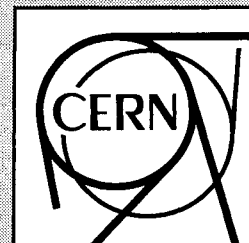


CERN COMPUTER NEWSLETTER



CERN - CN Division
CH-1211 Geneve 23
SWITZERLAND

JANUARY – MARCH 1996

No. 222 – “MIGRATION SPECIAL – MAIL ISSUES”

Contents

If you need Help	i	4 Desktop Computing	16
Letters from/to the Editor	1	4.1 Connecting between UNIX Machines	16
1 General	3	4.2 The UCO Command	17
1.1 The 1996 CERN School of Computing	3	4.3 Common Desktop Environment (CDE)	18
1.2 CERNSP Service Plans	4	4.4 The FVWM Window Manager	18
1.3 New Data Management Section in PDP Group	5	4.5 Netscape/UNIX version 2.0 at CERN	20
1.4 VMS 6.2 on VXCERN	5	4.6 PSS-05 FrameMaker and WebMaker templates at CERN	20
1.5 End of DXCERN Ultrix Service	6	5 Tutorial Section	21
1.6 PIAF New IP Address	6	5.1 UMTF Computing Tutorials	21
1.7 CPAN, the Comprehensive Perl Archive Network	6	5.2 Fortran 95	21
2 VM Migration—Issues for VMS and Unix Users	7	6 Text Processing	24
2.1 Tape Management Service (TMS) Migration to UNIX	7	6.1 Drawing Feynman Diagrams with $\LaTeX$ and METAFONT. Part 3: Extension Mechanism and Frequently Asked Questions	24
2.2 VMS Commands Affected by CERNVM Shutdown	7	6.2 A new Directory Structure for $\TeX$ Files	30
3 Mail Issues	8	6.3 National language support	32
3.1 Roadmap to MAIL Services	8	7 Questions and Answers from the UCO	33
3.2 How to Migrate your Mail out of CERNVM	9	7.1 General	33
3.3 Obvious Names, Generic Addresses and Preferred Email Addresses	10	7.2 Accounts and Registration	33
3.4 Mail Related Documentation	11	7.3 AFS tips	33
3.5 AFSmial and the Mailserver	12	8 Computer Documentation	34
3.6 Mailforwarding – Make Sure You Do Not “Lose” Mail	12	8.1 New Book Titles Available at the UCO	34
3.7 Accessing the Mailserver	13	8.2 New Reference Cards at the UCO	34
3.8 Mail Notification on Unix — Integration with the Mail Server	14	8.3 The UCO Reference Card Catalogue	34
3.9 Handling Mailing Lists — the “ListBox” Service	15	8.4 UCO Book Catalogue	35

Special Wide Distribution

Editorial Notes

Our Web home page is at <http://consult.cern.ch/cnls/>

Past experience shows that it is a good policy to have four CNL editions per year (one around Easter, one before and one after the summer, and the last one just before Xmas), unless the number of contributions makes it necessary to have a supplementary issue, or to cancel one. However, due to the shutdown of CERNVM at the end of June, we have decided this year to advance both the "easter" and the "summer" edition. We kindly ask our contributors to take note of

the date of the deadline for contributions to the next issue of the CNL:
(Last one before CERNVM shutdown !)

Issue number	Final date
223	Wednesday, 8th May 1996

Contributions to the CNL are accepted as plain text, although marked-up text in $\text{\LaTeX}$ is preferred. Articles, news items and letters intended for publication in the next issue should be sent **directly to the editor** (cnl.editor@cern.ch) without particular controls on the mail subject line.

The opinions expressed in this newsletter are those of the contributors and are not necessarily those of the CERN management. The editorial board reserves the right to edit, omit or hold-over copy due to lack of space.

This CNL issue is available on WWW at the URL <http://consult.cern.ch/cnl/222>

This document was produced with $\text{\LaTeX}$ and the `cerncnl` style. Compressed PostScript files, containing the complete printable version of this CNL or parts of it can be obtained by anonymous ftp to [asisftp.cern.ch](ftp://asisftp.cern.ch) as follows (commands to be typed by the user are underlined):

```
ftp asisftp.cern.ch
Name (asisftp:username): anonymous
331 Guest login ok, send your complete e-mail address as password.
Password: yourusername@yournode.domain.country
ftp> cd cnl/222
ftp> binary
ftp> get cnl222.ps.gz (or get cnl222.ps)
ftp> quit
```

Please note that, if you do not have the `gnu gunzip` utility on your system you can get the uncompressed PostScript Version by typing the command `get cnl222.ps`, without the `gz` suffix. In order to save Internet bandwidth, you are, however, strongly urged to try and install the `gunzip` utility since gzipped files are about three times smaller than their unzipped equivalents.

The following files related to the present CNL are available in that directory:

<code>cnl222.ps.gz</code>	Complete CNL	<code>edithelp.ps.gz</code>	Editorial and Help Pages
<code>general.ps.gz</code>	"General"	<code>vmmigr.ps.gz</code>	"VM Migration Issues"
<code>mail.ps.gz</code>	"Mail Issues"	<code>desktop.ps.gz</code>	"Desktop Computing"
<code>textproc.ps.gz</code>	"Text Processing"	<code>qa.ps.gz</code>	"Questions and Answers from the UCO"
<code>compdoc.ps.gz</code>	"Computer Documentation"	<code>f95.ps.gz</code>	"Fortran 95 Tutorial"

If you want to subscribe to the announcement of the PostScript version (in order to receive a mail when there is a new CNL ready as a PostScript file and available on `asisftp`), you can fill the form at URL: <http://consult.cern.ch/cnls/postscript.html> or directly send a mail (with your exact e-mail address) to the editor (cnl.editor@cern.ch).

If you want to receive a copy of the paper version of the CNL (at CERN or at your home institute) fill the form at URL: <http://consult.cern.ch/cnls/register.html> or send a mail (with your exact coordinates) to cnl.registration@cern.ch

N.B. You can also cancel your subscription in both cases by filling the appropriate forms all accessible from our Web page at URL:

<http://consult.cern.ch/cnls/>

Responsible editor: Nicole Cremel

Technical co-editor: Michel Goossens

IF YOU NEED HELP (Contacts at CERN)

Service	Name	Address	Telephone	E-mail Address
USER CONSULTANCY OFFICE (UCO)		513/R-052	4952	user.support@cern.ch
Opening hours: Monday 10:00-12:30 and 13:30-17:00, Tuesday-Friday 9.00-12:30 and 13:30-17.00				
All aspects	Miguel Marquina	513/1-017	4912	user.support@cern.ch
Accounting Service	Attila Koppanyi	513/1-019	4933	user.support@cern.ch
User Registration	M.C.Perler	513/1-017	5004	user.support@cern.ch
Consultancy Office	R.Woolnough	513/1-020	9156	user.support@cern.ch
Computer Book Selling Service	M.Franceschi	513/1-022	2371	user.support@cern.ch
CENTRAL COMPUTER OPERATIONS (24 HOURS)		513/R-066	5011	operator@cernvm
All aspects & IBM	David Underhill	513/R-035	4920	d.underhill@cern.ch
Central VAXes	Tim Whibley	513/R-033	4849	t.whibley@cern.ch
CERNSP	Harry Renshall	513/1-016	2377	h.rensall@cern.ch
CS-2	Eric McIntosh	31/3-023	4934,13+5584	e.mcintosh@cern.ch
CORE services - CSF	Vincent Doré	513/R-031	2397,13+3830	csf.support@cern.ch
CORE services - SHIFT	Gordon Lee	513/1-020	4974	g.lee@cern.ch
PaRC service	Pietro Martucci	31/S-022	8611,13+5553	parcsp@parcb.cern.ch
PIAF service	Thomas Pettersson	513/R-036	4919	t.pettersson@cern.ch
CERN PROGRAM LIBRARY OFFICE				
All aspects	Jamie Shiers	513/1-002	4928	cernlib@cern.ch
SP2, RS-6000 (AIX), VMS	Jamie Shiers	513/1-002	4928	cernlib@cern.ch
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Desktop Computing	Chris Jones	31/2-020	4884	chris.jones@cern.ch
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Tape Allocation to Experiments	Hansjorg Klein	13/3-024	2124,2060	hans.klein@cern.ch
Computer Science Library, mornings only	Jutta Megies	513/1-024	2379	j.megies@cern.ch

SERVICE URLs (WWW)

Service	URL Location
User Migration Task Force	http://consult.cern.ch/umtf/
Accounting Service	http://consult.cern.ch/accounting
User Registration	http://consult.cern.ch/uco/registration.html
Consultancy Office	http://consult.cern.ch/uco/
Computer Documentation Office	http://consult.cern.ch/uco/cobs/

ONLINE COMPUTING: See "ONLINE", the Newsletter of Data acquisition and Computing for Experiments,
Available from Anne Perrelle 31/1-003 2406 a.perrelle@cern.ch

COMPUTING FOR ENGINEERING: See the CERN Computing Support for Engineering Newsletter,
Available from Monique Tate-Lavergne 513/2-010 2863 m.tate@cern.ch

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DEC's OSF/1 s/w	osf.support@cern.ch	SGI software	sgi.support@cern.ch	Printers	printer.support@cern.ch
RS/6000 s/w	aix.support@cern.ch	Solaris s/w	solaris.support@cern.ch		
ULTRIX s/w	ultrix.support@cern.ch	X terminals	xterminal.support@cern.ch		

Please use generic electronic mail addresses whenever possible. These mailboxes will be read even when the usual specialist is absent. It is helpful to use relevant keywords in the *subject* field of your message. Contact specialists directly only for very urgent cases or for very general consultations.

<http://wwwcs.cern.ch/wwwcs/public/contacts.html>

Service	E-mail Address
Software and interface consultancy	John.Gamble@cern.ch or Mike.Gerard@cern.ch
Network infrastructure consultancy (backbone and FDDI)	Jean-Michel.Jouanigot@cern.ch or Marc.Collignon@cern.ch
Network infrastructure consultancy (Ethernet in buildings)	George.Smyris@cern.ch
Network security alerts (hacking attacks)	cert@cern.ch (if urgent: 160152) [5011 night/weekend]
General network operational problems	netops@cern.ch (if urgent: 4927 or 8665) [5011 night/weekend]
Specific Ethernet problems	ethernet.support@cern.ch or 2299
Internet (TCP/IP) registration requests	tcpip@cern.ch
LAT terminal server registration requests	lat.support@cern.ch (2299 for problems)
DECnet Registration Requests and Queries	decnet.support@cern.ch (dxmint::decnet-support)
Other registration requests	netops@cern.ch
Queries about electronic mail	mail.support@cern.ch
Novell coordination and general PC networking advice	nice@cern.ch
Advice on Macintosh networking	macnet@cern.ch (2299 for problems) [4366 for general Macintosh problems]

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Computing Colloquia	Auditorium / bldg 500	Sverre Jarp	CN	4944	s.jarp@cern.ch
Computing Seminars	CN Auditorium 31/3-005	Gunter Folger	CN	5010	g.folger@cern.ch
		Jean-Pierre Porte	ECP	3457	j.pierre.porte@cern.ch
Technical Presentations	CN Auditorium 31/3-005	Stanley Cannon	CN	5036	stan.cannon@cern.ch

Div.	Representative	Div.	Representative	Div.	Representative	Div.	Representative
AS	M. Draper	AT	P. Heymans	CN	A. Koppanyi	DSU	M. Draper
ECP	A. Grant	FI	S. Lauper	MT	Ch. Delamare	PE	D. Duret
PPE	H. Klein	PS	J. Riche	SL	A. Hilaire	ST	E. Sanchez-Corral
TH	R. Sommer	TIS	G.R. Stevenson				

Div.	Representative	Div.	Representative	Div.	Representative	Div.	Representative
AS	M. Moller	AT	R. Saban	DSU	M. Moller	ECP	J.-P. Porte
FI	J. Groz	MT	C. Andrews	PE	D. Duret	PPE	E. Pagiola
PS	I. Deloose	SL	P. Lienard	ST	P. Ciriani	TH	R. Sommer
TIS	B. Moy						

Letters from/to the Editor

“Migration Special – Mail Issues”

At the time of publication of this Computer NewsLetter, there will be fewer than 110 days left before CERNVM ends on June 30, 1996. One immediate and critical question that CERNVM users must ask themselves is:

How do I to move my mail away from CERNVM?

We hope that, with this issue of the CNL (222) – labelled “Migration Special – Mail Issues” – we will answer most of the questions users may have concerning this mail migration phase, which, unfortunately, cannot be processed automatically: users must choose first the machine on which they would like to process their mail in the future, and then the mail system they prefer to use; the mail migration process will depend on that. As you will see all the questions related to *Mail* are grouped in a special and separate chapter (Chapter 3, “Mail Issues”).

As we think that many people are concerned about these questions, it has been decided, by the CN management, to distribute exceptionally the paper version of this and the next CNL to a larger audience than usual inside CERN, i.e. taking the existing lists of registered users plus the distribution scheme used for the “Weekly Bulletin”. For this reason we will not yet use, for these issues, the new lists (CERN internal or outside users) for the paper version distribution. However, for the future, please note that it is still possible to register (or to cancel your registration) by filling in the form at URL:

<http://consult.cern.ch/cnls/register.html>

Finally, and still because of the official shutdown of CERNVM taking place at the end of June, we would like the next CNL (223) (which will contain a repetition of the most important messages, but also the very latest and up-to-date information) to appear on the users desks not later than the beginning of June. Therefore, we have decided to fix the deadline for contributions a little earlier than usual. We would like the contributors to take note of this deadline:

Wednesday 8th May

and I thank them in advance for respecting this date in order to fulfil the requirement of having the CNL 223 printed by the end of May.

Nicole Cremel CN/ASD, CNL editor

Document Migration and Processing

Dear UMTF working group,

I am, as I told you previously, very happy with the SP2 and have therefore even some confidence in a move to Unix over the next 5 years or so.

I cannot think of many VM things which are not available on the SP2, except perhaps SGML. At the moment one moves from VM/CMS to its ancestor, Unix, it may seem also logical to go from SGML to its ancestor, T_EX. But I don't like T_EX at all, and am very happy with SGML and would like to continue to use it. Is some kind of publicly accessible SGML foreseen? BOOKMASTER/SGML is presumably available for the SP2, but I would also be happy with another good quality product.

Rob Veenhof

Another user raised the same question, in a more general form:

How to process SGML documents on Unix? . . . and to obtain a PostScript file as a formatted output?

Peter Gorbunov, PPE

Dear Mr Veenhof:

I am afraid the answer will not be fully satisfactory to you. We publicised an article related to document migration in the last CNL issue (221 – section 1.6 “Migration out of Central Printing”). As you will see no SGML standard is foreseen to be supported except for the basic HTML (which probably will not make you happy).

See this article for all possible alternatives, which include, but are not limited to, E_T_X, WORD or FRAMEMAKER.

M.Marquina, CN/DCI (User Support).

Remarks from the text processing “expert”, as a complement of information:

"SGML" is like "FORTRAN", it is a language, not a system. If the question was "how will I be able to run my BookMaster documents on Unix", then the only answer is "impossible".

On Unix, several ways exist to use SGML on top of products like FRAMEMAKER and WORD, but, as commercial products, they cost money. There is also an excellent public domain product called SGMLS (or NSGML), which is a full SGML parser, for which you would have to write "style files" to get your documents printed.

On the other hand, HTML being a simple SGML application, if you are happy with its functionality, then you can also use it as markup language. Therefore your document will be immediately available on the Web, and you can obtain a more or less "acceptable" an output in PostScript. However, we are aware that the PostScript formatting is not very good and together with a technical student I am trying to develop ways to solve that problem.

In any case, as Miguel pointed out above, in the previous CNL (221) we have listed migration paths for various kinds of documents. I can thus only repeat that for a document containing a lot of mathematics $\text{\LaTeX}$ is a good choice and can be used in a generic way close to what you did with SGML. For other documents, you might prefer FRAMEMAKER or WORD. BOOKMASTER is NOT available on SP2, since IBM themselves now use INTERLEAF (another commercial product) for their documentation.

As a short conclusion I would say:

- *if your document still has to evolve, and is not too complex, then go to HTML;*
- *if your document is still to evolve and is quite complex (lot of mathematics, tables, ...) then go to $\text{\LaTeX}$ or FRAMEMAKER.*

Michel Goossens CN/ASD

1. General

1.1 The 1996 CERN School of Computing

Jacqueline Turner CN/DI and Carlo Vandoni CN/ASD

Watch the Web at <http://www.cern.ch/Physics/Conferences/C1996/CSC>

The 1996 CERN School of Computing is organised by CERN, in collaboration with ASCI and NIKHEF.

This year's School is a little different from usual. In recent years the programme has been structured into a number of important themes for modern computing systems. The first week of the school is devoted to themes of general relevance both inside and outside particle physics: the second explores a number of themes in more depth with particular reference to the current computing challenges facing the particle physics community.

In 1996, the first week of the school is being organised jointly with the ASCI organisation in the Netherlands. ASCI is an Inter-University Graduate Research School set up by Dutch Universities to coordinate research and training in the area of Computing and Imaging Systems. The first week of CSC'96 will, therefore, be combined with the ASCI Summer School.

1.1.1 Date and place of the School

The nineteenth CERN School of Computing will be held in the Hotel Zuiderduin, situated near the sea in the village of Egmond aan Zee, from Sunday, 8 September, to Saturday, 21 September 1996.

