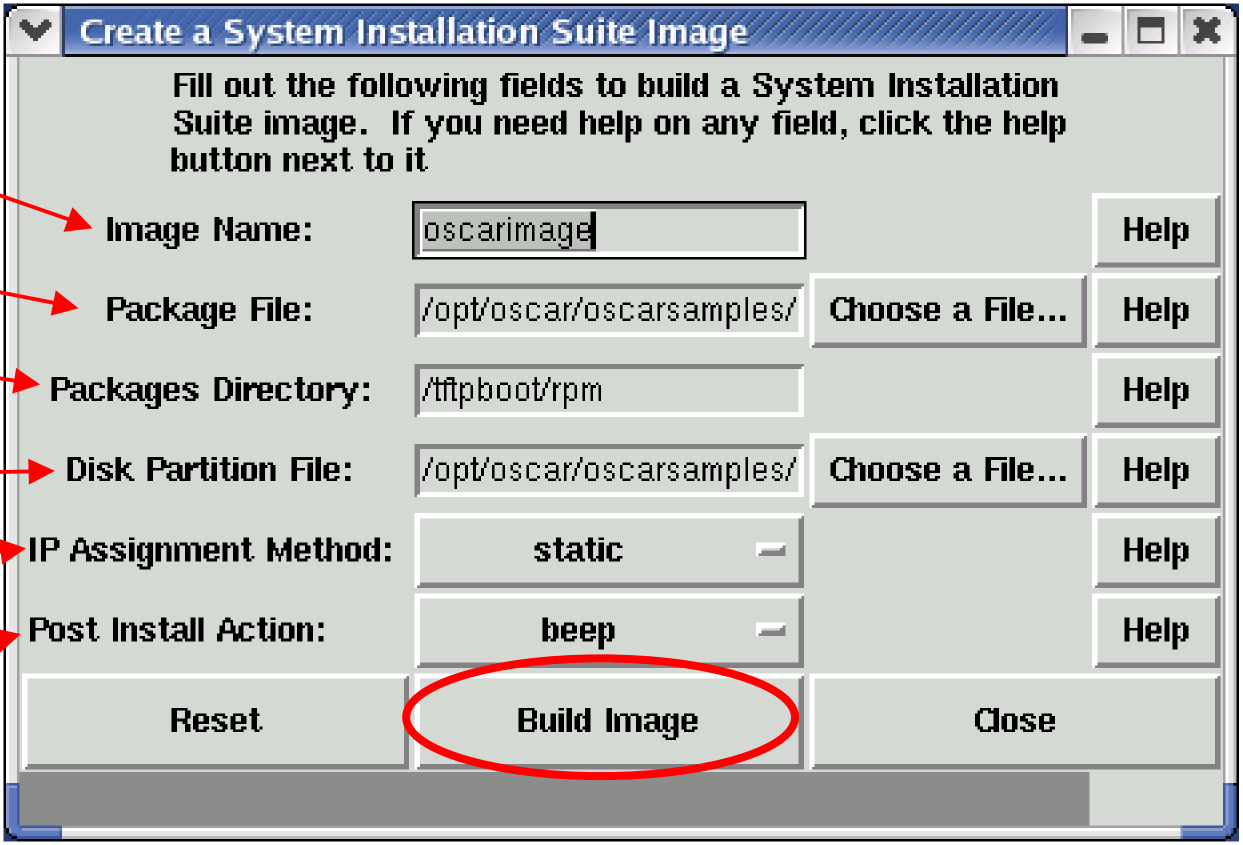
list of packages

package file location

disk partition file location

static or dynamic

halt, reboot, beep



Create a System Installation Suite Image

Fill out the following fields to build a System Installation Suite image. If you need help on any field, click the help button next to it

Image Name: oscarimage

Package File: /opt/oscar/oscarsamples/

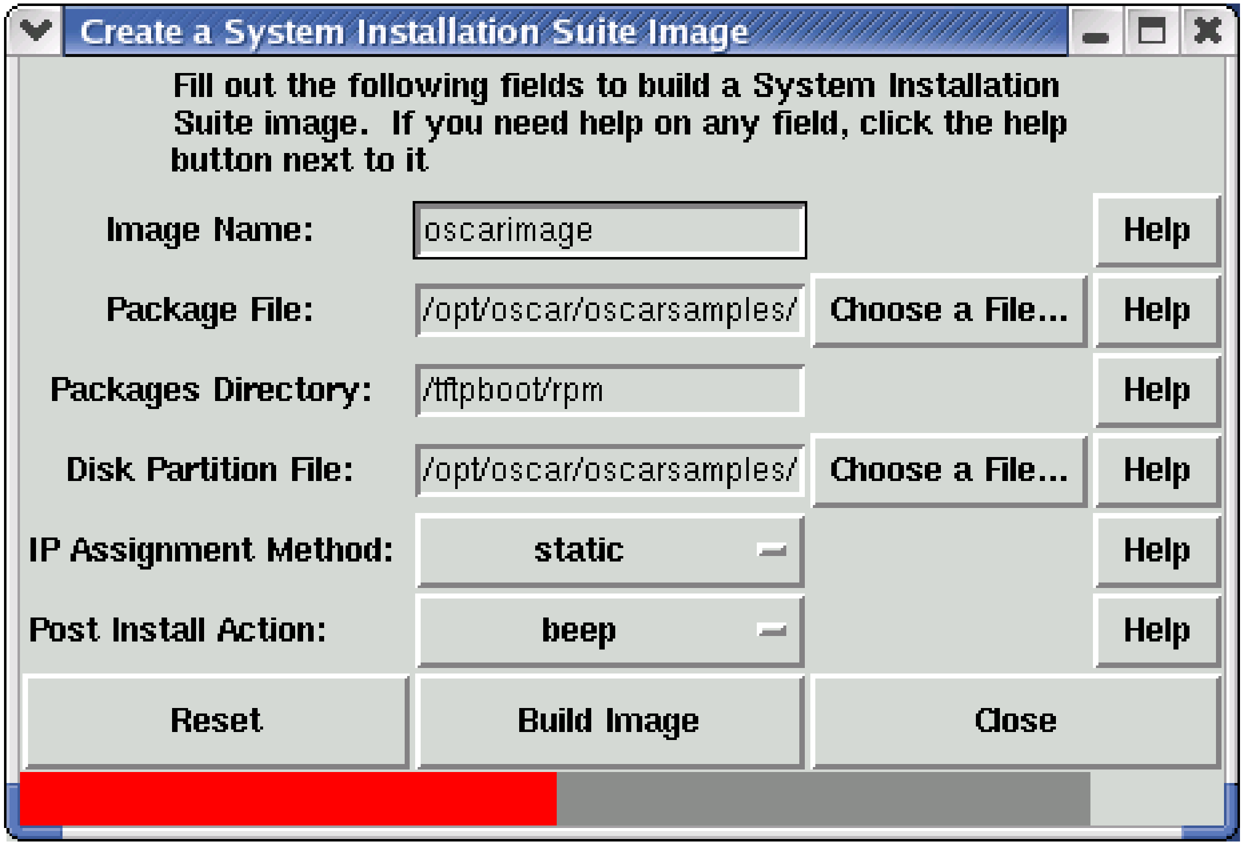
Packages Directory: /tftpboot/rpm

Disk Partition File: /opt/oscar/oscarsamples/

IP Assignment Method: static

Post Install Action: beep

Building image



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Package File: /opt/oscar/oscarsamples/

