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(TM)

FAQ

October 1999

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Number of times this page has been served: **8383**

HTML-ized and updated: **Fri Oct 1 10:41:04 EDT 1999**

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General Info about this FAQ

This posting contains frequently asked questions and answers about the IBM RS/6000 series workstations and AIX versions 3 and 4. All input is very welcome, I can be reached at jum@anubis.han.de.

The list is split into five articles to pass thru most mailers. I'll usually try to post them once a month to comp.unix.aix, news.answers, and comp.answers. Please let your input continue as I am most thankful for all of it.

This FAQ is available from (see section 6.08 for more sites):

<http://www.emerson.emory.edu/services/aix-faq/>

<ftp://rtfm.mit.edu:/pub/usenet/news.answers/aix-faq/part1>

<ftp://mirrors.aol.com:/pub/rtfm/usenet-by-hierarchy/comp/unix/aix>

The Adobe Acrobat PDF version of the FAQ is available at:

<ftp://anubis.han.de/pub/aix/aixfaq.pdf>

Please make a note of the fact that these sites contain more than just the AIX FAQ and would probably be worth consulting before you post questions to any of the usenet groups.

If you see a From: line it means that whatever follows is either an unabridged or slightly edited version of the input I have received, and that I may not have verified its contents. If there is no From: line, I probably know what I am talking about, and the entry is edited from various sources.

All entries are numbered with major and minor subject number, e.g. 2.11. If the subject is preceded by an asterisk, that entry has been changed or added since the last posting.

The comp.unix.aix group is for AIX on all IBM platforms -- RT, PS/2, 370, RS/6000 and mainframes (ESA based on OSF/1), but the traffic has evolved to discuss predominantly AIX 3.x and the RS/6000. The newsgroups comp.sys.ibm.pc.rt and comp.sys.ibm.ps2.hardware cover the RT, mostly hardware and AOS 4.3, and on PS/2 hardware respectively. Mark Whetzel posts FAQ lists about RTs in the rt and *.answers groups. There are few to non-existent discussions on AIX/370 and AIX/ESA.

If you post questions to comp.unix.aix, please be sure to indicate:

- the machine type and brief configuration, e.g. Model 540, 64 MB RAM, 48 MB swap space (this is actually bad), 1.2 GB XYZ hard drive, etc. Note: There are now three classes of RS/6000s - the original, RS or POWER, RS/2 or POWER2, and PowerPC.
- the exact AIX version number, i.e. AIX 3.1 is NOT sufficient, whereas AIX 3.1.5 or AIX 3.1 with the 3005 update is. With 3.2 you should mention any significant ptf's using the U4xxxxx numbers.

I am doing this on my own time. Please do not ask me questions that should be asked to IBM. If you suspect you have software defect problems call (800) 237-5511. If you have hardware problems call (800) IBM-SERV.

1.0 General concepts

Subject: 1.000: The AIX operating system - what is it?

This is best answered by reading the text files in /usr/lpp/bos. The README file there contains general information and the bsd file contain useful information if you know BSD and/or System V.

The last release for the RT PC is 2.2.1. The latest release for PS/2s and Intel architecture machines is AIX 1.3; for PS/2s only, 1.2.1. For the RS/6000, there are three major levels, 3.2, 4.1, 4.2, and various intermediate levels. IBM has dropped support for 3.1.

For those who don't have a copy of /usr/lpp/bos/README or bsd, I'll summarize: IBM tried to follow IEEE, POSIX 1003.1, ANSI C, FIPS and then X/Open Issue 3. Beyond that, AIX is a combination of System V and BSD.

Subject: 1.001: I know neither Unix nor AIX
- where do I find more information?

If you are new to Unix, you should look at the other newsgroups in the comp.unix hierarchy, in particular comp.unix.questions. There are FAQs more most of these groups as well.

If you need information about C programming, try comp.lang.c or comp.std.c, the latter for Standard ANSI C issues. comp.lang.c has a FAQ posting.

Subject: 1.002: What is the Object Database?
From: Uwe Geuder <Uwe.Geuder@informatik.uni-stuttgart.de>

AIX stores most of the system management information in /etc/objrepos, /usr/lib/objrepos, and /usr/share/lib/objrepos. Files (also referred to as system object classes) in these directories are administered by the Object Database Manager, ODM, which is a set of library routines and programs providing basic object oriented database facilities.

Under most circumstances, only SMIT or the commands SMIT call (see 1.100) should be used to change the contents of the system object classes. A harmless way to look at the object database is to use odmget <Class> where <Class> is one of the files in /etc/objrepos.

Experienced users can use the ODM editor, odme, to navigate the database in detail. Modifying the database should only be attempted if you know exactly what you are doing.

Subject: 1.003: How do I get rid of the verbose error messages?
From: Bjorn P. Brox <brox@corena.n>

Many of the messages from the Unix commands are available in different languages. This is controlled by the LANG environment variable, the default being En_US meaning English in the US. All the default messages have a message number associated with them, e.g.:

```
$ cat no-such-file  
cat: 0652-050 Cannot open no-such-file.
```

If you prefer the terser Unix-looking error message, set your environment variable LC_MESSAGES to C, and you will get:

```
$ cat no-such-file  
cat: Cannot open no-such-file.
```

By default LC_MESSAGES is the same as your environment LANG. Setting LANG does also work, but should be avoided since it changes app-defaults lookup etc. See locale(): LC_ALL

Subject: 1.004: Which release of AIX or other products do I have?

New with 3.2.5: The oslevel command shows OS and component levels. Run oslevel -help to see options

The command 'lslpp -h bos.obj' will show all lines referring to the BOS, Basic Operating System. E.g.:

Fix Id	Release	Status	Action	Date	Time	User Name

Path: /usr/lib/objrepos						
bos.obj						
	03.02.0000.0000	COMPLETE	COMMIT	12/31/69	18:00:00	root
U401864	03.02.0000.0000	COMPLETE	COMMIT	11/12/92	20:09:35	root
U401968	03.02.0000.0000	COMPLETE	COMMIT	11/12/92	23:18:21	root
U401969	03.02.0000.0000	COMPLETE	COMMIT	11/12/92	23:18:20	root
.....						
U418349	03.02.0000.0000	COMPLETE	COMMIT	08/28/93	15:34:13	root
U419950	03.02.0000.0000	COMPLETE	COMMIT	08/28/93	15:34:11	root

For AIX 3.2, you may come across discussions on 3.2.0, 3.2.1, 3.2.2, 3.2.3 extended, 3.2.4 and 3.2.5. There is no absolute way to tell which of these you are running since the newer releases are simply 3.2.0 with some sets of PTFs added. See above example listing. These selective fixes could mean there are literally thousands of slightly different variations of 3.2 in use. Please see section 6 to request some useful fixes to help with this number game.

AIX 3.2.4 and later attempts to resolve this confusion. The OS is broken down into subsystems so that updates can be applied to an entire subsystem. lslpp also sports a new option; use 'lslpp -m bos.obj' to show what level and update the system is running. You can also use the new oslevel command. Unless you have a pressing need (such as applications unsupported on > 3.2.3), it is recommended that you update

to this level. Also see 1.128.

Subject: 1.005: What hardware do I have? What is available? WITS?
From: C.Deignan@frec.bull.fr (C.DEIGNAN)

The wits script is unfortunately no longer maintained. I just don't have the time, and I'm not sure it is a realistic proposition anymore. There are so many different models that have the same model-ID that it's impossible to be "definitive."

[Editor's note: I've deleted the source to the wits program from the FAQ, but it is listed as being part of the aix.tools.1.3.0.0.exe archive at Bull's freeware download site <<http://www-frec.bull.com/>>. Press the "Download" button once the top page loads, then look for "The Large AIX Freeware and Shareware Archive" link.]

Subject: 1.006: Is IBM "dropping" AIX? AIX 3 discontinued.

No. IBM sells and supports AIX 4. However, on January 31, 1997 IBM will "withdraw AIX 3.2.5 from marketing." That is, you won't be able to purchase AIX 3.2.5 anymore. On December 31, 1997, IBM will "discontinue Program Services" for AIX 3.2.5. Translation: they will no longer respond to (most) defect reports for AIX 3.2.5.

The US announcement letter can be read via <<http://ww1.ibm.link.ibm.com/>>. Pick the US as region, look for "Announcement Letters," then search for document number 996-245.

1.1 SMIT, system administration

Subject: 1.100: I am used to Unix systems programming,
why should I learn SMIT?

Using SMIT is probably very different from your normal way of doing system administration, but could prove very useful in the long run. In some areas, in particular TCP/IP, NFS, etc., you can also do things the normal way, but it is unfortunately difficult to know exactly when the normal way works. Again, always using SMIT is probably your best way to go, even when you have to learn a new tool.

What SMIT actually does is build up commands with all required options to perform the functions requested and execute them. The commands called and the output they produce are stored in the files `smit.script` and `smit.log` in your home directory. Looking in `smit.script` may teach you more about system administration.

Subject:1.101: How do I turn off the "running man" in smit?

Use `smitty`, the standard curses version or add this line to your `.kshrc` file:
`alias smit="smit -C"`

Subject: 1.102: How do I import an `/etc/passwd` or `/etc/group` file
from another box?

If the other box is non-AIX, copy the password and group entries for the non-system users into AIX's `/etc/passwd` and `/etc/group` files. Then run `/bin/pwdck -t ALL`. This will create the proper entries in the shadow password file (`/etc/security/users`). You should also run `usrck` and `grpck`.

To duplicate the password and group entries from another AIX box, copy `/etc/passwd`, `/etc/group`, `/etc/security/passwd`, `/etc/security/group`, `/etc/security/user`, `/etc/security/limits`, `/etc/security/envIRON`. The last three are optional unless you modified them. If you modified `/etc/security/login.cfg`, you should also copy that file.

Subject: 1.103: Cleaning up `utmp`, `who`, and accounting problems

The best way to fix this problem is to fix the programs which are causing the behavior in the first place. The short answer is to call software support and ask for the "UTMPFIX" collection of PTFs.

Virtually all of these problems should be fixed in the 3251 PMP and the only one I've been able to prove is still broken is using ALT-F4 to close an aixterm.

This applies if you are running an X11R5 xterm on 3.2.

Add this to the top of X11R5 mit/clients/xterm/main.c:

```
#ifdef AIXV3
#define USE_SYSV_UTMP
#define HAS_UTMP_UT_HOST
#define WTMP_FILENAME "/var/adm/wtmp"
#endif
```

And your utmp problems should go away. If you want xterminal sessions to go into the wtmp file you need to define -DWTMP in the Imakefile and be sure the WTMP_FILENAME is set to the right place.

Section 8.02 contains a small C program that you can use until the PTFs arrive. The program must be run as root and will periodically clean up old entries.

Another utmp program was posted to comp.sources.unix, volume 25, issue 96 by David W. Sanderson (dws@cs.wisc.edu) that also works on AIX 3.1.

Subject: 1.104: How to fsck the root filesystem

You can run fsck either in maintenance mode or on mounted filesystems. Try this:

1. boot from diskette (AIX 3 only --- AIX 4 boot from CD or tape)
2. select maintenance mode
3. type /etc/continue hdisk0 exit (replace hdisk0 with boot disk if not hdisk0)
4. fsck /dev/hd4

Subject: 1.105: How can I unmount /usr to run fsck on it?
From: accapadi@mathew.austin.ibm.com (Matt Accapadi)

[This is for 3.2.]

In order to fsck /usr, it has to be unmounted. But /usr cannot be unmounted because /bin is symbolically linked to /usr/bin. Also /etc/fsck is symbolically linked to /usr/sbin/fsck.

To work around this, when you boot from the boot/maintenance diskettes and enter maintenance mode, enter "getrootfs hdisk0 sh" instead of "getrootfs hdisk0" where hdisk0 is the name of the boot disk. Then run "fsck /dev/hd2".

Subject: 1.108: How do I see/change parameters like number of processes per user?

You can use SMIT as described below or simply use lsattr/chdev. The former will list the current setting as in:

```
# lsattr -E -l sys0 -a maxuproc
```

maxuproc 40 Maximum # of processes allowed per user True

and you can then increase the maxuproc parameter:

```
# chdev -l sys0 -a maxuproc=200
sys0 changed
```

If you just type 'lsattr -E -l sys0' you will get a list of all parameters, some of which can be changed but not others.

If you want to use smit, do as follows:

smit

System Environments and Processes

Change / Show Operating System Parameters

- on this screen you can change by overtyping the following fields:
 - Maximum number of PROCESSES allowed per user
 - Maximum number of pages in block I/O BUFFER CACHE
 - Maximum Kbytes of real memory allowed for MBUFS
- toggle fields exist for:
 - Automatically REBOOT system after a crash (false/true)
 - Continuously maintain DISK I/O history (true/false)

Info 1.30 erroneously suggests that in AIX 3.2.5 you can set different limits for different users.

Subject: 1.109: How do I shrink the default paging space on hd6?
X-With-Changes-From: Ray Reynolds <reynolds@valisys.com>

- 1) create a paging space to use temporarily
mkps -s 20 -a rootvg
- 2) change default paging space hd6 so it is not used at next reboot
chps -a n hd6
- 3) For AIX 3.1, edit /etc/rc.boot4 and change swapon /dev/hd6;
for AIX 3.2 and 4.x, edit /sbin/rc.boot and change swapon /dev/hd6
swapon /dev/paging00
- 3a) Since the default system dump device is /dev/hd6 in 4.1.x, it has to
be changed to the temporary swap device before you remove the old
swap device.

sysdumpdev -p /dev/paging00
- 4) Update information in boot logical volume
bosboot -a (3.1)
bosboot -a -d hdisk0 (3.2 & 4)
- 5) shutdown and reboot
- 6) remove current hd6 and create a new one of smaller size
rmpps hd6
mklv -y hd6 -t paging rootvg <size of PS in 4 Meg blocks>

7) Re-edit /etc/rc.boot4 (3.1), /sbin/rc.boot (3.2) to swap to /dev/hd6
swapon /dev/hd6

7a) On AIX 4, change the dump device back to hd6:

```
sysdumpdev -p /dev/hd6
```

8) Update information in boot logical volume

```
bosboot -a (3.1)  
bosboot -a -d hdisk0 (3.2 & 4.1)
```

9) change current paging device (paging00) so it is inactive at next boot
chps -a n /dev/paging00

10) shutdown, reboot, remove paging00 using the command:
rmpps paging00

You can check your paging space with `lsps -a`

Subject: 1.110: The swapper seems to use enormous amounts
of paging space, why?

When you run ps, you may see a line like:

USER	PID	%CPU	%MEM	SZ	RSS	TT	STAT	TIME	CMD
root	0	0.0%	14%	386528	8688	-	S	17:06	swapper

This is normal behavior, the swapper looks to ps like it has the entire
paging space plus real memory allocated.

Subject: 1.111: How much paging space do I need?

See answer 2 in question 1.300.

Subject: 1.112: How do I mount a floppy disk as a filesystem?
From: op@holmes.acc.Virginia.EDU (Olaf Pors)

You can build a filesystem on a floppy and mount it, however the
filesystem will be read only. The reason that the filesystem will be
read only is because AIX Version 3.1.5 cannot create a journal log on a
diskette. The intended use is for temporary access to read only data.
The diskette file system must be unmounted after use and during system
backup procedures or errors could occur.

To make the read only filesystem on a floppy:

1. Make a subdirectory on an existing filesystem and place all of the
files that the diskette will contain into this subdirectory.
2. Enter the following command to create a prototype file containing
information about the new filesystem, in the example /dir_struct

is the pathname of the subdirectory created in step 1, and proto_filename is the name of the prototype file to be created.

```
proto /dir_struct > proto_filename
```

3. Place a formatted floppy into the drive.
4. Edit the prototype file and replace the first line with the following:

```
<noboot> 0 0
```

5. Enter the following command to make the filesystem on your floppy:

```
mkfs -p proto_filename -V jfs /dev/fd0
```

6. Create the directory upon which you will mount the floppy based filesystem, or you can use /mnt. Mount the filesystem:

```
mount -r -V jfs /dev/fd0 /your_mount_point
```

7. To unmount the filesystem:

```
umount /dev/fd0
```

Since the filesystem is read-only it may be of limited use but if you are going to use it for utility programs and other data that does not change much, it may still be useful. If you need to change the data, you can copy the directory from the floppy into another directory, make your modifications, and remake the filesystem using this procedure.

Subject: 1.113: How do I remove a committed lpp?

AIX 3.2.5: you can get rid of COMMITTED lpps/ptfs by installing with the force option and then rejecting the package.

AIX 4.1 users: installp has a new option, uninstall (-u) which can be used to remove lpps.

Subject: 1.114: How can I recover space after installing updates?

From: Milt Cloud <cloud@ux1.cso.uiuc.edu>

Note: If you are a /usr server, do not use this because the files mentioned below are needed by /usr clients and cannot be deleted.

Installp creates numerous files in /usr to clean up after failed/rejected installs and also for de-installing uncommitted lpps. Once you have COMMITted packages you can remove these files safely. Depending on your installation activity the numbers can be significant: hundreds-to-thousands of files, megabytes of data.

Files eligible for removal are associated with each "product" you have installed; the largest collection being due to bos. After COMMITting bos lpps, you may safely remove all files of the form:

```
    /usr/lpp/bos/deinstl*
    /usr/lpp/bos/inst_U4*
    /usr/lpp/bosadt/deinstl*
and   /usr/lpp/bosadt/inst_U4*
```

You may repeat this for all additional COMMITTED products (e.g., bostext1, bosnet, xlc) you have on your system.