1.1.2 Scientific programme

The programme will be dedicated to the following themes:

- **Imaging**
- **Parallel and Distributed Computing**
- **Networks and Electronic Highway**
- **Data Acquisition Systems**
- **Collaborative Engineering and Simulation**
- **Detectors/Imaging**
- **Modern Programming Language Trends**

The first three themes will be covered in week one with the participation of the ASCI students. There will be tutorial sessions during both weeks and the tutorial topic for week two will be "Programming Web Applications in Java".

The total number of lectures will be 41. Exercises and demonstrations will be a complement to these lectures.

Imaging

Imaging systems, image processing and analysis, and image recognition and understanding have come a long way in the past 40 years. In the Imaging track of the 1996 CERN School of Computing, the modern developments will be stressed in

six two-hour lectures. Starting from an introduction to 1) Modern Imaging Systems, followed by a presentation on 2) Image Filtering Techniques, advanced techniques will then be presented in a number of areas that are directly relevant to physics applications. The presentations will cover 3) Model-Based Image Analysis, 4) Coding Techniques for Image Compressions and Image Sequences, image recognition through 5) Neural Networks, and image representation and processing through 6) Scale Space Techniques. Associated with the lectures will be an extensive series of "hands-on" laboratory experiments that are to be performed by the participants.

Parallel and Distributed Computing

Parallel and distributed computing is in a very tumultuous stage because of the ever increasing speed of processing and communication and size of memory and other storage devices. This has a large impact on the design and the use of parallel and distributed computing systems. In two series of three lectures the state of the art in hardware and software system development will be presented. One series will present the status of parallel machines and their applications, the other will put emphasis on the state of the art in distributed operating system technology.

Networks and Electronic Highway

This series of lectures will present the state-of-the art in networking technology, in particular recent advances in high-speed solutions including ATM. It will also present an overview of the major applications on the emerging information highways, with a particular emphasis on multimedia developments.

Data Acquisition Systems

Designing and implementing distributed applications can be a daunting task, the developer has to deal with a number of difficult issues, concerning program complexity, concurrency and parallelism. Computer science researchers have been working to produce tools and methods to help the programmer with them: Operating Systems, Programming Languages and Formal Methods. We will give an account of these research efforts, and their practical outcomes, in three talks:

1. Distributed Operating Systems
2. Micro-Kernel Operating Systems
3. Distributed Object Oriented Programming and Formal Methods.

Collaborative Engineering and Simulation

The emergence of Collaborative Engineering, illustrated by LHC problems, will be discussed, tools and strategies for co-operative work presented – the WWW, videoconferencing, sharing knowledge, etc. – Computer Aided Design and Product Data Management techniques and methods described. The realisation of the LHC machine and its experiments represents a great challenge and calls for the most advanced technical resources.

Detectors/Imaging

Applications of the concepts of visualisation and imaging to problems in High Energy Physics will be shown in four one-hour lectures. Visualisation of results of particle interactions and use of imaging techniques for fast selection in trigger processing will be addressed.

Modern Programming Language Trends

This theme picks out three interesting trends in the development of programming languages.

1. Object-oriented technology
O-O methodology is becoming of increasing importance in the design and coding of significant software systems.
2. High Performance Fortran
The use of distributed-memory multi-processor systems is important for the solution of large-scale scientific problems. HPF allows the programmer to dictate the placement of data to obtain high performance on such systems at the same time as maintaining a high level of abstraction.
3. Functional Skeletons
The use of functional techniques applied to imperative language programming is a potentially important new

development. This topic explores progress in this exciting new area.

The final part of this theme is the provision of tutorial laboratory sessions on programming WorldWideWeb applications with Java. Java has been adopted by all the major Internet applications developers and is likely to be of increasing importance in the next decade.

1.1.3 Participation and Language

Participation

This year the CERN School of Computing will be combined with the Advanced School of Computing and Imaging (ASCI), and is open to post-graduate students and research workers with a few years' experience in elementary particle physics, in computing, imaging, or in related fields. The number of participants will be of the order of 110; about 70 participants will come from CERN or from laboratories closely associated with CERN ("non-ASCI" students) and about 40 students from laboratories belonging to ASCI ("ASCI" students). Most of the ASCI students will participate only in the first week of the School.

Language

The working language of the School will be English. There will be no simultaneous translation. Participants should therefore have sufficient understanding of English to enable them to benefit from the School.

1.1.4 Application

All details concerning application (registration, cost, cancellation, enquiries and correspondence) for both non-ASCI and ASCI students can be found on the Web.

1.2 CERNSP Service Plans

Harry Renshall CN/PDP

Several important developments are underway on the `cernsp` service. Firstly the PaRC engineering service has been absorbed into it. For interactive work, PaRC users should login to interactive nodes as normal `cernsp` users. For batch work, either using `loadleveller` or their special `ride` command, they have eight dedicated SP2 nodes, and we have started to merge the previous eight-node SP1 system of PaRC as the seventh frame of the SP2. This has reduced the number of batch nodes for normal users, so, in compensation we have bought twelve new IBM 850 `powerpc` nodes and are integrating them into the `cernsp` service. These nodes are a different cpu chip but are fully binary compatible, except when special compiler architecture optimisation flags are used (e.g. `hepf77 -qarch pwr2`.) To allow for this, we will be intro-

ducing `loadleveller` parameters requiring work to execute on the right nodes. The new `powerpc` nodes do not connect to the high speed switch and will not perform well for data intensive work, so we are also introducing `loadleveller` parameters to allow jobs with low input/output requirements to be preferentially run on these new nodes. These will all be documented in the next release of the "*CERNSP Introductory User Guide*".

Finally we are planning to migrate the whole `cernsp` cluster from version 3.1 of the AIX operating system to version 4.1. We have already blocked off nine nodes and are running the new AIX on them with selected test users. We hope to migrate the whole cluster before the end of March in order to

have a stable service before the accelerators restart. Please subscribe to the `cern.cernsp` newsgroup if you want to be

kept informed about all these developments.

1.3 New Data Management Section in PDP Group

Fabrizio Gagliardi CN/PDP

In order to adapt to the evolution of the data management services provided by the PDP group in CN and to make the best use of the available resources, both PDP sections formerly dealing with the hardware and the software aspects of data management have been merged into a new section called DM (Data Management), led by Fabrizio Gagliardi.

The major activities of this new section are:

- Management and operation of the tape volumes in the computer centre vault and associated tape and robotic devices
- Introduction of a fully automated service based on modern commercially available robots and high density tapes
- Migration of user data to high density media
- Migration of TMS and all other production utilities from VM to Unix
- Continued support of data services for the current experiments
- Evolution of the CORE data service architecture towards the requirements of new experiment such as NA48, NA49, LHC test beams etc.
- Consolidation and evolution of the Central Data Recording service
- Investigation and prototyping of HSM systems
- Collaboration with LHC experiments and projects such as RD45 on the evolution of the general data management models.

A series of internal technical discussions to review the current activities and to plan future developments has been started with the participation of external experts from CN division and outside. The first two subjects have been TMS and the Tape Automation project. Other subjects will follow in the near future.

The section is composed of the following staff: David Asbury, Marisa Barja, Jean Philippe Baud, Charles Curran, Lenny Hoejenbos, Antonio Maver, Richard Minchin, a French co-operant Stephane Gonthier and a technical student Claire Redmond.

User contacts:

- General tape vault operations and management:
C. Curran, Lenny Hoejenbos and R. Minchin.
- Stager and general tape software: J-P. Baud
- TMS: M. Barja and A. Maver
- Central Data recording: M. Barja and F. Gagliardi
- Evaluation of new HSM software:
D. Asbury and A. Maver

Two Majordomo lists have been set-up to report problems and explain solutions: TAPESW and TAPESW-SUPPORT.

- TAPESW is a moderated list (J-P. Baud moderator) for sending all comments for tape related software: TMS, Tape, Stager and Copytape.
People can subscribe to the list by sending a mail to: `majordomo@listbox.cern.ch`
The body of the mail should contain:
`subscribe tapesw`
To withdraw send a mail with: `unsubscribe tapesw`
- TAPESW-SUPPORT is for reporting problems or ask questions related to tape software. This is the recommended way to submit problems, since the list is always monitored and individual answers guaranteed (even in case of responsible people being absent).

1.4 VMS 6.2 on VXCERN

Christiane Letertre CN/DCI and Tami Kramer PPE/LE

VMS 6.2 was installed on the VXCERN cluster on 2 March. A full list of the new features offered by this system can be obtained with the command `HELP V62_FEATURES`. The main new capabilities are:

- BOOT and LOGIN have been added as keywords to the

/BEFORE and /SINCE qualifiers of many commands.

- MAIL supports partly the Internet format for user addresses. You may now send mail using the address format `USER@NODE.ORG.DOMAIN`. Use the MAILFWD command for this purpose:

`MAILFWD USER@NODE.ORG.DOMAIN`

1.5 End of DXCERN Ultrix Service

Judy Richards and Dietrich Wiegandt CN/DCI

After many years of faithful service the dxcern Ultrix service will be stopped towards the end of 1996. We are aware of the fact that dxcern is still serving many users, but we are forced to take this decision for several reasons, e.g.:

- Digital is encouraging Ultrix users to migrate to Digital Unix, which provides a richer environment, and is under active development, whereas Ultrix support will only consist in fixing existing bugs,
- the availability of other public Unix services at CERN: cernsp and HPPLUS,

- a DEC PLUS Service running Digital Unix (formerly OSF/1) planned for spring or early summer 1996,
- the need for rationalisation as resources, especially manpower, shrink.

As of mid-March, group administrators will no longer be able to register accounts on dxcern, and people wishing to get such an account will have to contact the UCO.

If these plans seriously inconvenience you, please let us know in time so that we can get together and talk about alternatives.

1.6 PIAF New IP Address

Dino Ferrero Merlino CN/ASD

On 15 February 1996 the HP-PIAF machines have had their IP addresses re-numbered. This will have the unfortunate effect that users of the PROduction version of PAW will, from that time on, have to CONNECT to PIAF using the command:

```
PAW> connect node=piaf1.cern.ch
```

otherwise PAW will reply

‘‘*** Server does not answer’’.

The default NODE value in the connect command is now piaf1.cern.ch.

N.B. Users of the 96a release of the CERN program library will be able to use the simple “connect” command as before.

1.7 CPAN, the Comprehensive Perl Archive Network

Michel Goossens CN/ASD

For the ever growing number of Perl users at CERN it is without doubt interesting to know that (in analogy with the CTAN archives for T_EX) there now exists “CPAN” (Comprehensive Perl Archive Network) whose aim is to be *The* Perl archive, i.e. the only Perl archive one will ever need to consult to find Perl code and information.

At present CPAN is still very much under construction and, since there are many Perl-related resources spread across the Internet and it will probably take some time before all of them will end up with a copy on CPAN.

The basic principle of CPAN is “being distributed”. It would be quite frankly impossible to coordinate the numerous resources so that all the people contributing Perl material would enter their contributions into some central site. Therefore, most of the contents of CPAN is mirrored from other sites, with CPAN just pulling all the various resources together and presenting them as a (hopefully) coherent whole.

Files on the server are classified in the various categories:

- recent additions;

- modules/extensions sorted by author;
- archives of the comp.lang.perl.announce Usenet newsgroup;
- documentation;
- various index views of CPAN;
- miscellanea;
- modules/extensions;
- non-Unix Perl ports, both as executables and source;
- do not reinvent the wheel if you can avoid it (please check whether someone somewhere has already coded the script you are planning on writing);
- source code and patches for Perl itself (and for some auxiliary utilities)

The URL <ftp://ftp.switch.ch/mirror/CPAN/README.html> is the home of the Swiss CPAN node. Many other sites (in Europe, N. America and elsewhere) exist (see the file CTAN.html at the above URL to choose the node closest to you. The master CPAN site is at FUNET (Finland, Europe) (<ftp.funet.fi>).

2. VM Migration—Issues for VMS and Unix Users

Special Chapter

2.1 Tape Management Service (TMS) Migration to UNIX

Maria Luisa Barja CN/PDP

A milestone in the process of migrating CERNVM onto a Unix workstation environment has been reached. The new version of the Tape Management Service, TMS, is since the evening of the 21st of January running under Unix.

The TMS software is currently running under Solaris 2.4. on a Sparc 20. The interface to TMS, the System Service Request facility SYSREQ, is also running under Solaris 2.4. on a Sparc 5 architecture. The database management system used for the access and manipulation of the TMS data is Oracle 7.2, and the data is stored over 3 x 1GB Sparc Storage Array mirrored disks. On-line backups of the data are taken daily, and an off-line backup is performed weekly.

An interface to the Unix service is running on CERNVM, which enables users to issue TMS requests from this platform. However, given the imminent shutdown of this service (scheduled for the end of June), users are encouraged to port their VM applications to Unix.

2.2 VMS Commands Affected by CERNVM Shutdown

Christiane Letertre CN/DCI and Tami Kramer PPE/LE

Several VMS commands will be affected by the shutdown of CERNVM. These commands are of 3 different types.

Type 1: Commands explicitly communicating with CERNVM.

The following commands will no longer work after the shutdown of CERNVM:

- SUBVM – to submit a batch job to CERNVM,
- RDRLIST – to look at files created by execution of commands on CERNVM,
- All CLIO commands – to access CERNVM tapes/files,
- VMSTAGE, VMQUERY – mainly used by CLIO users,
- any INTERLINK commands.

Type 2: Commands implicitly using CERNVM which will be replaced.

After the shutdown of CERNVM, these commands will either be replaced by another facility or will have a reduced capability:

- GRPLOT – to send plot to various plotters. It will work only for
/PRINTER=AOCOLOUR
- PHONEB – To get a selected list of phone numbers. It will be replaced by a WEB facility. Use a Web browser with URL:
<http://xwho.cern.ch/WHO/combined>
- FIND – To get information on selected KEYWORDS. It will be replaced by a WEB facility.
- XPRINT – To print files on any CERN printers. It will only work if the /LW qualifier is selected.

This utility is now replaced by WPRINT which offers for all printers directly connected to Appletalk and Ethernet the same formatting capability previously offered by XPRINT without /LW. As much as possible, compatibility with XPRINT has been preserved.

To use WPRINT, you can either:

- Replace XPRINT by WPRINT in your printing commands
- Define a symbol XPRINT == "WPRINT"

Type 3: Commands implicitly using CERNVM which will not be replaced.

After the shutdown of CERNVM, these commands will no longer be available:

- SGML – uses the SGML command on CERNVM.
- BOOKIE – uses the BOOKIE command on CERNVM.
- XSCRIPT – uses the XSCRIPT facility on CERNVM.

Three alternatives are possible:

1. Get a good-quality copy of the document on one printer and keep it as an original for making future hardcopies.
2. Translate the document, if not too complex, to HTML format.
3. Translate the document to ~~LT~~EX.

See CNL 221, section 1.5.3 ("Migrating your Documents") for further details.

- PRHELP – extracts part of HELP files in SGML format.

3. Mail Issues

Special Chapter

3.1 Roadmap to MAIL Services

Miguel Marquina CN/DCI

3.1.1 What are my choices at CERN?

The main criteria you should use when choosing your preferred MAIL service are:

- the combination Desktop/Operating System with which you feel most comfortable;
- the need to process your mail from more than one location, including from outside CERN if necessary on occasions.

The following is a summary of the current choices at CERN, with their corresponding association to centrally provided services.

Currently recommended options

1 - Unix Mail Agent – MailServer

This is the Internet-based solution. The currently recommended Unix Mail Agents matching this service are *pine* and *Netscape*.

You can:

- connect to the service remotely and process your mail from both inside and outside CERN;
- forward your mail to another destination;
- work over low speed lines (using *pine*) as well as over the internal CERN network (with both *pine* and *Netscape* assuming you have a graphical terminal, or using *pine* only if you have only a simple "dumb" terminal).

2 - Microsoft Mail (MS Mail) – NICE

This is the PC-based option (later to be replaced by Microsoft Exchange). It provides standard mail facilities, except that you cannot:

- connect remotely and look at your mail;
- forward your mail to other destinations.

3 - QuickMail 3.5 – Mac environment provided by AS Division

This again provides the standard mail functions, but you have to buy a licence (180 CHF).

You can:

- connect to the CERN Appletalk network (including external access through CARA¹) from any Mac to process your mail;
- forward your mail to another computer.

but you cannot:

- even with a MAC, connect to QuickMail from offsite without MODEM access to the CARA Service.

3.1.2 How do I select one of them?

Now that you know what you can expect from each service, it should be much easier for you to match your choice to your needs. Many people will fall in one of these two situations.

I only care about my mail when at CERN

You are generally not directly involved in the research activities but require to use electronic mail as a means of communication with colleagues, e.g. administrative or technical support staff.

In this case your main consideration should be what you have on your desk: a PC, Macintosh, a Unix box (workstation or X-terminal) or a Falco terminal would naturally determine your choice.

I would like also to process my mail from outside CERN

You are probably a physicist, engineer or manager involved in the research activities of the Laboratory. There are two acceptable choices.

• TCP/IP Network

This is the case when you use connectivity tools such as *telnet* from another computer elsewhere.

Appletalk is a different network protocol so *QuickMail* drops out, and so does *MS Mail*. Only the *MailServer* solution remains.

• MODEM

This is the case if you use standard telephone lines to request a connection (from your home, or your portable computer while away from CERN).

You may use *QuickMail* only if you have a Mac (portable or at home) and have registered on the CARA Service.

Otherwise you are left with the *MailServer* option.