Packages Directory: /tftpboot/rpm

Disk Partition File: /opt/oscar/oscarsamples/

IP Assignment Method: static

Post Install Action: beep

showing progress

Building image finished

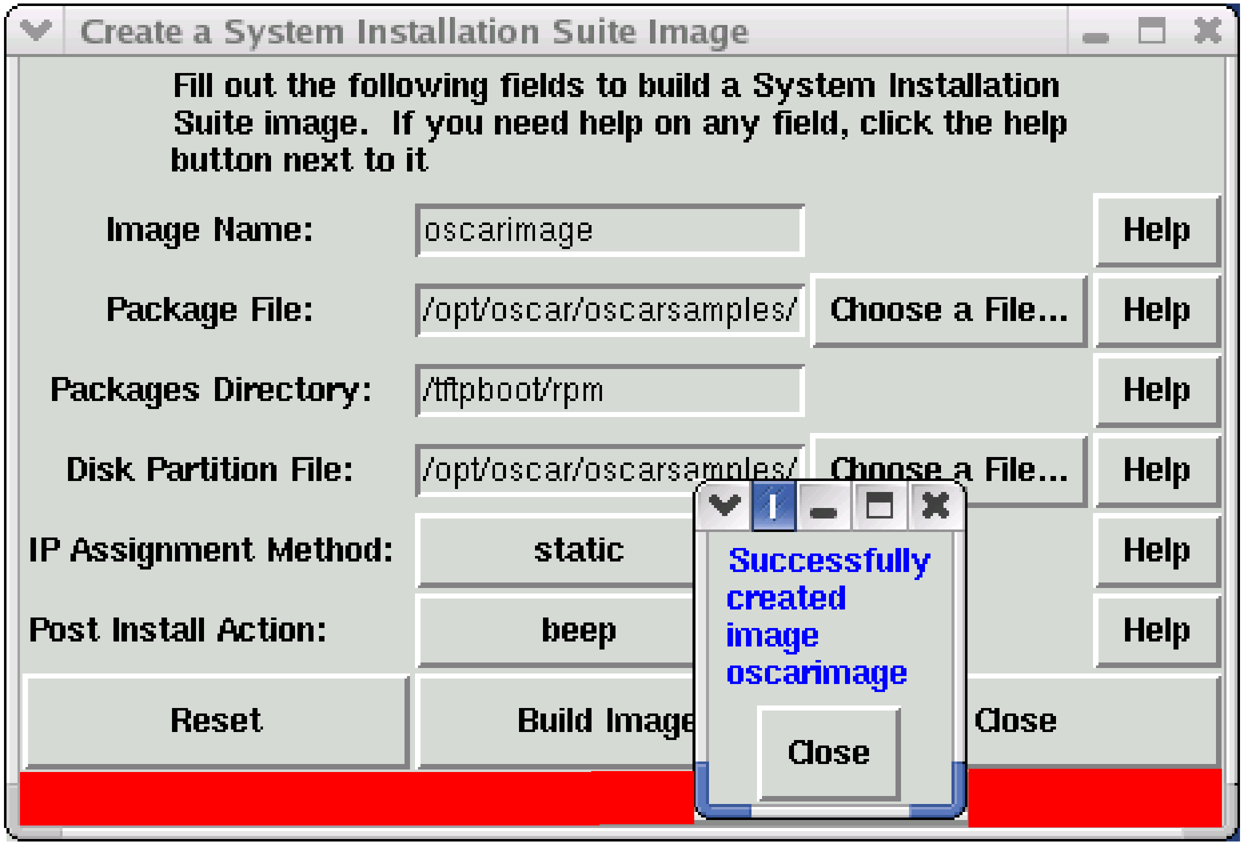

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Image Name: oscarimage

Package File: /opt/oscar/oscarsamples/

Packages Directory: /tftpboot/rpm

Disk Partition File: /opt/oscar/oscarsamples/

IP Assignment Method: static

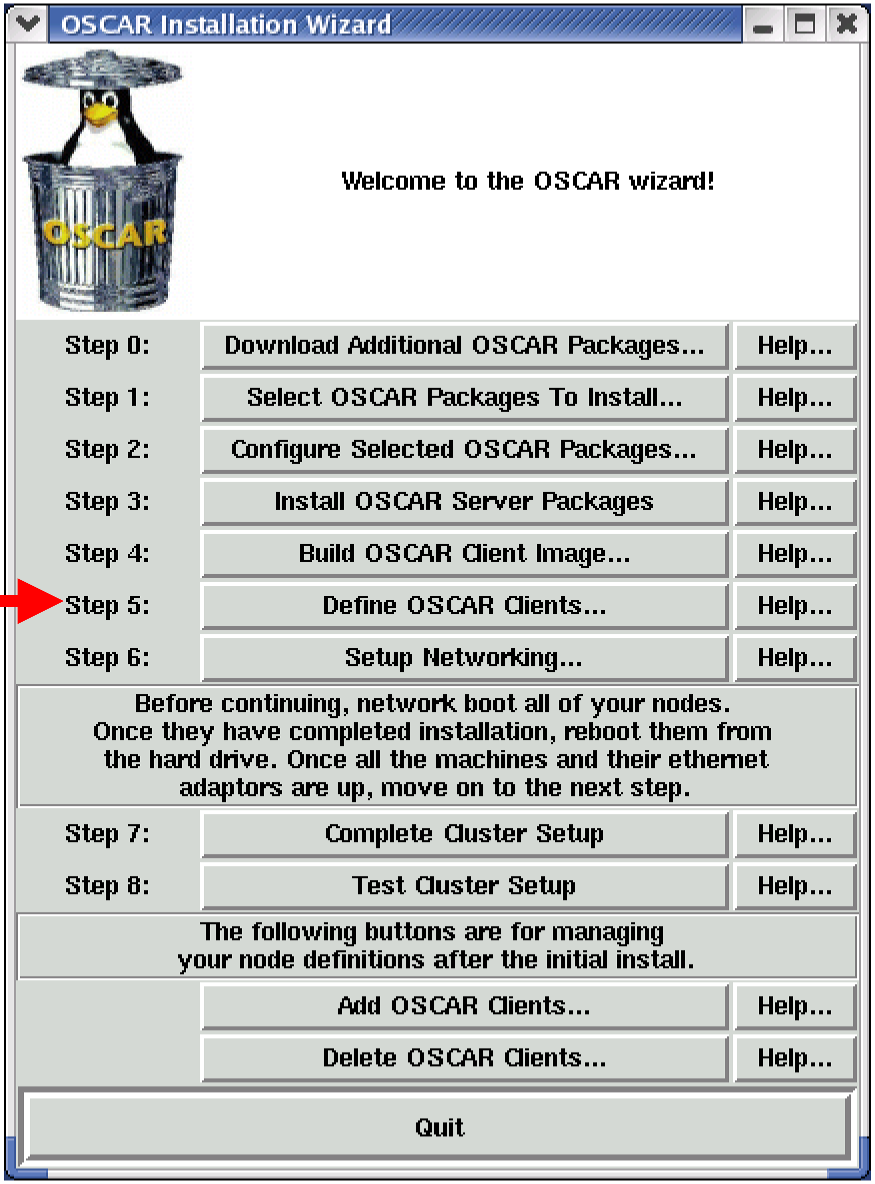
Post Install Action: beep

Successfully created image oscarimage

success

Step 5

Define client nodes



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The following buttons are for managing your node definitions after the initial install.

Define client nodes

specify image name (from step 4 – or other saved image)

client IP domain name

client base name (oscarnodeXXX)

node count

starting index to append to base

padding to client names (3 = oscarnode009)

starting IP address

Subnet Mask

Default Gateway

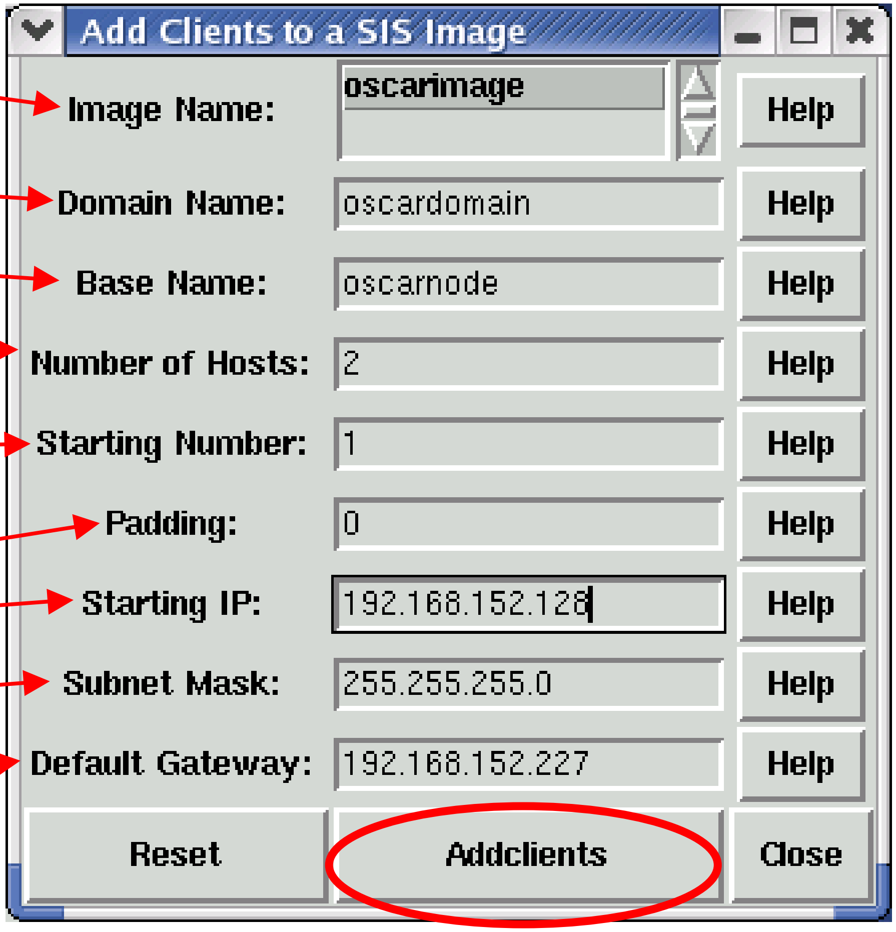


Image Name: oscarimage

Domain Name: oscardomain

Base Name: oscarnode

Number of Hosts: 2

Starting Number: 1

Padding: 0

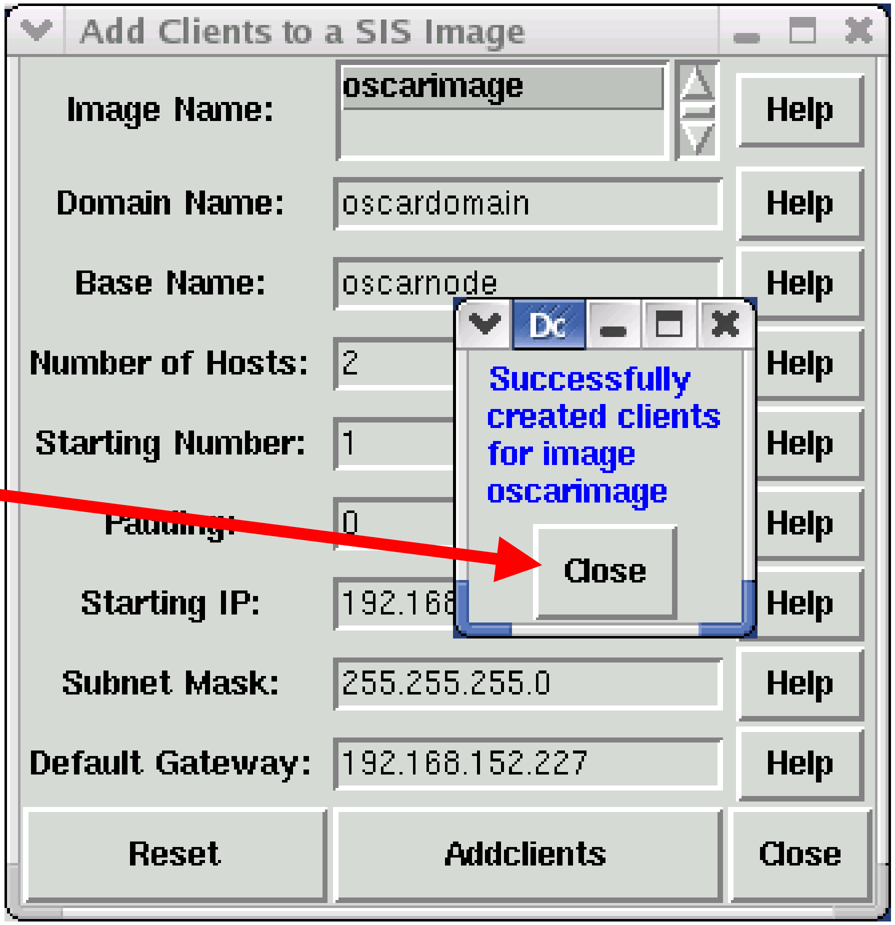
Starting IP: 192.168.152.128

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.152.227

Define client nodes

success



Add Clients to a SIS Image

Image Name: oscarimage

Domain Name: oscardomain

Base Name: oscarnode

Number of Hosts: 2

Starting Number: 1

Padding: 0

Starting IP: 192.168

Subnet Mask: 255.255.255.0

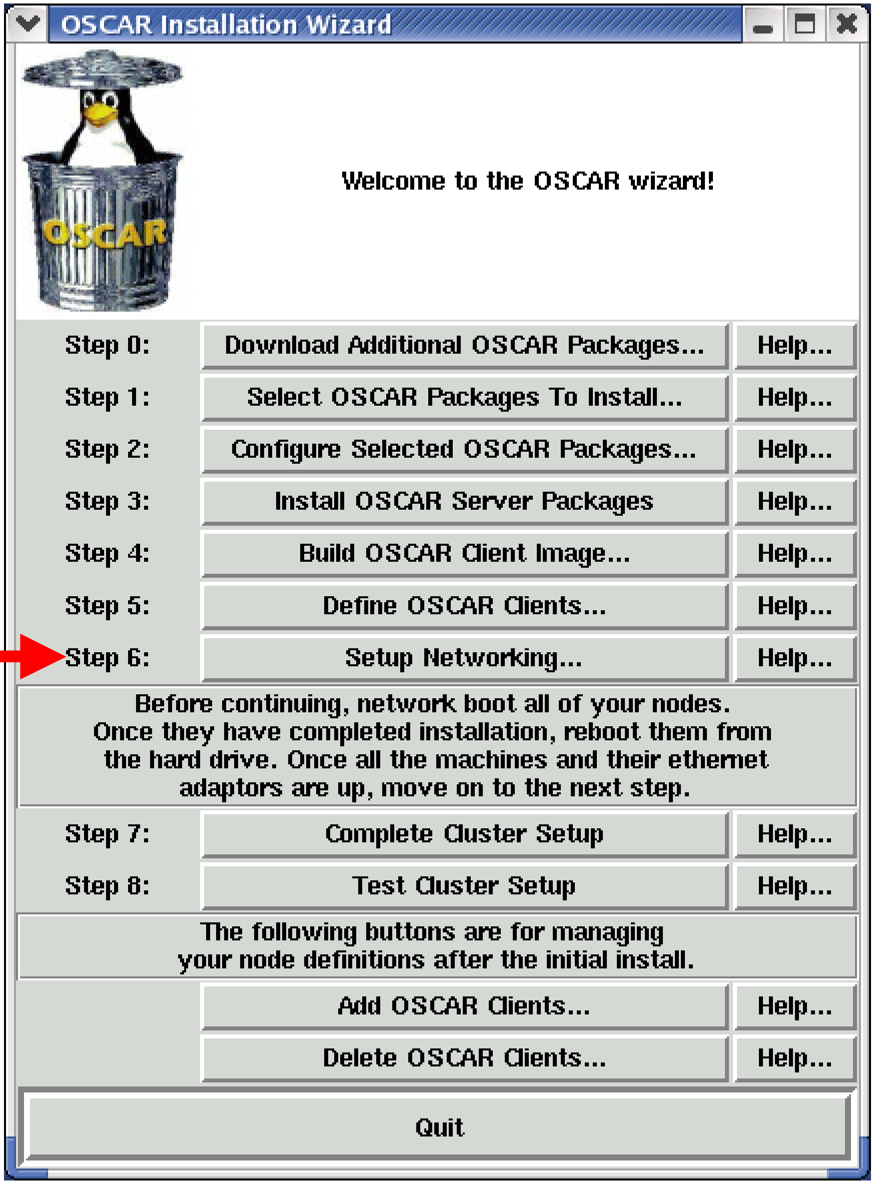
Default Gateway: 192.168.152.227

Successfully created clients for image oscarimage

Step 6

in one operation – setup networking for all cluster client nodes

for first time in installation process we will “touch” the client nodes



Welcome to the OSCAR wizard!

Step 0: Download Additional OSCAR Packages...

Step 1: Select OSCAR Packages To Install...

Step 2: Configure Selected OSCAR Packages...

Step 3: Install OSCAR Server Packages

Step 4: Build OSCAR Client Image...

