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CERN COMPUTER NEWSLETTER

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Contents

Editors Nicole Crémel and Hannelore Hämmerle, CERN IT Department, 1211 Geneva 23, Switzerland. E-mail: cnl.editor@cern.ch. Fax: +41 (22) 7668500. Web: cerncourier.com/articles/cnl.

Advisory board Wolfgang von Rüden (head of IT Department), François Grey (IT Communication team leader), Christine Sutton (*CERN Courier* editor), Tim Smith (group leader, User and Document Services).

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Dirac House, Temple Back, Bristol BS1 6BE, UK. Tel: +44 (0)117 929 7481. E-mail: jo.nicholas@iop.org. Fax: +44 (0)117 920 0733. Web: iop.org.

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Internet Services improve security

CERN is moving towards single-sign-on to guarantee user identity.

One of the reasons CERN exists is to provide the high-energy physics (HEP) community with services that facilitate collaboration in Europe and beyond. Building and maintaining accelerators is an obvious example of this, but providing reliable Internet services is increasingly critical for the research teams that are distributed around the world. *CNL* asked the leader of the Internet Services (IS) group, Alberto Pace, how these services are evolving and what new features users may expect in the coming years.

What is the IS group's mandate?
The group consists of some 20 people and it is mandated to provide central computing services for the whole lab as well as the wider HEP user community. We manage about 6000 desktop systems in the lab and we also manage 15 000 mail accounts and 7500 websites, which reflect the much larger HEP community that we service.

We focus on three areas: electronic mail, web servers and managing Windows desktops. We are also responsible for Macintosh support, user data in the Distributed File System, terminal services and improving computing security.

The IT department has focused on IT security in recent years. What is the status for Internet security?
The Internet used to be a network between trusted people. Now it is open to the entire world, which means we cannot base our approach on trust anymore. Therefore we have to ensure that CERN resources are not misused or abused but in a way that does not disrupt the services for the community, which would negate the purpose of the Internet.

Concerning spam, for several years now about 90% of e-mails we receive at CERN have been spam, and of the 10% that are let through by spam filters a fraction are still spam. This gives an idea of the constant race that is going on between spammers and antispam software.

When it comes to computer viruses, which are delivered via e-mail or by users accessing infected websites, we have several threats a week, which means that antivirus software has detected malicious activity on a computer and stopped it. We sometimes register compromised computers that require a complete reinstallation

Editorial

of the operating system. It should be said, though, that these incidents affect desktop machines. The security of our central computing infrastructure is much higher.

What plans are there to improve security?
While we deal with the daily threats, our longer-term strategy for Internet security is similar to that used in the food industry: to ensure traceability at all stages of production. Users want to be sure that the people they are communicating with are indeed who they say they are, that data being sent over the Internet are not being tampered with, and that no-one is eavesdropping on communications. In other words, data authenticity, integrity and confidentiality are the goals.

This is why various authentication projects will start this year, including the CERN Certification Authority project. The objective is to move quickly towards a single-sign-on environment where, for all users at CERN, the access system will guarantee the identity of the person behind the computer. This is an example of an evolution that should increase security while making life easier for the users.

More specifically, every desktop computer installed in 2006 that runs Windows executes applications without administrative privileges, and this reduces the threats posed by viruses and malware. Several awareness campaigns have also been held to limit clear-text passwords and to enforce encrypted communications in both e-mail applications and Web-authoring software.

What other changes are users of your services likely to see soon?
We are rebuilding the print infrastructure of the lab. Following last year's initiative with the fax infrastructure, which resulted in people being able to send and receive faxes via e-mail, we aim to integrate printing with desktop applications so that a dedicated program (the CERN Printer Wizard) will no longer be needed to locate and install printers. This improvement will give the user greater flexibility to search for suitable printers according to a range of criteria.

Alberto Pace, the leader of the Internet Services group at CERN.

A visible change that will affect all users of Windows desktops is the introduction of Computer Management Framework software, which will improve the deployment of patches and the installation of applications. A separate article in this newsletter describes this change in detail (see 'New management system for NICE' on p5).

Another initiative planned for 2007 is the global search facility for all documents on the CERN intranet, including those stored in CERN Document Server (CDS), Administrative Information Services (AIS) and Engineering Data Management System (EDMS) media. This service should make life easier for everybody because it will enable protected documents to be searched for according to the permissions of the user.

Also in the pipeline, we are collaborating with the User and Document Services (UDS) group and the Communication Systems (CS) group to automate the publication of multimedia documents (video, audio and photographic images). The goal is to offer "media on demand" at variable bandwidth via the CDS, and a scalable webcast service that could distribute everywhere on-site a high-quality broadcast signal of television quality.

What about Internet Protocol (IP) telephony? Skype cannot be used in the lab but are there other options?
We are working closely on this project with the CS group. The goal is to integrate e-mail, presence information, voice and video. A first step will be to install the gateways between the existing telephone exchange and the IP network to enable IP telephony, computer-to-phone and phone-to-computer calls. We are also looking into ways to include video telephony, instant messaging, application sharing, whiteboards and so on.

Two challenges are involved in such an evolution. First there is the technical challenge: we are moving from a world that was simple and clearly defined, with standard equipment at each end, to an adaptive environment where communication systems, be they phones or computers, must negotiate what types of information (voice, video or data) they can exchange with the partner at the other end.

Then there is the need to avoid a proliferation of incomplete solutions. For example, we don't want to end up with several ways of doing a videoconference, which might cause users to feel confused and frustrated. We must work with other stakeholders in the lab and elsewhere on a unique project with a consistent and integrated solution. When people agree to work on a common technology you get a performance boost in terms of user productivity and efficiency. This is what made the Internet a success in the first place.

Computing featured in this month's CERN Courier

Computing News
- Second phase of openlab begins
- KEK installs Japan's fastest simulation supercomputer
- EGEE forum unites Grid users
- CNL is 40 years old
- BNL creates magnetic nano-dots
- Fibre-optic network sets world record
- New Braille keyboard extends independence

Calendar of events

Feature article
- Computing conference in India gets ready for LHC

Computing at CERN in the 1980s

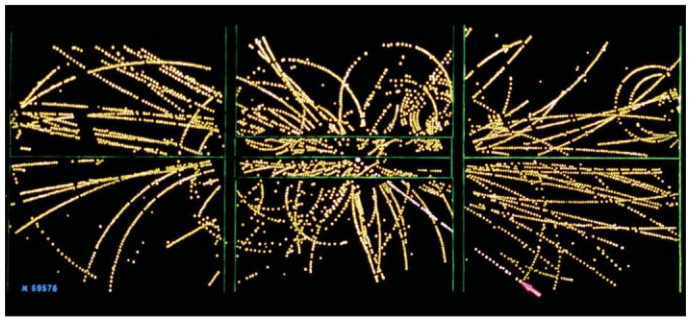
During *CNL*'s 40th birthday year we continue to bring you historical curiosities from the early days of computing at CERN. This issue we take a look at the 1980s.