This problem of lingering install files is a known defect in installp. If you have installed PTF U411711 (or any superseder of it: U412397, U413366, U413425) the deadwood in /usr will not be quite as prevalent. No single PTF currently available completely corrects this problem.

On my own 320, the following freed up 12.4M in /usr:

```
# rm -R /usr/lpp/bos/deinstl*
# rm -R /usr/lpp/bos/inst_U4*
```

Subject: 1.115: Where are the AIX log files kept?
From: dirk@kimosabi.ucsc.edu (Dirk Coldewey)

AIX logs messages as specified in /etc/syslog.conf. Here's an example

```
#
*.err;kern.debug;auth.notice;user.none          /dev/console
*.err;kern.debug;daemon,auth.notice;mail.crit;user.none /var/adm/messages
lpr.debug                                         /var/adm/lpd-errs

*.alert;kern.err;daemon.err;user.none           operator
*.alert;user.none                               root
*.emerg;user.none                               *

# for loghost machines, to have authentication messages (su, login, etc.)
# logged to a file, un-comment out the following line and adjust the
# file name as appropriate.
#
# if a non-loghost machine chooses to have such messages
# sent to the loghost machine, un-comment out the following line.
#
auth.notice                                     /var/log/authlog
mail.debug                                       /var/log/syslog

# following line for compatibility with old sendmails. they will send
# messages with no facility code, which will be turned into "user" messages
# by the local syslog daemon. only the "loghost" machine needs the following
# line, to cause these old sendmail log messages to be logged in the
# mail syslog file.
#
user.alert                                       /var/log/syslog
#
# non-loghost machines will use the following lines to cause "user"
# log messages to be logged locally.
#
```

```
user.err          /dev/console
user.err          /var/adm/messages
user.alert       'root, operator'
user.emerg       *
```

Subject: 1.116: How can I log information about ftp accesses to a file?
From: elr@trintex.uucp (Ed Ravin)
From: map@hal.maths.monash.edu.au (Michael Page)

- 1) In /etc/syslog.conf, add the line:
 daemon.debug /tmp/daemon.log
- 2) # touch /tmp/daemon.log
 # refresh -s syslogd
- 3) Modify your inetd.conf so that ftpd is called with the "-l" flag.
 You may also want the "-d" flag. This can be done with 'smit inetdconf'.

All the syslog messages from various system daemons should now appear in the file "/tmp/daemon.log".

Subject: 1.117: How do I find a file name from the inode number?
From:
/G=Bill/S=Mansfield/O=P00S38E/OU1=notes/DD.HPNOTES=Bill_Mansfield/mcd/us#a#MCD@ms-hs-mcdusa.attmail.com (Bill Mansfield)

```
ncheck -i nnnn /mntpoint
```

Subject: 1.118: How do I set up postscript accounting?
From: taluskie@utpapa.ph.utexas.edu (Vince Taluskie)

Ephraim Vider originally wrote this program to configure postscript page accounting. It acts as a backend wrapper which logs accounting information in /etc/qconfig and can be ftp'd from utpapa.ph.utexas.edu in /pub/aix/psacct.tar.Z.

Compile with:

```
cc pswrap.c -o pswrap -lqb
```

and then make this program suid root:

```
chown root pswrap
chmod u+s pswrap
```

If this step is not done, the printer will hang.

Then start up SMIT and go to :

```
Spooler
  Manage Local Printer Subsystem
```

Local Printer Queue Devices
Change / Show Characteristics of a Queue Device
 <Select Queue>
 <Select Device>

and change "BACKEND PROGRAM pathname" to the full pathname of pswrap since pswrap will now handle the backend interface with the queue.

A stream of info will be written to a logfile in /tmp (prob lp0.log) but this file is mainly used for status info and raw pagecounts. If the accounting data is going to the qconfig-specified acctfile, then use the 'pac' command to read it. I prefer to have readable ascii data files instead, so I just comment out the '#define WANT_PAC' line and it will only go to the ACCTFILE specified in pswrap.c.

[pswrap.c source has been moved to section 8.03]

Subject: 1.119: How do I create boot diskettes?

In AIX 4.1.x and 4.2 you cannot, the kernel and ram drive don't fit on a diskette. You should get "0301-174 bosboot: Invalid device /dev/fd0 specified!" if you try.

For AIX 3.2.x you will need to have four formatted diskettes.

boot disk: bosboot -d /dev/fd0 -a
display disk: mkdispdskt
display extension disk: mkextdskt
Install/Maintenance disk: mkinstdskt

AIX 3.2.5 may require a fifth boot diskette if you have a FDDI adapter in the machine. It is the "communications extension" diskette.

Subject: 1.120: Where can I find tools for performance monitoring?

Free X based performance watcher: xsysstats - <ftp://ftp.x.org/contrib/>

For 3.2 a few tools are available in /usr/lpp/bosperf. There are tools to monitor traces, I/O events, CPU, virtual memory, disk block usage, kernel extensions, etc. It even has a simulator, rmss, that allows one to try out different memory size configurations to see how it impacts performance. See 6.05 for the AIX Performance and Tuning Guide.

The Monitor program is an AIX/6000 System performance monitor program. Monitor can be used to display system statistics of various short time performance values. Monitor program is available for anonymous ftp from <ftp://ftp.funet.fi/pub/unix/AIX/rs6000/monitor-2.1.1.tar.Z> -file.

New to version 2 (released as version 2.1.1)

- * Allow logging of information on interval basis in ascii format. The logfile can be specified as a strftime string and can be compressed.
- * Synchronize sample/interval time on wall clock (from 00:00).

- * Sample/interval time is now accurate to around 10 milliseconds (depending on system load).
- * User counts for remote and inactive users, and average inactive time.
- * System uptime is printed.
- * Highlighted headers
- * In logmode, filesystem usage is logged
- * support for Symmetric multiprocessing `cpuinfo` (`-smp` option or `'s'` character command).
- * help page in interactive mode `'h'` or `'?'` character commands

Subject: 1.121: How can I tell what virtual printer a print queue is using?
From: yoder@austin.ibm.com (Stuart R. Yoder)

Use the command `'lsvirprt'`. Don't use any parameters and it will run in an interactive mode that will give you a menu of all virtual printers on the system with the queue and device for each one.

Subject: 1.122: Two `srcmstr`'s are less useful than one?
From: hubert@rs530.ncs.mainz.ibm.com (Bernhard Zeller)

This can happen on systems that have no console, or systems with an `async` terminal as the console but not attached or turned off. One of the symptoms is a second `srcmstr` got run. But the second `srcmstr` is worthless as we can't use the `stop/startsrc` commands, `refresh inetd`, `qdaemon` won't start, etc.

To resolve this, type:

```
smit chgtty
```

and add the keyword `'clocal'` in following lines:

```
STTY attributes for RUN TIME  
STTY attributes for LOGIN
```

Subject: 1.123: How do I set the `tty` name associated with a physical port?
From: accapadi@mathew.austin.ibm.com (Matt Accapadi)

Let's say you wanted to make a `tty` on the `s1` port and call it `rs0000` and a `tty` on the `s2` port and call it `rs0001`.

You could run:

```
mkdev -c tty -s rs232 -t tty -l rs0000 -p sa0 -w s1 # creates rs0000  
and  
mkdev -c tty -s rs232 -t tty -l rs0001 -p sa1 -w s2 # creates rs0001
```

Subject: 1.124: How do I use `mksysb` to clone a system?

From: joann@ariadne.SLAC.Stanford.EDU (Jo Ann Malina)

I use the following steps on the master machine to clone an AIX system:

- 1) Remove the password from root.
- 2) Remove the NIS line from the end of the /etc/group file (the last line with the +:)
- 3) Change most of the level '2' designations in /etc/inittab to level '3' to prevent them from being started up when the new system is booted (the minimum ones to change are rc.nfs and rc.tcpip)
- 4) Boot in service mode and change the name and ip address to a "spare" set to avoid address collision.
- 5) Clear /tmp, /usr/tmp and /usr/spool/lpd/stat.
- 6) Run mkszfile and edit it to be sure /usr is as small as possible; then mksysb from the command line.

The above changes allow me to boot in normal mode the first time, get in as root, change the above files back and do the other things necessary to configure the new system.

Then, of course, I go back and clean up and reboot my master machine.

Note: 1 and 2 lets you log in even if you can't get on the network. It prevents the login process from trying to reach an NIS server. Step 2 needed only if you use NIS.

Subject: 1.125: How do I retain timestamps with mksysb?
Originally From: graeme@ccul.aukuni.ac.nz (Graeme Moffat)

As of AIX 3.2.5 bosrest preserves timestamps and permissions as does pax.

In AIX 3.2.2 /usr/lpp/bosinst/bosnet (for net installs), and bosrest (tape), the 'pax' commands all have '-pmop' options. m = "DON'T retain modification times". So, simply change all the '-pmop' to '-pop' and remake inst/maint diskettes or mksysb tapes.

Subject: 1.126: How can I find out the machine type?

[Due to it's length this script was moved to section 8.04]

Subject: 1.127: Updating to 3.2.5
From: kraemerf@franvm3.VNET.IBM.COM (Frank Kraemer)

(Ed. The following is useful if you have to update a large number of systems, large being > 3.)

```
*** WARNING : Modify the scripts if you need dataless, diskless ***
***                or remote /usr support.                ***
```

- 1) Receive the PMP3250 tape from your AIX support center the PTF number

is U493250.

2) Create a filesystem with 240 MB of space (60 PP's) and mount it as

```
/dev/pmp3250 - /pub/pmp3250
```

3) Insert the tape (blocksize is 512) and install PTF U422467

```
# installp -BXacqg -d /dev/rmt0 bos.obj 3.2.0.0.U422467
```

4) Use the following script to load the tape in the new filesystem

```
# cd /pub/pmp3250
# mktape2disk.sh 0 447          <<-- read 447 files from rmt0
```

[The mktape2disk.sh script has been moved to section 8.05]

Subject: 1.128: AIX fix strategy
From: leedp@austin.ibm.com (Dennis Lee, PMP Release Manager)

First, a little history...

The maintenance strategy for AIX 3.1 was cumulative updates. Every few months, we'd put all available fixes in one large package and ship it. There was no real strategy for providing a single fix. Although we'd occasionally produce an emergency patch, there was no method for tracking them; if you got a second one, it might overwrite the first. So, after a few of these patches, it's hard to track.

In AIX 3.2 we introduced a "selective fix" strategy to support individual fixes. The package contained information about other fixes that were required for that fix to work correctly. For example, a Korn shell fix might require a change in libc.a, which might in turn require a fix in the kernel. This strategy allowed us to keep track of which fixes were installed to make sure we didn't overwrite one with another, and make sure they all worked together. But the initial selective fix design still had a few problems.

- o None of the fixes were cumulative. If you got a fix for Korn shell, you may not receive all of the fixes for Korn shell. This left the possibility of rediscovering other problems that were already fixed.
- o Since we chose to fix everything possible that was reported as a problem, instead of deferring them to the next release, the number of available fixes became quite large.
- o The number of additional fixes required by any given fix could also be quite large. Since the installation program ran once for each fix, the size and complexity of the fix packages grew, and installation time lengthens greatly.

While developing the AIX 3.2.4 upgrade, we undertook a large effort to resolve the selective fix concerns, and dramatically increase the quality of AIX 3.2. The base operating system and most of the optional program products were split into subsystems. A subsystem is a group of

logically related files. The division was made such that changes to a given subsystem were less likely to affect other subsystems. In total there are approximately 500 subsystems, but in practice, files have been modified in only about half of them. The advantages of the new packaging strategy are:

- o Each subsystem package is cumulative, containing all of the fixes and enhancements to date for that subsystem.
- o The cumulative subsystem package is tested as an entity.
- o The number of fix packages is greatly reduced because the number of subsystems is far fewer than the number of fixes and enhancements.
- o The number of other fixes required by any given fix is also greatly reduced because a subsystem package has requisites only on other subsystem packages.
- o The reduced number of fix packages greatly reduced installation time.

Some customers also told us that they liked the maintenance level strategy that we used in AIX 3.1. They liked being able to install all of the known fixes, and they liked knowing what "level" of AIX they had. To meet these requirements, we produced a Preventive Maintenance Package (PMP). The PMP is simply a collection of the latest cumulative subsystem packages tied together in such a way that it can be installed by selecting a single fix. We also added flags to the `lslpp` command and added a new command, `oslevel`, to show which PMP is installed. Now we had both! The good attributes of selective fix along with the good attributes of maintenance levels.

A few Q&As:

Q. Why is the fix I just received 130 megabytes!@#? I already have the AIX 3.2.4 update installed!

A. Your fix may be part of the AIX 3.2.5 update. AIX 3.2.5 is another PMP that contains all of the fixes to date, as well as enhancements to support the PowerPC model 250, and the new high-end RS/2 models 590 and 990, as well as support for new disk and tape drives, graphics adapters and more.

Q. Why can't you just build my fix on 3.2.4?

A. There really isn't such a thing as 3.2.1 or 3.2.2 or even 3.2.4. They're just collections of fixes and enhancements built on a 3.2 base. If the fix for your problem was built prior to 3.2.5, you can get the older version. But if your fix was built for the first time in a 3.2.5 subsystem, that's the only version of the fix that exists.

See also 6.02.

Subject: 1.129: Are passwords limited to 8 char?

AIX passwords are only significant to 8 characters. You can set a `passwd` to more than 8 characters but anything over eight are ignored. No messages or warnings are given.

Be careful if you're running NIS. You probably want to limit passwords to 8 char on all machines (6000 and others) to be compatible.

Someone mentioned that DCE supports kerberos which supports passwords greater than 8 characters.

Subject: 1.130: How do I increase the number of ptys > 64?
From: mick@oahu.cern.ch (Mickey Coggins)

SMIT only allows 64. Try this:

```
odmget -q"attribute=num and uniquetype=pty/pty/pty" PdAt |  
sed "s/0-64/0-512/" |  
odmchange -q"attribute=num and uniquetype=pty/pty/pty" -o PdAt  
  
chdev -l pty0 -anum=256 -P  
reboot
```

Subject: 1.131: Where can I find patches for CERT advisories?

Patches (APARs in IBMspeak) for CERT advisories (system security problems) can be found at <<http://service.software.ibm.com/>>. You should have a copy of Fixdist <<ftp://service.software.ibm.com/aix/tools/fixdist/fd.tar.Z>> handy to deal with translating APAR and PTF numbers into downloadable files. See question 1.142 for more information about fixdist.

Subject: 1.132: How do I remove a non-existent physical volume?
Thanks to Johnny Shieh (shieh@austin.ibm.com)

To delete a phantom disk from the ODM use reducevg with the pvid instead of the disk name. You are running some command such as lsvg or varyonvg and it is griping about a disk that is no longer findable right? In that warning message, it should give you a pvid. Try one of the following, (note: reducevg updates the VGDA but not the ODM).

```
reducevg -f <vgname> <pvid>  
  
ldeletepv -g VGid -p PVID  
    -g Required, specify the VGid of the volume group you are  
        removing the physical volume from  
    -p Required, specify the PVID of the PV to be removed
```

Subject: 1.133 How do I kill a process that ignores
kill -QUIT -KILL -STOP

If there is i/o pending in a device driver, and the driver does not catch the signal, you can't kill it - a reboot is the only way to

clear it.

Furthermore, if the process stays hung for more than a few minutes, you can find out what device is wedged by doing this --

```
% echo trace -k $(expr <pid> / 256) | crash | tee stack
```

If you can't figure out what is wrong, print that trace out and call 1-800-237-5511 and tell them that something is broken. Tell them you want to fax in the nice stack trace that you have as your testcase.

Subject: 1.134: How can I see "console" messages?
From: crow@tivoli.com (David L. Crow)

Use the swcons command to redirect the console to a file. Or use chcons to do it permanently.

Subject: 1.135: Where can I find TOP for AIX?

TOP functionality is included in an AIX package called Monitor. See question 1.120 for more information.

Subject: 1.136: How can I restrict root logins to specific terminals?
From: jfh@austin.ibm.com (Julianne F. Haugh)

Read FAX 2737 available from the 800-IBM-4FAX number discussed in section 6.02. Refer to APAR IX45701 for fixes related to the rsh style commands.

Subject: 1.137: How do I merge my /etc/password and
 /etc/security/password for Crack?

/usr/sbin/mrgpwd. You must have permissions to read /etc/security/password.

1.138: I lost the root password, what should I do?
From: dramm@csusm.edu (Donald E. Ramm)

Boot from boot diskettes, bootable tape, or bootable CD.

At the Installation/Maint menu select item 4, "Start a limited function maintenance shell.

At the subsequent "#" prompt enter the command:

```
getrootfs hdiskN
```

(where "N" is replaced by the number of a disk on your system that is in rootvg.)

That will run for about a minute or so and you get a # prompt back. At this point you are logged in as root in single user mode.

Change to /etc/security and edit the passwd file. Delete the three lines

Subject: 1.143: Is there an easy way to determine if AIX
has a PTF applied or not?

lslpp -Bl Uxxxxxxx

Where Uxxxxxxx is the PTF id.

Subject: 1.144: How do I recreate a deleted /dev/null?
From: tvweaver@austin.ibm.com (Tom Weaver)

/bin/mknod /dev/null c 2 2

Subject: 1.145: What is a checkstop error?
From: tvweaver@austin.ibm.com (Tom Weaver)

While this may not be the official definition, what it means is that the hardware has detected a condition that it cannot resolve, and which prevents normal operation. So, it stops executing instructions, responding to interrupts, etc. Usually it means that some component of the hardware is broken.

Subject: 1.146: How do I recover deleted files?

Preferably from a backup. If you don't have a backup, at least one company, Compunix, claims to have a product that will recover deleted files. More information is available at <<http://www.compunix.com/>>.