Step 5: Define OSCAR Clients...

Step 6: Setup Networking...

Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

Step 7: Complete Cluster Setup

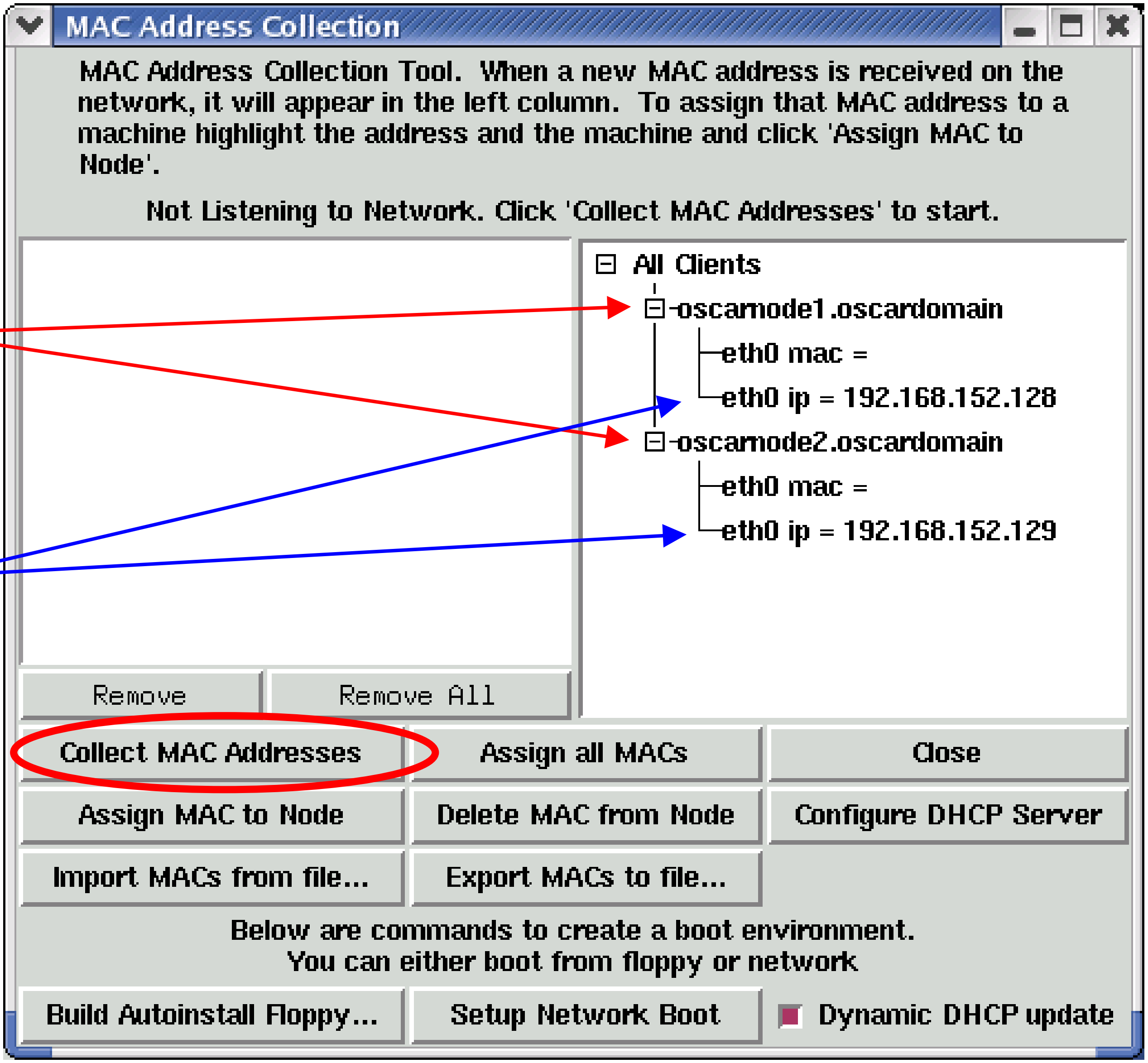
Step 8: Test Cluster Setup

The following buttons are for managing your node definitions after the initial install.

Add OSCAR Clients...

Delete OSCAR Clients...

Setup network – initial window



MAC Address Collection Tool. When a new MAC address is received on the network, it will appear in the left column. To assign that MAC address to a machine highlight the address and the machine and click 'Assign MAC to Node'.

Not Listening to Network. Click 'Collect MAC Addresses' to start.

```
⊟ All Clients
  ⊟-oscarnode1.oscardomain
      ├eth0 mac =
      └eth0 ip = 192.168.152.128
  ⊟-oscarnode2.oscardomain
      ├eth0 mac =
      └eth0 ip = 192.168.152.129
```

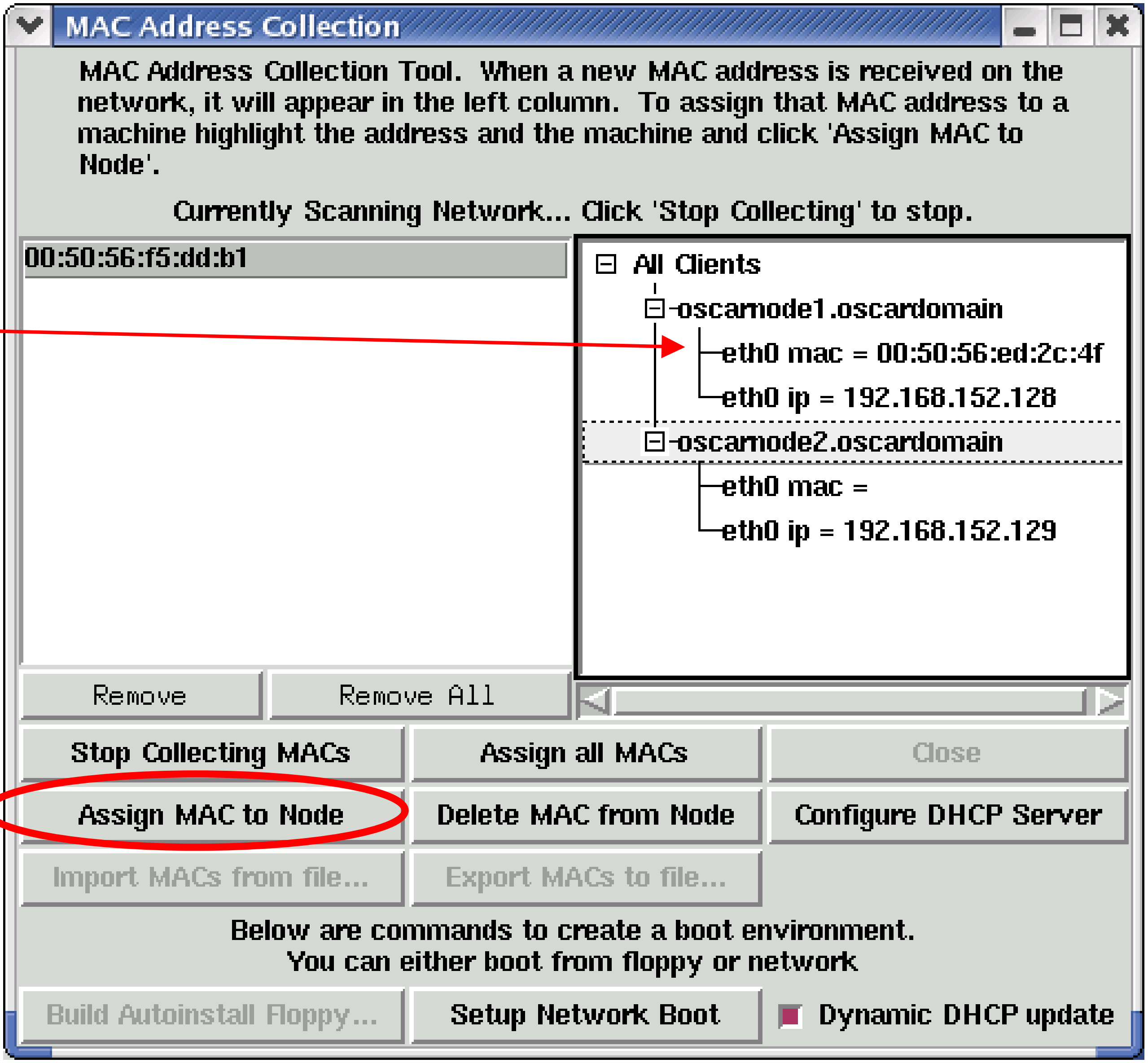
Below are commands to create a boot environment.
You can either boot from floppy or network

machines named as specified in prior step 5

IP address as specified in prior step 5

Setup network – scanning network

found first MAC address
and assigned to machine



MAC Address Collection

MAC Address Collection Tool. When a new MAC address is received on the network, it will appear in the left column. To assign that MAC address to a machine highlight the address and the machine and click 'Assign MAC to Node'.

Currently Scanning Network... Click 'Stop Collecting' to stop.

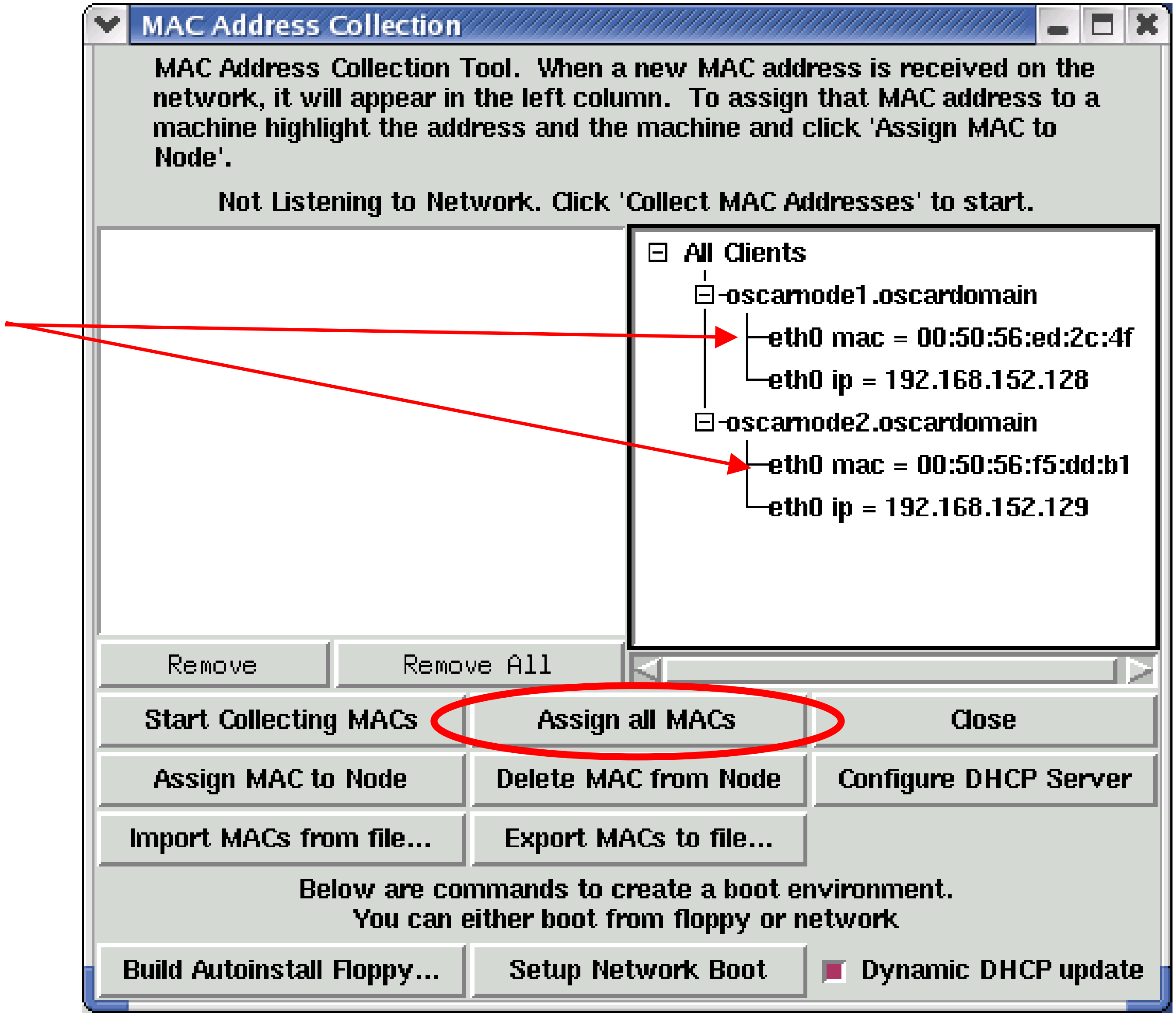
```
00:50:56:f5:dd:b1
```

```
⊟ All Clients
   ⊟-oscarnode1.oscardomain
      ├eth0 mac = 00:50:56:ed:2c:4f
      └eth0 ip = 192.168.152.128
   ⊟-oscarnode2.oscardomain
      ├eth0 mac =
      └eth0 ip = 192.168.152.129
```

Below are commands to create a boot environment.
You can either boot from floppy or network

Setup network – initial window

found and assigned all MAC addresses



MAC Address Collection

MAC Address Collection Tool. When a new MAC address is received on the network, it will appear in the left column. To assign that MAC address to a machine highlight the address and the machine and click 'Assign MAC to Node'.