Fortran 8×
"Sometime next year we shall be able to start using new compilers, conforming to the ANSI 77 standard, on our CDC 7600 and IBM computers, and presumably this standard will be adopted for new programs some while after. Meanwhile, the ANSI committee responsible for Fortran standards, X3J3, has begun work on a new standard, presently known as Fortran 8×. The timetable for this revision is very uncertain… so it is perhaps unlikely that we shall have new compilers much before the end of the decade." (November–December 1980)

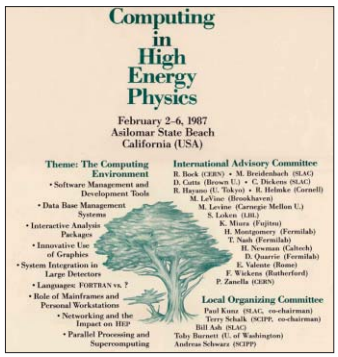
Removal of central card-punching and card-reading services
"The last central card punch and card reader, presently connected to the CDC 835, will not be available after the Christmas–New Year shutdown." (November–December 1983)

The end of the CDC 7600
"The 7600 User Service was finally stopped at the beginning of July and the 7600 itself was switched off for the last time on August 2nd… Unfortunately the cost of maintaining a more than 10-year-old system finally proved too high and the decision was taken to replace it… Nonetheless many of the concepts pioneered by the 7600 SCOPE 2 system live on in the later generation of fast processors like the CYBER 205 and the CRAY. Modern trends towards multi-processors and decentralization are very important and are improving the quality of computing services everywhere, but as long as cheap, powerful, efficient 'number-crunching' is required 'a good big un will always beat a good little un'." (July–August 1984)

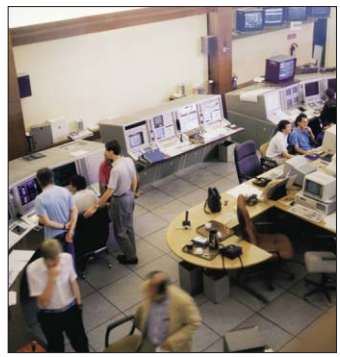
The IBM PC at CERN
"An agreement for the purchase of IBM PCs has been set up between IBM and CERN… it is the responsibility of each user to judge his requirements with respect to maintenance coverage, hardware redundancy, or interventions on a 'billing' basis." (September–November 1984)



Computer view of the discovery of the W particle in the UA1 detector from the October–December 1982 run of the proton-antiproton collider.



Poster announcing the 1987 CHEP conference in Asilomar, California.



The Prevessin Control Room during LEP's start-up in 1989.

A new computer and the introduction of VM/CMS
"The Finance Committee of the 30th October 1984 agreed in principle to a plan to update the IBM-compatible capacity of the Computer Centre. This plan seeks to replace both the Siemens 7880 and the IBM 3081 with the latest computers available from the two manufacturers over the next 15 months… One of the major consequences of having a hardware upgrade is that we can now announce the start of a VM/CMS service at CERN." (December 1984)

The central VAX 8600
"A Digital VAX 8600 computer was installed in the Computer Centre at the beginning of March of this year. The machine was mainly intended to offer a powerful interactive tool for the offline computing needs of the four LEP experiments, as well as a test bed for a VMS 4 public service." (June–July 1985)

Hackers – a reminder and a warning
"We still suffer from attacks by hackers every day. Twenty attempts to break in is now the daily rate for some VAXes at CERN. While we have taken steps to approach the Swiss PTT, with the advice of the CERN legal service, to find possible ways of acting against these people, we insist on the principle that each end-user system should protect itself. This is the only solution in that it gives a much finer granularity of protection and puts the responsibility for protecting resources where it belongs (i.e. on the owners of the resources)." (January–February 1986)

The FIND command in VM/CMS
"This article introduces FIND, a CMS command which allows you to find and access documents via keywords. At present FIND 'knows' about 1250 documents (HELP files in IBM jargon)." (January–February 1986)

Introduction of CRAYs
"At the June meeting of the Finance Committee, the acquisition of a CRAY X/MP-48 computer was agreed, for installation in October 1987. The system has four processors with a basic clock period of 9.5 nanoseconds, 8 million 64-bit words of bipolar main memory organized in 32 banks with a 38 nanosecond cycle time, and 128 million 64-bit words of secondary memory." (May–September 1986)

PAW – the successor of HTV
"PAW is a future substitute for HTV with substantial extensions. In addition to the data presentation capabilities of HTV, interactive data analysis and picture editing are possible. The PAW packages are now in a testing phase and they should be progressively released at the beginning of next year." (October–December 1986)

Computerized foolishness
"An electronic mail chain letter has recently been intercepted at CERN. Not only is such foolishness a waste of time and money (yes, electronic mail has to be paid for!), but also the superstitious nonsense in chain letters about 'bad luck if you break the chain' might actually worry some people. If you receive such a letter, please have the common sense to break the chain and send an appropriate comment to the person who wasted your time by sending it." (March–May 1987)

Electronic mail address change
"In order to conform to new *de facto* standards, and to prepare for transition to international standards, we are planning to introduce new electronic mail addresses for CERN users, namely user@host.CERN.CH or, for users of VMS Mail, to user@host.decnet.CERN.CH… (currently addresses are user@host.CERN or user@host.DECNET.CERN)." (September–December 1988)

Network upgrade makes progress

A major upgrade of the network infrastructure and services is under way so that CERN will be ready for the challenge of the Large Hadron Collider (LHC).

Network infrastructure

The installation of the LHC control network is running to schedule, and the network infrastructure is being extended to the LHC experimental areas, with dedicated networks for each LHC experiment. The general-purpose office network is also being upgraded and includes improved connectivity for visitors.

The wide-area network implementation for LHC is under way and provides 10 GB facilities to the Tier-1 centres (see http://lhcopn.cern.ch). Multigigabit transfer rates have already been demonstrated during CHEP'06.

Service Challenge 4 is exploiting the new very-high-speed LCG backbone in the Computer Centre and the dedicated 10 GB/s links to the 11 Tier-1 centres located around the world. CERN's server farm has been sending 6–13 GB/s of data continuously for several weeks now, and is warming up the system for the upcoming production phase. So far the new hardware has successfully demonstrated its ability to deal with the demanding traffic rates.

Security issues

Access to dedicated networks (such as the Technical Network (TN) and the networks of the LHC experiments) versus the General Purpose Network (GPN) has been filtered as a result of the Computing and Network Infrastructure for Controls (CNIC) project. The recent implementation of additional network protection for programmable logic controllers completed the second phase of the project. Both of these security mechanisms can be configured and managed via the updated network Web interface. (An article about the CNIC project appeared in the January–March issue, see www.cerncourier.com/articles/cnl/3/1/15/1.)

Furthermore, enhanced security features have been deployed across the CERN site to better protect the network infrastructure against internal attacks. The next major step in network security is to integrate the management of the CERN firewall with the network database in the context of the Integrated Site Security for Grids (ISSeG) project. ISSeg has three members: CERN, the UK Council for the Central Laboratory of the Research Councils, and Germany's Forschungszentrum Karlsruhe.