From: Bernard.Kozyra@bull.net

[Editor's note: this one appears to be for the really desperate ones, but it might be helpful if you really need it the most.]

RECOVERING REMOVED FILES AND DIRECTORIES IN A FILESYSTEM

If a file is Deleted from the system, the filesytem blocks composing that file still exist, but are no longer allocated. As long as no new files are created or existing files extended within the same filesystem, the blocks will remain untouched. It is possible to reallocate the blocks to the previous file using the "fsdb" command (filesystem debugger).

MAKE A BACKUP OF THE ENTIRE FILESYSTEM BEFORE PERFORMING THESE STEPS!!!
ELSE (BANG !!!!!).

It is possible to send a mail for have some informations ...

Bernard.Kozyra@bull.net

Steps to recover a deleted file

-
- 1) "ls -id {dir}"
 (where dir is directory where file resided)
 Record INODE number for next step.
 - 2) Unmount the filesystem.
 - 3) "fsdb /{Mountpoint}" or "fsdb /dev/{LVname}"
 (where Mountpoint is the filesystem mount point, and LVname is the logical volume name of the filesystem)
 - 4) "{INODE}i"
 (where INODE is the inode number recorded in step 1)
 This will display the inode information for the directory. The field a0 contains the block number of the directory. The following steps assume only field a0 is used. If a value appears in a1, etc, it may be necessary to repeat steps #5 and #6 for each block until the file to be recovered is found.
 - 5) "a0b"
 (moves to block pointed to by field "a0" of this inode)
 - 6) "p128c"
 (prints 128 bytes of directory in character format)
 Look for missing filename. If not seen, repeat this step until filename is found. Record address where filename begins. Also record address where PRIOR filename begins. If filename does not appear, return to step #5, and selecting alb, a2b, etc.

Note that the address of the first field is shown to the far left. Increment the address by one for each position to the right, counting in octal.

- 7) "a0b"
 (moves to block pointed to by field "a0" of this inode)
 If the filename was found in block 1, use alb instead, etc.
- 8) "p128e"
 (prints first 128 bytes in decimal word format)
 Find the address of the file to recover (as recorded in step 6) in the far left column. If address is not shown, repeat until found.
- 9) Record the address of the file which appeared immediately PRIOR to the file you want to recover.
- 10) Find the ADDRESS of the record LENGTH field for the file in step #9 assuming the following format:

```

{ADDRESS}:  x   x   x   x   x   x   x   x   x   x   ...
            |   |   |   |   |----- filename -----|
inode #  --+-----+   |   |
            |           +-- filename length
record LENGTH --+
  
```

Note that the inode number may begin at any position on the line. Note also that each number represents two bytes, so the address

of the LENGTH field will be `'{ADDRESS} + (#hops * 2) + 1'`

- 11) Starting with the first word of the inode number, count in OCTAL until you reach the inode number of the file to be restored, assuming each word is 2 bytes.
- 12) `"0{ADDRESS}B={BYTES}"`
(where ADDRESS is the address of the record LENGTH field found in step #10, and BYTES is the number of bytes [octal] counted in step #11)
- 13) If the value found in the LENGTH field in step #10 is greater than 255, also type the following:

`"0{ADDRESS-1}B=0"`
(where ADDRESS-1 is one less than the ADDRESS recorded in step #10)
This is necessary to clear out the first byte of the word.
- 14) `"q"`
(quit fsdb)
- 15) `"fsck {Mountpoint}"` or `"fsck /dev/{LVname}"`
This command will return errors for each recovered file asking if you wish to REMOVE the file. Answer "n" to all questions. For each file that is listed, record the associated INODE number.
- 16) `"fsdb /{Mountpoint}"` or `"fsdb /dev/{LVname}"`
- 17) `{BLOCK}i.ln=1`
(where BLOCK is the block number recoded in step #15)
This will change the link count for the inode associated with the recovered file. Repeat this step for each file listed in step #15.
- 18) `"q"`
(quit fsdb)
- 19) `"fsck {Mountpoint}"` or `"fsck /dev/{LVname}"`
The REMOVE prompts should no longer appear. Answer "y" to all questions pertaining to fixing the block map, inode map, and/or superblock.
- 20) If the desired directory or file returns, send money to the author of this document.

Subject: 1.147: What questions are on the AIX Certified
User/SystemAdministrator/etc., exam?

If you want more information, look at
<<http://www.rs6000.ibm.com/support/aixcert/>>.

There's also a self assessment exam available at
<http://www.rs6000.ibm.com/cgi-bin/TC2/tc2_reg.cgi>. The questions are supposedly *derived from the same sources* as the AIX Certification exams. I assume that this means the actual exams cover

much of the same information.

I assume that the actual questions (and especially the answers) are protected by copyright and possibly other laws, so disclosing them without IBM's permission would not be wise or legal.

Subject: 1.148: How can I run a command or commands at system shutdown?

"Stock" AIX 4.1.x doesn't have any obvious place to add commands to the shutdown sequence. You can 1) modify /etc/shutdown (it's a shell script); 2) add your commands to /etc/netware.clean (shutdown invokes this program if it exists) or 3) install APAR IX65326 ("ADD /ETC/RC.SHUTDOWN TO SHUTDOWN SCRIPT IN AIX4.1.5) which adds a user-defined /etc/rc.shutdown script to the shutdown sequence. AIX 4.2 already has a similar feature.

Subject: 1.149 How to install LPPs on a shared disk?
From: Ciaran Deignan <C.Deignan@frec.bull.fr>

I have an LPP that I want to install on all my AIX machines (for example the "perl" freeware), but I want to minimize the disk-space used on the network of machines. Can I selectively mount part of /usr on another machine?

In general it is not possible to share an LPP with several machines. Sometimes it is possible to use a dedicated filesystem to install freeware which can then be shared.

However for anything packaged as an LPP it is possible to use a script that replaces /usr/sbin/inurest, and that redirects files delivered by the LPP to the shared disk.

One script that does this is called Ninstallp, and it is available (with instructions) from
<http://www.geocities.com/ResearchTriangle/5428/ninstallp.html>

Subject: 1.150 How can I reduce the size of /var/adm/wtmp ?

The file /var/adm/wtmp grows with each login, but is never reduced. The contents of wtmp is used (only?) by the command "last", which shows, in reverse order, all the logins and reboots that happened since the start of the wtmp file.

The file should not be deleted, but the contents can be discarded using the following command:
> /var/adm/wtmp

Alternatively the freeware utility "tidysys" can remove all the entries from wtmp that are older than (say) 15 days. Tidysys was written by Terry Murray <terry@weavel.demon.co.uk> for AIX 3.2 and is available

from ftp://ftp.frontiernet.net/pub/aix/tsys220.tar.

Tidysys was ported to AIX 4.1 by C. Deignan and is available from
<<http://www-frec.bull.com/>>.

Subject: 1.151: How do I start local daemons at system startup?

AIX does neither use the BSD style rc.local file nor the System V style /etc/rc*.d startup files directories. To add local daemons to the system startup sequence in a BSD rc.local style use the following command to create an /etc/inittab entry:

```
# mkitab -i rcnfs "rclocal:2:wait:/etc/rc.local >/dev/console 2>&1"  
# touch /etc/rc.local  
# chmod 700 /etc/rc.local
```

Then put the command lines to start the daemons in /etc/rc.local.

Subject: 1.152 How do I set the TZ variable to automatically change to daylight savings time?

The TZ variable can be set in /etc/environment file so the time automatically switches to daylight savings time in spring and back to normal in autumn. The actual rules when to switch vary by country, the following should work in middle europe:

```
TZ=MET-1MET DST,M3.5.0/02:00:00,M10.5.0/03:00:00
```

The exact definition for the rules can be found with infoexplorer under the environment page.

Subject: 1.153 Why does init not reap its zombie child processes?

If you have lots of zombie (defunct) processes with parent process id 1, the init process is probably waiting for some bad /etc/inittab configuration line to finish. Check the inittab file for entries that specify the wait keyword for processes that do not terminate. These lines should probably specify "once" or "respawn" instead.

Subject: 1.154 I'm looking for a missing command or header file.
Which fileset do I need to install?

If you are at AIX Version 4.2.1 or later you could install bos.content_list and then use the command "which_fileset [File]" The which_fileset command searches the /usr/lpp/bos/AIX_file_list file for a specified file name or command name, and prints out the name of the fileset that the file or command is shipped in.

Subject: 1.155 Why doesn't the df -k output reflect the space I added to an LV?

You need to use the chfs command or the smit chfs menu to tell the file system to use the new space. By the way, in most cases it is better to just increase the size of the file system, it will increase the underlying LV automatically.

1.2 Backups, tape

Subject: 1.200: Some info about tape backups
From: Craig Anderson

The following supplements the information on rmt devices in InfoExplorer. It is based on my own personal experience with IBM tape drives running on AIX 3.1. No warranty is expressed or implied.

CONFIGURING THROUGH SMIT:

BLOCK size (0=variable length) (ALL)
Sets the tape block size. When reading, the block size must be set to the block size set when the tape was written. When using some commands, tapes written with ANY block size can be read if the block size is set to 0 (variable length) (see "BLOCK SIZES" below).

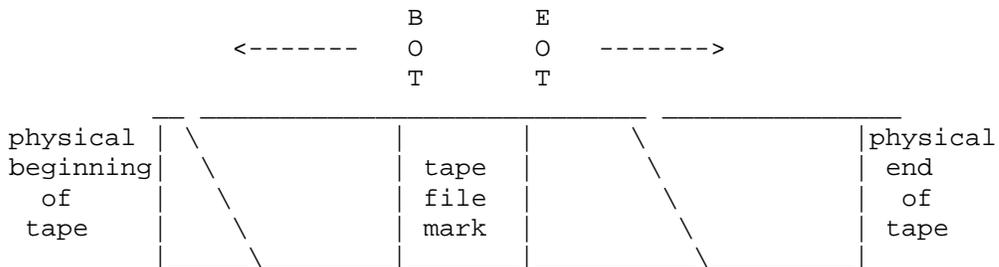
Use DEVICE BUFFERS during writes (ALL)
Set to yes, the device will buffer data internally on writes. This greatly improves performance, but under certain cases may be undesirable since the data is not written to tape before returning a good indication.

Use EXTENDED file marks (8mm only)
Extended file marks take up much more space than short (or non-extended) file marks. But extended file marks can be overwritten, allowing data not at the beginning of tape to be overwritten (see "FILE MARKS" below).

RETENSIONION on tape change or reset (1/4" only)
If set to "no" then the tape will not be retentioned automatically when the tape is inserted. Note that this will take effect only after the device is used.

FILE MARKS:

Tape devices support multiple tape files. Tape files are the result of a backup/cpio/tar/dd type command, where the device is opened, written to, and closed. Because tapes allow large quantities of data to be written on a single tape, several backups (that is, tape files), may be combined on one physical tape. Between each tape file is a "tape file mark" or simply "file mark". These file marks are used by the device driver to indicate where one tape file ends and another begins.



Note that there is a distinction between the beginning of tape (BOT) side of a file mark and the end of tape (EOT) side of a file mark. If the head is on the BOT side of a file- mark, "tctl fsf 1" command will move only to the EOT side of the same file mark.

With the 1/4" tape drive, writing can only take place sequentially, or after blank tape has been detected. You cannot write over data on the tape (except at BOT). If you wish to add data to a tape which has been written and then rewound you should space forward file mark until an error occurs. Only then can you start writing again.

With an 8mm tape drive, writing can only take place before blank tape, an EXTENDED file mark, or at BOT. Thus if several backups have been made on one tape and you wish to overwrite one of the backups, position the tape to the place you wish to start writing and issue the following commands:

```
tctl bsf 1
tctl eof 1
```

The first command skips back to the BOT side of the same file mark. The second command rewrites the file mark (writing is allowed before extended file marks). The erase head will erase data ahead of the write head, so that after writing the file mark the head will be positioned before blank tape. Only after this may you start writing over data in the middle of the tape. (All data beyond where you are currently writing will be lost). Note that you cannot write over short file marks. In order for this to work, the tape must have been written with extended file marks (use smit to change this).

With the 9-track drive writing can take place anywhere on the tape although overwriting single blocks of data is not supported.

On the 8mm drive extended filemarks use 2.2 megabytes of tape and can take up to 8.5 seconds to write. Short filemarks use 184K and take up to 1.5 seconds to write.

BLOCK SIZES:

When data is written to tape it is written in blocks. The blocks on a tape are separated by inter-record gaps. It is important to understand the structure of the written tape in order to understand the problems which can occur with changing block sizes.

In fixed block size mode all blocks on the tape are the same size. They are the size of the block size set in the device configuration. All read()s and write()s to the tape drive must be a multiple of the fixed block size.

In fixed block mode a read() will return as many blocks as needed to satisfy the read() request. If a file mark is encountered while reading the tape only the data up until the file mark will be returned.

It is not possible for the tape drive to read a tape whose block size is not the same as the block size in the device configuration. (Unless the device configuration is in variable

size blocks.)

In variable block size (0) mode, the blocks written on the tape are the size of the read() and write() requests to the device driver. In this case, the actual block sizes on the tape can be changed using the options to the backup commands (tar -C, cpio -C, backup -C).

In variable mode, read() requests greater than size of the block on the tape will return only the data from the next block on the tape. It is this feature that allows tapes written in any block size (fixed or variable) to read with the dd command (the output from the dd command may be piped to restore, tar, or cpio for example.) Note that backup, tar, and cpio cannot read all tapes by using a large block size because they assume there is an error if they get a short read().

```
dd ibs=128k obs=16k if=/dev/rmt0 | ...
```

The tape head is always positioned at an inter-record gap, file mark, or blank tape after reading or writing.

With the 8mm tape drive, using a fixed block size which is not a multiple of 1K is inefficient. The 8mm tape drive always writes internally in 1K blocks. It simulates the effect of variable block sizes, but, for example, using a fixed block size of 512 bytes (or using variable block size and write()ing 512 bytes at a time) wastes one half of the tape capacity and gives only one half the maximum transfer rate.

To figure out a tape's actual block size try:

- 1). Set the tape to variable block size.
- 2). "dd if=<tape> of=/tmp/dummy bs=128k count=1"
- 3). "ls -l /tmp/dummy"
- 4). The number of bytes in "/tmp/dummy" is the physical block size.

EXCHANGING DATA WITH NON-UNIX AND OTHER VENDORS MACHINES:

Many tape drives support both variable and fixed block sizes.

Variable block mode writes block sizes the size of the write command issued (tar and backup specify this with the -b option). In fixed mode, block sizes are fixed and all writes must be a multiple of the fixed block size.

Unix often internally chops larger reads and writes up into manageable pieces (often 65535, 65534, or 65532 bytes) before doing the actual reads and writes. This means reads and writes of 64K bytes are often broken up into a 65535 byte record and a 1 byte record (In fixed mode the write will fail). Block sizes >= 64K (-C128 and greater) should be avoided for this reason. AIX does not break up read and write requests, but be aware of the situation on other machines.

If the tape is written in an unknown block size then set the device configuration in smit to use variable size blocks, use the "dd" command with a large input block size, and pipe it to the restore command. For example:

```
chdev -l rmt0 -a block_size=0
dd if=/dev/rmt0 ibs=128k obs=16k | tar -tvf-
```

Subject: 1.201: How do I do remote backup?

There seems to be several ways of doing this. The first approach is a one-liner to allow tar to reference another machine's device. The second is more complete but uses a similar approach. The latest addition to this section claims to be able to support mksysb on a remote machine. Thanks to all the contributors.

```
tar -b1 -cf - . | rsh REMOTEHOST "dd ibs=512 obs=1024 of=/dev/TAPEDEVICE"
```

[Ed.: The usave.sh script has been moved to section 8.06. I've verified this script works fine. However, it may be slow for large filesystems since it creates a temp file of filenames in /tmp.]

There are also several commercial solutions. One is IBM's SYSBACK/6000 product. See Question 1.209 for more information.

Open Microsystems sells a product called DistribuTAPE which supports mksysb to a remote tape drive under AIX 3.2, 4.1 and 4.2. DistribuTAPE supports remote tape drives by placing a pseudo tape driver on the client system, and a server daemon on the server. More information at <http://www.openmic.com/>

Subject: 1.202: How do I backup a multi-disk volume group?
From: pack@acd.ucar.edu (Daniel Packman)

[Ed.: I have not verified this procedure. I would actually recommend NOT to have one volume group span multiple disks unless you really need such big logical volumes.]

1. If you have a set of three or more disks in a volume group (typically 3 for 5xx machines with three internal drives; with only two, the procedures outlined here have to be modified to ignore the fact that you don't have a quorum in the volume group)
2. If one drive has failed (usually only one fails at a time :-)

It is possible to go through a service boot (the volume group is called rootvg and one of the 2 good disks on it is called hdisk0):

```
importvg -y rootvg hdisk0
varyonvg -f -n -ml rootvg
```

These commands will work, but give error messages. If you wish to mount a user filesystem, say /u on logical volume /dev/lv00, then

```
mount -f /dev/lv00 /v
```

will work only if jfslog, the journaled file system log device, is not on the damaged disk. If it is, you must (and can in any case) mount the

filesystem read-only:

```
mount -f -r /dev/lv00 /v
```

This crucial and rather obvious point baffled several level 3 support personnel at Austin as well as myself for almost a week. Once the file system(s) of interest are available, they can be saved to tape for restoration later. Of course, one can expect only about two thirds of a filesystem to be recoverable if it spans all 3 physical disks. One other point to remember is that the standard boot procedure from floppy includes the restore command but does not include the backup command.

```
*****
* If you do not have other RS6000 machines at your site it is imperative *
* that you either build a bootable tape which includes either restore or *
* tar or cpio (a bootable floppy set will not have enough space) or at the *
* very least copy onto a spare floppy backup, cpio, or tar. The floppy *
* should be created with backup -ivq so that its contents can be read into *
* the memory resident system after booting. *
*****
```

All is not lost if tar, cpio or backup are available on an undamaged disk that can be mounted. Since tar and cpio are in /bin, they may both very well be unavailable.