Not Listening to Network. Click 'Collect MAC Addresses' to start.

```
⊟ All Clients
   ⊟-oscarnode1.oscardomain
      ├eth0 mac = 00:50:56:ed:2c:4f
      └eth0 ip = 192.168.152.128
   ⊟-oscarnode2.oscardomain
      ├eth0 mac = 00:50:56:f5:dd:b1
      └eth0 ip = 192.168.152.129
```

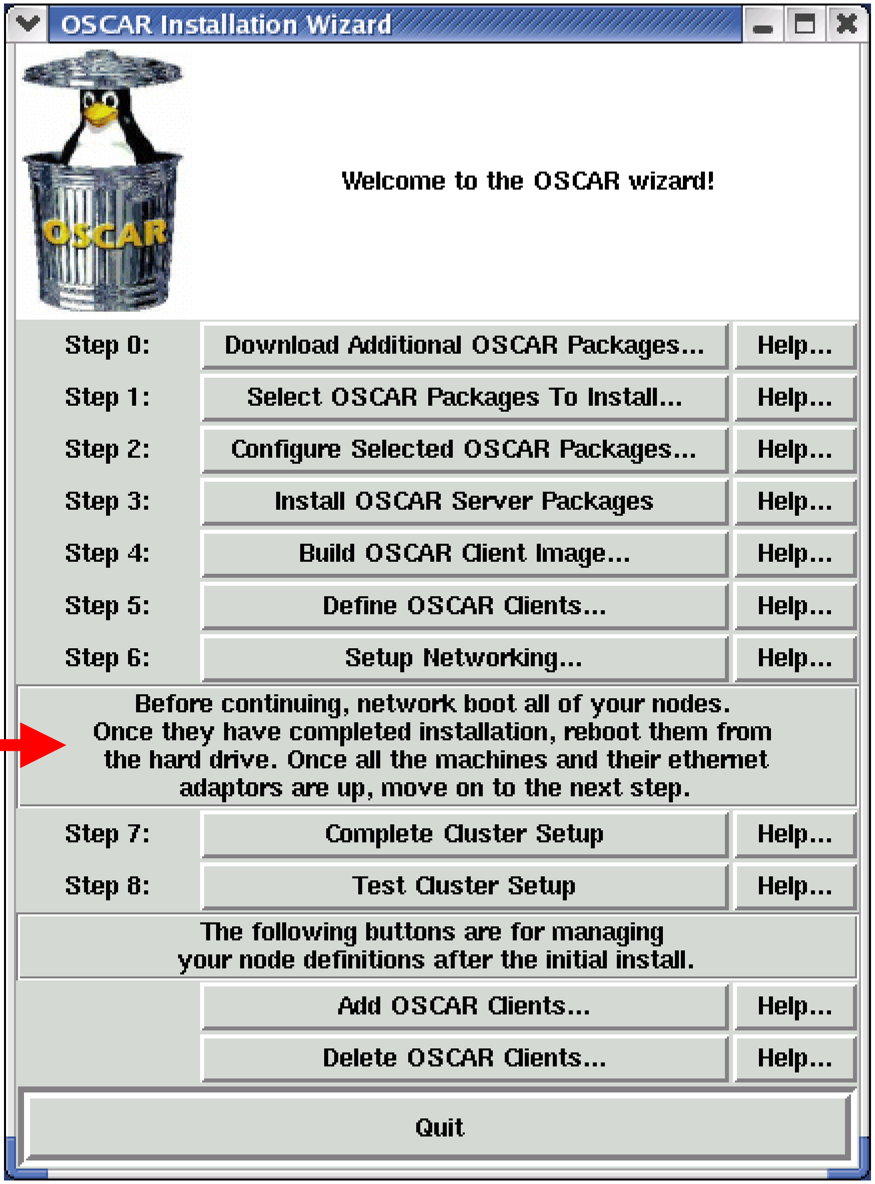
Below are commands to create a boot environment.
You can either boot from floppy or network

Reboot Clients

reboot on own – “post install action” from step 4

or

manually reboot



Welcome to the OSCAR wizard!

Step 0: Download Additional OSCAR Packages...

Step 1: Select OSCAR Packages To Install...

Step 2: Configure Selected OSCAR Packages...

Step 3: Install OSCAR Server Packages

Step 4: Build OSCAR Client Image...

Step 5: Define OSCAR Clients...

Step 6: Setup Networking...

Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

Step 7: Complete Cluster Setup

Step 8: Test Cluster Setup

The following buttons are for managing your node definitions after the initial install.

Add OSCAR Clients...

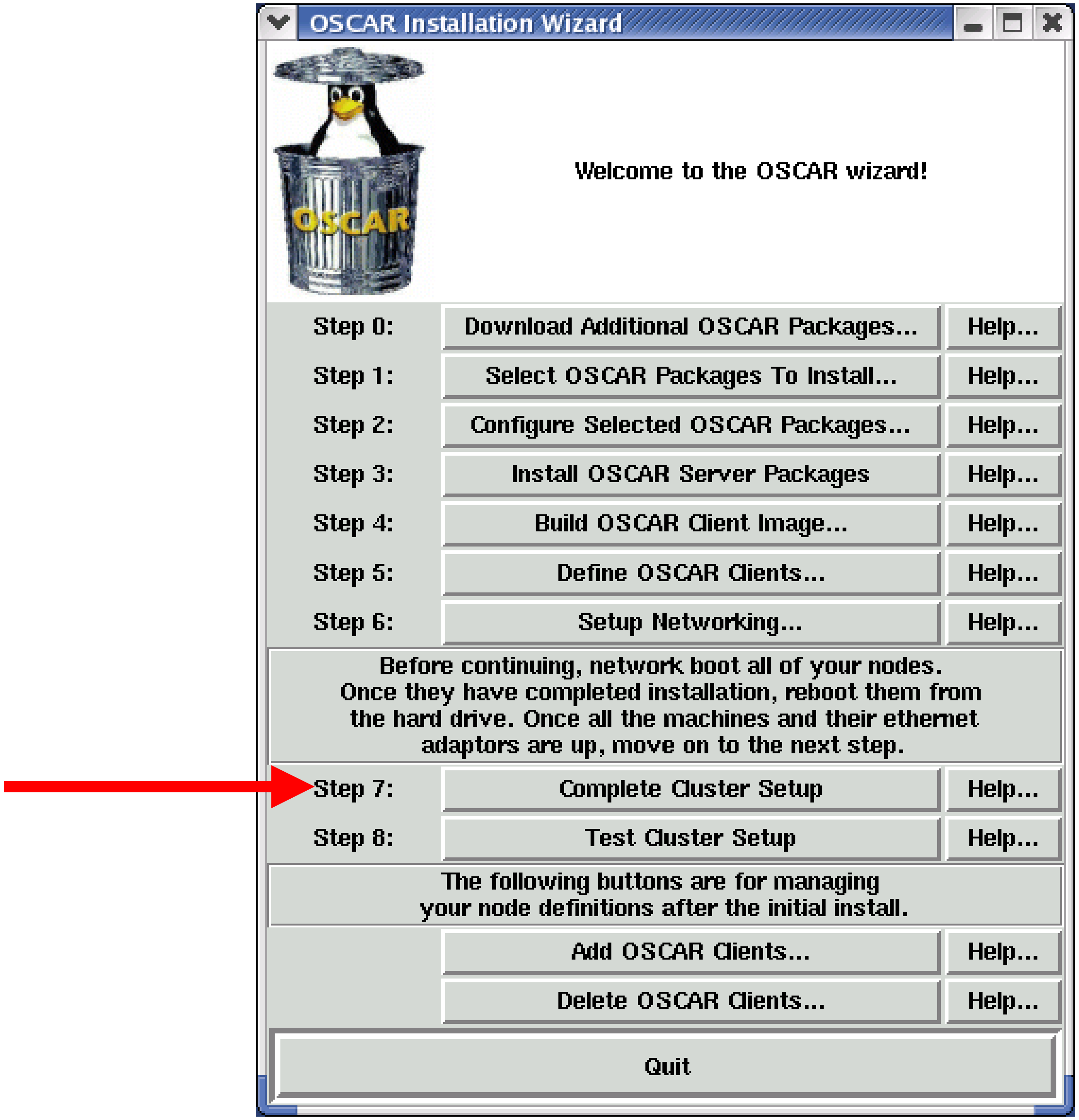
Delete OSCAR Clients...

Step 7

only after ALL clients have rebooted

runs “post install” scripts for packages that have them

cleanup and reinitialize where needed



Welcome to the OSCAR wizard!

Step 0: Download Additional OSCAR Packages...

Step 1: Select OSCAR Packages To Install...

Step 2: Configure Selected OSCAR Packages...

Step 3: Install OSCAR Server Packages

Step 4: Build OSCAR Client Image...

Step 5: Define OSCAR Clients...

Step 6: Setup Networking...

Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

Step 7: Complete Cluster Setup

Step 8: Test Cluster Setup

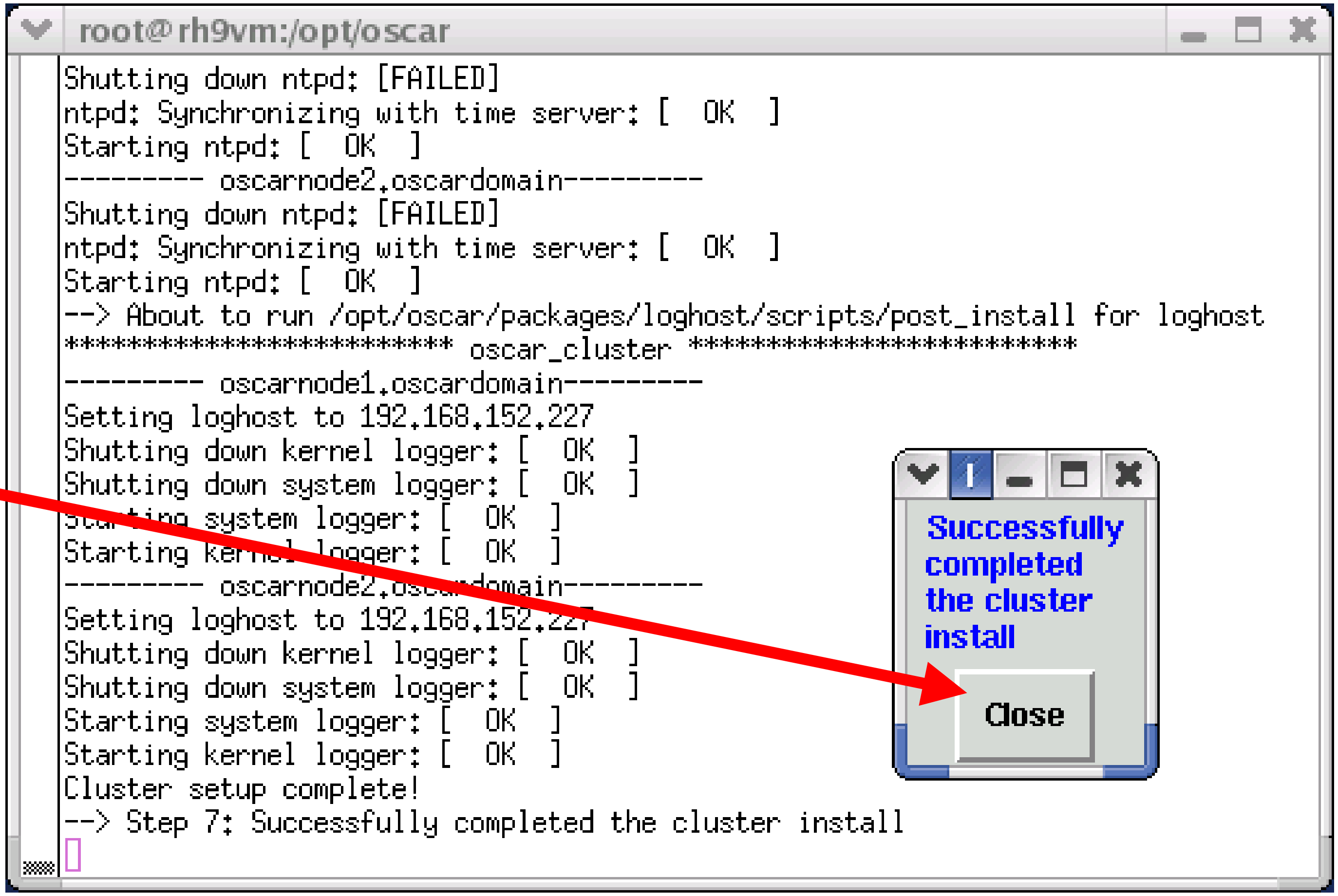
The following buttons are for managing your node definitions after the initial install.