Management tools and database

As well as the network evolving, the network management tools are also being adapted to handle different types of network equipment and address stronger security needs. The core of the CERN network is the network database, LANDB, in which the network configuration is stored.

As a user or system administrator you have probably accessed LANDB via the network Web interface. This is the main entry point for users to register and maintain information about network devices. If you browse the network database via the Web interface you will find information about the network topology, services and starpoints. However, this public interface hides a much more complex system that aims to automatically manage the thousands of network devices that are in use at CERN, as well as the workflow for the first-line support team that takes care of connections and installation.

The network database and these tools recently underwent a major upgrade. The legacy tool MTP that was used to manage the cabling and the physical equipment has been fully rewritten and integrated with LANDB. The infrastructure team now uses one coherent system to manage both the physical and logical definition of network equipment, cables and topology.

Network database clean-up

Some of you may have received e-mails from MIKE (Mysterious Issue Killing Engine), a new program that checks the consistency of the data in the network database (see article in the January–March issue, at www.cerncourier.com/articles/cnl/3/1/3/1). Because the database is used as a reference for all network devices, it is essential that the information in the database is up to date. We therefore ask you to provide correct information about your device or to delete obsolete computers from the database if you receive mails from MIKE.

Network monitoring

Monitoring a large and complex network infrastructure is not an easy task. Because of the recent extensions to the network, the monitoring system has to be extended and improved to cope with the extra demand. The LCG network infrastructures, including the high-speed transfer links, are now fully monitored, and more projects in this area have enabled us to better understand the behaviour of the infrastructure.

DNS and DHCP

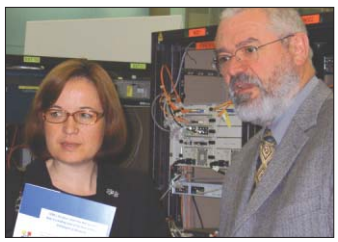
The DNS and DHCP services have recently undergone a major restructuring to make them more manageable and reliable. The many servers that run these services have been upgraded to more modern platforms, running Scientific Linux CERN 3 and the external network DNS service fully integrated with the internal one. The DNS/DHCP servers on the Technical Network have also been upgraded to provide better resilience should there be a hardware failure.

The IT/CS group

Bulgarian deputy minister visits Computer Centre

Ekaterina Vitkova, the Bulgarian deputy minister of education and science, visited the CMS experiment and the Computer Centre while she was at CERN for the Council meeting in March.

The IT department presented work that was of particular interest to Bulgaria, such as the Grid and public resource computing. The deputy minister was impressed by the opportunities offered by these collaborative environments: "We are developing an ICT strategy for secondary schools and universities, including digital libraries and an educational portal," she said. "The technology that we have needs to be used more effectively but people are not aware of the possibilities. The Grid is too difficult for teachers, but there are several tools that can be used today and we invite Wolfgang von Rüden to come to Bulgaria to see the system we have put in place and to give his advice."



Ekaterina Vitkova with Wolfgang von Rüden, IT department leader.

Vitkova learnt about the collaborations between CERN and Bulgaria. The country has supplied about 150 muon chambers for the CMS experiment, and 60 Bulgarian scientists are working in the collaboration. Bulgaria's membership of CERN gives the country access to cutting-edge scientific infrastructure and a chance to meet scientists, engineers and computer experts. In the framework of a collaboration agreement, CERN donates a small number of computers, storage and networking equipment, and trains Bulgarian computer scientists in cluster and Grid technologies during their brief visits to CERN.

"We are proud of our participation in this organization and we thank CERN for its contributions," said the deputy minister. She invited CERN to participate in a workshop in Sofia to promote opportunities for education and science.

New management system for NICE

A new Windows management system, the Computer Management Framework (CMF), is being deployed throughout CERN. CMF was designed by the IT/IS group to provide a range of tools that would enable sets of computers to be easily managed in independent activities, such as the Large Hadron Collider (LHC) experiments.

The system, however, also offers improved security, stricter control on patch deployment and reboot actions, and enables instant reporting. Considering the limitations of the existing desktop management system and the shareable features provided by CMF, it was decided at the beginning of this year to adopt CMF as a global desktop management system for all NICE computers at CERN.

What will change for the user?

The list of available applications is now available from the Web-based CMF interface, which replaces the basic Add New Programs window. Add New Programs contains a single entry that redirects the user to the CMF interface. This interface can also be accessed directly from the CMF icon in the system tray (figure 1).

The user can select all of the applications needed for his/her computer and then save the configuration. The applications will be installed sequentially without the user having to intervene. Because this configuration is saved in a central database, the selected applications will be reapplied automatically if the computer has to be completely reinstalled.

The CMF interface can also be accessed remotely from the http://cern.ch/cmf website. After logging on, the user can control all of the computers for which he/she is registered as responsible in the network database (LANDB).

CMF icon

The CMF icon in the system tray is the unique entry point for all interactions between the user and the CMF system.

- It provides a messaging system, using balloons to announce new applications that have been installed, pending or required reboots, and the action status of applications that are being deployed.
- It provides direct access to the Add/Remove CMF Packages Web-based user interface.
- It enables users to schedule or execute pending installations. However, the options for scheduling depend on the deployment policy of the application, which was set by the person responsible. In figure 2 the installation of the CERN Phonebook 6.5 is announced to the computer and is now pending further action. Clicking on Install *CERN Phonebook 6.5* will open a dialogue box. This enables the user to start the installation by clicking the Start Now button or to schedule the execution date by clicking Set Date.
- The CMF icon enables users to start a pending reboot by clicking Restart PC Now.

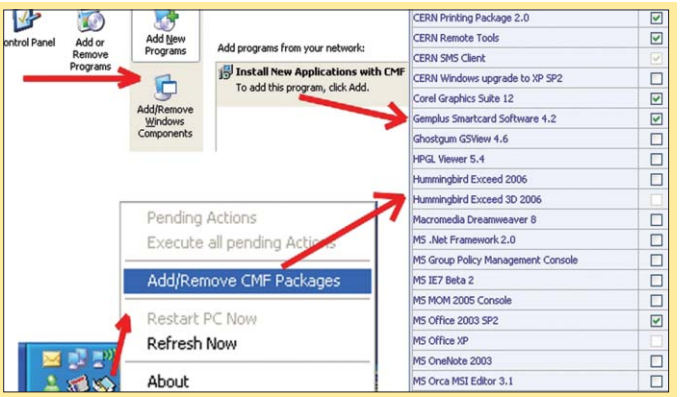


Fig. 1: Users can access the CMF interface and list of available packages from the Add New Programs window or the CMF icon in the system tray.

