

CLIC

Cluster Linux pour le Calcul *Scientific Computing Linux Cluster*



ID-IMAG/INRIA Laboratory
Grenoble, France

<http://www-id.imag.fr/>
<http://clic.mandrakesoft.com/>



CLIC project

French government Funded (RNTL)

Three partners:

Bull: Mainframe and IA64 experts

ID-IMAG: Cluster experts + users

Mandrakesoft: Linux experts

Cluster Management

Full *all-in-one* distribution

Linux was a prerequisite

Horizontal scalability

Thousands of machines



The CLIC Distribution

Classical tools

- Installation, Auto-configuration tools (clusterscripts)

- MPI, PVM, PBS, Ganglia

- Math libraries (blas, scalapack, PETSC)

- Middleware (CORBA, java)

- Virtual Reality software, etc

Hardware support

- IA64, Myrinet, SCI, Opteron

Software support

- Mosix, HA, LVS

Mandrake spirit

- Very easy install

- As many packages as possible

Specifically designed tools

Cluster installation
Parallel commands
Data Replication
File systems





Ka-tools

Ka-deploy

- Deploys a cluster

 - Clones a configuration on other machines

- Allows heterogeneous hardware

- Uses network boot (PxE)

Ka-run (RSHp)

- Parallel Distributed command launcher

 - ssh or rsh based

 - stdin/stdout/stderr redirection

- From one server towards N nodes

 - N is *large*

mput

- Optimized file replication on a cluster



Diffusion topologies

Master-slave

Scales in $O(N)$

Spanning trees

Binomial tree (optimal in the postal model)

Scales in $O(\log(N))$

Multicast

Scales in $O(1)$

Error handling causes bottlenecks and slowdowns

Flat tree (chain)

Scales in $O(1)$

Fastest on switched networks



Mput performance

	Mput 1Mo	Mput 2Mo	Mput 4Mo	Mput 8Mo	Mput 16Mo
Tps sec	0.97	1,09	1.35	1.81	2.82

Mput on 200 nodes

8 MB/s

Latency 0,8 s

Peak point to point network BW: 12 MB/s

Disk bandwidth is the limit



CLIC Status

Developed since 2000

Used on I-Cluster platform

225 PIII+Ethernet100

Parts used on I-Cluster2

208 Itanium2+Myrinet2000

Ka-Tools only (yet)

RedHat to Mandrake transition

Available since early 2003

Mandrake production software

<http://clic.mandrakesoft.com/>

Phase 2 about to be released

New installation procedure

Just Power On

Dual Ethernet cluster

Separated computing & administration network

New Parallel urpmi

Maintain the same set of rpms over the cluster

Based on rshp, mput and urpmi

Grid5000 project

5000 PCs

European grid

Will use CLIC (when?)