It is a very good idea for those who have tape devices to build a bootable tape with their desired extra commands in it. Follow the instructions from IBM but add your desired commands to the following three files:

```
/usr/lpp/bosinst/tape2
/usr/lpp/bosinst/diskette/boot2
/usr/lpp/bosinst/diskette/instruct
```

If you have anything other than a minimum memory configuration, you should be able to add many commands.

Subject: 1.203: How do I put multiple backups on a single 8mm tape?
From: kerm@mcnc.org (Cary E. Burnette)

There are two possible solutions to this, both of which use /dev/rmt0.1 which is non-rewinding.

SOLUTION #1

To put multiple backups on a single tape, use /dev/rmt0.1, which is a no-rewind device, using either rdump or backup (both by name & inode work). Using rdump or backup "byinode" both generate the message that the tape is rewinding but actually do not. This is an example that works on my system:

```
# rsh remotel -l root /etc/rdump host:/dev/rmt0.1 -Level -u /u
# rsh remote2 -l root /etc/rdump host:/dev/rmt0.1 -Level -u /u
# tctl -f /dev/rmt0.1 rewind # rewinds the tape
```

where I am implementing the command from host.
To restore a table of contents of the first I would use

```
# restore -f /dev/rmt0.1 -s1 -tv
```

where the -s1 flag tells restore to go to the first record on the tape.
Type the exact command again to get the second record. The -s(Number)
means go to Number record from this spot. It works pretty well.

SOLUTION #2

Steve Knodle, Educational Resources Center, Clarkson University

I use:

----- Dump.sh -----

```
CONTENTSFILe='date |dd conv=lcase |sed -e 's/19//' |awk '{print $6 $2 $3}'`  
set -x  
LEVEL=$1  
shift
```

```
backup -c -b 56 -$LEVEL -uf /dev/rmt0.1 /  
backup -c -b 56 -$LEVEL -uf /dev/rmt0.1 /usr  
backup -c -b 56 -$LEVEL -uf /dev/rmt0.1 /u  
tctl -f /dev/rmt0 rewind
```

```
touch /usr/local/dumps/Contents.$CONTENTSFILe  
echo "Dumping /" >>/usr/local/dumps/Contents.$CONTENTSFILe  
restore -t -s 1 -f /dev/rmt0.1 >>/usr/local/dumps/Contents.$CONTENTSFILe  
echo "Dumping /usr" >>/usr/local/dumps/Contents.$CONTENTSFILe  
restore -t -q -s 1 -f /dev/rmt0.1 >>/usr/local/dumps/Contents.$CONTENTSFILe  
echo "Dumping /u" >>/usr/local/dumps/Contents.$CONTENTSFILe  
restore -t -q -s 1 -f /dev/rmt0.1 >>/usr/local/dumps/Contents.$CONTENTSFILe  
tctl -f /dev/rmt0 rewind
```

I process the table-of-contents first by a little program that does
common prefix encoding, and then compress.

This gives a table of contents file I can keep on-line until the tape
is reused.

Solution #3

```
mount | grep jfs | cut -c27- | cut -d" " -f1 | \  
xargs -i backup -${LEVEL} -u -f /dev/rmt1.1 {} > ${DATE}.backup 2>&1
```

Subject: 1.204: How can I make an exact duplicate of a tape over the network?

The challenge here is not to have to create a temporary file (disk space
limitation) and work across heterogeneous networks.

This script might work:

```
LOCAL=/dev/tape_dev
REMOTE=/dev/tape_dev
dd if=$LOCAL ibs=64k obs=512 | rsh remote_host dd ibs=512 obs=64k of=$REMOTE
```

From: pack@acd.ucar.edu (Daniel Packman)

Daniel provides the following perl script to convert from the known world's function codes to AIX for compatibility.

```
#!/bin/perl
# Wrapper to convert input rmt requests to
# AIX 3.2 ioctl numbers. We pass on all commands we don't understand
# I0 MTWEOF -> I10 STWEOF write and end-of-file record
# I1 MTFSF -> I11 STFSF forward space file
# I2 MTBSF -> I12 STRSF reverse space file
# I3 MTFSR -> I13 STFSR forward space record
# I4 MTBSR -> I14 STRSR reverse space record
# I5 MTREW -> I6 STREW rewind
# I6 MTOFFL -> I5 STOFFL rewind and unload tape
# I7 MTNOP -> I0 (no-op? should ignore following count)
# I8 MTRETEN-> I8 STRETEN retention tape, leave at load point
# I9 MTERASE-> I7 STERASE erase tape, leave at load point
#I10 MTEOM (position to end of media ... no ibm equivalent?)
#I11 MTNBSF (backward space file to BOF ... no ibm equivalent?)
@iocs = (10,11,12,13,14,6,5,0,8,7);
open(RMT,"|/usr/sbin/rmt") || die "Can't open pipe to rmt\n";
select(RMT);
$| = 1;
while (<STDIN>) {
    s/^(^I)(\d$)/I$iocs[$2]/;
    exit 0 if $_ =~ /^[Qq]/;
    print RMT $_ ; }
exit 0;
```

Subject: 1.205: What is tape block size of 0?
From: benson@odi.com (Benson I. Margulies)

Tape devices are generally split into two categories: fixed block and variable block. 1/4" tape is the fixed block, and 8mm is variable.

On a fixed block size device, the kernel always sends data to the device in suitable block size lumps, and varying the size passed to write(2) (e.g., via the bs option to dd) gives the kernel more data to stream. On a variable block size device, the kernel writes to the device whatever passed to it. On an 8mm, it had better be a multiple of 1024 to get efficient tape usage.

AIX has the World's Only Variable Block Size 1/4" tape drive. If you use SMIT to set the block size to a nonzero value, AIX treats the device as fixed block size, whether it is or not. By default, 8mm drives are set to the same size as 1/4", 512 bytes. This is wasteful, but otherwise mkysb and installp would fail.

If you set the block size to 0, the device is treated as variable block

size, and the size passed to write becomes the physical block size.
Then if you use a sensible block size to dd, all should be wonderful.

Subject: 1.206: Resetting a hung tape drive
From: Craig_Anderson@kcbbs.gen.nz (Craig Anderson)

A process accesses the tape drive. The process stops, exits, or whatever, but still hold on to the drive. When this happens, the process cannot be killed by any signal and the tape drive cannot be used by any other process until the machine is rebooted.

The following should help:

RESET:

AIX, like most UNIX systems has no reset function for tape drives. You can however send a Bus Device Reset (a standard SCSI message) to the tape drive using the following piece of code. If the tape drive does not respond to the BDR, then a SCSI Bus Reset will be sent (and this will reset every device on the SCSI Bus). SCSI Bus resets are rather extreme so you should refrain from using this program unnecessarily. But there are times (like after you've inserted a jammed/old/bad tape in an 8mm drive), when there's no other way to reset the device other than to shutdown and reboot (obviously you can power down and up an external drive to reset it - and this would be the better choice).

This is actually documented in info, but can be hard to find and there's no complete program.

```
/* taperst: resets the tape drive by sending a BDR to the drive. */
#include <stdio.h>
#include <fcntl.h>
#include <errno.h>
#include <sys/scsi.h>

int main(int argc, char **argv)
{
    /* This can be run only by root */

    if (argc != 2) {
        fprintf(stderr, "Usage: %s /dev/rmt#\n", argv[0]);
        return 1;
    }

    if (openx(argv[1], O_RDONLY, 0, SC_FORCED_OPEN) < 0) {
        perror(argv[0]);
        return 2;
    }
    return 0;
}
```

Subject: 1.207: How do I restore specific files from a mkysb tape?
From: Marc Pawliger (marc@sti.com)

To recover specific files from a backup made with mksysb, try
\$ tctl fsf 3
\$ tar xvf /dev/rmt0.1 ./your/file/name

From: Matt Willman (Willman.matt@cnf.com)

The procedure changed with AIX 4, which uses backup instead of tar to write the tape. For AIX 4 the procedure is as follows:

```
$ tctl fsf 3
$ restore -xvf /dev/rmt0.1 ./your/file/name
```

Subject: 1.208: How do I read a 5Gbyte tape on a 2Gbyte drive?
Posted by: bobmet@clam.com (Robert Metcalf)

To read a 5Gbyte tape on a 2Gbyte drive, the tape needs to have been created with a density setting of 20.

The following is from IBM's electronic ASKSUPPORT repository:

R: The 7208 011 5 GB tape drive has various density settings which are as follows:

DENSIT SETTIN	DESCRIPTION
140	Writes in 5.0GB mode and will enable data compression; also, to do compression you must use "DATA COMPRESSION = yes"
21	Writes in 5.0GB mode and will NOT do data compression
20	Writes in 2.3GB mode and will NOT do data compression
00	Factory power-on default for 5.0GB data compression mode

The density setting of the 7208 011 must be 20 for it to make a tape that is readable by the 7208 001.

Subject: 1.209: What can Sysback do for me?
From: johnsont@austin.ibm.com (Tony Johnson)

Sysback provides the flexibility of restoring onto the same system in the exact same manner, or onto a completely different system with different disk configuration, platform type, kernel, etc, while reporting any inconsistencies and allowing you to adjust to fit. For instance, you will get warnings if a particular volume group cannot be created because the original disks do not exist, or that mirroring cannot be accomplished because there is no longer enough disk space because the disks are smaller. You can then select the disks for each volume group, reduce or add space to filesystems and LVs, exclude entire VGs or filesystems, etc. You can even add and delete mirrors, stripe or un-stripe logical volumes, etc.

In addition, all of the Sysback functions can be performed across the network, including network boot and network install, and you can perform striped backups across multiple tape drives, use sequential tape autoloaders, and perform unattended multi-volume backups with cron.

ON AIX 3.2, mksysb does not retain paging space config, disk LV placement, mirroring, etc.

On AIX 4.1, it does these on an EXACT same configuration, but does not allow any flexibility, and still does not retain non-rootvg volume groups (although you can now use additional commands to backup and restore these). mksysb also does not allow you to clone onto different platforms (i.e. rspec -> rs6k -> rs6ksmp).

Subject: 1.210: How can I get my HP 4mm DAT to work?

For HP25470/80A DDS:

MRS disabled: Set switches 3,6,7,8=0 and 1,2,4,5=1

MRS enabled: Set switches 3,6,7=0 and 1,2,4,5,8=1

Subject: 1.211: How do I copy DAT tapes?

If you have two drives try tcopy(1). Otherwise the traditional UNIX approach is (dd if=/dev/rmt0 bs=1024b | dd of=/dev/rmt1 bs=1024b) Put that in a while loop using a non-rewinding device to do multiple files. To use drives from two different machines either get the GNU dd (bundled with GNU tar) or use something like.

```
$ dd if=/dev/rmt0 bs=1024b | rsh hostname dd of=/dev/rmt0 bs=1024b
```

Subject: 1.212: How do I speed up backups to DLT tapes?

DLT tapes need high data rates to stay in streaming mode. To achieve higher data rates, use a variable length block size by setting the fixed length block size to zero. Also use a buffer size of about 64KB for backup (128 blocks for tar).

1.3 Memory and process management

Subject: 1.300: Some info about the memory management system
From: Michael Coggins (MCOG@CHVM1.VNET.IBM.COM).

1. Does AIX use more paging space than other unix systems?

Under many scenarios, AIX requires more paging space than other unix systems. The AIX VMM implements a technique called "early allocation of paging space". When a page is allocated in RAM, and it is not a "client" (NFS) or a "persistent" (disk file) storage page, then it is considered a "working" storage page. Working storage pages are commonly an application's stack, data, and any shared memory segments. So, when a program's stack or data area is increased, and RAM is accessed, the VMM will allocate space in RAM and space on the paging device. This means that even before RAM is exhausted, paging space is used. This does not happen on many other unix systems, although they do keep track of total VM used.

Example 1:

Workstation with 64mb RAM is running only one small application that accesses a few small files. Everything fits into RAM, including all accessed data. On AIX, some paging space will already be used. On other unix systems, paging space will be 100% free. Clearly, this is an example that shows where we use more paging space than the other machines.

Example 2:

Same machine as above, except we are in an environment where many applications are running with inadequate RAM. Also, the system is running applications that are started, run, left idle, and not in constant use. A session of FRAME running in a window, for example. What happens is that eventually (theoretically) all applications will be paged out at least once. On the AIX system and the other systems the total paging requirements will be the same (assuming similar malloc algorithm). The major difference is that the AIX system allocated the paging space pages before they were actually needed, and the other systems did not allocate them until they were needed. However, most other systems have an internal variable that gets incremented as virtual memory pages are used. AIX does not do this. This can cause the AIX system to run out of paging space (virtual memory), even though malloc() continues to return memory. This "feature" allows sparse memory segments to work, but requires that all normal users of malloc() (sbrk()) know how much virtual memory will be available (actually impossible), and to handle a paging space low condition. A big problem. There are some pretty obvious pros and cons to both methods of doing Virtual Memory.

2. How much paging space do I need?

Concerning the rule of thumb of having 2 times RAM for paging space: this is rather simplistic, as are most rules of thumb. If the machine is in a "persistent storage environment", meaning that they have a few small programs, and lots of data, they may not need even as much as 1 times RAM for paging space. For example, a 1GB database server running

on a 6000 with 256MB of RAM, and only running about 50MB of "working" storage does not need 512MB of paging space, or even 256MB. They only need the amount of paging space that will allow all their working storage to be paged out to disk. This is because the 1GB database is mostly "persistent storage", and will require little or no paging space. Excessive paging space may simply mean wasted disk space. However, avoid insufficient paging space. Tip: Don't have more than one paging space per disk. Tip: Put lots of RAM in your system - it will use it.

3. Why does vmstat show no free RAM pages?

AIX uses RAM as a possibly huge disk buffer. If you read a file in the morning, that file is read into RAM, and left there. If no other programs need that RAM, that file will be left in RAM until the machine is halted. This means that if you need the file again, access will be quick. If you need that RAM, the system will simply use the pages the file were using. The pages were flushed back to disk earlier. This means that you can get a huge speedup in disk access if you have enough RAM. For example, a 200MB database will just ease into RAM if you have a 256MB system.

4. Since vmstat shows no free RAM pages, am I out of RAM?

Probably not. Since disk files will be "mapped" into RAM, if vmstat shows lots of RAM pages FREE, then you probably have too much RAM (not usual on a RISC System/6000)!

5. Shouldn't the "avm" and the "fre" fields from vmstat add up to something?

No. The "avm" field tells you how much "Active Virtual Memory" AIX thinks you are using. This will closely match the amount of paging space you are using. This number has **ABSOLUTELY** nothing to do with the amount of RAM you are using, and does **NOT** include your mapped files (disk files). The amount of RAM can be determined with
/usr/sbin/bootinfo -r

6. Why does the "fre" field from vmstat sometimes show lots of free RAM pages?

This will happen after an application that used a lot of RAM via "working" storage (not NFS storage, and not disk file or "persistent" storage) exits. When RAM pages that were used by working storage (a program's stack and data area) are no longer needed, there is no need to leave them around. AIX completely frees these RAM pages. The time to access these pages versus a RAM page holding a "sync'd" mapped file is almost identical. Therefore, there is no need to periodically "flush" RAM.

7. Is the vmstat "fre" field useful?

The vmstat "fre" field represents the number of free page frames. If the number is consistently small (less than 500 pages), this is normal. If the number is consistently large (greater than 4000 pages), then you have more memory than you need in this machine.

Subject: 1.301: How much should I trust the ps memory reports?

From: chukran@austin.VNET.IBM.COM

Using "ps vg" gives a per process tally of memory usage for each running process. Several fields give memory usage in different units, but these numbers do not tell the whole story on where all the memory goes.

First of all, the man page for ps does not give an accurate description of the memory related fields. Here is a better description:

RSS - This tells how much RAM resident memory is currently being used for the text and data segments for a particular process in units of kilobytes. (this value will always be a multiple of 4 since memory is allocated in 4 KB pages).

%MEM - This is the fraction of RSS divided by the total size of RAM for a particular process. Since RSS is some subset of the total resident memory usage for a process, the %MEM value will also be lower than actual.

TRS - This tells how much RAM resident memory is currently being used for the text segment for a particular process in units of kilobytes. This will always be less than or equal to RSS.

SIZE - This tells how much paging space is allocated for this process for the text and data segments in units of kilobytes. If the executable file is on a local filesystem, the page space usage for text is zero. If the executable is on an NFS filesystem, the page space usage will be nonzero. This number may be greater than RSS, or it may not, depending on how much of the process is paged in. The reason RSS can be larger is that RSS counts text whereas SIZE does not.

TSIZ - This field is absolutely bogus because it is not a multiple of 4 and does not correlate to any of the other fields.

These fields only report on a process text and data segments. Segment size which cannot be interrogated at this time are:

Text portion of shared libraries (segment 13)

Files that are in use. Open files are cached in memory as individual segments. The traditional kernel cache buffer scheme is not used in AIX 3.

Shared data segments created with shmat.

Kernel segments such as kernel segment 0, kernel extension segments, and virtual memory management segments.