A more detailed description of the technical differences between the various mail services can be found in the UCO Reference Card 50, "Cross-Reference for Mail Services at CERN", which is also available at the URL <http://consult.cern.ch/writeup/refcard50>

¹ CARA stands for "CERN Appletalk Remote Access". It is a communication protocol to allow connectivity to remote Apple computers.

3.2 How to Migrate your Mail out of CERNVM

Judy Richards CN/DCI

3.2.1 Migrating to Microsoft Mail or QuickMail

Since these are well established services, you will find the documentation you need already available.

1. The use of Microsoft Mail is described in Chapter 9 of the NICE User's Guide, English and French editions of which are available on request from the UCO, tel 4952, email, User.Support@cern.ch
You will need to contact your local Novell Administrator in order to get your personal mailbox created.
2. If you choose to move to QuickMail, you will have to install it on your Mac. Instructions for doing this, and access to the documentation can be obtained on the Web at URL, <http://asserv.cern.ch/quickmail/>.
3. In order to ensure that mail which is still being sent to your old CERNVM email address will be forwarded to your new address, you should execute the `mailfwd` command on CERNVM, for example
`mailfwd jrichards@cn.msm.cern.ch`
`mailfwd Judy.Richards@macmail.cern.ch`
4. Once you are confident with your new environment, don't forget to 'announce' the change in your email address by changing your `emdir` address to point to your new mail address. You can do this with the command `emdir` on CERNVM.
5. There are no automatic tools available for moving VM notebooks and NAMES files to the PC or Mac.

3.2.2 Migrating to the MailServer

The mailbox for your incoming mail will be on the MailServer and your email address will be

`userid@mail.cern.ch`

You will access your mail from any Unix service, normally one of the public Unix services, `cernsp`, `HPPLUS`, or from your private workstation.

1. Make sure you have a MailServer account;

- use `xwho` or the web to check whether you already have an account on a public Unix service and the MailServer. If you do, you will see something like

Service	Logon_id	uuu\$gg	uid	gid	Last	logon
AFS	JUDY	***\$CP	663	1020	01-mar-96	
==> CERNSP	JUDY	JAR\$CP	663	1020	01-mar-96	
CERNVM	JUDY	JAR\$CP			01-mar-96	
CSF	JUDY	JAR\$CP	663	1020	19-jul-95	
DXCERN	JUDY	***\$CP	663	1020	22-feb-96	
HPPLUS	JUDY	JAR\$CP	663	1020	16-feb-96	
==> MAILSERV	JUDY	***\$CP	663	1020	Not known	

Many people have had a MailServer account created for them as part of a mass registration procedure.

- if you do not already have an account on one of the public Unix services, contact your group administrator to get one. If you have no special requirements, get an account on `cernsp`. You will automatically get a MailServer account at the same time.
- if you have a private workstation from which you want to read your mail, get your group administrator to add this to the list of hosts from which you are authorized to access the MailServer.

2. If your Unix account is not brand new, before starting to handle your mail, on your Unix account, enter the command

`mailmigrate`

This ensures that your *pine* configuration (`.pinerc`) and forward files (`.forward`) are correctly set for using the MailServer. (If your Unix account was created some time ago, you may have settings which are not appropriate for use with the MailServer.)

3. Decide whether you want to use *pine* or *Netscape* to handle your mail.

- *pine* offers essentially the same functionality as mail on CERNVM,
 - has a keyboard interface (although the mouse can be used for basic 'cut and paste')
 - can be used from any type of terminal, even over slow lines
- *Netscape* offers a full GUI interface
 - uses an X-based interface, and consequently needs an appropriate terminal and a good network connection
 - is quite new, and as such we have limited experience with it

4. You can try both of them out (but one at a time please) by sending mail to yourself at

`userid@mail.cern.ch`

5. Moving between use of *pine* and *Netscape* is possible, but requires extra knowledge and care, so you are advised not to do this initially (see the *Netscape* FAQ at the URL <http://consult.cern.ch/uco/netscape>).
6. Once you have made your choice and are reasonably comfortable with it, set up a forward from your 'old' mail address on CERNVM to your new MailServer account. On CERNVM issue the command

mailfwd userid@mail.cern.ch

7. Once you are confident with your new environment, don't forget to "announce" the change in your email ad-

dress by changing your emdir address to point to your MailServer account. You can do this with the command `emdir` on either CERNVM or one of the central Unix services.

3.3 Obvious Names, Generic Addresses and Preferred Email Addresses

Dietrich Wiegandt CN/DCI

3.3.1 Introduction

It is now possible to use addresses of the form

`Firstname.Familyname@cern.ch`
e.g. `Judy.Richards@cern.ch`

in place of traditional email addresses of the form

`userid@computer.cern.ch`
e.g. `judy@cernvm.cern.ch`

The condition is that **you** have set your preferred email address in `emdir` to point to the `userid` and `computer` where you want to receive your mail.

Since this type of email address will not change (unless you change your name!), you are recommended to use it on your business card, when people ask for your email address, in your personal addressbook and in your mailing lists.

To find out more details, read on...

3.3.2 Generic Addresses – what are they and why are they useful?

Think of a telephone directory – it lists correlations between people's names and their telephone numbers. In much the same way a directory exists at CERN giving the correlations between people's names and the addresses of a computer mailbox where they want to receive their electronic mail. This directory is called EMDIR for Electronic Mail DIRectory.

The main purpose of this directory is to allow you to use electronic mail addresses for CERN users which are:

- fairly easy to guess if you know the name of the person at CERN, and,
- have a longer "lifetime" than a "real" electronic mail address that is tied to a particular computer or a group of computers.

This form of address is called "generic address", sometimes also "obvious" or "user-friendly" address. The "generic address" is meant to go on your business card and into addressbooks for electronic mail. An example for a generic address is:

`Alan.Silverman@cern.ch`

Generic addresses are used in EMDIR in the same way as someone's name and address in a telephone directory. A "generic address" consists of two parts as all electronic mail addresses do: a username part and a domain part glued together with the character "@". Lower- or upper-case letters are treated identically.

The domain part is simply:

`cern.ch`

and the username part is the "obvious name".

Obvious names are constructed from data in the Computer Centre Data Base CCDB, where all people using one of the central computing services (and others) are registered. The basis for the construction of the obvious name is data provided by the CERN administration for the person concerned (usually corresponding exactly to what is written in the person's passport). An obvious name consists of a firstname part and a familyname part joined together by a '.' (period) character, e.g.:

`Philippe.Dupont`

However there are many people who are better known by a shorter or more familiar version of the firstname written in their passport, e.g. Mike instead of Michael, Nick instead of Nicolas, Jeff instead of Jeffrey and so on. Others may not like the transcription of a Russian or Indian firstname into a French or English version. These people can have a "preferred first name" registered in the CCDB by their group administrator. Thus, both

`Michael.Someone`

and

`Mike.Someone`

would then be valid obvious names.

The case of multipart firstnames and/or multipart familynames is a bit more difficult to handle. The automatic generation of obvious names will use a period character '.' everywhere between parts of the obvious name, so the obvious name of Mr. Juan Fernandez de las Vegas will be:

`Juan.Fernandez.de.las.Vegas`

Note that only spaces between parts of the name are replaced by periods, other separators will be preserved unchanged, i.e. the obvious name for Ms. Marie-Claire Noelle-Neumann will be:

`Marie-Claire.Noelle-Neumann`

3.3.3 Preferred EMail Addresses

When you use the telephone directory, you are “converting” name information into a telephone number. Similarly computer programs can use EMDIR to convert a “generic address” to a real computer mailbox address.

The address of the mailbox which in our analogy corresponds to the telephone number is called PEM (Preferred EMail address) and has the form:

`valid_loginname@some_real_machine`

e.g.: `dietrich@dxcern.cern.ch`

Unlike a telephone number that is given to you by the telephone company, you can choose your Preferred EMail address (PEM). If you move house and need a new telephone number you make a request to the phone company. If you move to a new computer for handling your mail, it is up to you to change your PEM. You can change it using the `emdir` command or your group administrator can change it using `user-reg`. Unfortunately there is no easy way to check the validity of the information being entered in EMDIR.

One mistake that is happening quite often is to set the PEM to the generic address, but that creates a circular definition as if you would have your telephone number in the telephone directory replaced by a reference to your name.

DON'T PUT IN EMDIR AN ADDRESS ENDING IN
@cern.ch

or your PEM address will be “out of order” for at least one day. Usually the faulty PEM is detected the following day and

replaced by the one before the erroneous change, but there is again a delay before this modification becomes effective and mail can be delivered.

3.3.4 Converting Generic Addresses into Preferred EMail Addresses

The conversion of a “generic address” into a “preferred email address” and the subsequent routing of electronic mail to this address is taking place on the MailServer. The conversion procedure starts by trying a very efficient exact match using the whole generic address as a pattern to search for. Should the exact match fail, a program will be run that tries to do its best to find an approximate match for the given obvious name². It is therefore much more efficient and less demanding on the resources of the MailServer to send mail to

`Alan.Silverman@cern.ch`

(exact match)

than to send it to

`A.Silverman@cern.ch`

(fuzzy match).

If you want to check before sending mail to a generic address that an obvious name is valid you should send mail to

`cerndir@cern.ch`

specifying not more than one (possibly incomplete) obvious name to check for on the Subject: line of your mail and zero or more (possibly incomplete) obvious names (one per line) in the message body.

3.4 Mail Related Documentation

Miguel Marquina CN/DCI

In addition to the articles in this newsletter, you will find all the documentation relevant to the mail service at CERN via the URL <http://consult.cern.ch/dci/mail>.

Below is a list of those which are likely to be of most interest:

- **Quickmail on Macintosh**

- *QuickMail at CERN*
<http://asserv.cern.ch/quickmail/>

- **Microsoft Mail on PCs**

- *NICE User's Guide*
English and French editions on request from the UCO, tel 4952, email User.Support@cern.ch.

- **pine on Unix**

- *Introduction to pine for CERNVM users*
<http://consult.cern.ch/writeup/refcard23>

- *Migrating Names Files and Notebooks from MAIL/VM to pine*
<http://consult.cern.ch/writeup/refcard24>
- *pine Key Reference for VM mail users*
<http://consult.cern.ch/writeup/refcard29>
- *UMTF Tutorial – Handling your Mail on Unix with pine*
<http://consult.cern.ch/umtf/training/95-11-15/>
- There are also sections on *pine* in the *CERNSP Introductory User Guide*.
<http://consult.cern.ch/writeup/cernspintro>
and in *A user guide to HPPLUS*
<http://consult.cern.ch/writeup/hpplusug>

- **Netscape** The recent release of *Netscape*, Version 2, contains a mail interface that can be used in conjunction with the MailServer. The Unix version

²For historical reasons the syntax that this program accepts is unfortunately different from the one used for the automatic generation of obvious names for multipart familynames. To guide the program to find the boundary between the firstname part and the familyname part the convention is that the last occurrence of the period (.) character delimits the firstname part. So at present the program will not find a match for the incomplete obvious name `de.las.vegas` but it would be able to find a match for `de-las-vegas` because it is not confused by “misleading” period characters. We are working on a solution with compatible syntax.

of *Netscape* has been configured to allow users with **MailServer** accounts to access mail that is sent to them on the **MailServer**. Since this product has only been very recently released (early February), experience with it so far is limited. However, if the experience continues to be positive, it is our intention to recommend it as the graphical user interface for Unix mail, as an alternative to *pine*. If you would like to try

it, consult the document:

- *Netscape/Unix at CERN*
<http://consult.cern.ch/uco/netscape>

- **The MailServer**

- *Introduction of a New Service: The Mail Server*
http://consult.cern.ch/dci/mail/doc/mailserver_intro

The remaining articles in this chapter are mainly of interest to users who have accounts on multiple central computers and/or are moving their mail to Unix.

3.5 AFSmail and the MailServer

Judy Richards CN/DCI

We have made life confusing – our apologies! When the desktop Unix and AFS home directory service was set up, we foresaw putting mail “inboxes” in AFS. This could be done by sending mail to `userid@afsmail.cern.ch`.

After some experience with this and observing usage patterns, it became clear that this solution was not going to scale to a community as large as CERN, due to the way caching works in AFS. There would simply be too much network traffic. We therefore had to come up with an alternative solution, which is the **MailServer**.

People who are already using **afsmail** will have to move to the **MailServer** at some point in time, but there is no immediate pressure to do so. Our highest priority for the moment

is to move users away from CERNVM mail.

People still using CERNVM mail should go directly to the **MailServer**, not **afsmail**. Many people, just starting to use Unix for their email, had their accounts created some time ago, many as a result of mass registration. The email configuration they got at the time may not be the right one for today.

So, if you are sure that you have been registered on the **MailServer** and you want to use *pine* to handle your mail, before you start, issue the command “**mailmigrate**” which will ensure that your *pine* configuration file (*.pinerc*) and forward file (*.forward*) are correctly set for using the **MailServer**.

3.6 Mailforwarding – Make Sure You Do Not “Lose” Mail

Dietrich Wiegandt CN/DCI

Many of you have accounts on several computers at CERN but not all of you may be aware of the fact that this also means there is a valid mailbox address that goes with your home directory on these computers. For example, if you have a home directory in AFS you have a mailbox addressed as

`your_loginid@afsmail.cern.ch`

which is valid on all machines that are AFS clients and have their users’ home directories stored on AFS. You may still have an account on say, CERNVM, VXCERN, or dxcern, and a new one on the **MailServer**. How do you make sure that

- you collect all mail that is sent to one of your mailboxes in one place,
- you avoid that mail goes back to the sender because you have arranged by bad forwarding requests that the message bounces between two of your valid mailboxes?

Here is a proposal for attacking the problem in a systematic way:

- 1) Make a list of all your valid computer accounts (use e.g. `xwho`).
- 2) Decide on which computer(s) you want to read your mail.
- 3) Identify the computer on which you want your mail to be delivered. This computer is your “mail target”.
- 4) If you want to (or have to) read your mail independently of where you are logged in, e.g. because you are a user of a cluster of machines, for example `cernsp`, use the **MailServer** (`mail.cern.ch`) as your mail target.
- 5) On all other computers where you have an account you should activate mailforwarding using the address:
`your_login_id@your_mail_target`
for example:

`fred@mail.cern.ch`

if your “mail target” is the **MailServer** and you own the **MailServer** account “fred”

No forwarding should ever be established on your mail target except in the case of the mandatory AFS forward (see below). Please be aware of the fact that mail will be returned to the sender if your mail target, e.g. your personal workstation is unreachable (e.g. switched off because you are on vacation) for more than two days.

- 6) If you currently have your mail delivered in your AFS mailbox, the appropriate forward has already been set up when your AFS account was registered. To get all your mail delivered into your AFS mailbox make sure that mailforwarding is activated on all your non-AFS accounts on other computers, even on the MailServer if you have an account there. The mailbox address to be used for forwarding is:

`your_login_id@afsmail.cern.ch`

- 7) Make sure that your entry in the Electronic Mail Directory EMDIR is identical with your mailbox address used for forwarding.

In principle you should never have a forward defined on the computer where you want your mail to be delivered. One exception to this rule is the activation of an automatic mail answering mechanism, e.g. telling people that you are absent and they should send mail to your deputy/secretary/colleague in case of urgent problems. Another one is the mandatory forward in your AFS account which enables delivery to your AFS mailbox.

Unfortunately the way in which a mail forward is installed varies from computer to computer. However CERNVM, VXCERN, dxcern, cernsp, HPPLUS, the workgroup servers

and the MailServer all have a program called “*mailfwd*” installed that helps you to verify the current state of forwarding and to install new or add to old forwarding directives, for example:

```
mailfwd -q
```

will tell you where your mail is currently forwarded to, and:

```
mailfwd fred@mail.cern.ch
```

will make all your mail received on the host on which you are executing this command go to fred’s mailbox on the mail server. For details on other options of mailfwd please consult the man pages.

Your “generic” address (see the article 3.3, “Obvious Names, Generic Addresses and Preferred Email Addresses”, in this issue) which has the form

```
Firstname.Familyname@cern.ch
```

can be used as forwarding directive provided your EMDIR address points to the host where you want to read your mail. However you should never put this address itself as EMDIR address nor use it as forwarding address on the host your EMDIR address points to.

As a general rule make sure that you do not create the situation that host A redirects your mail to host B and host B redirects your mail to host A (or variants of this where even more hosts join the game). The result of this ping-pong is that the message will never reach you. It is returned to the sender when a maximum number of hops is exceeded and it might take some time before you are aware that you don’t receive any mail and start to investigate.

3.7 Accessing the Mailserver

Judy Richards CN/DCI

Like every other computer, when you get an account on the MailServer, a password is set for you. However, for users of *pine*, there is normally no need to know your password, provided you access your mail from an “officially recognized” machine. “Officially recognized” machines include cernsp, HPPLUS and the workgroup servers. In addition, you can request your group administrator to register other hosts, such as your private workstation, from which you will be able to access your MailServer mailbox without the need of a password. (All such hosts are entered in your `.rhosts` file on the MailServer.)

If you use *Netscape* to read your mail, the `.rhosts` file mechanism doesn’t work and you are required to supply a password the first time you access your mailbox. This password

is stored, encrypted, in your *Netscape* configuration file and you will not need to give it again as long as this configuration file is accessible when you use *Netscape*.

If you got your MailServer account as part of a mass registration, your password will be set to a random string and you will have to contact the UCO to get it reset. If you got your MailServer account at the same time as your AFS account, your password will be the same as your initial AFS password. It is however a separate password, in a separate password file and has to be changed independently of your AFS password. To change it type:

```
rlogin mail
passwd      follow the prompts
exit
```

3.8 Mail Notification on Unix — Integration with the MailServer

Arnaud Taddei CN/DCI

A new service opened recently: the mail server. It is serving incoming mailboxes to users in a central way. In order to use this service, you must

- have an account created for you through `userreg`,
- use a mail agent which is able to connect to this service in order to access your incoming mail.