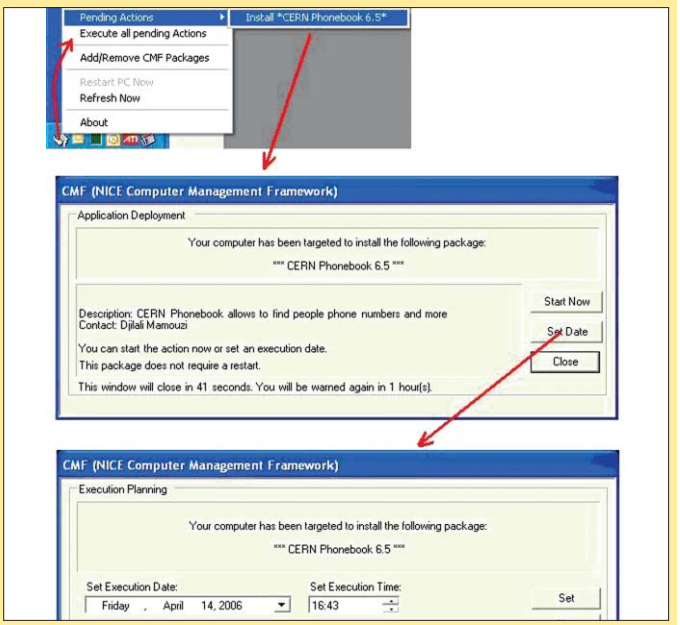


Fig. 2: Users can schedule or execute the installation of new software by clicking the CMF icon then selecting the Pending Actions option.

Deployment schedule

CMF was first deployed in April to volunteers in the IT department. It is due to be fully deployed in the IT department in early May, and in other departments from June. Installation is expected to be completed by the end of the summer.

More information, including guides for administrators and users, is available on the CMF website at http://cern.ch/cmf/help.

Ivan Deloose, IT/IS

Support to end for Windows XP SP1

Microsoft will stop supporting Windows XP Service Pack 1 (SP1) this summer. As a consequence, NICE has ceased supporting Windows XP SP1 as of 1 June. This means that:

- NICE will not automatically deploy missing security patches to SP1 computers.
- New security patches will no longer be integrated in the NICE Diane installation of SP1.
- New NICE-supported applications will not be tested or deployed on SP1 computers.

All NICE computers running Windows XP SP1 should have been updated to SP2 before 1 June. If this is not the case and you are responsible for a PC that is still running SP1 we recommend that you install Windows XP SP2 using the Diane tools (from PXE boot, CD or floppy disk).

As a work-around to formatting the disk, the computer can also be upgraded by using the CERN Windows XP SP2 program in Add/Remove Programs. This will require 1.4 GB of free disk space. Please note that although this is an easy way of updating the software, problems may arise in the future because the computer was not reinstalled from scratch.

For more information about Windows XP SP2, see http://cern.ch/Win/Help/?kbid=010115.

- As with any system reinstallation, remember to first back-up important local files on external media. If you would like help with updating your system, please ask the Helpdesk (e-mail helpdesk@cern.ch or call 78888).

The NICE team

Students experience collaborative work at international masterclass

This year more than 3000 high-school students from some 60 institutes across Europe and the US spent a day working at the frontier of physics in the second International Masterclasses for High-School Students. The Virtual Room Videoconferencing System (VRVS) teams from CERN and Caltech again coordinated the video link-up between the students during this event, which took place from 6 to 21 March.

A screen shot of part of the masterclass videoconference held with the Slovak Education Ministry (top right).

How did it start?

Particle physics masterclasses began in the UK in 1997, the centenary of J J Thomson's discovery of the electron. It was then that Ken Long of Imperial College and Roger Barlow of Manchester University came up with the idea for a series of one-day events for 16- to 19-year-old students and their teachers.

Run by particle physicists at various institutes all over the UK and coordinated through the High Energy Particle Physics group of the Institute of Physics, each year the programme offers a popular combination of exciting talks and hands-on experience of the interactive graphical display programs that particle physicists use at CERN. More recently the concept of the particle physics masterclasses has been adopted successfully by several institutes in Belgium, Germany and Poland.

The international idea

The World Year of Physics 2005, which commemorated Albert Einstein's *annus mirabilis*, was the inspiration for the particle physics masterclasses to spread even further. It was just enough to mention the idea of a Europe-wide version of this programme for all members of the European Particle Physics Outreach Group (EPPOG) to come on board and try to get institutes in their countries involved. Eventually, 58 institutes in 18 countries across Europe, from Athens to Bergen and from Lisbon to Helsinki, participated in the event, which was centrally coordinated by CERN and Bonn University. This year the event included two non-European participants – Brookhaven National Laboratory and Florida State University – organized by QuarkNet, the US network of universities and schools.

As with the original masterclasses, the basic idea of the pan-European event was to let the students work as much as possible like real scientists in an authentic environment at a particle physics institute – to feel the excitement of dealing with real data, and to experience the difficulties of validating the scientific results. After watching lectures by practising scientists the students performed measurements on real data from particle physics experiments, then at the end of each day, as in an international collaboration, they joined in a videoconference to discuss and combine their results.

The measurement of the branching ratios of Z boson decays at CERN's Large Electron Positron (LEP) collider was chosen as the main common task at all sites. For this the students had to identify the final states of quark-jets, electron pairs, muon pairs and the notoriously difficult tau pairs from the tracks and signals in various components of LEP detectors. Interactive computer material for this task was available using data from OPAL in the Identifying Particles package from Terry Wyatt at Manchester University, or alternatively using DELPHI data in A Keyhole to the Birth of Time by James Gillies and Richard Jacobsson at CERN, or in the well known Hands-on-CERN package developed by Erik Johansson of Stockholm.

To facilitate the students' access to the unfamiliar world of particle physics, EPPOG and the national institutes had translated the material into the local language of the students. By the start of the project, at least one of the packages was available in each of the 16 languages involved, with Hands-on-CERN now covering 15 languages, from Catalan to Slovak. This material, including real data for performing the measurements and several extra teaching and learning packages, lays the basis for regularly performing masterclasses at an international level. The EU acknowledged the success of the first European masterclasses by selecting the leader of the project, Michael Kobel, as a nominee for last year's Descartes prize for excellence in science communication.

The second international masterclasses retained most of last year's successful format. The skills for how to become a "particle detective" were communicated in the morning lectures at each institute. Since particle physics is not normally taught at high-school level in most countries, the talks had to give a comprehensive overview, starting with basic explanations and extending to the world of quarks and leptons. "I was surprised to be able to understand what is going on in current scientific research," was the reaction of one of the students at Dresden.

After some training by young researchers from the institute, the students discovered that they could even identify the

Masterclass students identify the final states of quark-jets, electron pairs, muon pairs and tau pairs using OPAL and DELPHI data samples.

elementary particles on the event displays themselves. The exercise was in fact usually performed quite quickly: "What next?" was a frequent demand once the Z-decays had been measured.

During the late-afternoon videoconference an extra component was added this year: a quiz about particle physics and CERN. This was particularly interesting since it triggered more discussion, not only about the exercise but also about CERN and its ongoing activities. The winners of the quiz at each session and at each site were awarded a prize.

VRVS enables global research

The daily international videoconference used the same VRVS service (see www.vrvs.org) as that used by practising scientists. Here the students learnt to exchange their results and to discuss particle physics in English, the common language of modern science research.