Speaking of kernel segments, the %MEM and RSS report for process zero are totally bogus for AIX 3.1. The reason why RSS is so big is that the kernel segment zero is counted twice. For AIX 3.2, this has been changed, but the whole story is still not known. The RSS value for process 0 will report a very small number of the swapper private data segment. It does not report the size of the kernel segment 0, where the swapper code lives.

In summary, ps is not a very good tool to measure system memory usage. It can give you some idea where some of the memory goes, but it leaves

too many questions unanswered about the total usage.

Subject: 1.302: Which simms do RS6000's use?

This answer is under construction... I'm trying to collect details about compatible simms.

RS/6000 220,230 USE 2 pair 70ns PS/2 style simms
RS/6000 250,C10 USE 4 pair 70ns PS/2 style simms

Subject: 1.303: What is kproc?

kproc (always PID 514 on AIX 3 and PID 516 on AIX 4) is the kernel's idle process.

Subject: 1.304: How do I create a RAM disk in AIX?
From: Jeff Wang <hjiwa@nor.chevron.com>

You can't create a RAM disk in AIX. The closest related functionality the operating system gives you is the RAM disk buffer. Read 1.300 sub-section 3.

Subject: 1.305: How much RAM (real memory) does my machine have?
From: Michael Abel/resnova
<Michael_Abel/resnova%RESNOVAD@notesgw.compuserve.com>

As root: bootinfo -r
As any user: lsattr -E -l sys0 -a realmem

lsdev -C -c memory

shows all memory adapters. On MCA systems one may add up the values displayed for each memory card in order to sum up to the amount of total memory. On PCI systems only one item (mem0) is displayed. Additional information may be displayed with

lsattr -E -lmem0

These commands were tested on various IBM systems running AIX releases 3.2.5 and 4.1.4

Subject: 1.306: Why do PIDs run non-sequentially?
From: Julianne F. Haugh <jfh@austin.ibm.com>

The answer (I was there, consider me an authority ...) is that the PIDs needed to be somewhat unpredictable. This is because AIX was originally designed with a number of C2 and B1 features, and one of those

is the notion of covert channel analysis. Sequential PIDs are a covert channel (assuming the system has one PID namespace ...) since the value of the "next" PID is shared by all currently running processes. So if I want to sneak some of my classified data out to your co-operating non-classified program, I can do it by carefully controlling the value of the "next" PID.

1.4 Shells, commands, man pages, InfoExplorer

Subject: 1.400: How do I make an informative prompt in the shell?

In the Korn Shell (ksh), the PS1 variable is expanded each time it is printed, so you can use:

```
$ export myhost=`hostname`  
$ PS1='$LOGNAME@$myhost $PWD \ $ '
```

to get, e.g.

```
bengsig@ieibm1 /u/bengsig $
```

In the C-shell, use:

```
% set myhost=`hostname`  
% alias cd 'chdir \!* > /dev/null; set prompt="$LOGNAME@$myhost $cwd % "'  
% cd
```

to get, e.g.

```
bengsig@dkunix9 /u/bengsig/aixfaq %
```

There is no easy solution in the Bourne Shell. Use the Korn Shell instead.

Subject: 1.401: How do I set up ksh for emacs mode command line editing?

The ksh has an undocumented way of binding the arrowkeys to the emacs line editing commands. In your .kshrc, add:

```
alias __A=`echo "\020"` # up arrow = ^p = back a command  
alias __B=`echo "\016"` # down arrow = ^n = down a command  
alias __C=`echo "\006"` # right arrow = ^f = forward a character  
alias __D=`echo "\002"` # left arrow = ^b = back a character  
alias __H=`echo "\001"` # home = ^a = start of line
```

Type "set -o emacs" or put this line in your .profile.

Also, you MUST have PTF U406855 for this to work in AIX 3.2. The APAR # for the problem is IX25982, which may have been superseded.

Subject: 1.402: Listing files with ls causes a core dump
From: Julianne F. Haugh <jfh@austin.ibm.com>

Scenario: a directory that is shared by N users (N >= 200).
Run 'ls -l' in that directory. It goes for a while, then
Seg fault(core dump)!

It only occurs when the usernames are displayed (almost every file is owned by a different person). The -g and -n options work fine; only -l

and -o (which shows owner and not group) cause it.

I believe that this problem was corrected by U407548. If you have that many users that you are having core dump problems (it took over 200), you might also want to look into getting the PTF that fixes IX31403. That APAR deals with large numbers of accounts and performance problems associated with looking them up.

Subject: 1.403: How do I put my own text into InfoExplorer?

With AIX 3.1, you cannot do it. AIX 3.2 has a product called InfoCrafter that allows you to do that.

Subject: 1.404: InfoExplorer ASCII key bindings
From: mycroft@hal.gnu.ai.mit.edu (Charles Hannum)

If you just press 'Return' when it starts up, with 'Basic Screen Operations' highlighted, you'll get some help.

If you look long enough, you'll find a page named 'Using Keys and Key Sequences in the InfoExplorer ASCII Interface'. It describes the key sequences and actions. Here are a few to get you started.

Keys	Action
------	--------

Ctrl-W	Moves between the Navigation screen and the Reading screen. If the Navigation screen is displayed, you can press Ctrl-W to display the Reading screen. If the Reading screen is displayed, you can press Ctrl-W to display the Navigation screen.
--------	---

Ctrl-O	Makes the menu bar active or inactive. If your text cursor is located in the text area of the screen, you can press Ctrl-O to make the menu bar active. If the menu bar is already active, you can press Ctrl-O to make it inactive, which moves the text cursor to the text area.
--------	--

Tab	Moves to the next menu bar option in the menu bar. If a pull-down menu is not displayed and you press the Right Arrow key, the next menu bar option is displayed in reverse video.
-----	--

Subject: 1.405: How can I add new man pages to the system?
From: horst@fau163.informatik.uni-erlangen.de (Horst Luehrsen)

Put the man pages in /usr/man, e.g. /usr/man/man1/tcsh.1 for the tcsh man page. Under AIX 3.1.10, /usr/lib/makewhatis can be used to update the makewhatis-database /usr/man/whatis so apropos and whatis know about the added manpages. /usr/lib/makewhatis should be available on all 3.2 versions.

For AIX 4.x, you can store the man pages in the /usr/share/man hierarchy. /usr/lib/makewhatis is still there.

Subject: 1.406: Why can't I read man pages? Where is nroff?

Nroff and troff aren't in the base installation. It is shipped as part of AIX 3.2.5 but may not be installed. Use smit to install a software package called txtfmt.tfs.obj from your 3.2.5 distribution media.

In AIX 4.x, you need bos.txt.tfs.

Subject: 1.407: Why is my environment only loaded once?

The .profile file is only loaded once (for your login shell) subsequent shells should be initialized by setting ENV=\$HOME/.kshrc (for ksh).

Bash users can use \$HOME/.bash_profile for the login shell environment and \$HOME/.bashrc.

Subject: 1.408: Where is the 'nawk' command on my AIX system?
From: Jeff Wang <hjiwa@nor.chevron.com>

The /bin/nawk that exists on many UNIX flavors is a superset of the 'awk' command, revised by the same original authors to include added functionality. All the extra options normally associated with 'nawk' on other UNIXes have been incorporated into the AIX version of 'awk'; the AIX 'awk' InfoExplorer or man pages include nawk-specific features such as the "-v" command line option and atan2(), rand(), srand(), match(), sub(), gsub(), system(), close(), getline functions.

If your AIX version is missing /bin/nawk (as are most AIX 3.x versions), the simplest way to get around this and maintain script portability between UNIX platforms is to make a /bin/nawk link to /bin/awk (as root, of course). If you do not have root privilege or do not want to create a /bin/nawk link, to make the script work on different UNIXes, you may have to test 'uname' first and set all 'nawk' references on AIX runs to /bin/awk. If your script is to only run on AIX systems, you can just change all references of 'nawk' to 'awk' and everything should still work okay...but check the AIX awk script on test data prior to making actual runs.

[Editor's note: AIX 4.x already contains a link from /usr/bin/nawk to /usr/bin/awk.]

1.409: How do I copy InfoExplorer (manpages and more) to my hard drive?
From: David Alexander <unilink@online.rednet.co.uk>

[Editor's note: While this is documented in one of the AIX manuals and covered in /usr/lpp/bos/bsdadm (AIX 3 only), it comes up often enough I thought I would include it here.]

Not all the Info databases are required, so do not copy them all unless the customer specifically requests them, or has asked for the software they refer to. These instructions assume you have enough space on /usr.

Install and mount the InfoExplorer CD-ROM as for use of Info from CD-ROM.

```
Log in as Root
umount /usr/lpp/info/lib/$LANG
mkdir /mnt/$LANG
mount -v cdrfs -r /dev/cd0 /mnt/$LANG
```

```
cd /
cd /mnt/$LANG
cp -r aix /usr/lpp/info/lib/$LANG
cp -r aix2 /usr/lpp/info/lib/$LANG
cp -r compnav /usr/lpp/info/lib/$LANG
cp -r hardware /usr/lpp/info/lib/$LANG
cp -r nav /usr/lpp/info/lib/$LANG
cp -r prog /usr/lpp/info/lib/$LANG
cp -r uiprogram /usr/lpp/info/lib/$LANG
```

Other sections can be copied if required:

Section	Size
cp -r ada /usr/lpp/info/lib/\$LANG	7.2 Mb
cp -r assemb /usr/lpp/info/lib/\$LANG	5.23 Mb
cp -r cxx /usr/lpp/info/lib/\$LANG	6.52 Mb
cp -r dce /usr/lpp/info/lib/\$LANG	3.8 Mb
cp -r encina /usr/lpp/info/lib/\$LANG	2.67 Mb
cp -r fortran /usr/lpp/info/lib/\$LANG	6.85 Mb
cp -r graph /usr/lpp/info/lib/\$LANG	9.75 Mb
cp -r graph2 /usr/lpp/info/lib/\$LANG	4.1 Mb
cp -r pascal /usr/lpp/info/lib/\$LANG	3.23 Mb

```
umount /mnt/$LANG
eject the CD-ROM
```

Subject: 1.410: Why can't I set my default shell to one we've just installed?

When adding new shells to the system, add them to the "shells=" line in /etc/security/login.cfg so they can be used during ftp and rlogin by users who use them as their default shell.

Subject: 1.411: Why do I get the "Unable to connect socket: 3" starting Info-Explorer?

It's a bug in the way infod sets the initial permission on the /tmp/.info-help socket. Do a chmod 777 on /tmp/.info-help and the message will go away. (Charlie McGuire, mcguire@cs.umd.edu)

This problem was fixed by APAR IX43230, PTF U432315 (Paul Sitz, psitz@empros.com)

Subject: 1.412: Why can't I write a setuid shell script?
From: mww@microfocus.com (Michael Wojcik)

AIX, as of about the first release of 3.2.5* does not allow SUID scripts. (It ignores the SUID and SGID bits on scripts.) They're a huge security hole.

If you really want to run a script SUID, you can create a small C program that does a setuid(0) and then system()'s your script. (Actually, the setuid() call isn't necessary on all Unixes; IIRC, it's not on AIX 3.2.5, but YMMV.) Make the program SUID. Be very careful.

There are other similar solutions. You might also want to look into sudo, which handles this sort of thing in a somewhat more controlled manner

* Julianne Frances Haugh (jfh@tab.com) writes:

I raised an objection to set-ID shell scripts before AIX 3.1 was golden. ... it was finally done in the 3009 PTF for AIX 3.1.

1.5 Video, Graphics, X11

Subject: 1.500 Which release of X11 do I have?

AIX 4.x includes X11 R5 and Motif 1.2.

On AIX 3, Run 'lslpp -h X11rte.obj'.
If your output has a line similar to:

```
01.02.0000.0000 COMPLETE COMMIT 03/04/93 02:05:11 root
```

you have X11 R4. If your output has a line similar to:

```
U491068 01.02.0003.0000 COMPLETE COMMIT 07/28/93 12:50:42 root
```

you have X11 R5. Some people also call these AIXwindows 1.2.0 and 1.2.3. 'lslpp -h X11rte.motif1.2.obj' should tell you if you are running Motif 1.2.

From: Jan Just Keijser <KeijserJJ@logica.com>

AIX 4.1 and AIX 4.2 come with X11R5 and Motif 1.2.4

AIX 4.3.1 (and perhaps 4.3.0) comes with X11R6.1 and Motif 2.1

Some executables which run fine using the X11R5 libraries may not run when using the X11R6.1 libraries; you can specify which X11 libraries to use by setting

```
LIBPATH=/usr/lpp/X11/lib/R5:/usr/lib:...
```

for X11R5 and

```
LIBPATH=/usr/lpp/X11/lib/R6:/usr/lib:...
```

for X11R6.1; by default,

```
/usr/lib/libX11.a -> /usr/lpp/X11/lib/R6/libX11.a
```

and also for the other libraries on AIX 4.3.1.

On most of the AIX 4.1.x and 4.2.1 boxes I have seen the default is

```
/usr/lib/libX11.a -> /usr/lpp/X11/lib/R4/libX11.a
```

ie the default libraries are the X11R4 libraries and NOT the R5 libraries; this may also be due to the setup at my site.

Subject: 1.501: How to prevent ctrl-alt-backspace from killing the X session

Start X with 'xinit -T' to disable ctrl-alt-backspace from stopping X.

Subject: 1.502: Who has a termcap/terminfo source for the HFT console?

The console used on the RISC System/6000, PS/2 and RT can be used as a terminal on another system with the termcap below. You can find this and other termcaps in /lib/libtermcap/termcap.src, including IBM specific ones. The terminfo sources are stored in /usr/lib/terminfo/*.ti. This termcap can also be used from an aixterm window.

```
hf|hft|hft-c|ibm8512|ibm8513|IBM_High_Function_Terminal:\
:co#80:li#25:am:ht:\
:cm=\E[%i%d;%dH:ti=\E[25;1H:te=\E[20h:\
:nd=\E[C:up=\E[A:do=^J:ho=\E[H:\
:bs:sf=\E[S:ec=\E[%dX:\
:cl=\E[H\E[J:cd=\E[J:ce=\E[K:\
:AL=\E[%dL:DL=\E[%dM:al=\E[L:dl=\E[M:\
:im=\E[4h:ei=\E[4l:mi:\
:dm=\E[4h:ed=\E[4l:\
:so=\E[7m:se=\E[m:ul=\E[4m:ue=\E[m:\
:md=\E[1m:mr=\E[7m:mb=\E[5m:me=\E[m:\
:as=^N:ae=^O:sc=\E[s:rc=\E[u:\
:kl=\E[D:kb=^H:kr=\E[C:ku=\E[A:kd=\E[B:kh=\E[H:\
:kn#10:k1=\E[001q:k2=\E[002q:k3=\E[003q:k4=\E[004q:k5=\E[005q:\
:k6=\E[006q:k7=\E[007q:k8=\E[008q:k9=\E[009q:k0=\E[010q:\
:is=\Eb\E[m^O\E[?7h:rs=\Eb\E[m^O\E[?7h\E[H\E[J:
```

1.503: How can I look at PostScript files? Why is "dpsexec" so lousy?
From: Marc Pawliger <marc@sti.com>

showps comes with the 1.2.3 (X11R5) version of the X11rte.ext.obj LPP.
Very nice PS file previewer from Adobe. Replaces xpsview which came
with pre-1.2.3 Installed as /usr/lpp/DPS/showps/showps

From: VRBASS@ATLVMIC1 (Vance R. Bass)

You can look at PostScript files using either "xpreview" (in the
optionally installable text formatting services) or you can get
Ghostscript and Ghostview from a comp.sources.x server and build it
yourself.

>From the "xpreview" man page:
The xpreview command is an AIXwindows 1.2- and Motif 1.1-based
application that displays output from the troff command on an AIXwindows
display. The troff command output file must be prepared for any one of
the devX100, devX100K or devpsc devices. The xpreview command also
displays PostScript language files that begin with %!.

"dpsexec" is NOT intended to be a full-service document browser, but
rather a simple DPS code debugger. If you insist on using it, you can
edit your PS code to remove the "showpage" (which will reset dpsexec
and clear the window) to view single-page files. It does not handle
multi-page files gracefully.

Subject: 1.504: unix:0 vs `hostname`:0

1.) Is there any way to get the machine to check its local host table
first without renaming resolv.conf?

[AIX 3.2 only]

PTF U412845 implements an environment variable to set the resolver
time out in AIX 3.2. This allows you to set RES_TIMEOUT to the number

of seconds before it times out, a failing a DNS query the machine will consult /etc/hosts.

2.) How do you tell X applications where you are if the console display is unix:0?

From: David L. Crow <crow@waterloo.austin.ibm.com>

I would suggest that if you have R5, use ":<display>.<screen>". I do not believe that R4 clients will understand :0, so I would suggest unix:0 for them.

Without specifying unix or the hostname, you will get the fastest transport mechanism. While currently there are only two transport methods in the AIXwindows X server (Unix sockets and TCP sockets), many vendors are looking at using shared memory as a transport method. If you use :0 (or :0.0 or :1, etc.), then you should get the best performance regardless of the available transport methods.

From: Marc Pawliger <marc@sti.com>

Using "unix:0" or "hostname:0" when the X11 Shared Memory Transport (SMT) is installed as part of the 1.2.3 X11rte.obj (X11R5) will incur a penalty vs. using ":0" See /usr/lpp/X11/README.SMT

3.) Is there a significant performance penalty incurred by using 'hostname':0 as DISPLAY?

Yes! Using unix:0, you are using Unix sockets. These are much faster than their TCP socket counterparts.

