Inauguration of the TIK Experimental Cluster “Scylla”

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TIK, ETH Zürich, Switzerland

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What “Scylla” is:
An experimental research computer cluster of 22 identical nodes and one additional gateway node.

Initiators of this cluster:
- Design, planning, cabling and software installation by Arno Wagner
- Ordering and component tracking by TIK Dienstgruppe
- Node assembly by Alain Breedt
- Financing by TIK and D-ITET

Cluster administration and support:
Arno Wagner <wagner@tik.ee.ethz.ch>
How „Scylla“ was born

A short historical review

July 2003: First ideas for a TIK cluster by the DDoSVax team due to high computing power needs for Blaster/Sobig.F worm traffic analysis

August 26th, 2003: Arno Wagner presents a first hardware proposal for a cluster (variants with 11, 14, 19, and 22 nodes).

Sept. 26th, 2003: TIK IL-Meeting decides to buy a 12 node cluster

October 20th, 2003: KIM accepts cluster project with 22 nodes (36 kFr); recommends it for D-ITET Dep. Conference (DK)

October 21st, 2003: Components for cluster are ordered

Mid November 2003: Start of cluster assembly, cabling; installation

January 22nd, 2004: Inauguration of the cluster
22 cluster nodes:
• Athlon XP "Barton" 2.8 GHz
• 1 GB RAM, 120 GB Harddisk
• CD-ROM Drive
• 1 Gbit/s-Ethernet

One single gateway node:
• Athlon XP "Barton" 2.8 GHz
• 1 GB RAM
• 2x 200GB Harddisk (200 GB RAID-1 mirrored)
• CDROM
• 1 Gbit/s-Ethernet internal; 100 Mbit/s external
Planned use of the cluster

- Large computing power for network traffic analysis (DDoSVax)
- Massive distributed simulations (P2P nodes)
- Experimental kernel installations
- Gigabit/s network testing
- Computer security related research
„Scylla“
was an attractive nymph and a daughter of Phorcys. One day, the sea-god Glaucis fell passionately in love with her. However, she rejected him.

Therefore, Glaucis asked the sorceress Circe to create him a love potion. Bad enough, Circe instantly fell in love with Glaucis, who rejected her.

Filled with jealousy against Scylla, Circe poured a potion of herbs into the water, where Scylla was bathing in, and then cast her spell. Suddenly, out of Scylla's lower body half six monstrous dog heads grew.

We named the cluster „Scylla“ as the cluster’s possibilities are fascinating at first, however controlling it efficiently is a delicate task.
Cables:  
In total ca. 260 m, thereof:  
  70 m of Ethernet Cat5e Cable  
130 m of Video and keyboard cables  
  60 m of power cables  
And about 200 cable ties.

Networking:  
• 24 port switch full-duplex at 1 GBit/s;  
  20 Gbit/s aggregate bandwidth  
• Cluster nodes have private IPs 10.0.0.0/24;  
• Gateway node: scylla.ethz.ch (external interface)
Software Installation

Nodes n01-n22:
Debian Linux 2.4.22 with the openMosix cluster software extension

Gateway:
Debian Linux 2.4.24; role as Debian-testing mirror for nodes

Software distribution to nodes (from gateway)
FAI (Fully Automatic Installation): Boot via Etherboot (floppy), kernel is fetched via tftp from gateway.
→ Allows simple and individual change of boot kernel of the nodes from the gateway.
Electrical Power Consumption

One node:
Approx. 150W power consumption

Full cluster (gateway + 22 nodes):
Approx. 3.5 kW power consumption
(and heat generation!)

Cluster has its own dedicated
3 * 25A power line and circuit breaker
**Harddisks failure**

SMART monitoring of the harddisk drive in each node by the gateway; detects HDDs about to fail.

**Temperature alerts**

Temperature monitoring of each node by the gateway, and automatic shutdown of individual nodes or the whole cluster in case of overtemperature.
- Gateway: scylla.ethz.ch
- Nodes: n01-n20 (n21,n22 in PlanetLab temporary)
- n01 is Test node with remote power switch and serial console
- “Experimental” cluster means that OS installation and software configurations can be changed
- Complete new installation with FAI in less than 10 min.
- 100 GB persistent data storage/node; a new installation only changes 10 GB system/swap space partition
Thanks for your attention!

Feel free to ask any questions.