The videoconferences made the students aware that masterclasses were also taking place in other countries, and created the feeling of belonging to an international collaboration of researchers. It was "interesting to learn how scientific information is exchanged around the globe" was a comment on one of the feedback questionnaires that were evaluated last year by the Leibniz Institute for Science Education (IPN) at Kiel University.

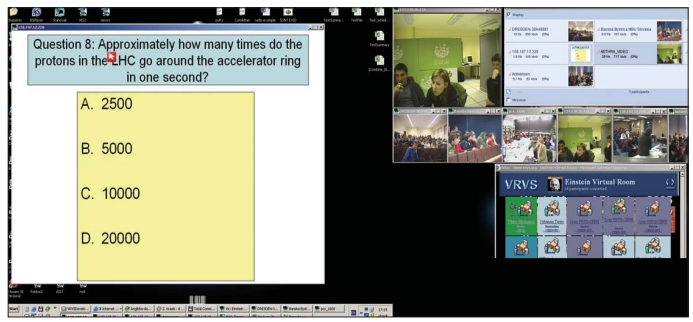
CERN's IT department and the Slovak group of the Caltech VRVS team provided valuable technical help for those institutes that had never used the system before. The link-up was moderated centrally by three inspiring young researchers at CERN: Silvia Schuh from ATLAS, LHC expert Mike Lamont, and Dave Barney from CMS. The technical set-up was coordinated centrally by Joao Fernandes from CERN (IT-UDS-AVC), and Viktor Michalcin and Marek Domaracky from the Slovak VRVS team (based at Pavol Jozef Safarik University in Kosice).

The VRVS service has been operating since 1997, serving the high-energy physics community and in particular the LHC experiments. There are some 4000 connected users in Europe, Asia and the Americas, and the service holds around 6000 hours of meetings each month.

VRVS is the only collaborative system that can scale up to the needs of large international physics experiments, especially the LHC experiments. VRVS is global in scope: it covers all existing and emerging protocols and all devices that clients use for collaboration, from desktop and handheld computers to installations in large auditoria. Therefore VRVS was the only system capable of supporting large international events such as the masterclasses, and it has contributed significantly to their success.

Moving on to EVO

After working with the VRVS system for 10 years, the VRVS team is preparing to release the new generation of collaborative systems – EVO (Enabling Virtual Organizations). The EVO system is based on a distributed intelligent software agent that creates a unique, efficient real-time infrastructure to support the community of research and academic users.



Students take part in a group quiz about particle physics and CERN.

EVO's advanced infrastructure will provide the core collaborative service for the LHC experiments and for other large international scientific experiments such as ITER. The service will operate over national and international networks in more than 100 countries. EVO promises to enhance all of the good points of VRVS and at the same time it includes new features such as instant messaging and presence, encryption, and automatic troubleshooting detection.

VRVS and EVO are essential for events such as the masterclasses. They enable the user to choose the type of client to use for the collaboration, independent of protocol, operating platform or budget. This is a key aspect because it is almost impossible to control each institution's set-up when more than 60 are involved. VRVS and EVO also provide full-scale multisite capabilities and enable users to see all of the remote participants at the same time, thus providing an immersive and collaborative experience for the young masterclass students.

How was it for you?

"I got the feeling that I did something which physicists do every day in their experiments, and I felt involved." This remark by a 17-year-old student shows that the authentic surroundings and the use of real data were indeed able to bring modern physics close to the hearts of young people. The masterclass teams from EPPOG, CERN and VRVS put students in contact all over the world, and enabled them to discuss the fascinating world of particle physics.

"I just wanted to say how much fun today was! I have not had as much fun at work for a long time! Lots of good questions, mainly from Poland (ranging from 'How old are you?' through 'Does the 8.3 tesla field of the dipoles have any effect on the environment' to 'Do you think quarks have substructure?')," said Dave Barney enthusiastically at the end of the last international masterclass day in 2006.

The CERN and Caltech VRVS teams

Mumbai workshop prepares sites for Service Challenge 4

A workshop focusing on Service Challenge 4 (SC4) and the services for the Worldwide LHC Computing Grid (WLCG) took place at the Tata Institute of Fundamental Research in Mumbai, India, on 10–12 February. The event was held immediately before CHEP'06 in the context of the Grid Deployment Board (GDB).

The workshop was well attended, with some 150 people registered from the four Large Hadron Collider (LHC) experiments, the Tier-1 sites, many of the Tier-2s and of course the Tier-0 site.

The meeting was timely, with the SC4 due to start on 1 June and full production service expected to begin in October. The three main themes of the workshop were: data and storage management, WLCG services, and the experiments' computing models. The workshop was highly interactive and included many break-out sessions. In this article, we summarize the main conclusions reached during the workshop.

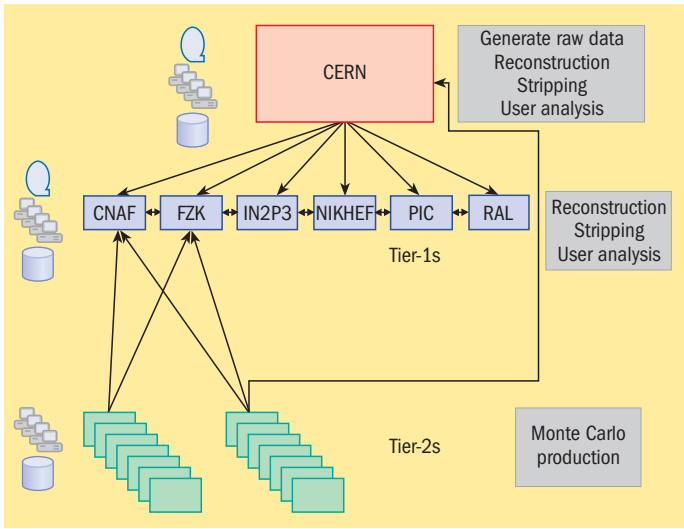


Fig. 1: One workshop topic was the use of diagrams to explain the computing models, such as this one for LHCb data processing.

Storage management

The first day focused on the important topic of storage management. The question of interoperability between different Storage Resource Manager (SRM) implementations was a major issue, as was the timetable for the delivery of production services based on SRM 1.1 and SRM 2.1 specifications.

Participants also discussed and reached agreement on issues such as the types of storage (permanent, durable) that would be deployed at the various sites as part of SC4, as well as the precise meaning of these terms. This work will continue as part of the WLCG Data Management working group, including a discussion of storage ontology. It was concluded that SRM 2.1 would have to be deployed after SC4, given the state of testing of the SRM 2.1 implementations as well as the development needed at the layer of FTS and gfal.

WLCG services and support

During this session on day two, key issues discussed were the service-level targets defined in the WLCG Memorandum of Understanding (MoU), how the targets could be met, and how they would be measured.

The MoU defines the targets for overall availability of the various services that a Tier-1 or Tier-2 centre must offer, during and outside times when the accelerator is in operation as well as during prime shift and other periods. The MoU also defines the maximum acceptable delay before an intervention is made in the case of service degradation.

Closely related to these issues are service (availability) monitoring; operations; and site, user and virtual organization support. All of these have to be understood in an environment where two major Grids (the Open Science Grid and Enabling Grids for E-sciencE) are supported, as well as other regional variations.