Moreover one important feature you need to enable is the **mail notification**: you want to be warned when you receive new mail.

Today this can be done on Unix through the `chkmail` program for the line mode interface and the `xbiff` xclient for a graphical interface.

If you need a graphical interface we provide a customisation of the `xbiff` program which must be called in a special way, using the previous `chkmail` program (warning it is written on three lines on this text but you should write it only in one line):

```
xbiff -t MAILSRV -update 180 -bg yellow
      -fg blue -geometry 120x70
      -xrm '*checkCommand: chkmail -s' \&
```

When new mail arrives, the mail box in the picture (see below) inverses the colours and it may beep.



If you want to save this command in the root menu of your X11 environment, on the "plus" `cernsp`, `HPPLUS` servers using the `fvwm` window-manager (this is the default/recommended environment), you can do so by editing the file

```
$HOME/.hep/xwm/fvwm_menu
```

as shown below (warning, the line `Exec ...` is split into three lines in this text but you should write it only on one line in the file):

```
Popup "UserMenu"
Title "User Menu"
...
Exec "Mail Notif." xbiff -t MAILSRV -update 180
      -bg yellow -fg blue -geometry 120x70
      -xrm '*checkCommand: chkmail -s' \&
...
EndPopup
```

If you want to read more information about `xbiff` you can access the manual pages

```
man xbiff
```

In the future we aim to integrate `chkmail` into the very popular `tkpostage` notification program. It requires an extension of the `chkmail` program code and a modification of the CERN `tkpostage` code. The preliminary study is promising and we are now in the analysis and design of new options for these two programs.

The `chkmail` program can be used in line mode, for example, entering

```
chkmail
```

on the command line may tell you:

```
You have 3 new message(s) in your mail server
(mail.cern.ch) inbox.
```

For *expert users*, you can also call this program from within a shell periodic command. The following is an example with the `tcsh` shell and `zsh` users can find a similar example in the `chkmail` manual pages.

If you modify your `$HOME/.tcshrc` file in the following way:

```
if ( -x "/usr/local/bin/chkmail" ) then
  set tperiod = 3
  alias periodic "/usr/local/bin/chkmail"
endif
```

every three minutes, the shell will check the mail server mailbox and the next time you use the shell you will get a message if you have new mail.

Note that the `tperiod` variable is expressed in minutes and be careful when you change the `periodic` alias as it may be used already, for example to check the lifetime of your AFS token. You can check it by issuing:

```
alias periodic; echo $tperiod
```

and on any HEPiX machine (`cernsp`, `HPPLUS`, Work Group Servers, Shift machines using AFS) you will get:

```
/usr/local/lib/hep/x/tools/tklife
50
```

If this is the case you could set instead (warning, the line `alias periodic ...` is split into two lines in this text but you should write it only on one line in the file):

```
if ( -x "/usr/local/bin/chkmail" ) then
  set tperiod = 3
  alias periodic "/usr/local/bin/chkmail;
                /usr/local/lib/hep/x/tools/tklife"
endif
```

This program has several options and is using the `MAILSERVER` environment variable which should be set in your environment. This is done by default on any machine using HEPiX 3.x.

You can specify a MailServer name with the `-m` option thus you could be notified for mail sitting on another MailServer

like the DESY or the FERMI ones. This can be useful especially if you are coming from these other institutes and want to check if you received new mail there or if you are going to DESY you can be notified about new mail on the CERN mail server.

Today this program is in use at DESY and is part of the official IMAP distribution at the University of Washington.

If you want to read more information about the `chkmail` notification program you can access the manual pages

`man chkmail`

3.9 Handling Mailing Lists — the “ListBox” Service

Miguel Marquina and Arnaud Taddei CN/DCI

The “ListBox” service replaces LISTSERV on CERNVM and has already been announced in the previous Computer Newsletter.

A review of the Mailing List “ListBox” Service was started one month ago as the service started showing some deficiencies. These problems appear mainly when users are administering or querying the ListBox service. Moreover this service is suffering from its increasing usage and we are facing some performance problems.

Two important bugs have been found and solved and a new version of the software has been put in production recently. It improves the functionality and solves partially the speed problem.

The next results of this review will be

- **Change in the access to the Mailing List server**

You should use

`ListBox.Server@cern.ch`

Instead of

`Mail.Server@cern.ch`

The old address will still be valid but will be deprecated at some point in time.

- **Documentation**

New documentation has been set up including a tutorial for users and list administrators.

This documentation is available at the following URL:

<http://consult.cern.ch/mail/listbox>

We appreciate any feedback on these materials and you can send your suggestions to:

`listbox.support@cern.ch`

- **Service performance issues**

We are looking at decreasing the load and improving the performance on the current service. Important changes (if any) will be announced as they are scheduled.

- **Upgrading important auxiliary software**

We plan to upgrade important auxiliary software in order to use the obvious address (`name.surname@cern.ch`) instead of the preferred electronic mail address (`login-name@host.cern.ch`). This concerns programs which are daily rewriting mailing lists, etc.

- **Migrating CERNVM mailing lists**

Any person who wants to migrate a CERNVM List-Serv Mailing List should contact:

`listbox.support@cern.ch`

- **Training sessions**

Two training sessions have already been given and you will find the slides on the Web together with the ListBox documentation.

4. Desktop Computing

4.1 Connecting between UNIX Machines

Michael Dodgson CN/DCI

A UMTF subgroup has been setup to address the issue of connectivity between computers. Our first aim is to find a recommended way for people to work between Unix machines both inside and outside of CERN. In the longer term, our aim is to find or provide a few convenient and secure tools to facilitate this access.

4.1.1 Interactive remote session without X

Unix provides two tools to start interactive remote sessions ('login') on another machine:

- *telnet* the original remote login program, requires that you connect to the remote machine and then enter your username and password. In addition, *telnet* has the advantage that it included in most non-Unix TCP/IP packages.
- *rlogin* tries to improve on *telnet*. For example it allows you to specify that 'this user' at 'this node' is trusted and can login to your account without a password. Unfortunately there are at least two major problems with recommending *rlogin*:
 - It does not work well from non-AFS machines to AFS machines
 - It weakens security and thus is blocked by the CERN 'firewall'. This means that it can not be used from machines outside CERN to machines inside CERN.

For more details on *rlogin* or *telnet* the user is referred to the CERN Unix guide (section 5.2 <http://consult.cern.ch/writeup/Unixguide>).

We currently recommend the use of *telnet*.

4.1.2 Interactive remote session with X

If you have an X-terminal or workstation, *telnet* may not be sufficient as you will probably want to run X programs on the remote machine. Before addressing this issue, it is important to understand the different ways you can permit such programs to access your X display:

X authorisation

There are three recommended ways you can authorise clients to connect to your X display:

- *xhost hostname*

A poorly secure method, this trusts any user on each host you authorise. It is not recommended when the hostname is a public machine (e.g. *cernsp*, *HPPLUS*).

- *'magic cookie'*

This is a recommended way to secure your X display and is enabled on all work group server and PLUS machines. It authorises only those programs which know a secret key (the 'cookie'). Normally this key is stored in your home directory making this method easy to use between machines sharing the same home directories (e.g. AFS machines) but more difficult to use in other cases.

- *mxconns*

This is the other recommended way to secure your X display. *mxconns* is a program which creates a virtual display for you and acts as a 'gatekeeper'. When anyone tries to connect to this virtual display, it pops up a message on your real display saying a connection is being attempted from a node (which it names), and asking if you will allow the connection. You can then allow the connection (which can then create windows on your real display); or else you can deny the connection. *mxconns* will **not** produce such a dialogue box if you start a window locally yourself. In addition, the body of the *mxconns* window shows nodes that are accessing your display through *mxconns* and can be used to close connections.

To start *mxconns* issue the command:

```
mxconns -hunt -verbose &
```

Be warned that some programs (*x3270-guess*, *ghostview* and others) access your display more than once, prompting several dialogue boxes from *mxconns*.

mxconns has an additional advantage: it is secure and thus not blocked by the CERN firewall. Thus, it allows you to work on machines outside CERN using X-terminals inside CERN. We thus recommend that you use *mxconns* in conjunction with *telnet*.

For more information on X security please read the CERN security handbook:

<http://consult.cern.ch/writeup/security>

Steps to start an interactive remote session with X

1. If *mxconns* is not running, start it:

```
mxconns -hunt -verbose &
```

Your virtual display name will be written on the screen and on the title bar of the small *mxconns* window which opens up. The body of the window will list nodes that are accessing your display through *mxconns*.

If you are using a window manager with several virtual desktops (such as *fvwm* or *HP-VUE*) you should make sure that *mxconns* always appears on your current desktop. This is the CERN default for *fvwm* (where *mxconns* has been defined as 'sticky') but users of *ctwm* or *HP-VUE* will have to click the top left hand corner of the *mxconns* window and select the 'occupy all desktops' menu option.

2. *telnet* to the remote machine.
3. Set the display on that machine to the name given in the *mxconns* window (but changing the form from *machine:n* to *machine.cern.ch:n* if you are connecting to a remote site). To set the display you
 - (in *zsh*) `export DISPLAY=machine:n`
 - (in *tcsh*) `setenv DISPLAY machine:n`

Parts of this procedure will soon be simplified or automated but the above steps should work reliably now.

4.1.3 Starting a remote client without X

Instead of starting an interactive session on a machine, you may just want to issue a simple command on that machine. Most Unix vendors provide a command that allows this facility called either *rsh* or *remsh*. For example to find out who is using a machine you can type

```
rsh machine who
```

However, this command suffers from similar problems to *rlogin* (see above) and in addition, cannot accept a password. As a result it does not work in many cases.

4.1.4 Starting a remote X client

An extension of *rsh* called *xrsh* can be used to start programs which use X. It automatically sets the correct *DISPLAY* variable and handles the X authentication. For instance to start a remote *xclock* from another machine try:

```
xrsh machine xclock &
```

N.B. If *xrsh* works it also provides a powerful way of starting an interactive session. Just type:

```
xrsh machine xterm &
```

or

```
xrsh machine
```

for short and you have started an interactive session with both the security and the *DISPLAY* variable set correctly! Unfortunately, since *xrsh* relies on *rsh*, it often will not work.

4.1.5 Conclusions

We realise that the current situation is not satisfactory but it is all that is available with current tools. We are now working on more satisfactory solutions. Ideally we would like to find or construct a set of simple commands that do not involve the user having to type his display name, that work from CERN and to CERN, and that work for dumb terminals and X terminals. As a secondary goal we would like to improve security by, for example, finding a tool which avoids the need for people to type their password across the Internet.

Although achieving these goals will not be easy we should certainly be able to improve on the current situation. Currently, solutions using *ssh* and *arc* are being considered and improvements will be announced as they become available.

If you wish to contribute or comment on this work please feel free to contact umtf-net@listbox.cern.ch.

4.2 The UCO Command

Arnaud Taddei CN/DCI

The *uco* command is the equivalent of the reset button for your most important Unix Home directory dot files. This command is part of the HEPiX project and it implements CERN/CN/DCI specific site policy concerning recommended configurations. It is a user interface which proposes menus for different "domains" of the user configuration files:

```
Shell
X11
mail
security
home directoy structure
```

Some features are already fully implemented like the *shell* and *X11* features. The *security*, *mail* and *home* features will be provided soon but are not yet fully operational because of

recent changes (OS Certification, Mail Service, Security Policy). For example, on *cernsp* or on *HPPLUS*, if you want to reset your *X11* environment, enter:

```
uco -X11
```

and you will get the following menu choice:

X11's possible actions:

- 0 - Cancel.
- 1 - Reset your X11 configuration files.
- 2 - Fake the Xsession.
- 3 - Restore the X11 configuration from a previous version.
- 4 - Migrate the X11 configuration files from version 2.5.1.
- 5 - Clean the X11 trailing configuration files.
- 6 - \FVWM\{ } template files.

Choice:

Choosing 1 will:

- create you a directory `$HOME/.hep` to host all your HEPiX user configuration files unless you already have one.
- place, in this directory, a template `xprofile` file for customising your X session.
- place an `xclient` file for starting the xclient programs you want to launch at startup time.
- place an `xkeyboard` file for setting your keyboard.
- create you a directory `$HOME/.hep/wm` to organise the customisation of your window manager.

- place, in this directory, a template `fvwm_menu` file for customising your `fvwm` user root menu.

Some features apply in general and some others are specific to your AFS Home directory.

If you need more information consult the manual pages
`man uco`

or contact Setup Support `setup.support@cern.ch`.

If you need more information on the HEPiX project consult
<http://wwwcn.cern.ch/hep/wg/scripts/www/>

4.3 Common Desktop Environment (CDE)

Alan Silverman CN/DCI

For some time now, the COSE collaboration of Unix vendors has been working on a common graphical user interface to Unix called CDE (Common Desktop Environment). For those people familiar with HP Unix systems, it resembles greatly HP-VUE.

After a long wait, CDE is finally coming and for some months we have been looking at it, especially at methods and tools to make the different vendor implementations look and behave

as similar as possible. However, we still have serious concerns over resource usage, in particular it will need very careful evaluation for multi-user machines. And, unfortunately, it is not our highest priority for moment, particularly in view of VM migration.

For anyone interested in CDE, we can only advise – ‘Watch this space’ for further news later this year.

4.4 The FVWM Window Manager

Roger Jones PPE/LE

4.4.1 Introduction

The default window manager with the HEPiX X11 scripts as used on the CERN central Unix platforms is `fvwm`:

<http://namu19.gwdg.de/fvwm/fvwm.html>

`fvwm` is a powerful window manager which makes few demands on the operating system. At CERN, a very simple default configuration has been chosen. This default will be tuned over time to provide commonly desired features and menus. However, simple tailoring of the window manager is expected at the user and group level. For example, we have provided a hook for a ‘Group’ menu to be found when the middle mouse button is clicked over the root window (‘the backdrop’), and we already provide a ‘User’ menu when the left mouse button is clicked in the root window.

This article gives brief introduction to `fvwm`. Space does not permit a description of how to customise it. A description of how to make simple customizations can be found at:

http://wwwcn.cern.ch/umtf/working-groups/X11/window_managers/fvwm/doc/easy_fvwm.html

There is also an expanded version of this article that describes simple customisations, available from the UCO (CERN/UCO/96/187).

Finally, some example files which will change the behaviour of your `fvwm` session from the default when copied (with the correct name) into your `$HOME/.hep/wm` directory may be found in `/afs/cern.ch/project/umtf/working-groups/X11/window_managers/fvwm/examples`

More complex customisation is also possible (indeed we are not aware of any limitations on the customisation imposed by the HEPiX scheme); a guide to the full setup is provided elsewhere: http://wwwcn.cern.ch/umtf/working-groups/X11/window_managers/fvwm/doc/fvwm.html

Before any major customisation, we strongly recommend that you read the full `fvwm` documentation.

4.4.2 The Present Default

At startup

Such things as the client programs (such as clocks, desktop managers etc.) and root window (‘backdrop’) colours and patterns are not controlled by the window manager, but are controllable in the HEPiX X11 scheme. Indeed, other window managers can be requested, though they are not necessarily supported, and window managers that make a heavy demand on system resources are strongly discouraged on

multi-user machines. Such things are not within the scope of this article, and you are referred to the relevant documentation.

<http://consult.cern.ch/writeups/hepouser>

When you begin a default HEPiX X11 session, you will be presented with a clock, an X-terminal labelled 'login' and a window in the bottom right-hand corner of the screen called the 'pager'. This pager is subdivided into four areas labelled 'Desk 0', 'Desk 1' *etc.*, each of which corresponds to a virtual desktop. By default, you start on Desk 0, and so you will

see small representations of the login window, the clock and the pager in the 'Desk 0' section of the pager. You can move to another virtual desktop by clicking with the left or middle mouse button in the appropriate area of the pager. Unless they have been declared 'sticky' (which the clock and the pager have, by default), then your windows will not change desktop as you do. You can move windows between desktops by clicking with the middle mouse button on their representation in the pager, and dragging them to the representation of the desktop you want in the pager.