Add OSCAR Clients...

Delete OSCAR Clients...

Complete setup

success

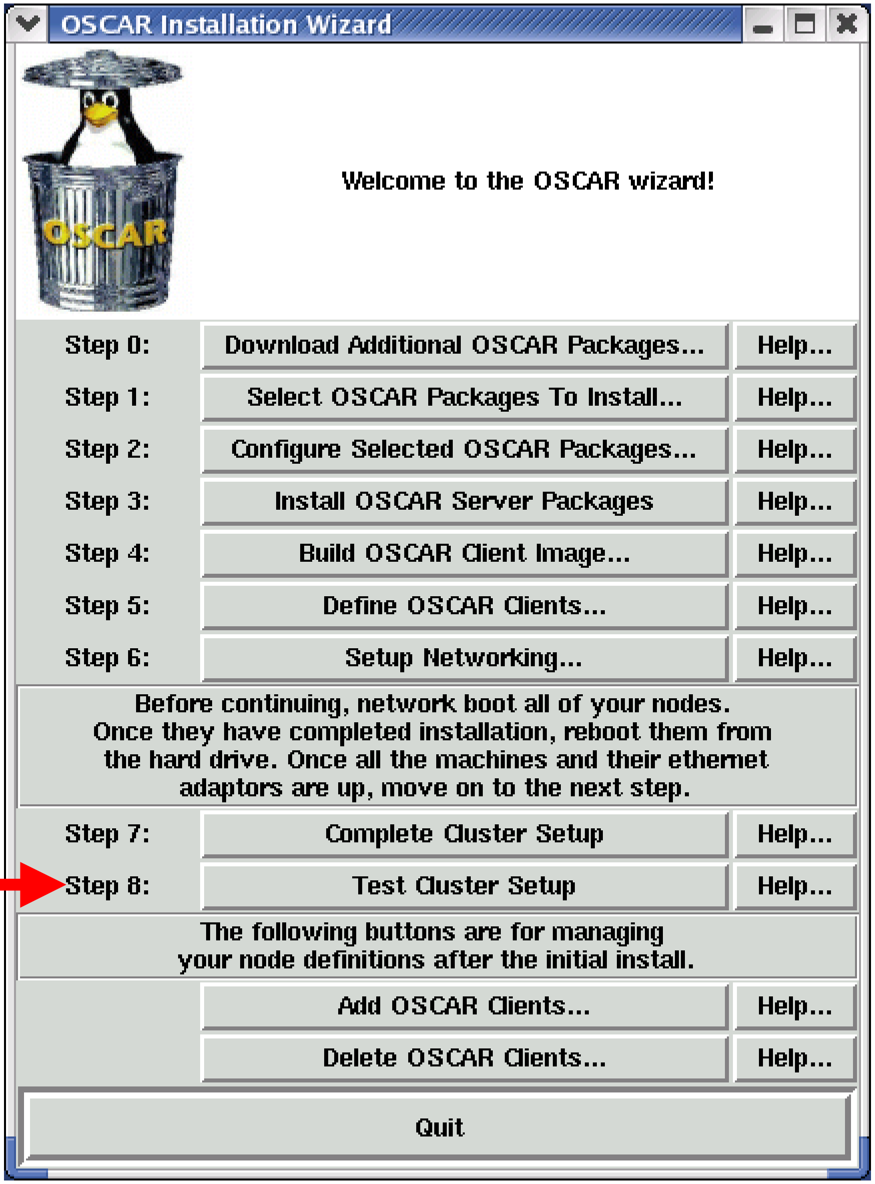


```
Shutting down ntpd: [FAILED]
ntpd: Synchronizing with time server: [  OK  ]
Starting ntpd: [  OK  ]
--------- oscarnode2.oscardomain---------
Shutting down ntpd: [FAILED]
ntpd: Synchronizing with time server: [  OK  ]
Starting ntpd: [  OK  ]
--> About to run /opt/oscar/packages/loghost/scripts/post_install for loghost
************************* oscar_cluster *************************
--------- oscarnode1.oscardomain---------
Setting loghost to 192.168.152.227
Shutting down kernel logger: [  OK  ]
Shutting down system logger: [  OK  ]
Starting system logger: [  OK  ]
Starting kernel logger: [  OK  ]
--------- oscarnode2.oscardomain---------
Setting loghost to 192.168.152.227
Shutting down kernel logger: [  OK  ]
Shutting down system logger: [  OK  ]
Starting system logger: [  OK  ]
Starting kernel logger: [  OK  ]
Cluster setup complete!
--> Step 7: Successfully completed the cluster install
```

Successfully completed the cluster install

Step 8

test suite provided to ensure that key cluster components are functioning properly



OSCAR Installation Wizard

Welcome to the OSCAR wizard!

Step 0: Download Additional OSCAR Packages... Help...

Step 1: Select OSCAR Packages To Install... Help...

Step 2: Configure Selected OSCAR Packages... Help...

Step 3: Install OSCAR Server Packages Help...

Step 4: Build OSCAR Client Image... Help...

Step 5: Define OSCAR Clients... Help...

Step 6: Setup Networking... Help...

Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

Step 7: Complete Cluster Setup Help...

Step 8: Test Cluster Setup Help...

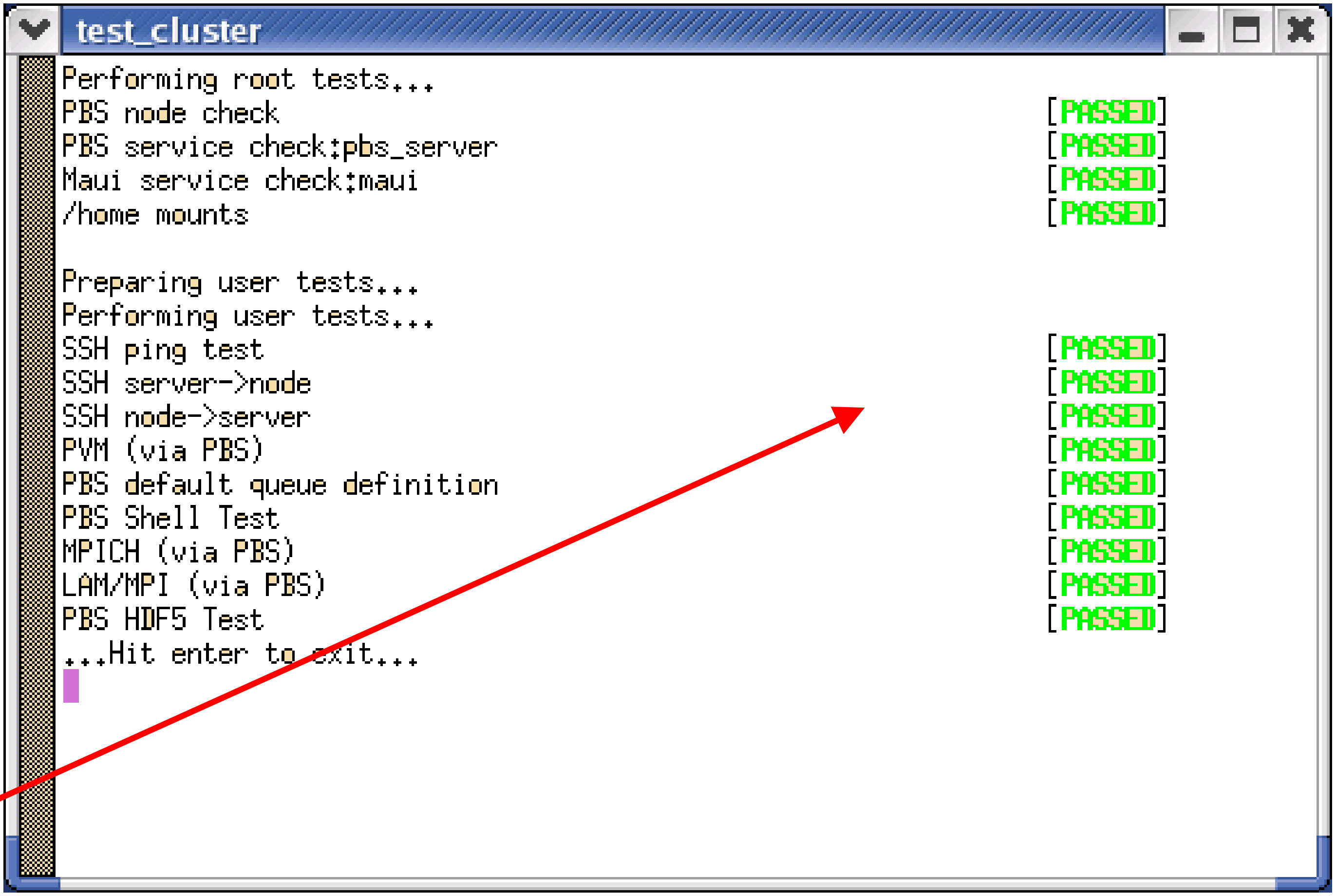
The following buttons are for managing your node definitions after the initial install.

Add OSCAR Clients... Help...

Delete OSCAR Clients... Help...