Participants agreed to adopt the Global Grid User Support centre at the Forschunszentrum Karlsruhe as a single entry point for support, and to streamline operations procedures and migrate rapidly away from stop-gap solutions that were introduced in Service Challenges 1–3. These changes are already in effect.

Experiments' computing models

Although the experiments' computing models are extensively described in the technical design reports, these documents – which were written for the LHC experiments committee (LHCC) – are not particularly accessible for a computer centre manager, for example at a multidisciplinary Tier-1 or Tier-2 site. The reports were written to explain how physics can be efficiently extracted from the data, and not to clarify the provision of resources that a site needs to plan to enable this work to take place.

As sites have often pointed out, it is virtually impossible to "reverse engineer" what an experiment is doing or plans to do, in terms of its production processing, from the observed activity, or lack of it, at a site. To clarify these issues much of the final day of the workshop was spent explaining the computing models in pictorial format, looking in detail at the various data flows and rates, as well as associated requirements for resources (figure 1).

Conclusions

The workshop resolved several key issues around storage and data management as well as operations and support, and it clarified the roles of Tier-1 sites, in particular through the pictorial computing models.

A report summarizing the agreements reached during the event has been reviewed by the GDB and approved by the LCG Management Board. It can be downloaded from the LCG Project Planning page (http://lcg.web.cern.ch/lcg/planning/planning.html) under Phase 2 Plans / Service Challenge 4 Planning / Conclusions of the SC4 Workshop in Mumbai.

Future discussions

A follow-up event focusing on Tier-2 sites, primary experiment use cases that are relevant to these sites, and the corresponding WLCG services, will be held at CERN on 12–14 June. It will be followed by two days of tutorials covering the middleware and fabric services as well as experiment- and project-specific issues. Details can be found on the Service Challenge Wiki at https://twiki.cern.ch/twiki/bin/view/LCG/WorkshopAndTutorials.

A pre-CHEP workshop is already being discussed for CHEP'07 in Victoria, Canada. This workshop would examine the details of running the full production service.

Sunanda Banerjee, TIFR; Gonzalo Merino, PIC; Jeremy Coles, GridPP; Jamie Shiers, IT/GD, CERN

LCG will benefit from gLite 3

Enabling Grids for E-sciencE (EGEE) released gLite 3 on 4 May, and the software is now being deployed at the Tier-1 centres. The target is for most production systems to have been upgraded by the start of June, in time for the next phase of the LCG Service Challenge 4 (SC4).

Anyone who has followed the previous releases may remember that gLite 1.5 was released in mid-January, and might ask themselves why there is such a big gap in version numbers. Those who have followed the development of the Grid production service might wonder, in a similar vein, what happened to LCG 2.7.

The answer lies in the fact that gLite 3 is the first release to incorporate the services from LCG 2 and several components from gLite 1.5. From this release onwards there will no longer be separate releases of the two middleware stacks. Since gLite 3 is neither a straight upgrade of gLite 1.5 nor of LCG 2.7 the distribution version number has been increased to 3 to avoid confusion with these two branches of the middleware.

The gLite 1.5 services that have been included are the gLite workload management services, logging and bookkeeping, R-GMA, VOMS, and the file transfer service. Since the goal was to extend the functionality of the production system and enable a smooth migration from old to new components, the LCG 2 workload management components have been kept in the release, and all of the computing resources will be accessible from both toolsets.

EGEE has produced more components than those that are included in the new release. The other components will be supported as required for virtual organizations that depend on their specific functionality, until they are integrated in a future release or made redundant. These components were not included in the gLite 3 release because of lack of time due to the demands of SC4.

To create an integrated release required adjusting the two software stacks so that they could coexist; merging the two teams that produced gLite and LCG 2 releases; and synchronizing the procedures and tools for integration, configuration, certification and documentation. Also, the operations team had to extend its monitoring suites to cover the new services. Finally, a major effort was made by the end-user support team to update the popular LCG 2 user guide to the gLite 3 user guide.

During this short yet intense process not everything went smoothly, but we are now much closer to our goal of making the heritage of the components invisible. Common repositories have been used and components have either already been built by a common build system provided by the e-Infrastructure for Testing, Integration and Configuration of Software (ETICS) project or are in an advanced stage of integration. Results from the different test suites still had to be aggregated manually but ETICS has started to unify them.

The branding of documents has been put aside for the time being and as a result the distribution's documentation looks less integrated than the contents actually are. Many steps leading to a release that should be, and in future will be, handled by an integrated tracking system have been tracked remarkably well by simple, manually updated, Wiki-based Web pages.

The preproduction service played a crucial role in spotting problems related to scale, deployment and long-term stability. Release candidates were deployed in mid-March and before Easter. This system, with more than 15 sites, is on a scale comparable to the production system two years ago.

The efficient flow of information between the developers and the release team was decisive in enabling the many changes that were required in the restricted time available. Combining Wiki-based tools with frequent, sometimes even daily, meetings proved to be effective.

For everyone involved, integrating two release processes that have been used by two experienced teams increased the awareness of issues that may have been overlooked in the past. Now we have an integrated middleware stack that will enable the user individually, on a job-by-job basis, to select between the workload management middleware of the two stacks. At the same time the different origins of the services will be invisible to both operation teams and system administrators.

Markus Schulz, IT/GD

Dutch Tier-1 centre has first-rate connections

The Science Park Amsterdam will be home to a Tier-1 centre for the ATLAS, LHCb and ALICE experiments. This Large Hadron Collider (LHC) Tier-1 will be jointly operated by SARA, the Dutch national supercomputer centre, and NIKHEF, the Dutch National Institute for Nuclear Physics and High-Energy Physics. The centre will provide about 20% of the total worldwide Tier-1 capacity for LHCb, about 10% of that for ATLAS and about 5% for ALICE.

By 2008 the Tier-1 will provide 4400 kSI2k of CPU power, 2500 TB of disk storage and 1800 TB of tape storage. Network bandwidth is generally among the best in the world, thanks to the leading position of the national research network SURFnet in the optical networking world. The cutting-edge research in global lambda facilities for next-generation optical networking that is being carried out by a team from Amsterdam University is also playing a crucial role.

When it comes to human networking, excellent connections via Schiphol airport make Amsterdam a popular alternative to Geneva for LHC Computing Grid (LCG) meetings.

Funding for the first four years of operation and acquisition has already been approved with a grant from the Dutch government. The proposal was submitted as a joint venture of NIKHEF, the Netherlands Bio-Informatics Centre (NBIC – a consortium of Dutch biological scientists working on e-science issues), and the National Computing Facilities foundation.

There has been a strong Dutch participation in the LHC grid since the beginning: NIKHEF was one of the five main partners in the EU Fifth Framework Programme's DataGrid project.