Subject: 1.505: VT100 key bindings for aixterm
From: haedener@iac.unibe.ch <Konrad Haedener>

Add this to your .Xdefaults file and start your VAX session with 'aixterm -v -name vt100 -e telnet MYVAXHOST'

vt100.vt102: true
vt100.fullcursor: false
vt100.translations: <Key>F1: string(0x1b) string("OP") \n\
<Key>F2: string(0x1b) string("OQ") \n\
<Key>F3: string(0x1b) string("OR") \n\
<Key>F4: string(0x1b) string("OS") \n\
<Key>KP_0: string(0x1b) string("Op") \n\
<Key>KP_1: string(0x1b) string("Oq") \n\
<Key>KP_2: string(0x1b) string("Or") \n\
<Key>KP_3: string(0x1b) string("Os") \n\
<Key>KP_4: string(0x1b) string("Ot") \n\
<Key>KP_5: string(0x1b) string("Ou") \n\
<Key>KP_6: string(0x1b) string("Ov") \n\
<Key>KP_7: string(0x1b) string("Ow") \n\
<Key>KP_8: string(0x1b) string("Ox") \n\
<Key>KP_9: string(0x1b) string("Oy") \n\
<Key>KP_Divide: string(0x1b) string("OQ") \n\
</Key>

```
<Key>KP_Multiply: string(0x1b) string("OR") \n\  
<Key>KP_Subtract: string(0x1b) string("OS") \n\  
<Key>KP_Add: string(0x1b) string("Om") \n\  
<Key>KP_Enter: string(0x1b) string("OM") \n\  
<Key>KP_Decimal: string(0x1b) string("On") \n\  
<Key>Next: string(0x1b) string("Ol") \n\  
<Key>Left: string(0x1b) string("OD") \n\  
<Key>Up: string(0x1b) string("OA") \n\  
<Key>Right: string(0x1b) string("OC") \n\  
<Key>BackSpace : string(0x7f) \n\  
<Key>Down: string(0x1b) string("OB")
```

You should also add

```
XENVIRONMENT=$HOME/.Xdefaults  
export XENVIRONMENT
```

to your .profile.

Subject: 1.506: Is there a screen saver that does not use excessive CPU?
From: Don Buchholz <buchholz@ese.ogi.edu>

Try using xlock with these options:

```
xlock -mode life -count 1500 -nice 20 -root
```

From: pranav@evolving.com (Pranav Vakil)

Use mlock -hide to hide the background. You can also modify the mlock (/usr/local/tools/mlock) code to allow the standard X screen saver to take effect. The timeout value is originally set to 0 which means the screen saver is off. Modify this to be 120 (2 minutes) and set the interval time to be 60 (1 minute). Using these intervals, I have found that over a 24 hour period, it uses only .3 cpu minutes.

Subject: 1.507: Where are the colors, available for an X session, listed.

```
/usr/lpp/x_st_mgr/bin/rgb.txt and on AIX 4.2, the file is  
/usr/lpp/X11/lib/X11/rgb.txt
```

Subject: 1.508: Why does my app hang the X server but not an X station?
From: Bjorn P. Brox <brox@corena.no>

```
/usr/lpp/X11/README.SMT X client/server communication uses a 64k  
buffer by default. The size of this buffer is controled by the  
X_SHM_SIZE environment variable increasing the size of the buffer has  
been used to prevent some applications from hanging the X server :)
```

Subject: 1.509: How do I switch the control and caps lock key bindings?

If you are running the X window system, you can put the following into .xmodmaprc

```
remove Lock = Caps_Lock
remove Control = Control_L
keysym Control_L = Caps_Lock
keysym Caps_Lock = Control_L
add Lock = Caps_Lock
add Control = Control_L
```

Hidden Hint: Use (xmodmap -e "pointer = 3 2 1") to make the mouse lefty friendly.

Subject: 1.510: Missing fonts?

If your Xserver supports X11R5 try running a font server (edit /usr/lib/X11/fs/config and run fsconf && startsrc -s fs) Consult your Xserver instructions on how to include a font server in your font path.

Subject: 1.511: What's the termcap entry for an IBM 3151 look like?

```
#
# Written by Aleksandar Milivojevic, alex@srce.hr
# 24.09.1994
#
I2|ibm3151|3151|IBM 3151 terminal:\
    :am:mi:cr=^M:sf=^J:co#80:li#24:cd=\EJ:ce=\EI:cm=\EY%+\040%+\040:\
    :cl=\EH\EJ:dc=\EQ:dl=\EO:do=\EB:le=\ED:mb=\E4$a:md=\E4(a:\
    :me=\E4@\E>B:mr=\E4!a:nd=\EC:se=\E4>b:so=\E4!a:ue=\E4=b:up=\EA:\
    :us=\E4"a:kb=^H:kd=\EB:kh=\EH:kl=\ED:kr=\EC:ku=\EA:\
    :k1=\Ea\r:k2=\Eb\r:k3=\Ec\r:k4=\Ed\r:k5=\Ee\r:\
    :k6=\Ef\r:k7=\Eg\r:k8=\Eh\r:k9=\Ei\r:k0=\Ej\r:\
    :ti=\E>B:te=\E>B:ms:ho=\EH:bl=^G:al=\EN:ta=^I:
```

Subject: 1.512: Errors starting X11 application binaries from aixpdslib.
From: <URL:ftp://aixpdslib.seas.ucla.edu/pub/README_X11R5_Stuff>

We have been aware of the problem people have with dynamic links when running the prebuilt of X-stuffs from this library.

The typical error messages will be:

```
Could not load program [program_name]
Member shr4.o not found or file not an archive
Member shr4.o not found or file not an archive
Could not load library libXt.a[shr4.o]
Error was: No such file or directory
```

It's because that we built the programs using X11 libraries of MIT which are not compatible with those of IBM. If this is the case, then please get the compressed tarred file of the source code instead, and recompile them on your system using your libraries.

Subject: 1.513: .XShm*, .sm* (Shared memory) Link errors building Xwindows applications.

Link errors that refer to .XShm* often times are a result of compiling applications to take advantage of the Shared Memory extension of the X server. You may either compile without shared memory or load the shared memory extensions. (see /usr/lpp/X11/README and README.SMT) A script for rebuilding your X server with the shared memory can be found in /usr/lpp/X11/Xamples/server.

Subject: 1.514: How do I set my DISPLAY when I login to another machine?

Though this is not a question specific to AIX, it appears often enough to warrant an answer here. There are lots of approaches, some of which are described in the X Windows FAQ. Most involve a little login shell programming to parse the output of 'who' or 'who am i'.

<URL:ftp://boogle.uchicago.edu/pub/aix/src/hostwhence.tar.Z> by e-siebert@uchicago.edu will help if you are willing/able to install it suid. See the X Windows FAQ and newsgroup for more information.

Hostwhence is also available in the "lsof" smit-installable package on www-frec.bull.com. The installation scripts use ACLs to allow hostwhence to read /dev/kmem without being set-uid-root.

Subject: 1.515: Why doesn't Netscape work?
From: "Gary R. Hook" <hook@austin.ibm.com>

The problem is that Netscape has statically linked libc into Mozilla. When the AIX 3 libc code (setlocale()) tries to load an AIX 4 locale, the two are incompatible and a core dump ensues. AIX 4 locales have to be loaded by AIX 4 libc. Using LANG=C causes a lot of locale code to be bypassed, allowing the application to avoid loading a non-C locale, and to continue execution.

>From: Colin <apollo@randommc.com>

Here is a shell script that works around Netscape's problems by setting the LANG and CLASSPATH environment variables.

```
#!/bin/sh
LANG=C
CLASSPATH=/path/to/java_30
export LANG CLASSPATH
if [ $# -eq 0 ]; then
    /path/to/netscape http://your.home.page &
else
    /path/to/netscape $* &
fi
```

1.6 Networks and communications

Subject: 1.600: My named dies frequently, why?
From: jpe@ee.egr.duke.edu (John P. Eisenmenger)

Running on 3.2, named dies frequently on network's primary name server.

Try the following:

```
stopsrc -s named          # stop running named
setenv MALLOCTYPE 3.1     # use 3.1 memory allocation algorithm
/etc/named ...           # don't use smit to start named
```

You might be able to use startsrc/smit after setting MALLOCTYPE and get the same effect, but I'm not sure.

[According to John, the problem is malloc() in the named code. He also suggests using Berkeley's bind, which he has ported and can be ftp'ed from ftp://ftp.egr.duke.edu/archives/bind-4.8.3.tar.gz. -ed]

Two ptfs should fix this problem. Get U412332 and U414752.

Christophe Wolfhugel <Christophe.Wolfhugel@grasp.insa-lyon.fr> reports that bind 4.9 works fine on AIX 3.2 and without MALLOCTYPE=3.1.

Subject: 1.601: How do I trace ethernet packets on an AIX system?
From: afx@muc.ibm.de (Andreas Siegert)

Do the following:

```
iptrace -i en0 /tmp/ipt
```

The iptrace backgrounds. Find its process id and kill it when you are ready. Then run

```
ipreport -rns /tmp/ipt >/tmp/ipr
```

and look at the output. The current version of Info does not document the r, n and s options but they are quite useful for layering the output.

Subject: 1.602 What is the authorized way of starting automount at boot time?
From: curt@ekhadafi.austin.ibm.com (Curt Finch)

I put this in my /etc/inittab:

```
automount:2:once:/usr/etc/automount -T -T -T -v >/tmp/au.se 2>&1
```

I hereby dub it authorized.

Jim Salter <jsalter@netscape.com> writes: You can also use the command:

'mkitab "automount:2:once:/usr/etc/..."' to avoid editing the file by hand.

Subject: 1.603: How do I set a tty port for both dial-in and dial-out?

Set the mode of the tty to be either 'shared' or 'delayed'.

Subject: 1.604: How to move or copy whole directory trees across a network

The following command will move an entire directory tree across a network while preserving permissions, uids and gids.

```
$rsh RemoteHost "cd TargetDir; tar -cBf - ." | tar -xvBf -
```

Explanation:

The tar-create is rsh'd to the remote system and is written to stdout (the pipe).

The local system is extracting the tar that is being read from stdin (the pipe).

From: abeloni <abeloni@hstern.com.br>

Another method is:

```
rcp -rp host1:/dir host2:/dir
```

Subject: 1.605: How can I send mail to hosts that cannot be pinged?

From: jupiter.sun.csd.unb.ca!dedourek (John DeDourek)

AIX 3.2 as shipped is configured to only send mail to mail addresses which include a host name. Many organizations use a mail address whose "host name" part is not a host name (technically an MX name). To change the configuration of the AIX mailer, login as root. Then edit the file /etc/sendmail.cf to remove the comment marker ("# ") at the beginning of the line which reads:

```
# OK MX
```

Now rebuild the machine readable form of the configuration with
sendmail -bz

and finally restart signal sendmail to load the new configuration by one of the following:

```
reboot
```

or

```
stopsrc -s sendmail
```

```
startsrc -s sendmail
```

or

```
kill -1 `cat /etc/sendmail.pid`
```

Subject: 1.606: How to configure dialup SLIP

IBM's WWW page <<http://www.ibm.com/>> can lead you to a helpful document <http://www.austin.ibm.com/pub/www/services/aix_service/faxes/SLIP.DOC.zap>

From: marvin@tornado.oche.de (Christian Bode)

If you don't have problems with slattach you should have PTF bos.obj 3.2.0.0.U411505 installed. I assume that you did the right ifconfig commands to setup your slip-device (for example sl0).

1. Create a group called slip.
2. Create a user slip with smit like this:

	[Entry Fields]
* User NAME	[slip]
ADMINISTRATIVE User?	true
User ID	[]
LOGIN user?	true
PRIMARY group	[slip]
Group SET	[slip]
ADMINISTRATIVE groups	[system]
SU groups	[slip]
HOME directory	[/home/slip]
Initial PROGRAM	[/bin/sh]
User INFORMATION	[SLIP-Dialup]
Another user can SU to user?	false
User can RLOGIN?	true
TRUSTED PATH?	nosak
Valid TTYS	[/dev/tty1]
AUDIT classes	[]
PRIMARY authentication method	[SYSTEM]
SECONDARY authentication method	[NONE]
Max FILE size	[2097151]
Max CPU time	[-1]
Max DATA segment	[262144]
Max STACK size	[65536]
Max CORE file size	[2048]
Max physical MEMORY	[65536]
File creation UMASK	[022]
EXPIRATION date (MMDDhhmmyy)	[0]

3. Create a tty with getty on it:

Add a TTY

	[Entry Fields]
TTY type	tty
TTY interface	rs232
Description	Asynchronous Terminal
Parent adapter	sa0
* PORT number	[s1]
BAUD rate	[38400]
PARITY	[none]
BITS per character	[8]
Number of STOP BITS	[1]
TERMINAL type	[dumb]
STATE to be configured at boot time	[available]

DMA	on
Read Trigger	0,1,2,3
Transmit buffer count	[16]
Name of initial program to run	[/etc/getty]

Note: The following attributes are only applicable if /etc/getty is specified as the initial program to run.

Enable program?	respawn
Run level	2
Enable LOGIN	share
TIME before advancing to next port setting	[0]
STTY attributes for RUN TIME	[hupcl,cread,brkint>
STTY attributes for LOGIN	[hupcl,cread,echoe,>
RUN shell activity manager	no
Optional LOGGER name	[]

4. Change the hardware characteristics so that it uses NO XON/XOFF handshake section 1.613 also talks about tty flow control.
5. A (new) .profile template for slip accounts is provided in section 8.07. The author, David Migliavacca, writes, "I would also like to assert that, to my experience, it is NOT required that the SLIP user be made "administrative" or member of "system" as other parts of the FAQ (and the original script) say. At least on my machine 8-). I now create SLIP users as members of group slip, it being the ONLY group; allowed ttys are set to the available modem lines only; their home directory is owned by root and the .profile is only readable by group slip.

Here's another scenario:

From: oosten@angelo.ee.ualberta.ca (Brian Oostenbrink)

Operating System: IBM AIX 3.2.1 and 3.2.3

Configuring two RS6000s via a Serial Line Interface Protocol (SLIP) connection over two US Robotics Sportster 14,400 modems.

The AIX implementation of SLIP is slightly different from most others. The ifconfig command is used to bring up a serial interface, and the slattach command is used to connect the interface to the serial port used for the connection. Dialer device commands can also be issued when invoking the slattach command, using UUCP chat syntax.

The following describes a connection between two machines:

```
local.j.k.l
  ethernet IP address 129.128.127.21
  slip interface IP address 129.1.2.1

remote.a.b.c
  ethernet IP address 129.11.22.44
  slip interface address 129.11.22.1
```

1. Interface configuration

Each machine must have a separate IP address dedicated to the SLIP

interface. On remote.j.k.l, start the SLIP interface with:

```
ifconfig sl0 129.11.22.1 129.128.127.1 up
```

and on local.a.b.c:

```
ifconfig sl0 129.128.127.1 129.11.22.1 up
```

It is important in later versions of AIX 3.2.3+ to use the same SLIP interface # as the pty port #, ie. if you use tty12, use ifconfig sl12 instead of sl0.

At this point the interfaces are ready to be connected.

2. tty configuration

The tty ports on both machines were configured in an identical manner using smit.

	[Entry Fields]	
TTY type	tty	
TTY interface	rs232	
Description	Asynchronous Terminal	
Parent adapter	sa0	
PORT number	[]	+
BAUD rate	[38400]	+
PARITY	[none]	+
BITS per character	[8]	+
Number of STOP BITS	[1]	+
TERMINAL type	[dumb]	
STATE to be configured at boot time	[available]	+
DMA	on	+
Read Trigger	0,1,2,3	
Transmit buffer count	[16]	#
Name of initial program to run	[etc/getty]	

Note: The following attributes are only applicable if /etc/getty is specified as the initial program to run.

Enable program?	respawn	
Run level	2	
Enable LOGIN	disable	+
TIME before advancing to next port setting	[0]	+#
STTY attributes for RUN TIME	[hupcl,cread,brkint,icr>	
STTY attributes for LOGIN	[hupcl,cread,echoe,cs8,>	
RUN shell activity manager	no	+
Optional LOGGER name	[]	

On older versions of AIX, we encountered some problems disabling getty, and resorted to changing the /etc/inittab file directly. For example, change

```
tty0:2:respawn:/etc/getty /dev/tty0
to
tty0:2:off:/etc/getty /dev/tty0
```

This will disable getty from running. After creating the SLIP tty device, you will need to change its hardware configuration to disable Xon/Xoff flow control. Software flow control should not be used for SLIP. Type 'smit chtty', and then select sub item 2: Hardware settings.

Most of the parameters in the tty configuration are the defaults.

3. Modem Configuration

The modems were configured as follows:

RTS/CTS flow control enabled.

Xon/Xoff software flow control disabled. Usually this is automatic if RTS/CTS is enabled.

Data rate, terminal to modem = fixed.

This is the baud rate from the tty port to the modem. We used a fixed modem-port transfer rate, set to the fastest speed supported by both the tty port and the modem. Newer modems can use a higher transfer rate between the modem and serial port than the modem to modem rate, which is necessary to use data compression effectively.

In our setup, we used 14.4 kBaud modems with a port speed of 38.4 kBaud. If your modem supports this feature, use it, otherwise set the port speed equal to the modem connection rate. On the USR Sportster at fixes the serial port rate to that of the last AT command. The speed parameter of the slattach command can be used to ensure that this rate is that set in the tty configuration.

Error Correction enabled - not mandatory, but a good idea

Data Compression - not required, but it helps, especially for text transfers.

Auto Answer - If the SLIP connection is to be initiated from either machine, both modems should be set to auto answer, otherwise, just the answering modem.

It is a good idea to configure the modem and then save the settings to NVRAM, so that the correct settings can always be restored by the slattach command.