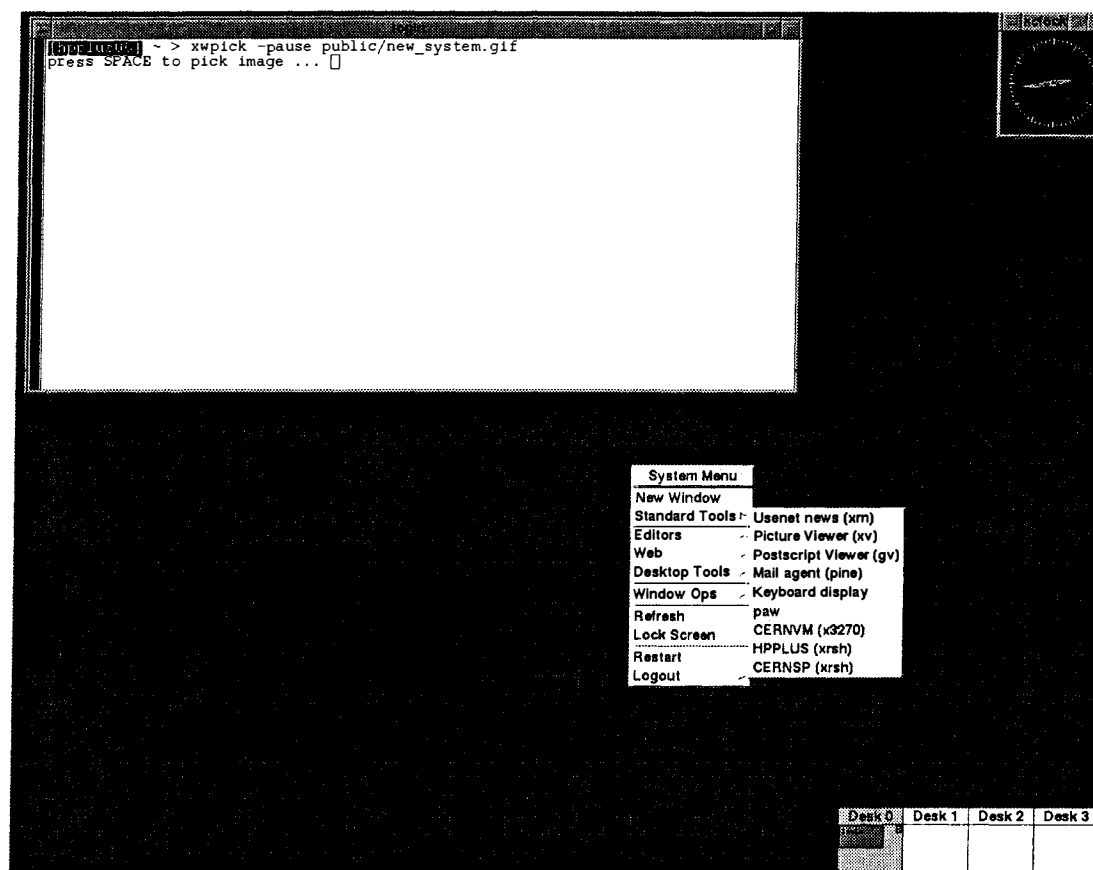


Figure 4.1: A typical fvwm session at login, with the 'System' and 'Standard Tools' Menus displayed.

Menus

A 'System' menu is defined which contains many of the commands you will commonly want to use. It may be obtained by clicking with the right mouse button while over the root menu (the 'backdrop'). Some of the commands may be found in submenus (indicated by arrowhead symbols on the main menu; keeping the mouse-button depressed, just move down the menu to the submenu name to obtain the submenu. Currently, we provide submenus for editors, web browsers, standard tools, common window management tasks (such as making windows 'sticky' or killing them) *etc.*

A 'User' menu is provided by default; it is a copy of the System menu at the time that the user's account is created. This can be tailored by the user, as described below. A hook for a 'Group' menu is also provided associated with the middle mouse button, but is left empty by default. Experiments and

other groups should use this hook to provide common tools that their users might want.

Interacting with X-windows

Windows may be enlarged by clicking on the border with the left or middle mouse buttons and with the button still depressed dragging the window border to the desired size. Clicking on the border with the right mouse button produces a menu of commands that act on windows. Clicking and releasing on the window border or title bar 'raises' the window above any others. The window may be brought into 'focus' (which is jargon for 'becomes the active window') merely by moving the cursor into the window area. Thus, you can type into a window while it is still partially obscured by another, which can often be useful. If you prefer to just click in the window to raise it and bring it into the focus, instructions for

this customisation are given in the simple customisation document.

4.4.3 Conclusions

We have chosen `fvwm` as the default HEPiX window manager because it demands few system resources and provides the re-

quired user functionality. We have provided a system for user and group customisation within the HEPiX framework that ensures that the required order of commands is enforced in a transparent way. We have attempted to provide a default configuration that provides a good environment for the user. This will evolve with increasing experience and user feedback.

4.5 Netscape/UNIX version 2.0 at CERN

Miguel Liebana and Miguel Marquina CN/DCI

Netscape Corporation released version 2.0 of its popular *Netscape Navigator* on February 2nd, 1996. This new release includes a full MIME compliant Mail Agent and News Reader. More information about the specific features of this release can be found at the Netscape WWW site (<http://home.netscape.com>).

The Unix version, available at CERN since February 8th through the command:

```
netscape -version beta
```

has been evaluated in its functions as Mail and News agent. We have prepared an automatic setup procedure for all Unix workstations at CERN accessing the `asis` repository (including the Central Services `cernsp` and `HPPLUS`) which performs all the configuration actions necessary to use *Netscape* for such functions. This procedure is executed the first time *Netscape* is invoked or by using the "reset" option.

Incidentally, when using *Netscape* as Mail agent, please no-

tice that you will need to know the password of your Mail Server account (`MailServer` Service). If you don't know it please contact the UCO (`User.Support@cern.ch`, x4952) to get it reset.

Netscape 2.0 became the default version in the ASIS Server on February 26th, replacing the current one (1.1N). Further details about *Netscape* at CERN can be found at:

<http://consult.cern.ch/uco/netscape>

Support (limited to the areas described above) is offered through the e-mail address: `Netscape.Support@cern.ch`.

Finally, on a related subject, please notice that within the next month the UCO will receive from Netscape Press their new book and CD-ROM "Netscape Navigator 2.0". This includes all information and the software for this product (Unix, PC and Mac versions). We will announce its availability when it arrives, through the usual `cern.computing` newsgroup channel.

4.6 PSS-05 FrameMaker and WebMaker templates at CERN

Mario Ruggier ECP/IPT

PSS-05 are Software Engineering Standards developed at the European Space Agency. They provide a concise definition of how to develop quality software. In support of these standards the Programming Techniques Group in the ECP Division has developed a first set of templates for two of the documents required by PSS-05, namely the *User Requirements Document* (URD) and the *Software Requirements Document* (SRD). The templates are for the FrameMaker desktop publishing software with automatic conversion to WWW using WebMaker.

At the moment a distribution package for the templates is available for CERN. This includes:

- FrameMaker templates for the URD and SRD;
- setup for automatic conversion to WWW, with Web-

Maker 1.4a, for URD and SRD FrameMaker templates;

- ASCII versions of URD and SRD templates;
- templates User Manual, in PostScript;
- the GEANT4 URD, in FrameMaker and WWW formats, as an example.

Up to date information about the CERN PSS-05 Templates is maintained on WWW at the URL <http://www.cern.ch/CERN/Divisions/ECP/PT/DocSys/PSS05/>

Included under this URL is the WWW version of the *Templates User Manual*, as well as information on how to download (CERN only) the distribution package.

We look forward to receiving your comments and feedback that will certainly help us improve. Please correspond by sending electronic mail to `docsys@ptsun00.cern.ch`

5. Tutorial Section

5.1 UMTF Computing Tutorials

Alan Silverman CN/DCI

This series of 1-2 hour seminars treats specific topics in the use of computers, Unix-based, PC and MAC. It is aimed primarily to help users migrating off CERNVM to other platforms but anyone interested in a particular topic is welcome to attend. They are all held on Monday afternoons and Thursday mornings in the *CN Auditorium*.

The current programme for the coming three months is as follows:

How to Set Up Your Unix Shell Environment by Arnaud Taddei – *Monday, March 11 14:00-16:00*

Accessing Unix Services from a MAC by Miguel Marquina – *Thursday, March 14 10:00-12:00*

HEPiX environment for System Administrators by Arnaud Taddei – *Monday, March 18 14:00-16:00*

How to Tailor Your X11 Environment by Arnaud Taddei and Lionel Cons – *Monday, March 25 14:00-16:00*

REXX by Pierantonio Marchesini – *Thursday, March 28 10:00-12:00*

AFS Group Admin tools by Rainer Toebecke – *Monday, April 15 14:00-16:00*

Requesting or Modifying a Network Connection at CERN by Jean-Michel Jouanigot – *Thursday, April 18 10:00-12:00*

How to Tailor ADAM by Miguel Liebana – *Monday, April 22 14:00-16:00*

Migrating to a MAC by Darudh Birker – *Thursday, April 25 10:00-12:00*

Handling your Mail on Unix with pine by Alessandro Miotto – *Monday, April 29 14:00-16:00*

Tools for Mail on the Mail Server by Arnaud Taddei – *Monday, May 13 14:00-16:00*

Will cover such topics as vacation mail, forwarding mail, mail notification, etc.

Simple editors by Miguel Marquina – *Monday, May 20 14:00-16:00*

Will include editors such as *Nedit* and *Pico* on Unix, *Write* and *Teachtext* on PC and MAC.

Full details of the seminars, and copies of the handouts of seminars already given, can be found on the Web at URL:

<http://consult.cern.ch/umtf/training/>

5.2 Fortran 95

Michael Metcalf CN/ASD

5.2.1 Why a new standard?

Following the publication of the Fortran 90 standard in 1991, two things happened. The first was that the High Performance Fortran Forum (HPFF) was set up to define a set of extensions to Fortran, to make it possible to write portable code when using parallel computers for handling problems involving large sets of data that can be represented by regular grids. This version of Fortran is known as High Performance Fortran (HPF), and is based on Fortran 90, mainly because of its array features. HPF is of a superset of Fortran 90, the main extensions being in the form of directives that take the form of Fortran 90 comment lines, and are thus recognized as directives only by an HPF processor. However, it did become necessary also to add some additional syntax, as not all the desired features could be accommodated in the form of such directives (see also *High Performance Fortran*, CERN/CN/95/11).

The second happening was that the standards committees, X3J3 and WG5, decided on a strategy whereby a minor revision of Fortran 90 would be prepared by the mid-1990s – Fortran 95 – and a further revision by about the year 2000. At the same time, it was clearly desirable to include the new syntax

defined by HPFF in Fortran 95 and, indeed, the HPF features are the most significant new features that it introduces.

The other changes consist mainly of what are known as ‘corrections, clarifications and interpretations’. These came about as it was discovered that the text of the Fortran 90 standard contained a number of errors that required correction, some obscure wording that required further textual clarification, and ambiguous statements that required interpretation. Apart from the HPF syntax and the corrections, only a small number of other pressing but minor language changes were made. Fortran 95 is almost completely backwards compatible with Fortran 90.

A draft of the Fortran 95 standard was published in 1995, (*ACM Fortran Forum*, June, 1995). It was finalized in November 1995, and the expected schedule is for a new ISO standard, replacing Fortran 90, to be published in October 1996. This article is a summary of what is new in Fortran 95; the final version is completely described in *Fortran 90/95 Explained*, by John Reid and myself, (Oxford U. Press, March, 1996).

5.2.2 Features for parallel computing

This section describes new features for parallel computing, based on HPF. They are designed to make Fortran a still better language for applications on parallel architectures.

Pure procedures

Within **FORALL** statements or constructs (see below), the possibility that a function might have side effects is a severe impediment to optimization on a parallel processor – the order of execution of the assignments could affect the results. To control this situation, it is possible for the programmer to specify that a procedure has no side-effects by adding the **PURE** keyword to the **SUBROUTINE** or **FUNCTION** statement. In practical terms, this is an assertion that the procedure alters no global variable, performs no I/O, has no saved variables, and does not alter its **INTENT(IN)** arguments. These requirements are so formulated that a compiler can check that this is the case. An example is

```
PURE FUNCTION calculate (x)
```

All the intrinsic functions are pure.

Elemental procedures

Elemental procedures are those with scalar dummy arguments that may be called with array actual arguments provided that the array arguments have the same shape. For a function, the shape of the result is the shape of the array arguments. Many intrinsic functions are elemental and Fortran 95 extends this to non-intrinsic procedures. It requires an **ELEMENTAL** prefix on the **FUNCTION** or **SUBROUTINE** statement. This is very useful to the programmer who can get the same effect in Fortran 90 only by writing 22 versions, for ranks 0-0, 0-1, 1-1, 0-2, 2-0, 2-2, ... 7-7, and is an aid to optimization on parallel processors. An elemental procedure must satisfy all the requirements of a pure procedure, as it automatically has the **PURE** attribute. All dummy arguments and function results must be scalar variables without the pointer attribute. For an elemental subroutine, if any argument is array valued, all the arguments with **intent INOUT** or **OUT** must be arrays. For example, we can make a subroutine, *swap*, perform its task on arrays of any shape or size:

```
ELEMENTAL SUBROUTINE swap(a, b)
  REAL, INTENT(INOUT) :: a, b
  REAL                  work
  work = a
  a = b
  b = work
END SUBROUTINE swap
```

The **FORALL** statement and construct

When a **DO** construct is executed, the processor is required to perform each successive iteration in order and one after the other. This represents a potential impediment to optimization on a parallel processor so, for this purpose, Fortran 95 has the **FORALL** statement, for example

```
FORALL(i = 1:n) a(i, i) = x(i)
```

which specifies that the individual assignments may be carried out in any order, and even simultaneously. The **FORALL** statement may be considered to be an array assignment expressed with the help of indices. In this particular example, this operation could not otherwise be represented as a simple array assignment. Another example of the **FORALL** statement is

```
FORALL(i=1:n, j=1:n, y(i,j)/=0.) &
  x(j,i)=1.0/y(i,j)
```

where the masking condition ensures that the assignment is not carried out for zero elements of *Y*.

The **FORALL** construct also exists. It allows several assignment statements to be executed in order. The **FORALL** equivalent of the array assignments

```
a(2:n-1,2:n-1) = a(2:n-1,1:n-2) &
                  + a(2:n-1,3:n)   &
                  + a(1:n-2,2:n-1) &
                  + a(3:n,2:n-1)
b(2:n-1,2:n-1) = a(2:n-1,2:n-1)
```

is

```
FORALL(i = 2:n-1, j = 2:n-1)
  a(i,j) = a(i,j-1) + a(i,j+1) &
           + a(i-1,j) + a(i+1,j)
  b(i,j) = a(i,j)
END FORALL
```

This sets each internal element of *A* equal to the sum of its four nearest neighbours and copies the result to *B*. The **FORALL** version is more readable. Each assignment in a **FORALL** is like an array assignment; the effect is as if all the expressions were evaluated in any order, held in temporary storage, then all the assignments performed in any order. The first statement must fully complete before the second can begin.

A **FORALL** statement or construct may contain pointer assignments, may be nested, and may include a **WHERE** statement or construct. Procedures may be referenced within a **FORALL**, both in the logical scalar expression that forms the optional mask or, directly or indirectly, in the body of the construct. All such procedures must be pure.

For full details of this important new feature, please see the references above.

WHERE construct extensions

It is permitted in Fortran 95 to mask not only the **WHERE** statement of the **WHERE** construct, but also any **ELSE-WHERE** statement that it contains. A **WHERE** construct may contain any number of masked **ELSEWHERE** statements but at most one **ELSEWHERE** statement without a mask, and that must be the final one. In addition, **WHERE** constructs may be nested within one another, just like **FORALL** constructs. A **WHERE** assignment statement is permitted to be

a defined assignment, provided that it is elemental. Finally, a WHERE construct may be named in the same way as other constructs.

5.2.3 Other new features

Improved compliance with IEEE arithmetic

Many processors distinguish at the hardware level between a negative real zero value and a positive real zero value, and the IEEE standard for binary floating-point arithmetic (IEEE 754 or IEC 559-1989) makes use of this where possible. In order to be able to distinguish between the two cases in Fortran 95, the function SIGN has been generalized such that the sign of the second argument may be taken into account even if its value is zero. On a processor that has IEEE arithmetic, the value of SIGN(2.0, -0.0) is -2.0.

Automatic deallocation of allocatable arrays

In Fortran 90, an allocated array that does not have the save attribute has an undefined allocation status on return from a subprogram. In Fortran 95, such an array is automatically deallocated. This feature not only avoids inadvertent memory leakage, but prevents the very undesirable undefined allocation status. For allocatable arrays defined in modules, see the references.

Specification functions

Any of the intrinsic functions defined by the standard may now be used in a specification expression. In addition, a non-intrinsic pure function may be so used provided that certain simple conditions are fulfilled. Such functions are called *specification functions*. This feature will be a convenience for specification expressions that cannot be written as simple expressions.

Pointer initialization and the function NULL

Fortran 95 allows pointers to be given the initial status of disassociated in a type declaration statement such as

```
REAL, POINTER, DIMENSION(:) :: vector => NULL()
```

NULL is a new intrinsic function and may be used in an executable statement:

```
vector => NULL()
```

It is very useful in avoiding memory leaks.

Initialization of components

Fortran 95 allows us to specify that any object of a derived type is given a default initial value for a component. The value is specified when the component is declared as part of the type definition. If the component is not a pointer, this is done in the usual way. If the component is a pointer, the only initialization allowed is to NULL(). Initialization does not have to apply to all components of a given derived type:

```
TYPE node
  REAL          :: value = 0.0
  INTEGER       index
  TYPE(node), POINTER :: next => NULL()
END TYPE node
```

Given an array declaration such as

```
TYPE(node), DIMENSION(100) :: arr
```

subobjects such as arr(3)%value will have the initial value 0.0, and the value false will be returned by the reference ASSOCIATED(arr(3)%next).

The implications for nested definitions, the interaction with the SAVE attribute, overriding default values, and dynamic object creation are all described in the references above.

Intrinsic procedures

For consistency with similar functions, the numeric intrinsic functions CEILING and FLOOR may now take an optional KIND keyword argument.

The transformational array location functions MAXLOC and MINLOC are extended with an optional argument DIM like those for the functions MAXVAL and MINVAL. The functions MAXVAL, MINVAL, PRODUCT, and SUM already have a DIM argument, but for consistency with MAXLOC and MINLOC, are extended to allow their MASK argument as the second positional argument.

There is a new intrinsic subroutine that returns the processor time, CPU_TIME.

Miscellaneous

There are minor changes concerning comments in NAMELIST input, minimal field width editing, and allowing an optional generic specification on the END INTERFACE statement.