Local activities centre around:

- Operations. SARA has a strong presence in the EGEE Northern Europe Regional Operating Centre, and NIKHEF has contributed several packages to the LCG software stack.
- Middleware development. NIKHEF (with Amsterdam University) is one of the main clusters producing middleware related to authentication and authorization, and leads the development of the LCAS and LCMAPS packages

SARA has been leading the local effort in the service challenges and has achieved excellent results thanks to its hard-working crew and to Amsterdam's high degree of optical connectivity. SARA also has experts in mass storage systems and in supporting MPI parallel-computing jobs.

The Tier-1 centre is part of BIG GRID, a Dutch e-science infrastructure. BIG GRID serves physics experiments as well as other disciplines.

Jeff Templon, NIKHEF

New talks format at HEPiX attracts more participants

The HEPiX forum unifies IT system support engineers from many high-energy physics (HEP) laboratories and institutes all over the world.

HEPiX meetings have been held since 1991 and are an excellent source of information for IT specialists. That is why some non-HEP organizations participate in them. Two meetings are usually held each year (during spring in Europe and autumn in North America).

The spring 2006 European meeting was hosted by CASPUR (the Italian Inter-University Consortium for the Application of Super-Computing for Universities and Research), and was held on 3–7 April in Rome at the central administration building of the National Research Council. The meeting was opened by CASPUR's director, Prof. Romano Bizzari, who explained the make-up and purpose of CASPUR.

Special meetings such as the Grid Deployment Board of the LHC Computing Grid (LCG), the LCG Optical Private Network working group, and one day dedicated to storage issues were held alongside the traditional HEPiX sessions, which brought the total number of attendees to more than 140.

Unlike previous meetings, this one mostly comprised half-day sessions on dedicated topics with invited speakers. The HEPiX board likes this new format and intends to continue with it at future meetings. There were 84 talks in total and the format attracted many new speakers and attendees. As in the past two HEPiX meetings in Europe, this meeting also attracted many representatives from LCG Tier-2 sites, from Europe especially.

Members of the board at the spring 2006 HEPiX conference in Rome.

Site reports

The meeting started with a series of site reports given by representatives from the various HEP institutes. The following are some of the main points raised during these sessions:

- Computer room cooling and air-conditioning systems were mentioned in most site reports, either at the rack or building level. Several sites are having to build or equip new computer rooms to get around capacity restrictions in existing facilities.
- Power consumption is a big issue everywhere and a criterion for most procurement.
- The choice of CPUs is shared between Opteron (at CASPUR, SLAC, the Rutherford Appleton Laboratory (RAL), Brookhaven National Laboratory (BNL), Fermi National Accelerator Laboratory (FNAL), the Paul Scherrer Institute (PSI), GSI and FZK of Germany, and LAL in France); and Xeon (at the Dutch National Institute for Nuclear Physics and High Energy Physics (NIKHEF), INFN-CNAF and CERN).
- For storage devices there is a slight trend towards storage-in-a-box in Europe; RAID 6 is getting ever more attention; Panasas systems (at BNL and Jefferson Lab) look good but have some issues; and tape-storage infrastructure is mainly based on the SL8500 tape library, and LTO3 and T10000 tape drives.
- The take-up of Quattor continues (this was mentioned by DESY, INFN-CNAF and LAL). DESY wants it to also manage desktop computers.
- For monitoring systems, this time only LAL mentioned Lemon (for monitoring the GRIF sites). Scaling issues were reported for Nagios at RAL and BNL.
- As for the Unix infrastructure, Linux has been adopted everywhere and DESY has moved to Scientific Linux 4 for services and laptops. GSI is continuing with Debian, migrating to Sarge (including support for 64 bit processors). Only Jefferson Lab seems to be continuing with a second Unix platform (Solaris).

General and personal comments

- Several benchmarks were presented with detailed overheads. These are quite useful for anyone interested in performance or costs.
- Collaboration on and reuse of HEP-developed tools was not strongly emphasized because it is now more or less taken for granted. There were several examples of wheels being reinvented for no clear reason.
- Among various topics, Indico seems to be a good experience (e.g. at DESY and LAL), Wikis are now commonly used, and Windows Terminal servers are becoming popular.
- Some tools that CERN/IT might want to look at more closely are: Imperia (for managing Web page content), which was mentioned in the PSI site report; and Subversion (a possible replacement for CVS for managing code), which has arrived at several HEP sites.

Plenary session

On day three the LCG Grid Deployment Board met in an adjoining room, and Les Robertson, the LCG project leader, took the opportunity to address the combined audience on the challenges of the WLCG, as the project has been renamed. The "W" signifies "worldwide" to denote that it now spans the globe using multiple grids, in particular Enabling Grids for E-sciencE in Europe and the Open Science Grid in the US.

The WLCG is a collaboration of some 120 computer centres spread over 20 countries; its funding was agreed in a memorandum of understanding that maps out operations over the next five years. Les also talked about the various bodies involved in the project, their composition and their functions. He showed overheads from the LHC experiments' technical design reports, which illustrated the computing models of the experiments, and showed how they will distribute, store and access experimental data across the Tier-1 and Tier-2 sites associated with each experiment.

Dedicated talks

Half-day sessions were held on the following topics: CPU technologies, network technologies, batch systems, database technologies, authentication technologies, and optimization and bottlenecks.

In his introduction to CPU technologies Bernd Panzer-Steindel discussed:

- Intel and AMD roadmaps of

decreasing chip size while introducing 64 bit, with an emphasis on virtualization;
- multicore issues: questions about how HEP will be able to use eight-core processing (which may be here in 2009 or later), and whether the community can use specialized heterogeneous systems such as the Cell processor with a PowerPC surrounded by eight DSP cores;
- game processors: whether the community can use them, their limited memory, and if there is a usable Linux;
- market trends: AMD chips have dominated the desktop in recent years and are making inroads in the server market; the rapid growth in the use of notebooks;
- costs: the major issue is the amount of memory required for HEP applications, which has a particular impact on multicore systems;
- benchmarks: it is necessary to consider real applications when comparing measurements. CERN openlab has developed low-level monitoring tools to understand what the CPU is doing at instruction level.

HEPiX'06 sessions were held at the National Research Council in Rome.

Participants continued their discussions during the coffee break.

Network technologies
This was the first time HEPiX had covered network technologies in detail and the talks were quite technical. These included topics such as GEANT2 (status and plan), using end-to-end technologies for LHC and the LCG Optical Private Network, and some results from a comparison of different TCP stacks and 10 GB Ethernet network interface cards (NICs).

Enzo Valente said that modern performance is good enough to start looking beyond bandwidth-on-demand numbers to what alternative protocols such as end-to-end can offer. He pointed out that good connectivity to countries such as India, Japan, China and Taiwan is important so that their physicists can participate fully in HEP; and he raised the issue of third-world countries and the digital divide, which was a hot topic at CHEP'06 in Mumbai (see the *CNL* April–May issue for a report on this conference).

Batch systems
For this session, convened by Tony Cass, a member of each of the four LHC experiments presented their computing model; for example, for ATLAS it is 1000 events per 2 GB file using a data-taking trigger rate of 200 Hz independent of luminosity. Each member then described the tasks to be performed at each Tier level and explained the batch infrastructure that would be required.