Quit

Test cluster setup



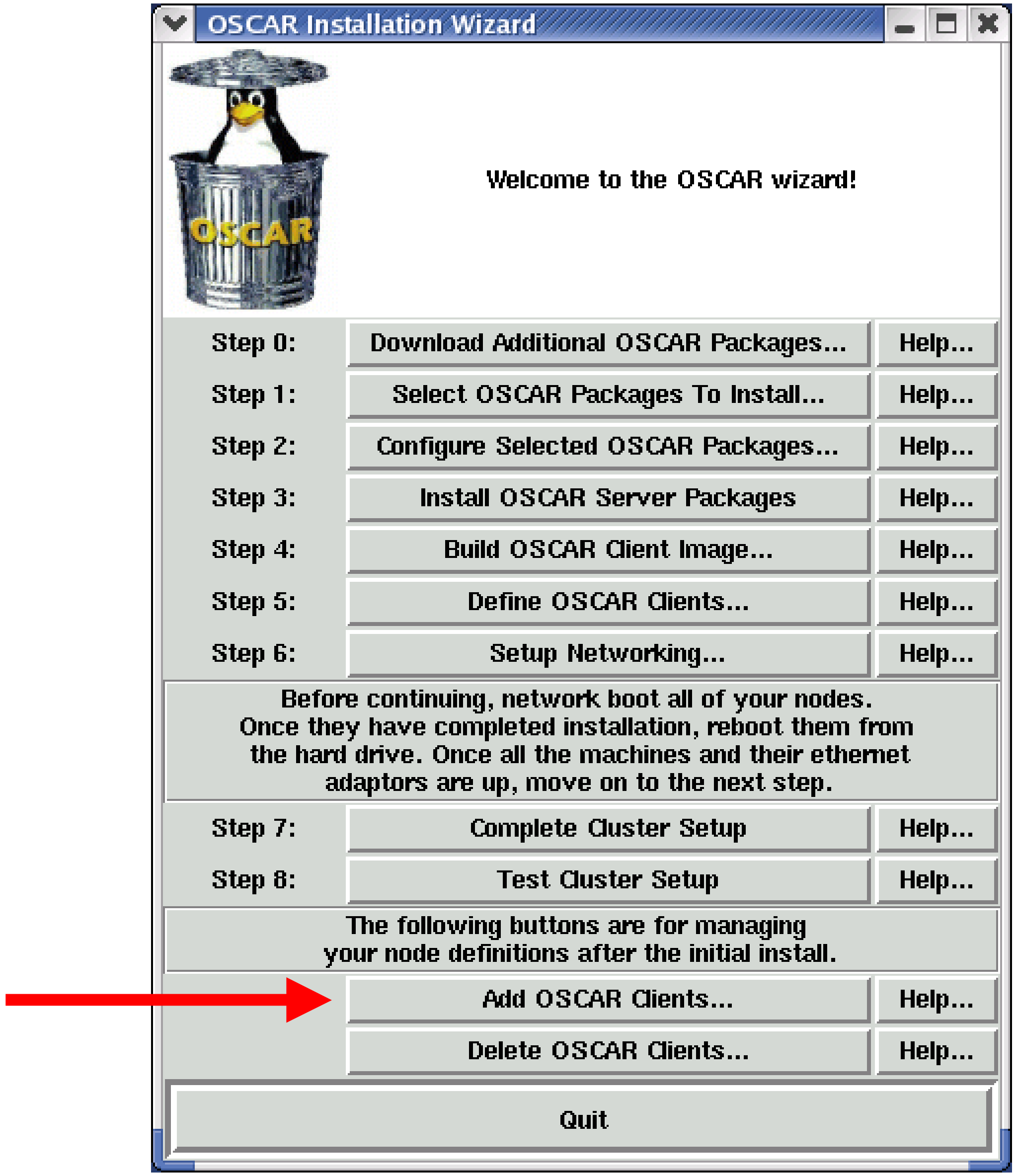
```
Performing root tests...
PBS node check                                                  [PASSED]
PBS service check:pbs_server                                    [PASSED]
Maui service check:maui                                         [PASSED]
/home mounts                                                    [PASSED]

Preparing user tests...
Performing user tests...
SSH ping test                                                   [PASSED]
SSH server->node                                                [PASSED]
SSH node->server                                                [PASSED]
PVM (via PBS)                                                   [PASSED]
PBS default queue definition                                    [PASSED]
PBS Shell Test                                                  [PASSED]
MPICH (via PBS)                                                 [PASSED]
LAM/MPI (via PBS)                                               [PASSED]
PBS HDF5 Test                                                   [PASSED]
...Hit enter to exit...
```

All Passed!!!

OSCAR
Cluster Maintenance
Add / Delete Nodes

Add OSCAR Clients

increase the number of compute nodes in the cluster



Welcome to the OSCAR wizard!

Step 0: Download Additional OSCAR Packages... Help...

Step 1: Select OSCAR Packages To Install... Help...

Step 2: Configure Selected OSCAR Packages... Help...

Step 3: Install OSCAR Server Packages Help...

Step 4: Build OSCAR Client Image... Help...

Step 5: Define OSCAR Clients... Help...

Step 6: Setup Networking... Help...

Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

Step 7: Complete Cluster Setup Help...

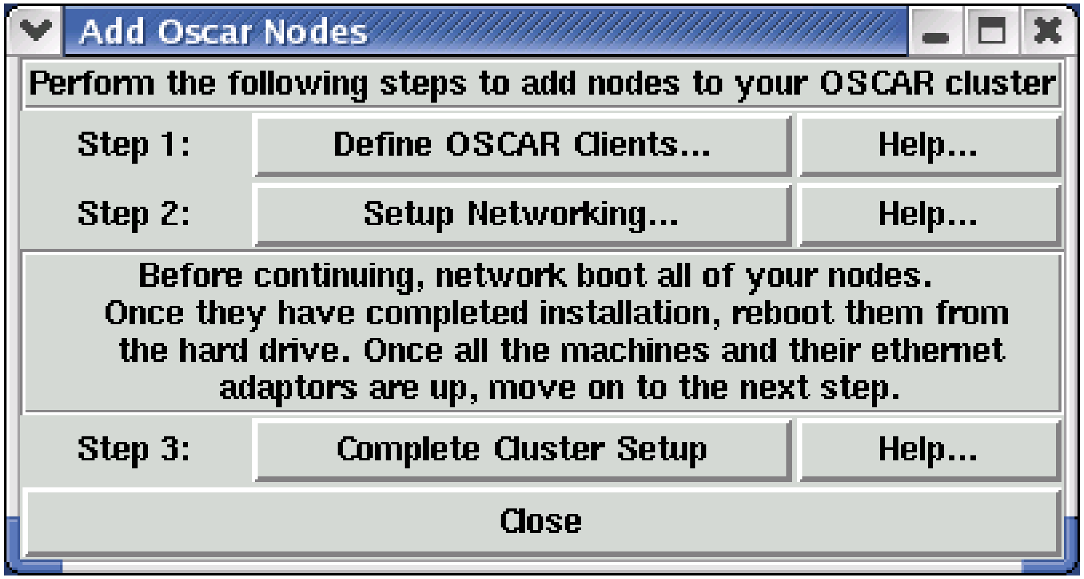
Step 8: Test Cluster Setup Help...

The following buttons are for managing your node definitions after the initial install.

Add OSCAR Clients

Operates in similar manner to steps 5, 6, and 7 in OSCAR installation

Action behind the scenes differs though…



Perform the following steps to add nodes to your OSCAR cluster

Step 1:

Define OSCAR Clients... Help...

Step 2:

Setup Networking... Help...

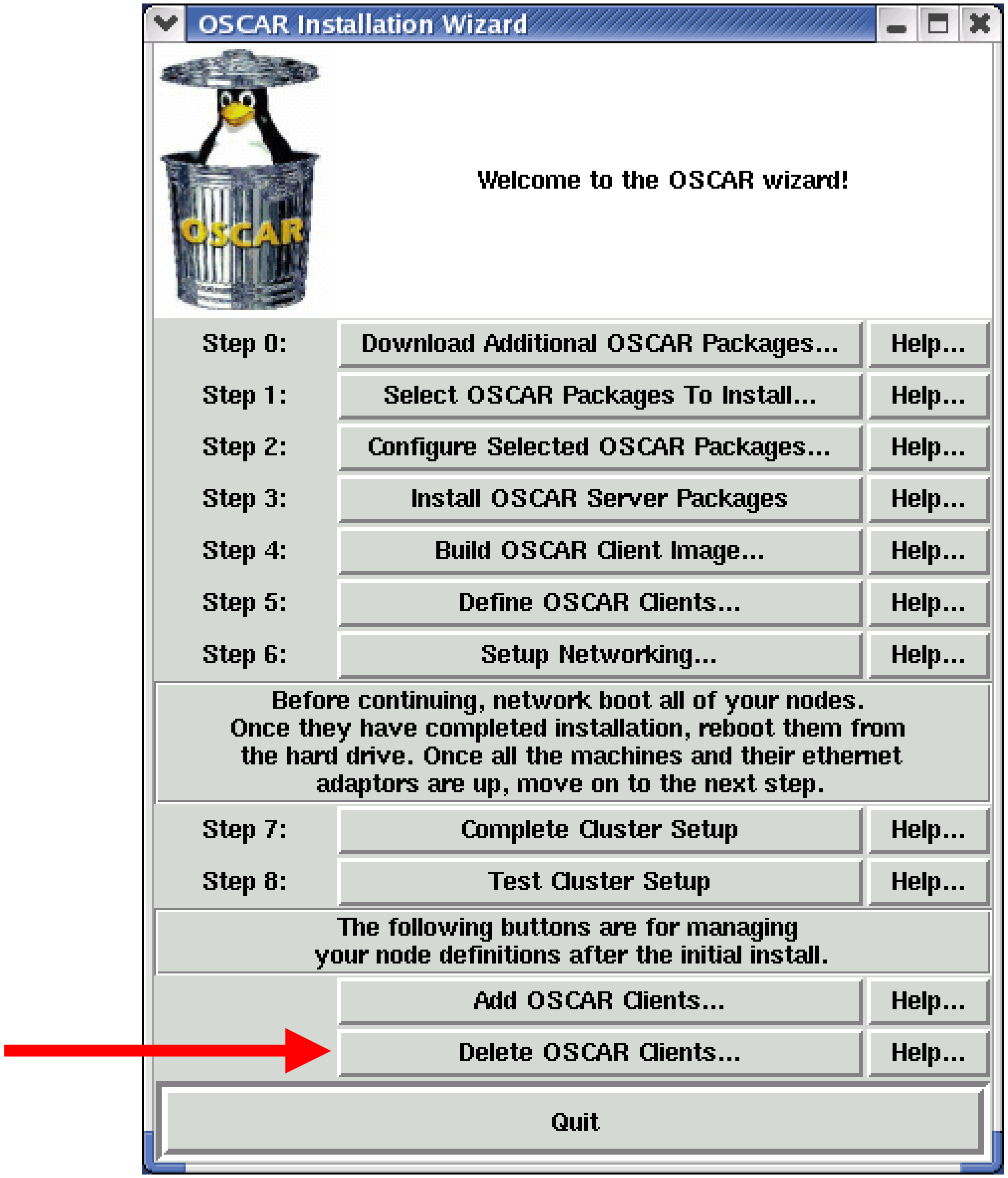
Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

Step 3:

Complete Cluster Setup Help...

Delete OSCAR Clients

decrease the number of compute nodes in the cluster



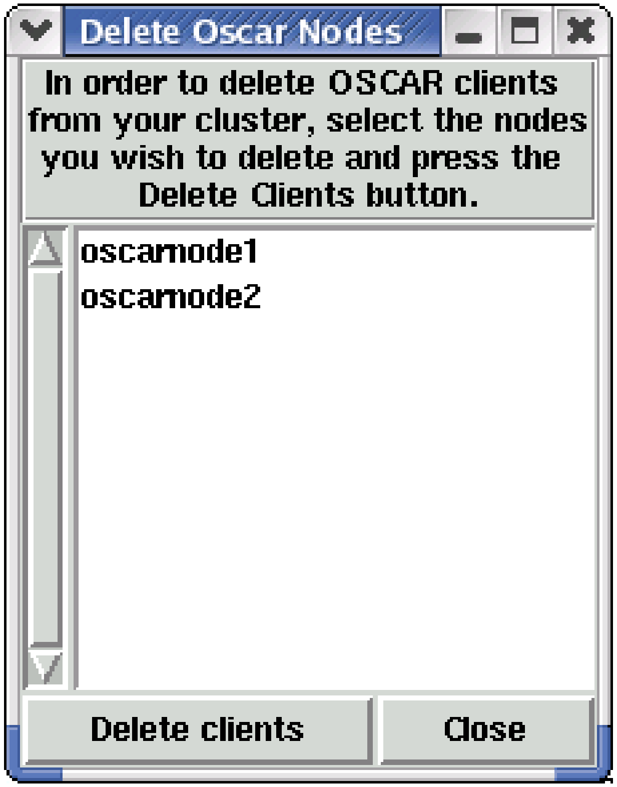
Welcome to the OSCAR wizard!

Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

The following buttons are for managing your node definitions after the initial install.