4. UUCP configuration files

```
/usr/lib/uucp/Devices  
/usr/lib/uucp/Dialers
```

The Devices file must contain an entry with the tty and serial port speed used for the interface. In our example,

```
Direct tty0 38400 slipdialer
```

The keyword 'slipdialer' is merely an index into the Dialers file. For our purposes, the slipdialer entry in the Dialers file is simply:

```
slipdialer
```

This entry can also contain UUCP chat commands, or the chat commands can be included in the slattach command.

5. slattach invocation

slattach connects the device on the tty port to the SLIP interface created by ifconfig, and sends any commands to the tty device if needed. For our example, remote.j.k.l would never initiate a call, only answer incoming calls. Therefore we execute:

```
slattach tty0 38400 "" ATZ OK ""
```

which connects the tty at 38400 baud. We could also simply run

```
slattach tty0
```

ie. without any modem commands, but the modem to port speed may not be correctly set this way. In addition, the ATZ command ensures the modem is set to the NVRAM settings.

On local.a.b.c type:

```
slattach tty0 38400 "" ATZ OK \pATDT4925871 BIS "" 4
```

This establishes the link at 38400 baud, and executes the dial string as shown. The dial string is a UUCP chat string and are configured in an expect send expect send ... format. The string:

```
"" ATZ OK \pATDT4925871 BIS ""
```

is interpreted as:

```
expect "" (null string) from modem
send   ATZ                to modem
expect OK                 from modem
send   \pATDT4925871      to modem
expect BIS                from modem
```

BIS is the end of the CONNECT STRING. You could use any portion of the string returned by the modem upon a connection as the expect string. It may be wiser to simply expect CONNECT since all connections should return this string.

The null strings are necessary because the first parameter of the UUCP is an expected string from the modem, which can only be a null string until the modem has been given a command.

The last parameter (4) of the slattach command is the debug level. A debug level of 4 displays the UUCP chat strings, which is useful for checking the modem status.

6. Routing

ifconfig is sufficient if all you want to do is talk between the two hosts. If you are running SLIP so that you can talk to more than just that one other host you have to advertise your address.

```
1) arp -s 802.5 iago 10:00:5a:b1:49:d8 pub
```

where 802.5 is a token-ring network the hardware address can be obtained with 'netstat -v' and iago was the SLIP client (My PC at home :) pub is the important part it means "published" You may want to run this at boot time.

Routing through the SLIP link is similiar to routing of any gateway. Invoking the ifconfig command automatically sets up a route between the two SLIP machines. An entry in /etc/hosts or the named database should be made, with the same machine name used for the SLIP address as the ethernet address on each machine. For example, in /etc/hosts on remote.a.b.c (and any other machine on remote.a.b.c ethernet):

```
129.11.22.44 remote.a.b.c # ethernet address
129.11.22.1  remote.a.b.c # slip address
```

It is preferable to place the ethernet address in the hosts file before the SLIP address so remote.a.b.c will resolve to the ethernet address. When using named, it is important to have both addresses in the reverse file with the same name. We experienced difficulties with NFS mounting over the slip link, owing to some machine interpreting NFS requests from one of the two SLIP machines as coming from the SLIP address, while the SLIP machine believed it was sending the request from the ethernet address. This problem was eliminated by having both addresses reverse resolve to the same name.

7. Performance

At a modem speed of 14.4 kBaud and a port speed of 38.4 kBaud, we realized a transfer rate through ftp of about 3.5 kB/s for text files, and 1.3 kB/s for compressed files.

Subject: 1.607: Where is DCE discussed?

DCE is the Distributed Computing Environment, which is roughly a flexible client-server architecture for heterogenous platforms. For more information, take a look in comp.soft-sys.dce.

Subject: 1.608: How do I make /var/spool/mail mountable?
From: petersen@pil.physik.uni-stuttgart.de (Joerg Petersen)

In our cluster we share a /usr/local disk. We have a directory /usr/local/spool/mail and /var/spool/mail is soft-linked to it.

From: fred@hal6000.thp.Uni-Duisburg.DE (Fred Hucht)

Several problems has been reported on sharing the mail directory via NFS. The problems may occur when two or more sendmail daemons and/or mail readers access a user's mail file simultaneously, because of NFS' file locking mechanism.

We use another method here: Every user has one line in his/her \$HOME/.forward file that reads

```
xxx@mainserver.domain.name
```

where xxx is the user node and mainserver.domain.name is the full hostname of one of the machines. Then all incoming mail to all machines is forwarded to mainserver, while mainserver ignores this line.

Subject: 1.609: getty spawning too rapidly
From: aslam@abaseen.lums.edu.pk (Sohail Aslam)

The problem can occur due a number of modem settings. The most frequent is that the echo is not disabled on modems that are to

accept incoming calls. In hayes language, ATE0 disables echo. If echo is enabled, the login prompt sent by the DTE (computer) is echoed back to it. It then issues "password:" prompt which the modem conveniently echoes back again. And the cycle goes on.

Another setting to check is the Q registers which controls the modem's response to the DTE. The hayes command ATQ0 enables results codes. The Q register in conjunction with the X and the V registers, reports back to the DTE the status of the incoming or outgoing call, and the type of connection established. For outgoing calls, one would want to enable result codes but not for incoming calls. If codes are enabled (via ATQ0), when a call comes in, the modem will send strings (if ATV1 and ATX4 set) "RINGING", "CONNECTED" etc. to the local DTE. The getty will think some one is trying to login. It will send password prompt. Trouble again. Telebit and other intelligent modems has ATQ2 setting which says "reports codes only when calling out." For others, you will need to disable it (ATQ1) and enable when calling out.

The DSR setting can be a source of problem. Ideally, modem should raise DSR only when CD is detected and modem raises CTS. Computer, such as the VAX, wait 30 seconds after the modem raises DSR. If CD is not on by that time, the computer will drop DTR causing the modem to reset. The DSR should be set to be raised only when carrier has been detected. The hayes setting is AT&S1.

The DCD setting should be such that it reflects the true nature of the carrier. The CD can be forced on at all times (AT&C0). This is not good. Set it to AT&C1.

Most modems can reload saved settings from non-volatile memory on a DTR transition. This is useful for resetting the modem when a call drops. Use AT&D3 to get this effect.

For dial in, thus, set AT E0 Q1 &C1 &D3 &S1 &W. The &W stores the settings in memory. They will be reloaded due to &D3.

Subject: 1.610: Does AIX support Compressed SLIP (CSLIP)?

No. That means no VJ compression either :) See PPP in section 5.07 if you want more than standard SLIP.

Subject: 1.611: How do I setup anonymous ftp on my AIX system?

(stolen from Peter Klee <klee@dhdibml.bitnet> posting)

Have a look at '/usr/lpp/tcpip/samples/anon.ftp'. It is a shell script and will set up a anonymous ftp site on your local RS/6000. Note: the ftpd that comes with AIX does not support the display messages every time a user changes a directory or even when they login.

Subject: 1.612: Talk, getting notification.

If you are not getting notification (that someone wants to talk to you), use (swcons `tty' && mesg y) in one window.

There are many variations of 'talk' and finding compatible versions for multiple operating systems can be tricky.

Subject: 1.613: Disabling software flow control; using RTS/CTS.

Different versions of AIX 3.2.5 respond differently to attempts to enable flow control (RTS/CTS signals). This section is an attempt to compile a list of different approaches.

The most straight forward is:

```
chdev -l ttyxx -a rts=yes  
[ Note: ix40410 for AIX 3.2.5 should give you this functionality.  
PTF U426113 and numerous other superceding ptfs should provide this.]
```

If carrier signal is high (its connected) you can try
stty add rts </dev/ttyxx

There is also a program that I first saw on the 800-IBM-4FAX number, also found in INFO that will remedy the situation in some cases. Note that this code ignores the return code from ioctl (which on my machine is <0 :)

Subject: 1.614: NIS security
Ole.H.Nielsen@fysik.dtu.dk (Ole Holm Nielsen)

SUMMARY: AIX 3.2.4 and above includes support for a more secure setup of the ypserv NIS daemon. You can prevent any random host on the entire Internet from reading your NIS maps, as is possible with the default AIX setup.

The details:

After starting the ypserv daemon, I noticed in the syslog the following line:
Jan 17 12:01:18 zeise syslog: /usr/etc/ypserv: no /var/yp/securenets file
This indicates that ypserv is looking for the mentioned configuration file, but did not find it, and hence will deliver the NIS maps to anyone on the net who can guess the NIS domainname. I installed the /var/yp/securenets file and restarted ypserv, and it works ! Any illegal attempt to read NIS maps will result in the following getting logged to syslog (example):
Jan 18 13:37:27 zeise syslog: ypserv: access denied for 129.142.6.79

How to enable this NIS security option:
Install the /var/yp/securenets file, for example:

```
# /var/yp/securenets file
```

```

#
# The format of this file is one of more lines of
# netmask netaddr
# Both netmask and netaddr must be dotted quads.
#
# Note that for a machine with two Ethernet interfaces (i.e. a gateway
# machine), the IP addresses of both have to be in /var/yp/securenets.
#
# for example:
#255.255.255.0 128.185.124.00
# Loopback interface
255.255.255.255 127.0.0.1

```

Uncommenting the last line would limit access to hosts on the 128.185.124.* net, only. The loopback interface must be included, as shown above.

To log violations, have a /etc/syslog.conf file containing the proper events. We use this line:

```
*.err;kern.debug;auth.notice;user.none /var/adm/messages
```

Caveat emptor: This works for us, and you will have to verify it at your own installation. Don't complain to us if you have troubles. I do not know what PTF level our AIX 3.2.4 is at. Our ypserv daemon looks like this:

```
zeise> strings /usr/lib/netsvc/yp/ypserv | head -2
@(#)16
1.12 com/cmd/usr.etc/yp/ypserv.c, cmdnfs, nfs325, 9334325a 5/4/93 19:44:41
```

If your AIX doesn't have securenets support, ask your support centre for the PTF which includes APAR IX32328. That seems to have included the securenets support.

Subject: 1.615: Why can't non-anonymous users login using WU-FTP?
From: swcxt@boco.co.gov (Shane Castle)

You must create a file named /etc/shells (this is the real /etc not a subdirectory of your false root), that contains all the shells that are defined on your system. Get the list from /etc/security/login.cfg. Also, if having proper group authentication is important to you, apply the following patch:

```

--- ftpd.c.dist   Wed Apr 13 15:17:18 1994
+++ ftpd.c       Tue Jan 17 13:29:58 1995
@@ -1153,7 +1153,13 @@
     setgroups(NULL, NULL);
     if (setpriv(PRIV_SET|PRIV_INHERITED|PRIV_EFFECTIVE|PRIV_BEQUEATH,
                &priv, sizeof(priv_t)) < 0 ||
-        setuidx(ID_REAL|ID_EFFECTIVE, (uid_t)pw->pw_uid) < 0 ||
+        initgroups(pw->pw_name, (gid_t)pw->pw_gid) < 0 ||
+        setgidx(ID_REAL|ID_EFFECTIVE, (gid_t)pw->pw_gid) < 0 ||
+        setegid((gid_t)pw->pw_gid) < 0) {

```

```
+         reply(550, "Can't set gid (AIX3).");
+         goto bad;
+     }
+     if (setuidx(ID_REAL|ID_EFFECTIVE, (uid_t)pw->pw_uid) < 0 ||
+         seteuid((uid_t)pw->pw_uid) < 0) {
+         reply(550, "Can't set uid (AIX3).");
+         goto bad;
+     }
```

Subject: 1.616: NIS users can't login, do I need '*' in /etc/passwd?
From: ohnielse@fysik.dtu.dk (Ole Holm Nielsen)

Aparently at least one version of AIX InfoExplorer suggests administrators use "+*:0:0:::" as the last entry in the /etc/passwd file of NIS clients for security reasons. If the configuration SMIT is done using SMIT it will actually append "+*:0:0:::" which works and does not compromise security. Using the '*' in the passwd field actually prevents NIS users from logging in.

"*:0:0:::" should not allow you to login as user "+" and without a password even when NIS is disabled, but it never hurts to double check.

Subject: 1.617: HP JetDirect cards and virtual printers? mkvirprt problems?

(stolen from many)

Since the release of AIX 3.2.5 adding a queue for JetDirect cards is as easy as creating a virtual printer using "smit mkvirprt" or mkvirprt. If the command hangs make sure you are using an HFT, aixterm or vt100 terminal. The entire procedure is available from the IBM FAX "Information Line" (800 IBM-4-FAX).

From: Mark Bergman <mark.bergman@syseca.co.uk>

SMIT complains that some required software is not present on the system. It turns out that this software, "printers.hpJetDirect.attach (4.1.3.0)" is on the installation CD.

HOWEVER, there is some bug somewhere, whereby the software may actually be already installed, but the system cannot see it. (Or maybe the bug is that the software is actually NOT installed, but the system in one place thinks it is! - I'm not sure). Therefore, use smit to look at Installed Software ("Software Installation and Maintenance", "Maintain Installed Software", "List Installed Software" and look at all software, then search through for "jet". If it finds it (i.e. it thinks that it is installed) - you must remove it (under smit's "Maintain Installed Software" level), and then reinstall from the CD!

Subject: 1.618: How can I hack libc.a to alter how hostnames are resolved?
From: <mlarsen@ptdcs2.intel.com> "L. Mark Larsen"

[

Editors note: The implications of corrupting libc.a should not be understated. While recovering from a corrupt libc.a should be a matter of booting from floppy I wouldn't wish that on anyone with a supervisor or users to support :)

Before you attempt this, you might want to read 2.07 first for advice on recovering from a destroyed or corrupted libc.a.
Remember: backups are a VERY GOOD IDEA.

enough of the weak kneed quivering...

]

Nate Itkin (a colleague) is the individual who did the initial work. I suspect he would rather not be troubled with any questions you may have in this area and I can probably answer them just as easily. The motivation for this was to use DNS for MX records (we are using IDA sendmail) but NIS for most hostname lookups.

Secondly, warnings: IBM has not given any sort of stamp of approval on what we have done (though they appear to have integrated resolv+ into AIX 4 based on some release notes I saw). While we have been using it successfully for about one year and have seen no problems, we can't and won't promise the same for you. This procedure plays around with libc.a which, as you probably know, is an XCOFF shared library under AIX and hence a critical part of the running system. You assume all the risk if you try to install this. All the usual disclaimers about liability, etc. apply - there is no warranty associated with any of this.

Furthermore, know that any PTF you subsequently install that updates/replaces libc.a implies that you have to execute most of these procedures again.

The details on how to use resolv+ under AIX 3 (it's only tested under 3.2.5 but should work for all point releases), have been moved to section 8.09.

Subject: 1.619: What modem settings do I need?

ATQ2 - result codes in originate only
AT&C1 - CD follows state of carrier
AT&D2 - hangup on DTR drop

Subject: 1.620: NIS slave server config with master on different subnet?
From: msidler@metronet.com (Mike Sidler)

Assuming AIX 3.2.5, the master server up and running and the hosts file has the master name defined. On slave do:

- 1) domainname <domain_name that matches master>
- 2) startsrv -s ypserv
- 3) startsrv -s ypbind (ypwhich should return "loopback")
- 4) (/usr/sbin/)ypset -d <domainname> <master_server_name>
(ypwhich should return "<master_server_name>")
- 5) (/usr/sbin/)ypinit -s <master_server_name>

- 6) Put "+::0:0:::" in /etc/passwd after last local login.
Note: InfoExplorer has this entry INCORRECT in some versions.
- 7) Other cfg files (group, etc) may need configuring but this will get ypserv and ypbind running on the slave looking at the right stuff.

Subject: 1.621: Why does my 64 port concentrator loose data and drop the queue?
[From: as@mynet.no (Arild Sletvold)]

This problem has been associated with upgrading machines to 3.2.5. Try changing the values for the "Transmit buffer count" parameter in the printer/plotter setup in smit. You need to experiment with this parameter, to see which value that makes the printer print as fast as possible. If the value is too high, the printers will loose some of the data, and the queue will be disabled. If the value is too low, the printers will print very slowly.

Subject: 1.622: Netscape FastTrack server won't install on AIX 3.2.5 or 4.1.
From: Cameron Ferstat <cferstat@austin.ibm.com>

Before installing FastTrack on an AIX 3.2.5 or 4.1 system, you must first install the AIX Shared Library Hookable Symbols/6000 Version 1.1.5.0, Reference RPQ No. P91153. (Note: This software should *not* be installed on an AIX 4.2 system!)

If you try to install FastTrack on an AIX 3.2.5 or 4.1 system, without first installing the Hookable Symbols PRPQ, you will get the following error:

```
> ./ns-setup
0509-037 System error - error data is: ./ns-setup
0509-022 Cannot load library libsvld.a[shr.o].
0509-026 System error: A file or directory in the path name does not exist.
```

You can download the installp image by anonymous ftp from
<ftp://ftp.software.ibm.com/aix/products/netscape/tools/slhs.rte.inst_image>.

There is also an associated README.slhs file in that directory.

Subject: 1.623: How can I share files/printers with Windows 95?

The freeware solution is Samba, available from <<http://www-frec.bull.com/>>.

Commercial solutions include Fusion95 from Performance Technology
<<http://www.perftech.com/>> and Syntax <<http://www.syntax.com/>>.