Database technologies
Dirk Düllmann introduced this session by describing how databases became commonly used in HEP environments, starting with RDBMS in the early nineties. Since then we have learned that databases should be used only for critical data that need database features. Dirk described how LCG databases are kept up to date by means of asynchronous replication via Streams. He compared the concerns of local and central site managers and how these must be reconciled to provide a reliable service.

Authentication technologies
Wolfgang Friebel provided useful information on this topic (available on the HEPiX website, see below). He listed major areas of work such as Kerberos, public key infrastructure (PKI), password synchronization across platforms, and single sign-on. PKI is becoming the favoured technology.

Optimization and bottlenecks
This session, introduced by Wojciech Wocjik, covered topics such as choice for the compiler, whether or not to use shared libraries at runtime, the choice of chips, and how to optimize the use of dCache and LCG Disc Pool Manager. Of particular interest were the talks by Rene Brun on code and compiler, including an analysis of problems; and Sverre Jarp's talk on the work done to analyse problems of performance, carried out in the framework of CERN's openlab collaboration with industry.

Meeting reports
A detailed report about the HEPiX meeting is available on the CERN Computing Seminar website at http://cern.ch/cseminar/2006/0421. The website also includes a trip report by Alan Silverman and slides of the presentation given by Helge Meinhard, Sverre Jarp and Luca Canali of CERN/IT. The CASPUR HEPiX spring 2006 webpage contains Alan's trip report as well as all of the talks, which can be downloaded in one file (see http://hepix.caspur.it/spring2006/agenda.php).

Future HEPiX meetings
The next meeting will be at Jefferson Lab, Virginia, US, on 9–13 October. The spring 2007 meeting will be held at DESY, Hamburg, Germany.

It is possible that the autumn 2007 meeting will be held at FNAL, and the spring 2008 meeting at CERN.

Alan Silverman, IT/DI; Nicole Crémel, IT/UDS

The deadline for submissions to the next issue of CNL is

4 August

E-mail your contributions to cnl.editor@cern.ch

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Users no longer require special password for AIS

Computer users at CERN now have the chance to reduce the number of passwords they need to remember. With the introduction of the Computer Resources Administration tool it is possible to use the NICE username and password to log on to AIS.

Users will soon be able to select this facility directly from the Change Password option on the AIS login. After that, when you log on to an AIS service your NICE password will be used for your authentication. For this to work you have to have the same log-on ID on NICE and AIS, which is now the case for most users.

A second password is still needed to sign documents in Electronic Document Handling (EDH). Your AIS/NICE log-on password is the key to access EDH, and the second password is the "AIS signature" password that you need to provide when signing a document – for example, when you approve a leave request. This password is your "digital signature", which replaces the written signature that was used in the past. For security reasons we recommend that you continue to have different log-on and signature passwords. There is no link between the AIS login password and the signature password, the two are unconnected.

Changing your AIS signature password is easy. From the EDH application, select Settings from the desktop then click the Authorisation Password icon. You will be asked to provide your "old" (current) signature password, and then to type the new password twice before submitting your request. Should you forget this password, call the helpdesk or send an e-mail stating that you need a new authorization password for signing documents.

Nicole Crémel and Roger Woolnough, IT/UDS

CERN tightens computer security

We would like to remind you of some measures that are being taken to improve security.

- Computer accounts are being blocked when registration at CERN expires. This was explained in the November/December 2005 issue of *CNL* (see www.cerncourier.com/articles/cnl/2/11/6/1). Details can be found at http://cern.ch/Computingrules/procedures/accountmanagement.php. This process will be applied to all staff in time, and recently started with the IT department.
- Users accessing mail servers at CERN are required to employ encrypted and authenticated protocols. This was explained in the last issue, see www.cerncourier.com/articles/cnl/3/4/7/1, and has been enforced for offsite access to CERN as of the beginning of June. It is planned to extend this to all access soon. Details can be found at http://mmmservices.web.cern.ch/mmmservices/Help/?kbid=191040.
- The need for authentication when accessing the LDAP server from offsite has also been enforced as of the beginning of June. This was explained in the last issue, see www.cerncourier.com/articles/cnl/3/4/5/1. For more information see http://mmmservices.web.cern.ch/mmmservices/Help/?kbid=022030.

SLC4 becomes default Linux version

Scientific Linux CERN 4 (SLC4) is now certified and, as of 31 March, became the default supported CERN Linux version for desktop PCs. We are encouraging all users and administrators to migrate to SLC4 as soon as possible. The previous release, SLC3, will be supported until October 2007 for 32 bit processors; however, support for 64 bit processors will cease at the end of 2006.

SLC4 is a CERN-customized Linux distribution built on top of a common base platform – Scientific Linux – which was in turn built from freely available Red Hat Enterprise Linux 4 sources by a joint Fermi and CERN effort. It is available for network installations and on CD and DVD (distributed through the IT bookshop, http://consult.cern.ch/books).

Plans for central clusters

As of October it is planned to change the default LXPLUS alias to go to SLC4 machines, and to migrate the current batch capacity to SLC4 in consultation with the users. Test machines are already accessible to users; please connect to LX32SLC4 for 32 bit machines and LX64SLC4 for 64 bit machines on LXPLUS. Some corresponding capacity is available in LXBATCH as well and will increase to match demand.

You will find more information on the CERN Linux website for SLC4 (https://cern.ch/linux/scientific4). Installation instructions are available at https://cern.ch/linux/scientific4/docs/install.shtml. For an overview of the certification process go to: https://cern.ch/linux/scientific4/cert.

More information on LXPLUS/LXBATCH running SLC4 can be found at: https://cern.ch/plus/SLC4.html.

The Linux team would like to thank all participants, especially the members of the Linux certification coordination body.

The CERN Linux team

Calendar

June

27–30 **21st International Supercomputer Conference (ISC2006)**
Dresden, Germany
www.supercomp.de

July

3–7 **EuroPython Conference**
CERN
www.europython.org

4–7 **26th International Conference on Distributed Computing Systems (ICDCS 2006)**
Lisbon, Portugal
http://icdcs2006.di.fc.ul.pt

15–19 **2nd Euroscience Open Forum (ESOF)**
Munich, Germany
www.esof2006.org

16–18 **GRIDNS 2006**
Silicon Valley, California, USA
www.iaria.org/conferences/ICNS06.html

August

21–1 Sep **CERN School of Computing (CSC 2006)**
Helsinki, Finland
http://cern.ch/CSC

29–1 Sep **European Conference on Parallel Computing (Euro-Par 2006)**
Dresden, Germany
www.europar2006.de

September

13–15 **HPCC-06**
Munich, Germany
http://hpcc06.lrr.in.tum.de

25–28 **Cluster 2006**
Barcelona, Spain
http://cluster2006.org

28-29 **Grid 2006**
Barcelona, Spain
http://people.ac.upc.edu/rosab/grid2006

25–29 **EGEE Conference**
Geneva, Switzerland
http://egee-intranet.web.cern.ch/egee-intranet/conferences/EGEE06

October

9–13 **HEPiX Autumn 2006**
Jefferson Lab, Virginia, US
http://conferences.jlab.org/HEPix