Delete OSCAR Clients

ready to select client(s) to delete

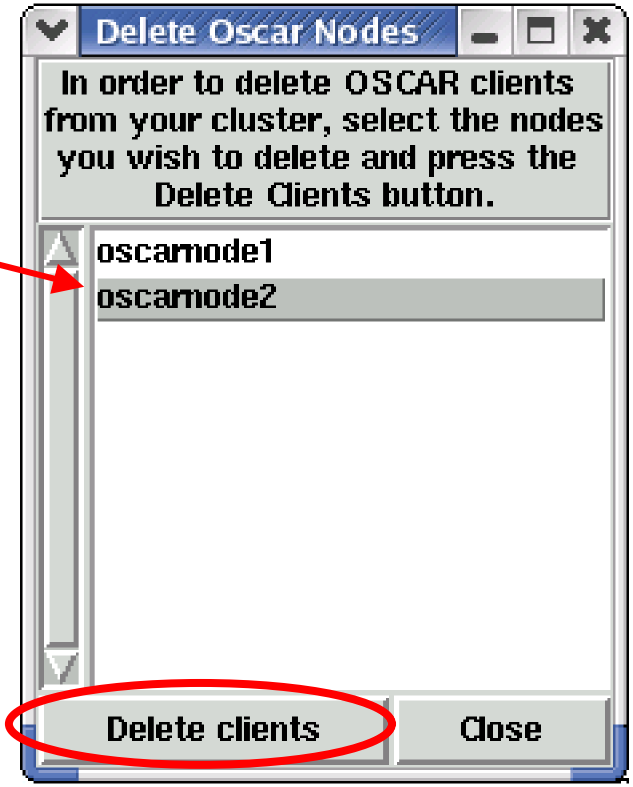


In order to delete OSCAR clients from your cluster, select the nodes you wish to delete and press the Delete Clients button.

oscarnode1
oscarnode2

Delete OSCAR Clients

client selected to delete

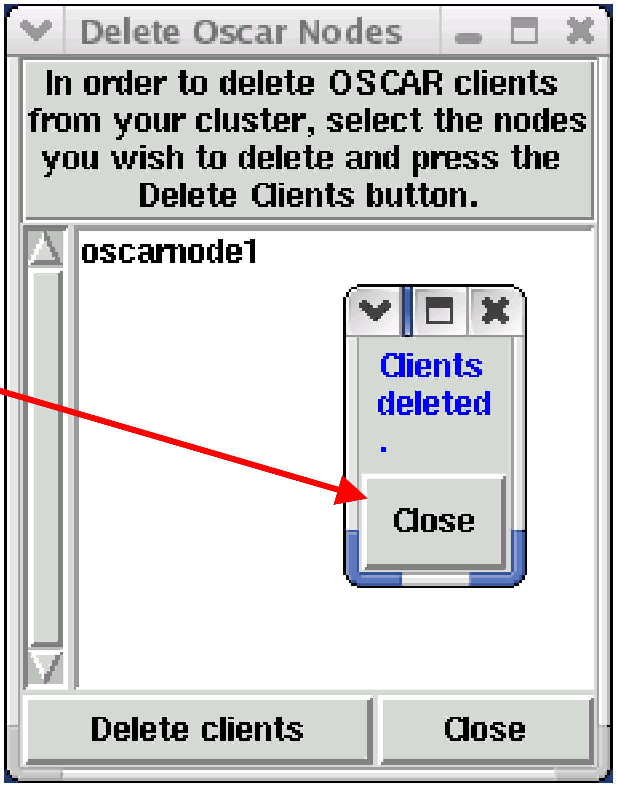


In order to delete OSCAR clients from your cluster, select the nodes you wish to delete and press the Delete Clients button.

oscarnode1
oscarnode2

Delete OSCAR Clients

success



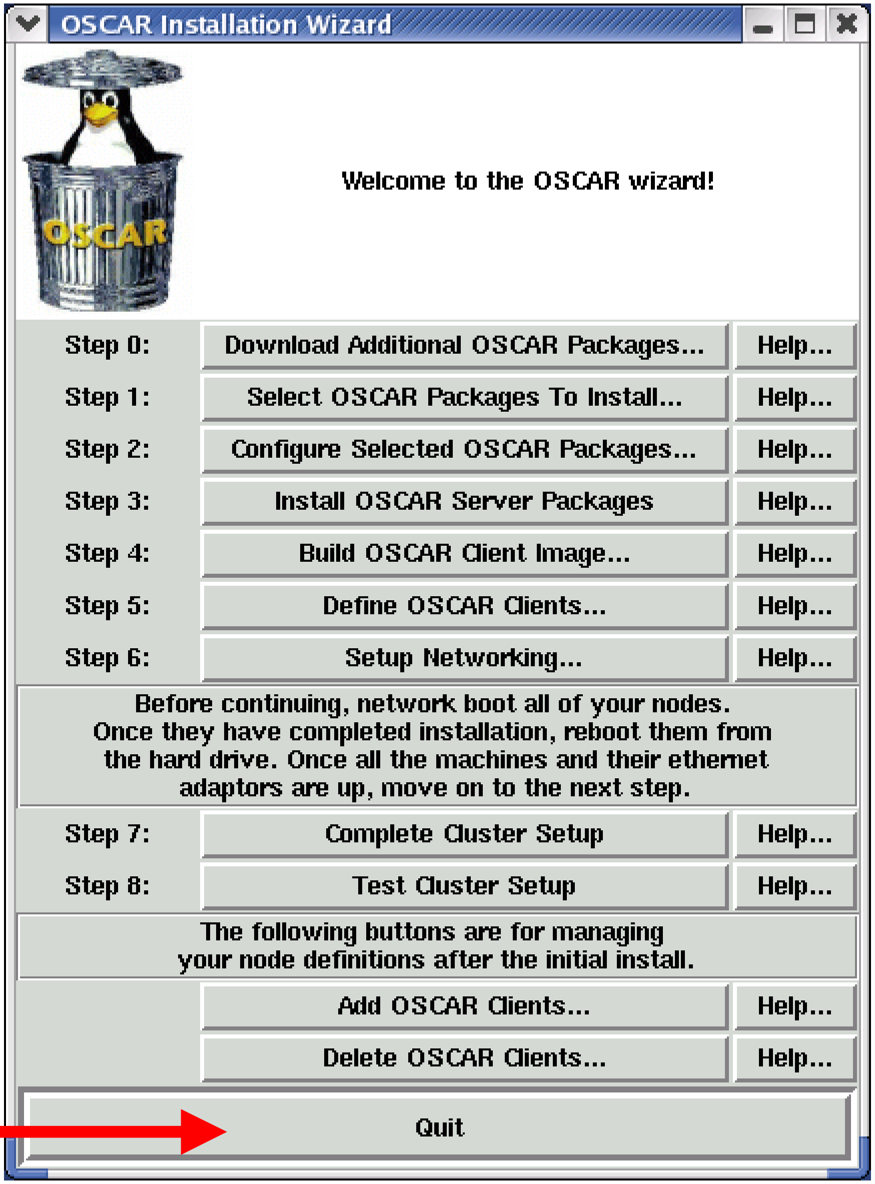
In order to delete OSCAR clients from your cluster, select the nodes you wish to delete and press the Delete Clients button.

oscarnode1

Clients deleted.

Quit OSCAR Wizard

Your OSCAR cluster is now ready to use



Welcome to the OSCAR wizard!

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Step 4: Build OSCAR Client Image...

Step 5: Define OSCAR Clients...

Step 6: Setup Networking...

Before continuing, network boot all of your nodes. Once they have completed installation, reboot them from the hard drive. Once all the machines and their ethernet adaptors are up, move on to the next step.

Step 7: Complete Cluster Setup

Step 8: Test Cluster Setup

The following buttons are for managing your node definitions after the initial install.

Add OSCAR Clients...

Delete OSCAR Clients...

Thin OSCAR

Sherbrooke University
Sherbrooke, Quebec, Canada

The Development Team

Benoit des Ligneris
Michel Barrette
Michel Dagenais
Francis Giraldeau

Thin OSCAR implementation

- Root RAM system
  - uses ram disks (/dev/ramXX)
  - compressed RAM disk image transferred by network at each boot
  - minimal system in ram (~20MB)