Redundant features

There are six additions to Fortran's list of obsolescent features: fixed source form, computed GO TO, CHARACTER* form of character specification, DATA statements amongst executable statements, statement functions, and assumed character length of function results. Also, for the first time, the standard contains a list of five features that were formerly obsolescent but are now deleted. The references above describe what they are and, for both categories, what to use instead.

5.2.4 The future

This article has set out briefly the changes that Fortran 95 brings to the language, with their justifications. But standardization continues, and Fortran 2000, planned for the year 2001 and whose contents are still speculative, will certainly be described at the appropriate time in these pages.

6. Text Processing

6.1 Drawing Feynman Diagrams with $\text{\LaTeX}$ and METAFONT. Part 3: Extension Mechanism and Frequently Asked Questions

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Abstract

This is the third and final article in a series describing the $\text{\LaTeX}$ package `feynMF` for easy drawing of professional quality Feynman diagrams with METAFONT (or METAPOST). This time the mechanisms for extending `feynMF` are covered and some trouble-shooting advice is given.

6.1.1 Introduction

In [1,2], I have described the design principles and simple applications of `feynMF` [3,4]. Now it is time to discuss the more esoteric features of `feynMF`, those that allow efficient creation of rather complicated Feynman diagrams.

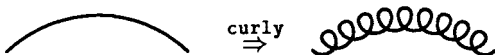
6.1.2 The extension mechanism

`feynMF` is an extensible system, i.e. a documented extension mechanism exists via the METAFONT macro `style_def`. It enables the user to define new styles for propagators, which are not provided in the standard distribution. These styles can be used just like any predefined style. Several concrete examples will be given below.

The examples presented in this part can be used as a cookbook from which recipes can be copied without intimate knowledge of METAFONT. Nevertheless, familiarity with some chapters of [5] will certainly be helpful for a deeper understanding of the macros.

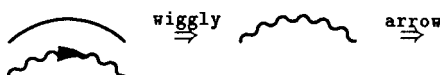
Transformers

An important tool for generating complex line styles is provided by *transformers*. These are functions that take a path as argument and return another path which corresponds to a embellished version. Here is an example that is used for implementing gluon lines:



Such transformers can be combined with other transformers or with drawing functions and packaged in a `style_def`:

```
1 \fmfcmd{%
2 style_def charged_boson expr p =
3   draw (wiggly p);
4   fill (arrow p)
5 enddef;}
```



The implementation does not attempt to force embellishments (e.g. arrows) into the transformer paradigm, because drawing along a path is inherently different from filling an outline. Therefore embellishments are drawn after each other and not added to the object in a pipeline.

6.1.3 Examples

Crosses

Double lines and crosses are popular among physicists working on ETC. There is no default line style with a cross at the center, but we can use the extension mechanism to define our own rather easily. We start in with a little utility function that returns a rotated bar at the center of the path `p`. This function is combined with the existing `double` style to the new style `tfermion`:

```
1 \fmfcmd{%
2 vardef bar (expr p, len, ang) =
3   ((-len/2,0)--(len/2,0))
4     rotated (ang + angle
5       direction length(p)/2 of p)
6     shifted point length(p)/2 of p
7 enddef;
8 style_def tfermion expr p =
9   draw_double p;
10  ccutdraw bar (p, 4mm, 60);
11  ccutdraw bar (p, 4mm, -60)
12 enddef;}
```

The `tfermion` line style is used in Figure 6.1 in a Schwinger-Dyson equation. Such definitions can be placed in a little library of personal preferences and reused later in publications dealing with similar diagrams.

Majorana neutrinos

A popular species from beyond the standard model are Majorana neutrinos, which are usually denoted by double arrows.

```
1 \fmfcmd{%
2 style_def majorana expr p =
3   cdraw p;
4   cfill (harrow (reverse p, .5));
5   cfill (harrow (p, .5))
6 enddef;
7 style_def dbl_majorana expr p =
8   draw_double p;
9   cfill (tarrow (reverse p, .55));
10  cfill (tarrow (p, .55))
11 enddef;}
```

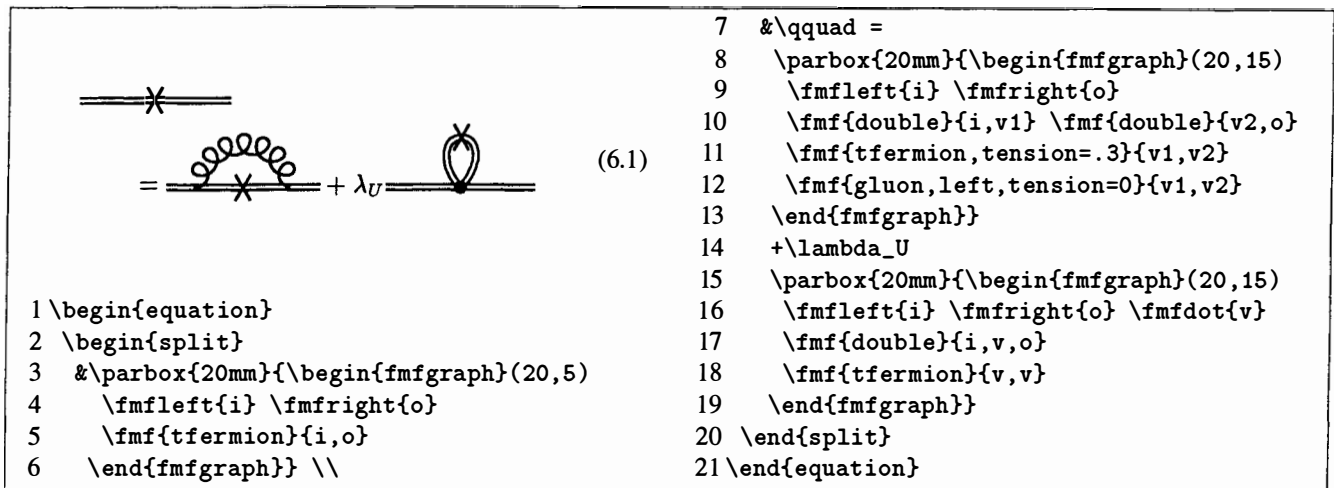


Figure 6.1: Schwinger-Dyson equation in ladder approximation for extended technicolor theories. This example demonstrates the extension mechanism and graphical equations.

The first kind has the arrows facing each other at the tip (`harrow` has the reference point at the head) and the second kind has them facing at the base (`harrow` has the reference point at the tail):



Momentum flow arrows

The most complicated aspect of Figure 6.2 is the placement of the little arrows indicating the momentum flow. One solution, which would be preferable in a case where more of these diagrams are to be drawn, would be to define several line styles corresponding to arrows in various orientations combined with the basic line styles.

Here we choose a more pragmatic approach and define some pseudo-line styles consisting of reduced and shifted arrows *without* a line:

```

1 \fmcmd{%
2   vardef middir(expr p,ang) =
3     dir(angle direction length(p)/2 of p + ang)
4   enddef;
5   style_def arrow_left expr p =
6     shrink(.7);
7     cfill(arrow p
8       shifted(4thick*midir(p,90)));
9   endshrink
10  enddef;
11  style_def arrow_right expr p =
12    shrink(.7);
13    cfill(arrow p
14      shifted(4thick*midir(p,-90)));
15  endshrink
16  enddef;}

```

Because the gluon lines occupy more space, we have to define another style `warrow_left` which is identical to `arrow_left` except for a larger distance `8thick` from the

line. These pseudo-line styles are used in lines 23–26 of Figure 6.2 to place the little arrows. Since the vertices that are connected by these arcs are already fixed, we can omit the `tension=0` option.

The gluons in lines 18–21 do not affect the layout, because they are added after the position of the vertices are fixed by `\fmffreeze`. The same effect could be achieved by adding a `tension=0` option to the gluons.

“Brown muck”

A common problem in phenomenological papers is the representation of non-perturbative contributions, also known as “brown muck”. To distinguish them from the perturbative propagators, they are usually shown as grey or shaded areas. `feynMF`’s extension mechanism allows for a systematic treatment of these contributions.

We start by defining a couple of utility macros: the macro `port(t,p)` returns a unit vector pointing to the left of the path `p` at `t`:

```

1 \fmcmd{%
2   vardef port (expr t, p) =
3     (direction t of p rotated 90)
4     / abs (direction t of p)
5   enddef;}

```

The macro `portpath(a,b,p)` returns a copy of the path `p` bent to the left by `a` at the beginning and end and by `b` in the middle.

```

1 \fmcmd{%
2   vardef portpath (expr a, b, p) =
3     save l; numeric l; l = length p;
4     for t=0 step 0.1 until l+0.05:
5       if t>0: .. fi point t of p
6       shifted ((a+b*sind(180t/l))*port(t,p))
7     endfor
8     if cycle p: .. cycle fi
9   enddef;}

```

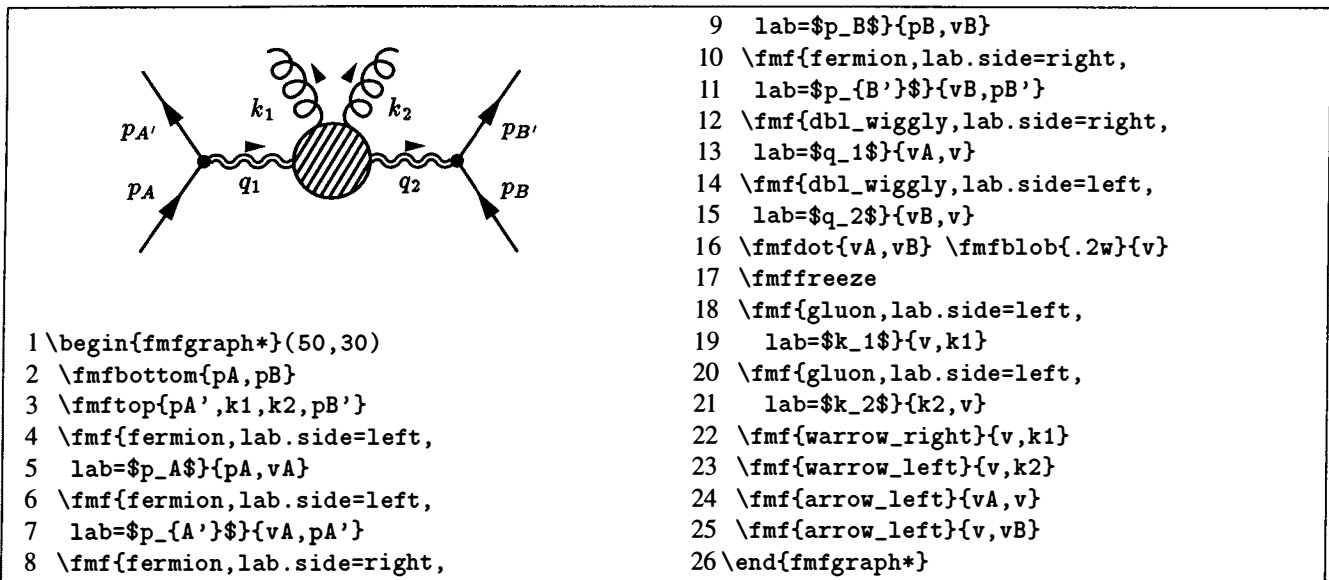


Figure 6.2: Quasi-Multi-Regge-Kinematics: a typical diagram from a paper on the high-energy asymptotics of QCD.

This macro is now used to draw a fat, shaded “propagator” along the path p :¹

```

1 \fmfcmd{%
2 style_def brown_muck expr p =
3 shadeddraw(portpath(thick/2,2thick,p)
4 ..reverse(portpath(-thick/2,-2thick,p))
5 ..cycle)
6 enddef;}

```

This `brown_muck` style can now be used just like any other predefined line style, cf. Figure 6.3 and Figure 6.4 below.

Protons

The solution used for protons in [2] has been straightforward and sufficient for most applications. Another, more elegant, method is to use `style_def` for defining a proton line style that can be used instead of `fermion`. It has to make more use of METAFONT functions, though:

```

1 \fmfcmd{%
2 style_def proton expr p =
3 save mp, sp; pair mp; path sp;
4 mp = point length(p)/2 of p;
5 sp = p shifted -mp scaled 1.05 shifted mp;
6 cdraw sp shifted (2thick*middir(p, 90));
7 cdraw sp shifted (2thick*middir(p,-90));
8 draw_fermion p
9 enddef;}

```

The outer lines are slightly enlarged to match with the circular blobs. This solution is not perfect (it would be a default line style in `feynMF` otherwise) because it is not guaranteed

to match *always* satisfactorily at the vertices. It is nevertheless a good example for how the `style_def` mechanism can be used to streamline `feynMF` applications.

Instead of redisplaying the Higgs production diagram from [2] once more, we apply the proton style in Figure 6.4 in a photoproduction diagram. This diagram also shows another application of the `brown_muck` style.

Two-loop diagrams

Finally, let us return to the subject of [2], the *immediate mode*. One notorious set of diagrams is given by the NLO contributions to $b \rightarrow s\gamma$. Figure 6.5 shows how aesthetically pleasing results can be produced with little effort in `feynMF`. Topologically, the second and fourth diagram are mirror images and it is a matter of taste which layout style is preferred.

Lines 2–16 are straightforward, except for the trick in line 7, where the quark loop is first drawn invisibly (phantom). Later (lines 10–15) a fermion is drawn on each half (using the undocumented feature that `length(p) = 2`).

The first four arguments of the `\NLO` macro describe the starting point of the gluon and the final four the end point. The first argument gives the position on the path connecting the vertices specified in the third argument, while the second argument gives the direction *relative to this path* (this is the non-trivial part). The fourth argument is needed to disambiguate multiple paths connecting the same pair of vertices. The actual path is defined in lines 25–26. Note that the value of the group is the value of the final expression in the group.

The first and second diagram reveal a slight problem with the current implementation of `feynMF`: since the coordinate along a METAFONT path doesn’t vary uniformly with the actual length, the gluons can appear a bit distorted. The effect is

¹ Note that `brown_muck` is not as general as it could be, because it doesn’t properly handle cyclic paths. This is in principle easy to fix. But the implementation of shading areas of genus > 0 has to behave differently for METAFONT and METAPOST and would occupy too much space in this short article. It will be provided in a future version of `feynMF`.

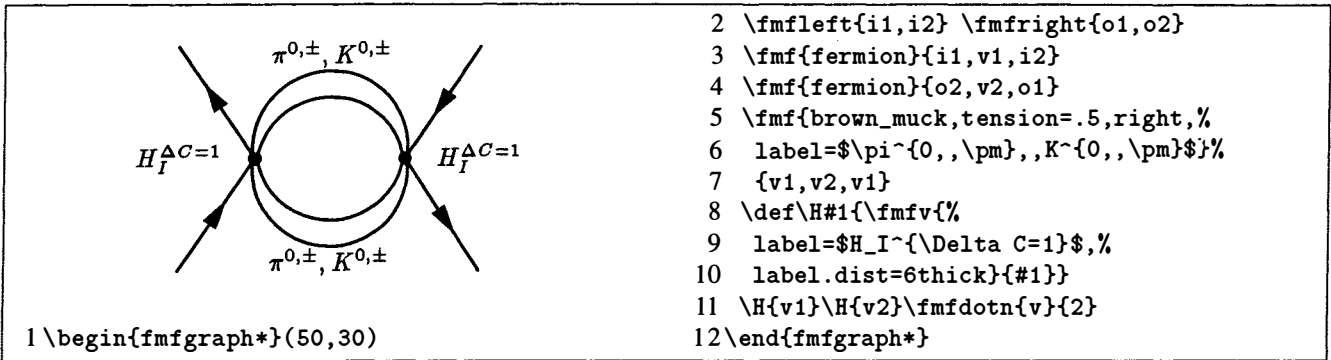


Figure 6.3: “Brown Muck” (i.e. long distance strong interactions) in a mixing amplitude.

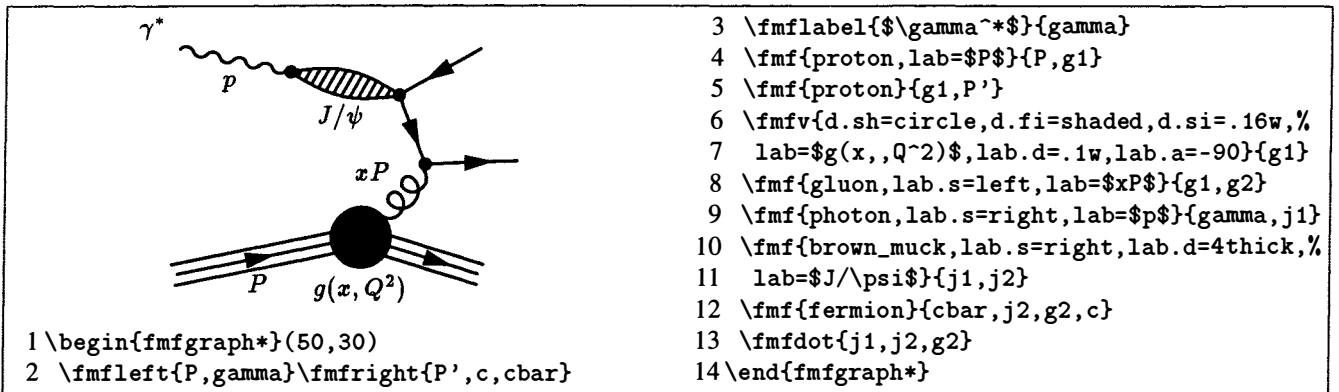


Figure 6.4: Vector meson contribution to heavy flavor photoproduction.

not dramatic, but it might be fixed in a future version anyway.

6.1.4 Frequently asked questions

How can I change the layout of gluons, photons and fermions?

The form of the gluon curls is governed by the global `curly_len` variable. Its default value is 3mm. Changing it to 2mm make the gluon appear tighter

oooooooooooooooo

```

1 \begin{fmfgraph}(30,3)
2 \fmfset{curly_len}{2mm}
3 \fmfleft{i} \fmfright{o} \fmf{gluon}{i,o}
4 \end{fmfgraph}

```

while a value of 4mm results in a more loose shape:

ooooooo

Currently, it is impossible to switch `curly_len` for individual propagators by using multiple `\fmfsets`. Most propagators are drawn at the very end and the most recent `\fmfset` will be in effect for *all* propagators.

Until this a future version `feynMF` will allow for these parameter as options similar to `tension`, there is a convenient

way of achieving the same effect using the extension mechanism. We just define a new style that will locally redefine the appropriate parameters:

```

1 \fmfcmd{%
2 style_def ir_photon expr p =
3 save wiggly_len, wiggly_slope;
4 wiggly_len = 6mm; wiggly_slope = 45;
5 draw_photon p
6 enddef;
7 style_def uv_photon expr p =
8 save wiggly_len, wiggly_slope;
9 wiggly_len = 2mm; wiggly_slope = 90;
10 draw_photon p
11 enddef;}

```

In the case of photons, there are two parameters `wiggly_len` and `wiggly_slope`. The latter should be increased when the wiggles are shortened. In Figure 6.6, we use both kinds of photons just like any other line style.

The shape of the arrow heads is governed by `arrow_len` and `arrow_ang`, with the latter denoting the half opening angle of the arrow head:

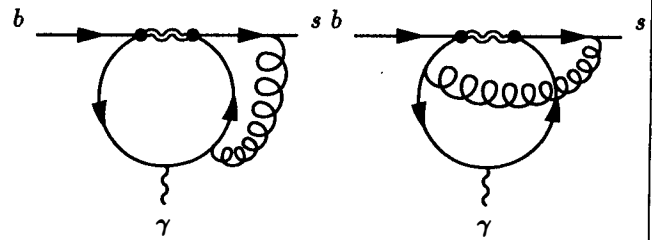


```
1 \begin{fmfgraph}(30,3)
```

```

1 \global\def\NLO#1#2#3#4#5#6#7#8{%
2 \begin{fmfgraph*}(35,25)
3 \fmftop{b,s} \fmfbottom{g}
4 \fmflabel{$b$}{b} \fmflabel{$s$}{s}
5 \fmflabel{$\gamma$}{g}
6 \fmf{fermion}{b,v1}\fmf{fermion}{v2,s}
7 \fmf{phantom,right=5,tag=1}{v1,v2}
8 \fmf{dbl_wiggly}{v1,v2}
9 \fmffreeze
10 \fmfi{fermion}{%
11 subpath (0,1) of vpath1(__v1,__v2)}
12 \fmfi{fermion}{%
13 subpath (1,2) of vpath1(__v1,__v2)}
14 \fmfi{photon}{vloc(__g)}
15 .. point 1 of vpath1(__v1,__v2)}
16 \fmfdotn{v}{2}
17 \fmfset{curly_len}{2.5mm}
18 \fmfi{gluon}{%
19 begingroup;
20 clearxy; save p, t;
21 path p[]; numeric t[];
22 p1 = vpath#4(#3); p2 = vpath#8(#7);
23 t1 = #1*length(p1); z1 = point t1 of p1;
24 t2 = #5*length(p2); z2 = point t2 of p2;
25 z1{direction t1 of p1 rotated #2}
26 ..{direction t2 of p2 rotated #6}z2
27 endgroup}
28 \end{fmfgraph*}

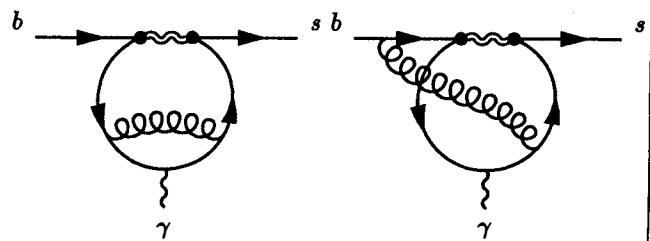
```



```

1 \NLO{.65}{-90}{__v1,__v2}{1}%
2 {.7}{90}{__v2,__s}{1} \quad
3 \NLO{.1}{90}{__v1,__v2}{1}
4 {.7}{90}{__v2,__s}{1}

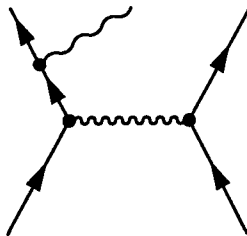
```



```

1 \NLO{.3}{90}{__v1,__v2}{1}%
2 {.7}{-90}{__v1,__v2}{1} \quad
3 \NLO{.3}{-60}{__b,__v1}{1}%
4 {.65}{-120}{__v1,__v2}{1}

```

Figure 6.5: Next-to-Leading-Order $b \rightarrow s\gamma$ -diagrams.

```

1 \begin{fmfgraph}(40,30)
2 \fmfleft{i}{2}\fmfright{o}{2}\fmftop{g2}
3 \fmf{phantom}{i1,v1,i2}
4 \fmf{fermion}{o1,v2,o2}
5 \fmf{uv_photon}{v1,v2}\fmffreeze
6 \fmf{fermion}{i1,v1,g1,i2}
7 \fmf{ir_photon,tension=0}{g1,g2}
8 \fmfdot{g1,v1,v2}
9 \end{fmfgraph}

```

Figure 6.6: Different kinds of photons in the same diagram.

```

2 \fmfset{arrow_len}{cm}\fmfset{arrow_ang}{25}
3 \fmfleft{i}\fmfright{o}\fmf{fermion}{i,o}
4 \end{fmfgraph}

```



```

1 \begin{fmfgraph}(30,3)
2 \fmfset{arrow_len}{cm}\fmfset{arrow_ang}{10}
3 \fmfleft{i}\fmfright{o}\fmf{fermion}{i,o}
4 \end{fmfgraph}

```

How can I use Makefiles efficiently?

The most convenient way of using `feynMF` is to let the `make` utility figure out which commands have to be run. Since the `.mf`-file is created from the `.tex`-file every time `LaTeX` is run, even if nothing has changed, we need to aid `make` a little in the decision making process.

Below is a `Makefile` rule that supports `feynMF`. In lines 1–6, we set up a few variables to make site specific customizations easier: `MODE` is the printer type (can be found from the file `modes.mf`, the output of the `MakeTeXPK` script or from your local wizard). `MAG` is the magnification which is usually 1, but some `LaTeX` packages need other values:

the most prominent example is `seminar.sty`, which wants `magstep(4)`. DPI is the product of the printer resolution and MAG. Finally, SUF is a suffix that is used to build the METAFONT file name from the $\text{\LaTeX}$ file name (they can't share the same name, because the names of the `.log` files would clash).

```

1 MODE = laserjet
2 MAG = 1
3 DPI = 300
4 # MAG = magstep(4)
5 # DPI = 622
6 SUF = pics
7 .tex:.dvi
8 -cp $$$(SUF).mf $$(SUF).mf~
9 -latex $$
10 if cmp -s $$(SUF).mf $$(SUF).mf~; then\
11   ;;\
12 else\
13   mf '\mode:=$(MODE);mag:=$(MAG);input '\
14     $$(SUF);\
15     gftopk $$(SUF).$(DPI)gf;\
16     latex $*;\
17 fi
18 while grep -s\
19   'Rerun to get cross-references right.'\
20   $*.log;\
21 do\
22   latex $*;\
23 done

```

Lines 8–23 define the sequence of commands that will produce a `.dvi`-file from the `.tex`-file (in the actual `Makefile`, the leading blanks have to be TABs, of course). Lines 8–9 create a copy of the `.mf`-file and run $\text{\LaTeX}$ (ignoring errors). Line 10 checks if the `.mf`-file has changed: if so, it is processed by METAFONT, the resulting `.gf`-file is turned into a `.pk`-file and $\text{\LaTeX}$ is run again (lines 13–16). The loop in lines 18–23 is independent from `feynMF` and runs $\text{\LaTeX}$ until all cross-references are resolved. It should be obvious how to extend this rule to support `BibTeX`, `makeindex`, etc.

How can I make sure that $\text{\LaTeX}$ will find the correct fonts?

The answer is system dependent, unfortunately. However, if you use a variation on the above `Makefile` and make sure that your font search path includes the current directory, you should have no problems. Your $\text{\TeX}$ administrator knows how to set up which environment variables, if necessary.

Never, ever rely on the automatic font generation methods to run METAFONT for you on the `feynMF` files. They will install the output in a system directory (where it doesn't belong) and it might be hard to remove it again. Even worse, some installations will search the system directories first and you might be forever stuck with an obsolete version if you make changes to the diagrams. The same applies to running `gftopk`.

How can I make sure that a recipient will be able to format my preprint that uses `feynMF`?

`feynMF` has a compatible companion `feynmp.sty` that uses METAPOST [6] in place of METAFONT. Shipping the PostScript files produced by METAPOST and `feynmp.sty` with the preprint, makes it portable to all installations that support PostScript and doesn't require the recipient to run METAFONT. METAPOST can be installed easily by any competent $\text{\TeX}$ administrator and will be a default part of the next Unix $\text{\TeX}$ distribution.

However, the preferred option is to spread the gospel of `feynMF`, of course...

6.1.5 Conclusions

I hope that this tutorial has eased the allegedly steep learning curve of `feynMF` a bit by providing a cookbook of examples from the "Real World". At the same time, I hope to have shown that the system is sufficiently general and can be extended to do things I have not thought about yet. *It is your turn now, go out, draw beautiful Feynman diagrams and calculate them or measure the corresponding cross sections.*

Bibliography

- [1] T. Ohl, CERN Computer Newsletter **220**, pp. 22-28, June 1995.
- [2] T. Ohl, CERN Computer Newsletter **221**, pp. 46-51, December 1995.
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- [4] T. Ohl, Comp. Phys. Comm. **90**, 340 (1995).
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6.2 A new Directory Structure for T_EX Files

Michel Goossens CN/ASD

6.2.1 Introduction

T_EX is a powerful, flexible typesetting system used by tens of thousands of people around the world. It is extremely portable and runs on virtually all operating systems. One unfortunate side effect of T_EX's flexibility, however, is that there has been no single "right" way to install it. This has resulted in many sites having different installed arrangements.

A working group of specialists of the T_EX world was created in 1994, and it produced recently a proposal (for a complete description see TUGboat 16 (16), pages 401-413, or in electronic form the URL http://wwwcn.cern.ch/asdoc/WWW/tds-html/tds_1.html, whose main points and effects for the CERN setup are the subject of this article.

As a first principle, the T_EX Directory Structure (TDS) setup has been designed to work on all modern systems, in particular it copes with MacOS, MS-DOS, OS/2, Unix, VMS, and Windows (3.x, 95, and NT). The same file base can thus be used on multiple platforms simultaneously.

6.2.2 Top-level directories

The directories under the TEXMF root (at CERN we have chosen a GNU-compatible /usr/local/share/texmf root directory) identify the major components of a T_EX system (see Table 6.1).

The top-level directories specified by the TDS are:

tex	T _E X files;
fonts	font-related files;
metafont	(non-font) METAFONT files;
metapost	METAPOST files;
bibtex	BIBT _E X files;
doc	user documentation;
source	sources, e.g., Web2c sources go in <code>texmf/source/web2c</code> or L ^A T _E X dtx sources go in <code>texmf/source/latex</code> ;
implementation	implementations (such as <code>emtex</code> , <code>web2c</code>); this directory contains files that cannot be shared between implementations, such as pool files (<code>tex.pool</code>) and memory dump files (<code>plain.fmt</code>), as well as implementation-wide configuration files;
program	program-specific input files for T _E X-related programs (e.g. for <code>mft</code> , <code>dvips</code>).

A few words on fonts

Font files are stored in separate directories, segregated by file type, font supplier, and typeface.

`texmf/fonts/type/supplier/typeface/`

type is the type of font file. The TDS reserves the following **type** names, such as **pk** (packed bitmap files),

source (font sources, i.e. METAFONT files, property lists, etc.), **tfm** (T_EX font metric files), **type1** (Type 1 fonts in any format), **vf** (virtual fonts).

supplier is a name identifying font source (examples: **adobe**, **ams**, **public**).

typeface name of a typeface family (examples: **cm**, **euler**, **latex**, **times**).

Some concrete examples:

```
texmf/fonts/source/public/pandora/pnr10.mf
texmf/fonts/tfm/public/cm/cmr10.tfm
texmf/fonts/type1/adobe/utopia/putr.pfa
```

Font bitmap files require two characteristics in addition to the above to be uniquely identifiable: (1) the type of device (i.e., mode) for which the font was created; (2) the resolution of the bitmap.

As TDS has to cope with file systems which do not support long filenames, the font bitmaps are segregated into directories by resolution (e.g., `dpi300/cmr10.pk`), so that we have two more subdirectory levels under **pk** and **gf**:

```
texmf/fonts/pk/mode/supplier/typeface/dpinnn/
texmf/fonts/gf/mode/supplier/typeface/dpinnn/
```

mode is a name which identifies the device type (examples: **cx**, **gsftopk**, **ljfour**).

dpinnn specifies the resolution of the font (examples: **dpi300**, **dpi329**). 'dpi' stands for dots per inch, i.e., pixels per inch.

Documentation

Most packages come with some form of documentation: user manuals, example files, programming guides, etc. In addition, many independent files not part of any macro or other package describe various aspects of the T_EX system.

The TDS specifies that these additional documentation files shall be stored in a structure that parallels to some extent the **fonts** and **tex** directories, as follows:

```
texmf/doc/category/...
```

category identifies the general topic of documentation that resides below it; for example, a T_EX format name (**latex**), program name (**bibtex**, **tex**), or other system component (**web**, **fonts**).

See Table 6.2 for a summary.

Executable programs

The location of executable programs is generally site dependent and also differs across the various platforms. For instance, on Unix, executables are often stored in the directory `/usr/local/bin`.

bibtex/	BIB _T E _X input files
. bib/	BIB _T E _X databases
. . base/	base distribution (e.g., xampl.bib)
. . misc/	single-file databases
. <package>/	name of a package
. bst/	BIB _T E _X style files
. . base/	base distribution (e.g., plain.bst, acm.bst)
. . misc/	single-file styles
. <package>/	name of a package
doc/	see Table 1.2
fonts/	font-related files
. <type>/	file type (e.g., pk)
. . <mode>/	type of output device (for pk and gf only)
. . . <supplier>/	name of a font supplier (e.g., public)
. . . . <typeface>/	name of a typeface (e.g., cm)
. dpi<nnn>/	font resolution (for pk and gf only)
<implementation>/	T _E X implementations, by name (e.g., emtex)
metafont/	METAFONT (non-font) input files
. base/	base distribution (e.g., plain.mf)
. misc/	single-file packages (e.g., modes.mf)
. <package>/	name of a package (e.g., mfpic)
metapost/	METAPOST input and support files
. base/	base distribution (e.g., plain.mp)
. misc/	single-file packages
. <package>/	name of a package
. support/	support files for METAPOST-related utilities
mft/	MFT inputs (e.g., plain.mft)
<program>/	T _E X-related programs, by name (e.g., dvips)
source/	program source code by name (e.g., latex, web2c)
tex/	T _E X input files
. <format>/	name of a format (e.g., plain)
. . base/	base distribution for format (e.g., plain.tex)
. . misc/	single-file packages (e.g., webmac.tex)
. . local/	local additions to or local configuration files for <i>format</i>
. . <package>/	name of a package (e.g., graphics, mfnfss)
. generic/	format-independent packages
. . hyphen/	hyphenation patterns (e.g., hyphen.tex)
. . images/	image input files (e.g., Encapsulated PostScript)
. . misc/	single-file format-independent packages (e.g., null.tex)
. . <package>/	name of a package (e.g., babel)

Table 6.1: A skeleton of a TDS texmf directory tree

6.2.3 Subdirectory searching

Recursive subdirectory searching is the ability to specify a search not only of a specified directory *dir*, but recursively of all directories below *dir*. Different implementations or applications specify subdirectory searching differently, as shown below.

dvips: TEXFONTS_SUBDIR environment variable;
kpathsea: texmf/subdir//;
VMS: texmf:[subdir...].

On the Unix systems at CERN, we use the Web2c implementation for the T_EX programs. All implementation-dependent T_EX system files (.pool, .fmt, .base, .mem) are stored by default directly in texmf/web2c. The configuration file texmf.cnf and various subsidiary MakeTeX... scripts used as subroutines are also stored there.

Non-T_EX specific files are stored following the GNU coding standards. Given a root directory *prefix* (/usr/local by default), we have default locations as follows:

<prefix>/	installation root
. bin/	executables
. man/	man pages
. info/	info files
. lib/	libraries (libkpathsea.*)
. share/	
. . texmf/	TDS root
. . . web2c/	implementation-dependent files (.pool, .fmt, texmf.cnf, etc.)