HA-OSCAR

The Development Team

Louisiana Tech University

Chokchai Leangsuksun
Lixin Sher
Hertong Song

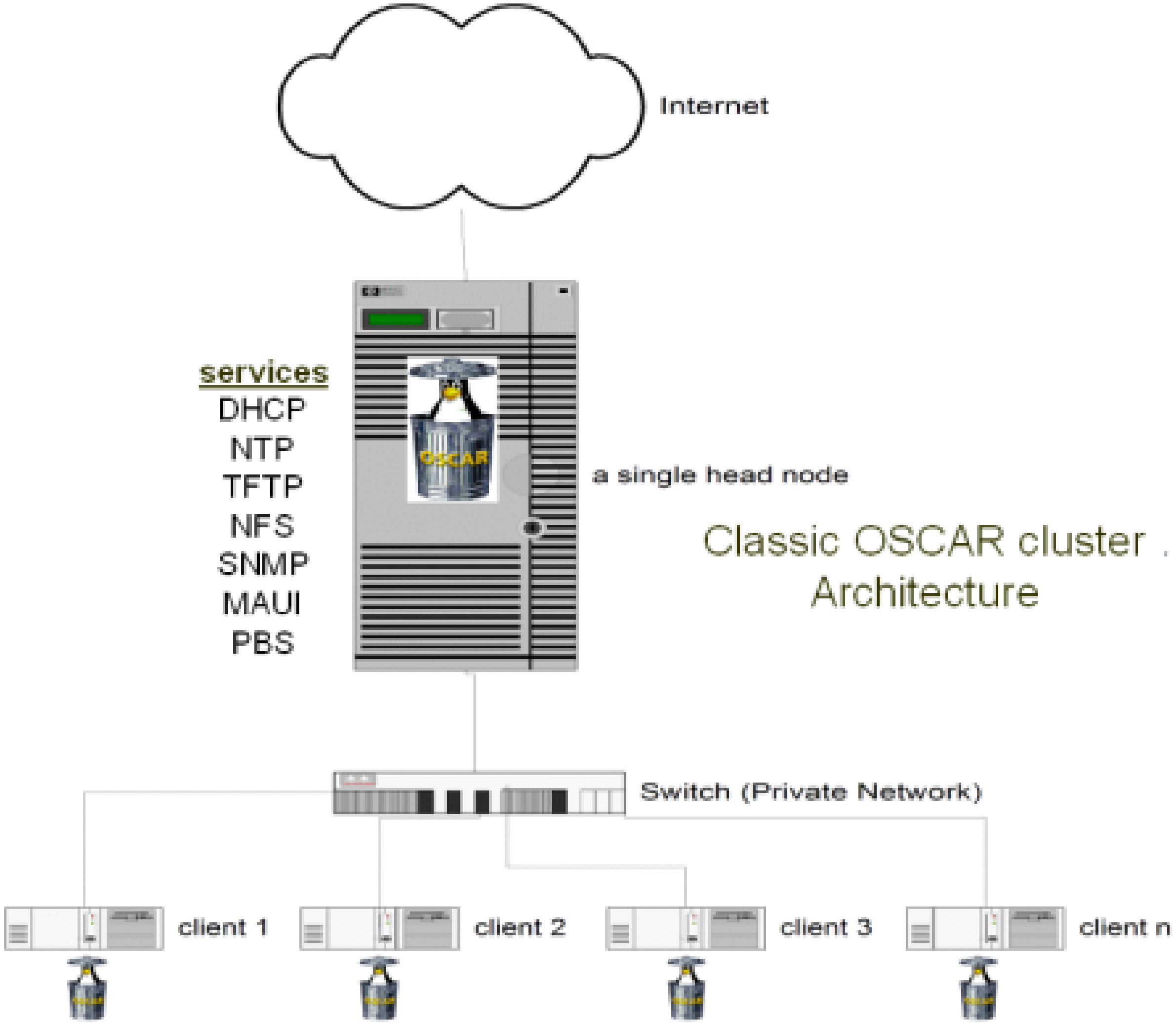
Ericsson Research, Canada

Ibrahim Haddad

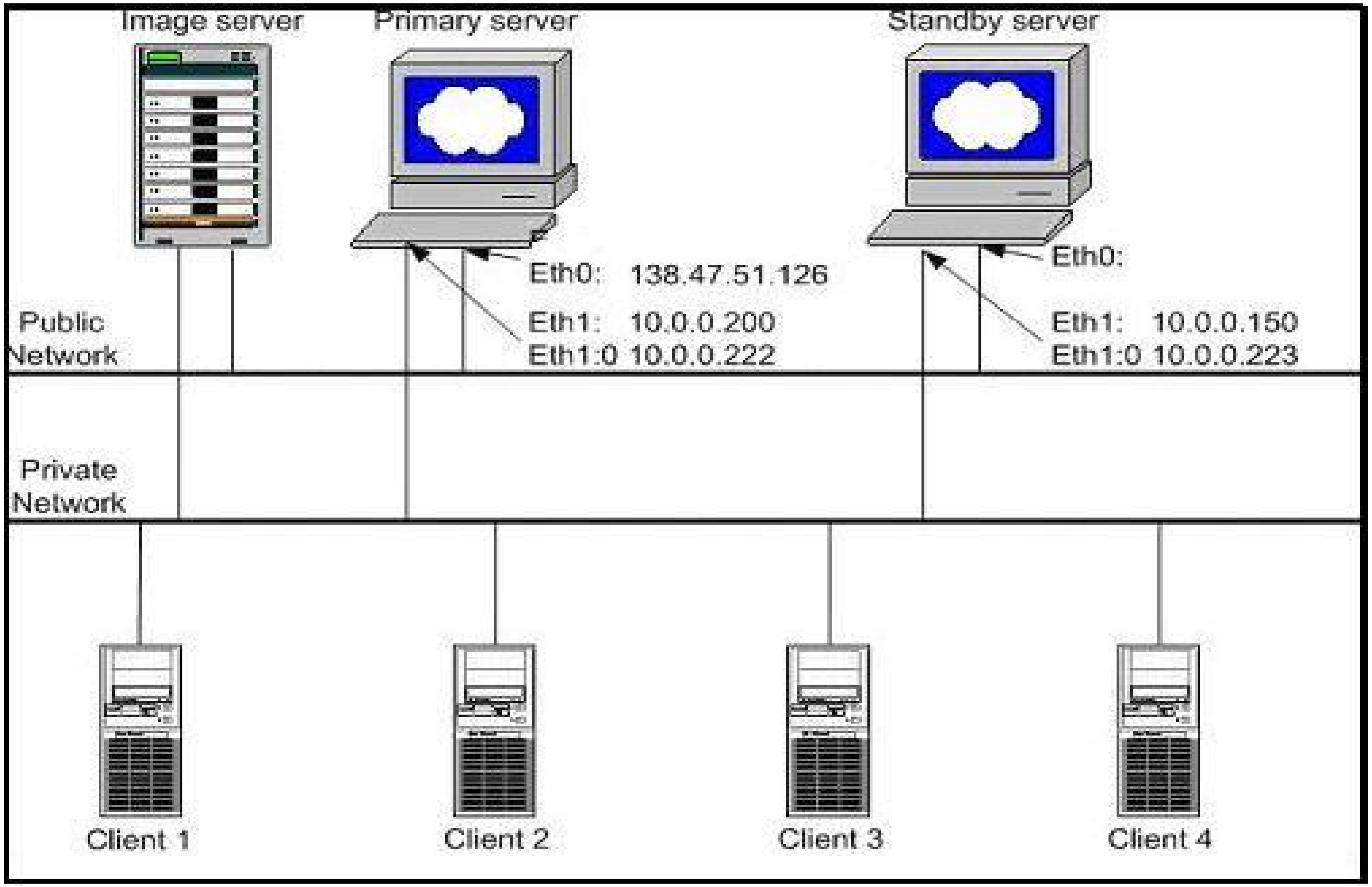
Oak Ridge National Laboratory

Stephen L. Scott

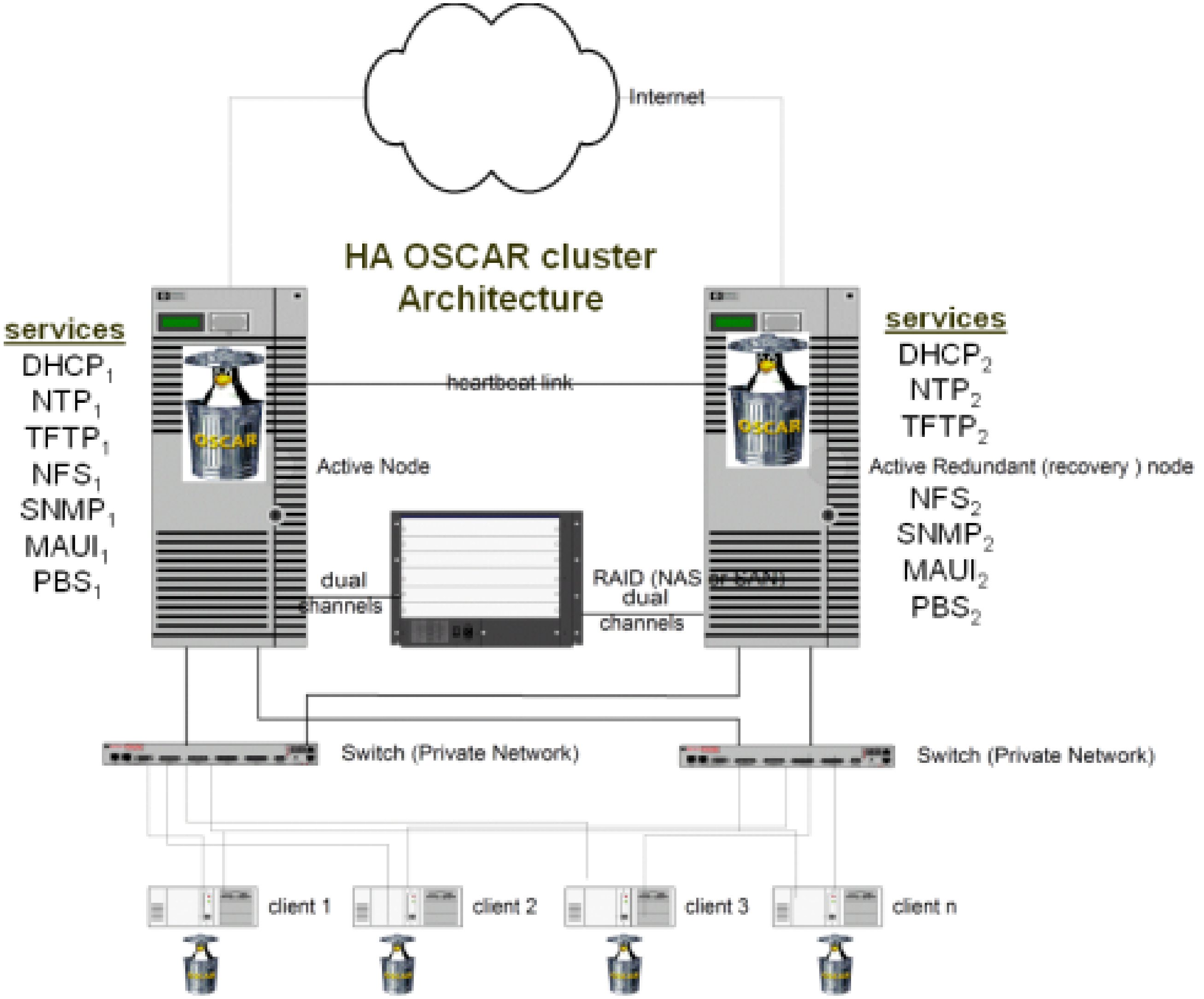
Conventional OSCAR Architecture



HA-OSCAR in active/hot-standby mode



HA-OSCAR in active/active mode



More OSCAR Information

Open Cluster Group

www.OpenClusterGroup.org/

OSCAR Home Page

oscar.sourceforge.net/

OSCAR Development site

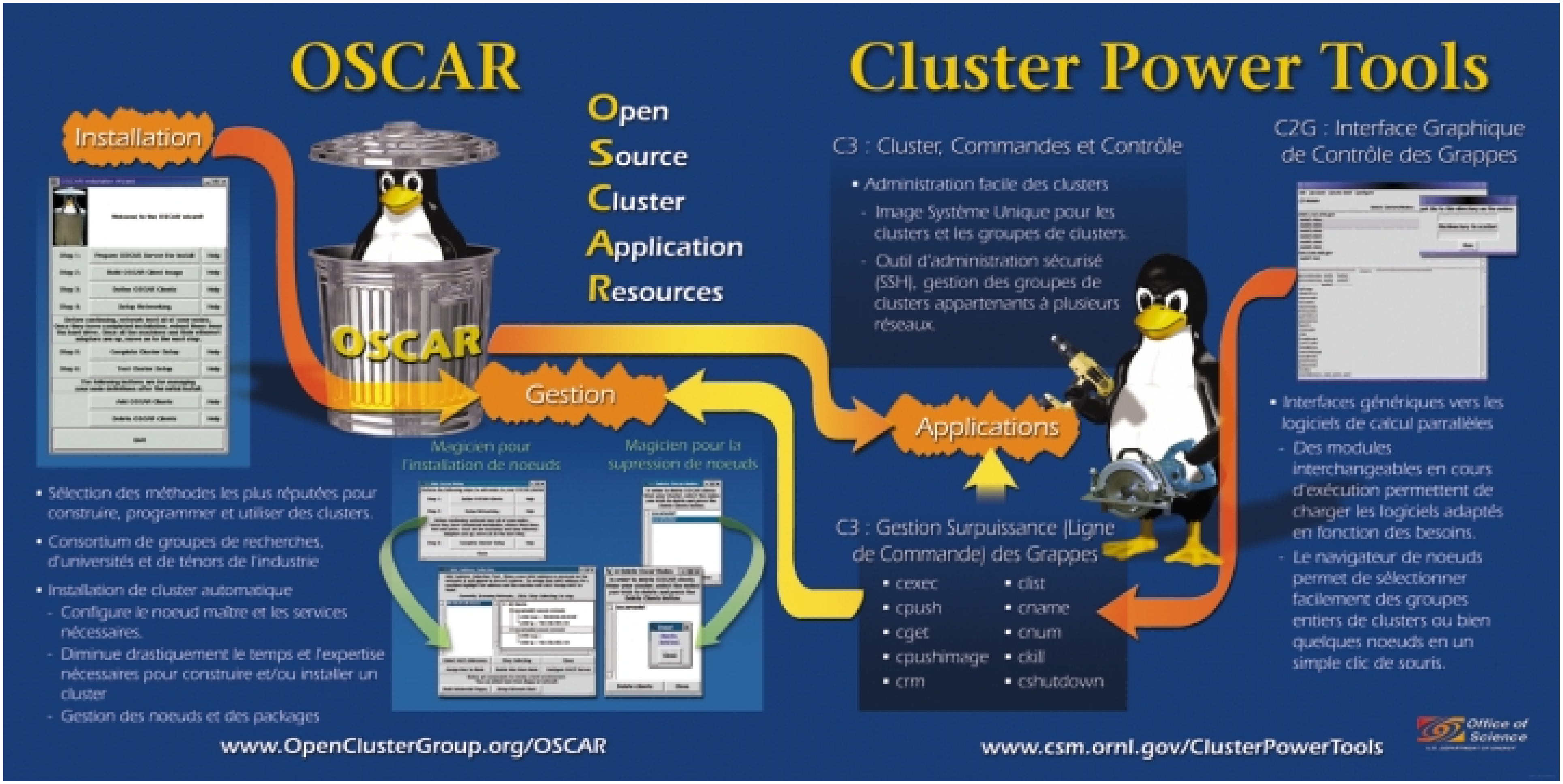
sourceforge.net/projects/oscar/

Mailing Lists

oscar-users@lists.sourceforge.net

oscar-devel@lists.sourceforge.net

Questions



- Sélection des méthodes les plus réputées pour construire, programmer et utiliser des clusters.
- Consortium de groupes de recherches, d'universités et de ténors de l'industrie
- Installation de cluster automatique
  - Configure le noeud maître et les services nécessaires.
  - Diminue drastiquement le temps et l'expertise nécessaires pour construire et/ou installer un cluster
  - Gestion des noeuds et des packages

www.OpenClusterGroup.org/OSCAR

C3 : Cluster, Commandes et Contrôle

- Administration facile des clusters
  - Image Système Unique pour les clusters et les groupes de clusters.
  - Outil d'administration sécurisé (SSH), gestion des groupes de clusters appartenants à plusieurs réseaux.

C3 : Gestion Surpuissance (Ligne de Commande) des Grappes

- cexec
- cpush
- cget
- cpushimage
- crm
- clist
- cname
- cnum
- ckill
- cshutdown

C2G : Interface Graphique de Contrôle des Grappes

- Interfaces génériques vers les logiciels de calcul parralélles
  - Des modules interchangeables en cours d'exécution permettent de charger les logiciels adaptés en fonction des besoins.
  - Le navigateur de noeuds permet de sélectionner facilement des groupes entiers de clusters ou bien quelques noeuds en un simple clic de souris.

www.csm.ornl.gov/ClusterPowerTools