6.2.4 Changing the CERN T_EX setup

The TDS group is in the process of preparing a “plug-and-play” CD-ROM, containing executables for most Unix systems, plus the cross-platform TDS file structure outlined in

ams/	
. amsfonts/	amsfonts.faq, amfndoc
. amslatex/	amslatex.faq, amslldoc
. amstex/	amsgauide, joyerr
bibtex/	BIB $\TeX$
. base/	btldoc.tex
fonts/	
. fontname/	<i>Filenames for $\TeX$ fonts</i>
. oldgerm/	corkpapr
<format>/	name of a $\TeX$ format (e.g., generic, latex)
. base/	for the base distribution
. misc/	for contributed single-file package documentation
. <package>/	for <i>package</i>
general/	across programs, generalities
. errata/	errata, errata[1-8]
. texcomp/	<i>Components of $\TeX$</i>
generic/	for non-format-specific $\TeX$ packages
. babel/	
. german/	germdoc
help/	meta-information
. ctan/	info about CTAN mirror sites
. faq/	FAQs of comp.text.tex, etc.
html/	HTML files
info/	GNU Info files, made from Texinfo sources
latex/	example of <i>format</i>
. base/	ltnews*, *guide, etc.
. graphics/	grfguide
<program>/	$\TeX$ -related programs, by name (examples follow)
metafont/	mfbook.tex, metafont-for-beginners, etc.
metapost/	mpman, manfig, etc.
tex/	texbook.tex, <i>A Gentle Introduction to $\TeX$</i> , etc.
web/	webman, cwebman

Table 6.2: A skeleton of a TDS directory tree under texmf/doc

the previous sections. At CERN, I plan to move to the TDS structure on the asis Unix file base during **the second week of May** (probably during the weekend of May 11/12). At that time the old setup (available on some platforms with the oldlatex command) will be deleted (this is overdue, since I originally announced this deletion for the summer of 1995!). If a user wants to continue using this old setup, it will have to be copied to the user's private disk space before that date. Later the same system will be installed on VMS and Nice, so that we can benefit from a uniform file base throughout all text processing platforms (at present it is not known whether

TeXtures, the $\TeX$ version we use on Macintosh, will also adopt the TDS file structure, but there is good hope that they will). Thanks to the fact that CERN will use the (" $\TeX$) world standard" system, all HEP institutes will be able to copy the CERN structure and hence be compatible with other setups which adhere to the same standard. They will also be able to buy the CD-ROM mentioned above (it should be available by the beginning of June), which will be ISO 9660-compatible, so that in principle it will be possible to mount it on VMS, PC (DOS, Windows) and Mac also.

6.3 National language support

Michel Goossens CN/ASD

Recently, several CERN users from non-English speaking countries contacted me to ask whether it would not be possible to set up a text processing system closely resembling that which they have at their home institutes. This would allow them to exchange documents with their home base in an optimal way. This issue is all the more important in the framework of the geographical distribution of the LHC experiments. I therefore invite representatives of such groups to contact me to see which is the best way to proceed in each

case, since I am a strong believer in the principle that it is up to the language groups to decide which is the "localized" text processing environment which suits their needs in the best way. In particular, I kindly invite input from the Russian (I have an offer from CyrTUG to collaborate in this area), Greek (I already got several requests from this community, but I have no contact person yet), central European, Nordic, Roman, and possible other language communities working at CERN.

7. Questions and Answers from the UCO

A more complete collection of Frequently Asked Questions can be found on our Web page at URL:
<http://consult.cern.ch/uco/direct/#FAQs>.

7.1 General

Question

Can I send a fax from my Unix workstation?

Answer

CERN/CN/CS group offers an email-to-fax gateway pilot service for official CERN user. All information concerning this service can be found at URL: <http://wwwcs.cern.ch/wwwcs/public/mail/isofax.html>

Question

How do I copy the content of an afs directory onto tape ?

Answer

Make sure you have a tape and a tape number assigned to you (this is done by self-service in Building 513) and use the `copytape` command from the Unix command line. For more information type `man copytape`.

7.2 Accounts and Registration

Question

Why does a MailServer account exist for many people and not for some? Is the MailServer registration automatic through a CUTE registration?

Answer

The automatic creation of a MailServer account depends in which order the registrations have been made. The CUTE registration includes a MailServer account for CUTE services (like `cernsp`) but not for a simple AFS registration. In that case the registration to MailServer must be done explicitly by the group administrator.

Question

I have forgotten my password. What can I do ? How long will it take until I can login again ?

Answer

Contact the UCO help desk and they will change your password after checking your identity. They have no access to your actual password but they will give you a new temporary password that you will have to change the first time you will login. Then the time it takes depends on the machine:

word after checking your identity. They have no access to your actual password but they will give you a new temporary password that you will have to change the first time you will login. Then the time it takes depends on the machine:

- on `dxcern`, `shift` and `csf` it requires human intervention so the delay can vary from several minutes to a few hours;
- on AFS (N.B. more CORE machines like `cernsp` or the Public Unix Login services and Work Group Servers are based on AFS), it is automatic and takes about 10 minutes;
- on VXCERN, it goes to a server and takes up to one hour (but can be less);
- on Novell, it goes to a server and that server send a message back to the UCO when the action has been performed.

7.3 AFS tips

Question

Which is the easiest method to allow ftp access to some of my home directory files on afs?

Answer

First create a `~/www` directory. Then type

```
fs setacl www cern:nodes read
```

to specify the web server read rights, and place files or links to files you wish to distribute. These files can be accessed using the link:

http://wwwcn.cern.ch/~Login_name/filename

A more user-friendly interface would be to create a `Welcome.html` file in `~/www` with links to the relevant files.

Question

How can I find out my quota/usage on afs?

Answer

Use the command `fs listquota`.

Question

Are my afs-files backed-up automatically? If yes, where do I find them?

Answer

Yes, they are, but only the versions of the previous working day (excluding weekends). You will find them in the directory: `/afs/cern.ch/ubackup/...`, i.e. your normal directory with `user` replaced by `ubackup`.

8. Computer Documentation

8.1 New Book Titles Available at the UCO

Roger Woolnough CN/DCI

The number of books offered at the UCO continues to increase helped by the input of users and as a result of sales. Since the last CNL we have managed to get two new accounts set up, with *Microsoft Press* and *Academic Press*.

With *Microsoft* we will be able to order the manuals available for the respective software products. We have started by making a tentative order for Windows 95 books such as *Inside Windows 95*, *Introducing Windows 95*, *Advanced Windows 95*, etc. We have also ordered books for running the most popular programmes with Windows 95, *Word*, *Excel* and *Power Point*. According to user demand we can enlarge this list.

Arriving in the next weeks are several other interesting titles. A new *Addison Wesley* book, *The Mother of all Windows 95 Books*, should be available by the time the CNL goes to Press.

International Thomson publishers have recently acquired *Netscape Press* so we will have the official *Netscape* books available. The *Netscape Navigator 2.0* book and CD-Rom will feature the software for Mac PC and Unix as well as a

very comprehensive manual on the subject, all for well under 50ChFrS we are told.

MacGraw Hill are the official publishers for the *Oracle* titles and we plan to have a selection of those available in the coming months.

Updates of existing books by *O'Reilly* will soon be arriving. The *Programming Perl* book is to be updated to include Perl 5 and the *Learning GNU emacs* to include version 19. There is also an update of the *Encyclopaedia of Graphic file formats*.

The complete book catalogue is to be found at the end of this newsletter (see section 8.4). In this list the books added since the last CNL are prefixed with (*).

Please contact me personally if you have suggestions for future acquisitions. New additions are always announced in the `cern.computing` newsgroup and you can find the complete list of books on the Web at URL:

<http://consult.cern.ch/books>
as well as the purchasing procedures.

8.2 New Reference Cards at the UCO

Jason Oh /SERCO, and Miguel Marquina CN/DCI

Two new reference cards are available at the UCO:

- 40 Obtaining and Configuring a Modem to Connect to CERN from Home
- 50 Cross Reference for Mail Services at CERN

The first points users to documentation concerning using a

modem from home, the second provides a comparison of different mail facilities available at CERN.

Note also that Refcard07: "Using QuickMail at CERN" has been replaced by a hyperlink to Mats Møller's QuickMail information page (<http://asserv.cern.ch/quickmail/>).

8.3 The UCO Reference Card Catalogue

Jason Oh /SERCO, and Miguel Marquina CN/DCI

The User Consultancy Office as a service provides a collection short documents, mostly related to Unix. Aimed as brief introductory guides to help the novice user, become effective, without initially having to plough through detailed reference documentation. Notice however, that we strongly recommend you consult the reference manuals if you intend to make serious use of the application or facility documented in the cards.

Most reference cards are also available on-line located at

<http://consult.cern.ch/uco/refcards>

and visible via a WWW browser such as *Mosaic* or *Netscape*. They have also been categorised to help users select or find documentation more easily. The current list is :

Computer Registration Documents

- 01 CERN Computer Centre User Registration (GU/SS)
- 02 CERN Computer Centre User Registration (OU)
- 03 CERN Computer Center User Registration (Super Computer)
- 04 Request for Account Modification/Deletion
- 05 Règlement révisé pour l'utilisation des service infor-

matiques au CERN

06 Revised rules for use of computing facilities at CERN

Electronic Mail

07 Using QuickMail at CERN

23 Intro to *pine* for CERNVM users24 Migrating from MAIL/VM to *pine*29 *pine* Key Reference for VM mail users

50 Cross-reference for Mail Services at CERN

Text Processing20 Include ps and eps files into $\LaTeX$ **Text Editors**

15 vi editor

16 pico editor

17 Emacs mini reference

30 Emacs and vi Commands for VM/XEDIT Users

34 GNU Emacs reference card

Programming Languages

22 SQL Basic introduction

Unix

08 Submitting a batch job on the SP2

09 Should I have a dot ('.') in my PATH

10 Customising your shell - zsh specific

11 Customising your shell - tcsh specific

12 Customising your shell - zsh options

14 Unix Introduction

25 AFS Reference

33 Unix Commands for VM and VMS Users

Browsers

18 xdvi and ghostview

21 NCSA mosaic

28 Lynx browser

VAX/VMS

31 VAX/VMS Card

Miscellaneous

13 Unix connectivity from Falco terms

19 make command

35 CMZ refcard

36 Zephyr Messaging Service for Unix Users

37 Falco infinity/Setup du terminal

38 Falco 5220e setup du terminal

39 Importing CERN Computer Equipment into France

40 Obtaining and Configuring a Modem to Connect to CERN from Home

8.4 UCO Book Catalogue

The books listed below can be obtained from the UCO. Payment for books is possible in three different ways:

- paper TID,
- the EDH system,
- cash payment to the SBS account C0-148,556.0, controlled by Finance Division (quote reference "UCO BOOK").

The last alternative has been set up for those willing to purchase items from our offering for private purposes or when there is no defined procedure (short-term visitors such as summer students, etc.).

In order to pay the books via paper TID, you must be authorized to sign it or bring one already signed by one of your budget holders. The EDH system is just the production of an electronic TID: the Divisional Secretariats have authorization to enter transactions in this system.

Note that the opening hours of the UCO (Bld. 513/R-052, Tel. 4952) are: Mon. 10.00-17.00 – Tue.-Fri. 9.00-17.00.

Text Processing*T_EX* CD ROMS Tex*PostScript Language Ref. Man.* by Adobe(*) *Hooked on JAVA* by L.Lamport*L^AT_EX User Guide (2nd. Edition)* by L.Lamport*The L^AT_EX Companion* by Goossens/Mittelbach/Samarin(*) *Portable document format ref manual* by Adobe(*) *Using HTML* by Savola(*) *The Frame Handbook* by Branagan, Sierra*Making T_EX Work* by Walsh**Text Editors***Learning the vi editor* by Lamb*Learning GNU Emacs* by Cameron/Rosenblatt*GNU Emacs manual* by R.Stallman**Programming languages***The C Programming Language* by Kernighan/Ritchie*Fortran 90 explained* by Metcalf/Reid*Scientific and Engineering C++* by Barton/Nackman*C++ Programming Language* by Stroustrup*The Art and Science of C* by Roberts*Design evolution C++* by Stroustrup*C++ Primer* by S.Lippman*Advanced C++ prog. styles* by Coplien*Design patterns* by Gamma,Helm,Johnson,Vliss...(*) *Object solutions* by Booch*A Book on C* by Pohl

C++ For C programmers by Pohl
Object Oriented Programming C++ by Pohl
 (*) *Programming with curses* by Strang
Programming PERL by O'Reilly
Practical C by Oualline
Learning PERL by Schwarz
Migrating to Fortran 90 by Kerrigan
Learning the Korn Shell by Rosenblatt
 (*) *C++ The Core language* by O'Reilly, Nye
Applying TRCS and SCCS by Bollinger, Bronson
Using csh and tcsh by Dubois
Practical C++ Programming by Oualline
 (*) *Learning the Bash Shell* by Newham, Rosenblatt
XL Fortran for AIX User Guide by IBM
XL Fortran for AIX Language Ref. by IBM

Internet

Understanding networked multimedia by Fluckiger
Unix network programming by Stevens
The Internet Companion by Tracy LaQuey
Firewalls and Internet Security by Cheswick/Bellovin
How to set up world wide web site by Stein
Managing Internet Information Services by Liu/Peeke/Jones/Buus/Nye
The Whole Internet by Ed Krol
 (*) *The whole internet for Windows 95* by Krol
Mosaic Handbook for Windows on PC by Koman
Mosaic Handbook for X windows by Koman/Ferguson
Mosaic Handbook for Macintosh by Koman
Building internet firewalls by Chapman, Zwicky
 (*) *The World Wide Web handbook* by Flynn

Sunsoft

Panic system crash dump a by Drake, Brown
Sun performance tuning sp by Cockcroft
Solaris implementation by Becker, Morris, Slattery

Unix

Unix System Administration Handbook by Nemeth/Snyder/Seebass/Hein
Unix for VMS users by Bourne
Unix for the Impatient by Abrahams/Larson
Advanced Programming In Unix Env. by Stevens
Teach yourself Unix in a week by Taylor
Unix Power Tools by Peek/Loukides/O'Reilly
A Practical Guide to the Unix System by M. Sobell
A Practical Guide to Unix System 5 by M. Sobell
Unix for Fortran Programmers by Loukides
sed & awk by Dougherty
System Performance Tuning by Loukides
Practical Unix security by Garfinkel/Spafford
Managing NFS and NIS by Stern
Power programming with RPC by Bloomer
Essential System Administration by Frisch
make by Oram/Talbott
Lex and yacc by Levine, Mason, Brown
Unix in a Nutshell, system V by Gilly/O'Reilly
Imake by Dubois
Posix.4 Programming for the real world by Gallmeister
Pretty Good Privacy by Garfinkel
Porting Unix software by Lehey
GNU make by Stallman

X Window, tools etc.

The X Window System in a Nutshell by Cutler/Gilly/O'Reilly
Vol 0 : X Protocol Reference Manual by Nye
Vol 1 : Xlib Programming manual by Nye
Vol 2 : Xlib Reference manual by Nye
Vol 3 : X Window System User Guide by O'Reilly, Quercia
Vol 3M : X Window System User Guide(OSF/Motif) by O'Reilly, Quercia
Vol 4 : X Toolkit Intrinsics Programming by O'Reilly, Nye
Vol 4M : X Toolkit Intrinsics Programming(OSF/Motif) by O'Reilly, Nye
Vol 5 : X Toolkit Intrinsics Reference Manual by Flanagan
Vol 6a : Motif Programming Manual by Heller, Ferguson
Vol 6b : Motif Reference Manual by Paula, Ferguson
Vol 7 : XView Programming Manual by Heller
Vol 7b : XView Reference Manual by Raalte
Vol 8 : X Window System Administrator's Guide by Mui, Pearce
X user tools by Mui, Quercia
Motif tools by Flanagan
X companion CD for R6 by Nye
Programmer's supplement for Release 6 by O'Reilly, Nye
Expect by Libes

Mac & Pc

Inside Macintosh by Apple Computer Inc.
The mother of all windows 95 books by Leonhard, Simon
 (*) *Macintosh Programmers Toolbox Assistant* by Apple Computer
 (*) *Network programming in windows NT* by Shina
Using Excel 5 for windows by Person, Rose
Using Word 6 for Windows by Person/Rose
The Macintosh Bible guide to word 6 by Langer
Word 6 for Windows essentials by Mandel
The Macintosh Bible + CDROM by Dinucci
Quickstart Excel 5 for windows by Webster
The Little Windows 95 Book by Nelson

Software Packages

(*) *Software engineering standards* by Mazza, Fairclough
 (*) *Software engineering guides* by Mazza, Fairclough
Mathematica by Stephen Wolfram
The Mathematica Graphics Guidebook by Smith/Blachman
Mathematica for Physics by Zimmerman
Mathematica for Scientists and Engineers by Bahder
 (*) *A discipline for software engineering* by Humphrey
 (*) *Mathematica quick reference manual* by Blachman
Lapack Users Guide by The Lapack Team
Learning oracle forms 4.5 Tutorial
Oracle performance tuning by Corrigan, Gurry
Oracle PL/SQL Programming by Feuerstein
Gphigs V 3.0 by G5G

General Computing

The OnLine Users Encyclopedia (no more) by Aboba
Tcl and Tk Toolkit by Ousterhout
TCP/IP Illustrated Vol.1 The Protocols by Stevens
TCP/IP Illustrated Vol.2 The Implementation by Stevens
 (*) *TCP/IP Illustrated Vol.3* by Stevens
TCP/IP network administration by Hunt
Encyclopedia of Graphics by Murray, VanRyper

Liste de livres disponibles en français

La programmation sous Unix par Rifflet
Tutorland pour Word 6 par Nicot, Charra
Tutorland pour Excel 5 par Nicot, Charra
ETX guide pratique par Rolland

(*) Book added since the last CNL.