Subject: 1.624: Printing from AIX to WinNT/95/3.1
From: Charles J. Fisher <charles_fisher@bigfoot.com>

1. On your Windows system, share the printer. Assuming that you are running NT, make a user "root" with some password.
2. Get the Samba distribution from <http://www.samba.org>
If you have a C compiler, get the source and compile it.
If you don't have a C compiler, get a binary distribution for AIX.
3. Install Samba on AIX under /usr/local/samba. Specifically, make sure that /usr/local/samba/bin/smbclient is installed with execute rights for everyone.
4. You must also install a Samba configuration file under /usr/local/samba/lib/smb.conf

If you intend to use your AIX as a file server for windows clients, you should modify smb.conf to accomplish this (see the Samba documentation).

If you will be printing only, just use the sample smb.conf.

5. Make the directory /usr/local/samba/lib/printers
6. In that directory, install the following shell script as file "winprint":

```
#!/bin/sh

# This is a modification of the samba provided smbprint script
# changed to work under AIX as the backend for a queue. It does
# not read a config file.
#
# Variables below define the server and service. They are
# the content of the .config file when printing from
# /etc/printcap.
#
server="winserver"
service="winprinter"
user="root"
password="root"
#
# Debugging log file, change to /dev/null if you like.
#
#logfile=/tmp/${USER}-print.log
#
# Some debugging help, change the >> to > if you want to save space.
#
#echo "server $server, service $service" >> $logfile
#cat $1 | /usr/local/samba/bin/smbclient "\\\\$server\\\$service"
$password \
#      -N -P -c 'print -' >> $logfile

(
# NOTE You may wish to add the line 'echo translate' if you want automatic
# CR/LF translation when printing.
    echo translate
    echo "print -"
    cat $*
```

```
) | /usr/local/samba/bin/smbclient "\\\\$server\\$service" $password \  
-U "$user" -N -P > /dev/null
```

7. The above file assumes that you are using `\\winserver\winprinter` as the printer share, and that the user is "root" and the password is "root". If this is not the case, modify the shell variable declarations.
8. Mark the file with execute permissions with `"chmod 755 winprint"`
9. Test the script with the command: `./winprint /etc/passwd`
If everything is ok, your password file should be spooled to your windows printer.

If it doesn't work, remove the `> /dev/null` from the last line of the script and rerun it. Examine the output of `smbclient` for clues.

Clue #1: The Windows printer server is on the other side of a router. AIX is sending broadcast packets to find the Windows machine, which the router will not forward. You must find the Windows server's IP address and specify it with the `"-I"` parameter to `smbclient`, i.e. `"-I 1.2.3.4"`. DHCP makes this situation even more complex.

Clue #2: Your username or password is wrong. `smbclient` will tell you about this if you free its output from `> /dev/null`.

Clue #3: You might be violating shell quoting rules if you use special characters in the server or share name, password, etc. Don't use `$`, `"`, `'`, etc., or escape them properly. A password of `";rm -rf /"` could be catastrophic.

10. Once the script can print files, it must be defined as a printer in the `/etc/qconfig` file. Add the following lines to the end of your `/etc/qconfig`:

```
winprint:  
    device = dwinprint  
    up = TRUE  
    discipline = sjn  
dwinprint:  
    backend = /usr/local/samba/lib/printers/winprint
```

11. Test the printer with the following command:
`"lp -d winprint /etc/passwd"`
(Your password file should be printed again.)
12. You might examine the queue with the command `"lpq -P winprint"`
or `"lpstat -t"`

Subject: 1.625: How do I get NFS mounting with Linux to work?

Linux by default requires any NFS mount to use a so called reserved port below 1024 and AIX 4.3 does by default use ports above 1024. You can use the `nfso` command to restrict AIX to the reserved port range as follows:

```
nfsd -o nfs_use_reserved_ports=1
```

Subject: 1.626: Telnet takes a 45 seconds to produce a prompt.

This is in nearly all cases a DNS configuration problem, the AIX machine can not resolve the IP address of the node initiating the telnet connection. You can check the DNS reverse mapping by using the nslookup command on the IP number in question, this will probably timeout as well. Make sure that the nameserver lines in the /etc/resolv.conf file point to valid name servers. Some folks have reported that putting the following in /etc/netsvc.conf can help as well (see also Subject: 1.800):

```
hosts=local,bind4
```

1.7 LVM

Subject: 1.700: Free LVM lecture slides.
From: shieh@austin.ibm.com

If you want free LVM documentation (lecture notes) from the SHARE conference in San Francisco where I presented last March just:

```
mail -s "S_basics.ps" shieh@austin.ibm.com < /dev/null
mail -s "S_limits.ps" shieh@austin.ibm.com < /dev/null
mail -s "S_lvm_extra.ps" shieh@austin.ibm.com < /dev/null
```

[Editor's note: Jens-Uwe Mager converted the slides to PDF format. They are available as <<http://www.han.de/~jum/aix/lvm.pdf>>.]

Subject: 1.701: How do I shrink /usr?
From: mike@bria.UUCP (Michael Stefanik) and Richard Hasting

FOR AIX 3.1

1) Make a backup of /usr

```
find /usr -print | backup -ivf /dev/rmt0 (or appropriate device)
```

2) shutdown to maintenance mode

```
shutdown -Fm
```

3) export LANG=C

4) remove the filesystem and the logical volume
ignore an error about the "dspmsg" command not found

```
umount /usr
rmfs /usr
```

5) make a new logical volume hd2 and place it on rootvg with desired size

```
mklv -yhd2 -a'e' rootvg NNN
```

where NNN is the number of 4 meg partitions

6) create a filesystem on /dev/hd2

```
crfs -vjfs -dhd2 -m'/usr' -Ayes -p'rw'
```

7) mount the new /usr filesystem and check it

```
/etc/mount /usr
df -v
```

8) restore from the tape; system won't reboot otherwise

```
restore -xvf/dev/rmt0
```

9) Sync and reboot the system; you now have a smaller /usr filesystem

FOR AIX 3.2

0) Experiences posted to comp.unix.aix lead me to suggest that many administrators find the following piece of information useful after completing this procedure. I thought some of you might like to read it BEFORE getting yourself into this predicament.

Call 1-800-IBM-4FAX and request document 2503 dated 1/26/94. Title is "How to recover if all files are owned by root after restoration from a mkysyb tape".

- 1) Remove any unneeded files from /usr.
- 2) Make sure all filesystems in the root volume group are mounted. If not, they will not be included in the re-installed system.
- 3) Type mkszfile. This will create /.fs.size that contains a list of the active filesystems in the root volume group that will be included in the installation procedure.
- 4) Edit .fs.size. Change the size of /usr to what you want.

Example: This .fs.size file shows /usr to be 40MB.

```
rootvg 4 hd2 /usr 10 40 jfs
```

The 10 is the number of physical partitions for the filesystem and the 40 is 40 MB. Most systems have a physical partition size of 4 MB. Therefore, the second number (40) will always be 4 times the previous number (10). Note, however, that a model 320 with a 120 MB drive will have a physical partition size of only 2 MB, and the total MB is twice the number of physical partitions. The first number (4) in the .fs.size file represents the PP size.

If you want to reduce the size of /usr from 40 MB to 32 MB, edit the /usr entry to:

```
rootvg 4 hd2 /usr 8 32 jfs
```

IMPORTANT: Make sure that you DO NOT enter a value which is less than the size of the filesystem required to contain the current data. Doing so will cause the re-installation procedure to fail.

- 5) chdev -l rmt0 -a block=512 -T
- 6) Unmount all filesystems that are NOT in the root volume group.
- 7) Varyoff all user-defined volume groups, if any

varyoffvg VGname

- 8) Export the user-defined volume groups, if any

exportvg VGname

- 9) With a tape in the tape drive, type

mksysb /dev/rmt0

This will do a complete system backup, which will include information (in the .fs.size file) for the installation procedure on how large the filesystems are to be created.

- 10) Follow the instructions in the Installation Kit under "How to Install and perform maintenance from Diskettes" (reportedly now called "BOS Installation from a System Backup") using the diskettes and tape that you created in the previous steps.

[pre AIX 325: DO NOT select the option "Reinstall AIX with Current System Settings". Instead use "Install AIX with Current System Settings" for the logical volume size changes to take affect.]

[w/ AIX 325: Select "Install from a mksysb image"]

- 11) When the installation is complete, you may then import any user-defined volume groups.

importvg -y VGname PVname

where "VGname" is the name of the volume group, and "PVname" is the name of any one of the physical volumes in the volume group.

- 12) Varyon your user-defined volume groups

varyonvg VGname

The reduction of the filesystems is now complete.

COMMERCIAL OPTION

There are also commercial tools available to help you do this more conveniently. I know of one vendor that can be reached at info@compunix.com

Subject: 1.702: How do I make a filesystem larger than 2Gb?

AIX 3.2.5 and preceding versions are limited to 2 Gigabytes per filesystem.

With AIX 4.1 IBM allows filesystems up to 64Gb (reference: Individual files are still limited to 2Gb. AIX 4.2 allows 128Gb filesystems and 64 Gb files. (See also question 1.706.)

If you are having trouble creating a file greater than 1Mb it maybe because that is the default limit for your account, see 'smit users'

or /etc/security/limit.

Subject: 1.703: Chlv warning. Is the first 4k of a LV safe?

The first 4k of a raw LV are used to store control block. Applications that write to the raw disk can overwrite this section (common applications that do this are Oracle and Sybase). Commands that call getlvcb will generate a warning but succeed (since the control block exists in ODM. Don't run synclvodm unless you really want to erase the first 4k and replace it with the info from the ODM.

shieh@austin.ibm.com (Johnny Shieh) has kindly provided the following explanation:

The logical volume control block (lvcb) is the first 512 bytes of a logical volume. This area holds important information such as the creation date of the logical volume, information about mirrored copies, and possible mount points in a journaled filesystem. Certain LVM commands are required to update the lvcb, as part of completeness algorithms in LVM. The old lvcb area is first read and analyzed to see if it is a valid lvcb. If the information is verified as valid lvcb information, then the lvcb is updated. If the information is not valid, then the lvcb update is not performed and the user is given the warning message:

Warning, cannot write lv control block data

Most of the time, this is a result of database programs accessing the raw logical volumes (and thus bypassing the journaled filesystem) as storage media. When this occurs, the information for the database is literally written over the lvcb. Although this may seem fatal, it is not the case. Once the lvcb has been overwritten, the user can still:

- 1) Extend a logical volume
- 2) Create mirrored copies of a logical volume
- 3) Remove the logical volume
- 4) Create a journaled filesystem with which to mount the logical volume (note that this will destroy any data sitting in the lvcb area)

However, there is a limitation caused by this deletion of the lvcb. The logical volumes with deleted lvcb's face possible, incomplete importation into other AIX systems. During an "importvg", the LVM command will scan the lvcb's of all defined logical volumes in a volume group for information concerning the logical volumes. Surprisingly, if the lvcb is deleted, the imported volume group will still define the logical volume to the new AIX system which is accessing this volume group, and the user can still access the raw logical volume. However, any journaled filesystem information is lost and the logical volume and its associated mount point won't be imported into the new AIX system. The user must create new mount points and the availability of previous data stored in the filesystem is NOT assured. Also, during

this import of a logical volume with an erased LVCB, some non-jfs information concerning the logical volume, which is displayed with the "lslv" command, cannot be found. When this occurs, the system uses default logical volume information to populate the logical volume's ODM information. Thus, some output from the "lslv" will be inconsistent with the real logical volume. If logical volume copies still exist on the original disks, this information will not be correctly reflected in the ODM database. The user should use "rmlvcopy" and "mklvcopy" to rebuild any logical volume copies and synchronize the ODM. Finally, with an erased lvcb, the output from the "lslv" command might be misleading or unreliable.

Subject: 1.704: What's the limit on Physical Partitions Per Volume Group?
From: shieh@austin.ibm.com (Johnny Shieh)

1016 Physical Partitions Per Disk in a Volume Group:

In the design of LVM, each Logical Partition maps to one Physical Partition. And, each Physical Partition maps to a number of disk sectors. The design of LVM limits the number of Physical Partitions that LVM can track PER DISK in a volume group to 1016. In most cases, not all the possible 1016 tracking partitions are used by a disk. The default size of each Physical Partition during a "mkvg" command is 4 MB, which implies that individual disks up to 4 GB can be included into a volume group.

If a disk larger than 4 GB is added to a volume group (based on usage of the default 4 MB size for Physical Partition) the disk addition will fail with a warning message that the Physical Partition size needs to be increased.* There are two instances where this limitation will be enforced. The first case is when the user tries to use "mkvg" to create a volume group where the number of physical partitions on one of the disks in the volume group would exceed 1016. In this case, the user must pick from the available Physical Partition ranges of:

1, 2, (4), 8, 16, 32, 64, 128, 256

Megabytes and use the "-s" option to "mkvg". The second case is where the disk which violates the 1016 limitation is attempting to join a pre-existing volume group with the "extendvg" command. The user can either recreate the volume group with a larger Physical Partition size (which will allow the new disk to work with the 1016 limitation) or the user can create a standalone volume group (consisting of a larger Physical Partition size) for the new disk.

In AIX 4.1 and 3.2.5, if the install code detects that the rootvg drive is larger than 4 GB, it will change the "mkvg -s" value until the entire disk capacity can be mapped to the available 1016 tracks.** This install change also implies that all other disks added to rootvg, regardless

of size, will also be defined at that new Physical Partitions size.

For RAID systems, the /dev/hdiskX name used by LVM in AIX may really consist of many non-4GB disks. In this case, the 1016 limitation still exists. LVM is unaware of the size of the individual disks that may really make up /dev/hdiskX. LVM bases the 1016 limitation on the AIX recognized size of /dev/hdiskX, and not the real independent physical disks that make up /dev/hdiskX.

The questions asked of this issue are:

- 1) What are the symptoms of this problem?
- 2) How safe is my data? What if I never use mirroring or migratepv?
- 3) Can I move this volume group between RS/6000 systems and versions of AIX?

Here are the answers:

- A) What are the symptoms of this problem?

The 1016 VGSA is used to track the "staleness of mirrors". If you are in violation of 1016, you may possibly get a false report of a non-mirrored logical volume being "stale" (which is an oxymoron) or you may get a false indication that one of the your mirror copies has gone stale. Next, migratepv may fail because migratepv briefly uses mirroring to move a logical volume from one disk to another. If the target logical partition is incorrectly considered "stale", then the migratepv cannot remove the source logical partition and the migratepv command will fail in the middle of migration.

- B) How safe is my data? What if I never use mirroring or migratepv?

The data is as safe (in your mind) as the day before you found out about 1016 violations. The only case where data may be lost is if one is mirroring a logical volume and ALL copies go bad at the same time and LVM isn't aware of it because the copies that go bad are beyond the 1016 tracking range. However, in this case, you would lose data even if you were within the 1016 range. If you never mirror or use migratepv, then this issue shouldn't concern you. But, it might be unwise to state you'll NEVER use either of those options.

- C) Can I move this volume group between RS/6000 systems and versions of AIX?

Yes you can. The enforcement of this 1016 limit is only during mkvg and extendvg. The "safeness" of the data on the volume group on AIX 3.2 is the same as it is on AIX 4.1.

* This bug was fixed in apar ix48926. Current AIX 3.2.5 and 4.1.1, which do not have this fix on applied, will allow the creation of volume groups with more than 1016 partitions. The implication of this bug allowing more than 1016 physical partitions is that the user may access all portions of the logical volume. However during disk mirroring, the status of partitions beyond the 1016 limit will not be tracked correctly. If mirrors beyond the 1016 range become "stale", LVM will not be aware of their condition and data consistency may become an issue for those partitions. Additionally, the "migratepv" command creates mirrors and deletes them as a method for moving logical volumes

around within/between disks. If the 1016 limit is violated, then the "migratepv" command may not behave correctly. The user should pick up apar ix51754, which clarifies the error message when this condition is detected. Additionally, the user can read the non-ptf documentation apar ix50874 which is a companion to ix48926 and ix51754.

** This bug was fixed for AIX 3.2.5 rootvg install in apars ix46862 and ix46863. This bug does not exist in AIX 4.1.1.

Subject: 1.705: Why am I having trouble adding another disk to my VG?
From: shieh@austin.ibm.com (Johnny Shieh)

In some instances, the user will experience a problem adding a new disk to an existing volume group or in the creation of a new volume group. The warning message provided by LVM will be:

Not enough descriptor space left in this volume group.
Either try adding a smaller PV or use another volume group.

On every disk in a volume group, there exists an area called the Volume Group Descriptor Area (VGDA). This space is what allows the user to take a volume group to another AIX system and "importvg" that volume group into that AIX system. The VGDA contains the names of disks that make up the volume group, their physical sizes, partition mapping, logical volumes that exist in the volume group, and other pertinent LVM management information.

When the user creates a volume group, the "mkvg" command defaults to allowing the new volume group to have a maximum of 32 disks in a volume group. However, as bigger disks have become more prevalent, this 32 disk limit is usually not achieved because the space in the VGDA is used up faster, as it accounts for the capacity on the bigger disks. This maximum VGDA space, for 32 disks, is a fixed size which is part of the LVM design. Large disks require more management mapping space in the VGDA, which causes the number and size of available disks to be added to the existing volume group to shrink. When a disk is added to a volume group, not only does the new disk get a copy of the updated VGDA, but all existing drives in the volume group must be able to accept the new, updated VGDA.

The exception to this description of the maximum VGDA is rootvg. In order to provide AIX users more free space, when rootvg is created, "mkvg" does not use the maximum limit of 32 disks that are allowed into a volume group. Instead in AIX 3.2, the number of disks picked in the install menu of AIX is used as the reference number by "mkvg -d" during the creation of rootvg. For AIX 4.1, this "-d" number is 7 for one disk and one more for each additional disk picked. i.e. you pick two disks, the number is 8. you pick three disks, the number is 9, and so on..... This limit does not mean the user cannot add more disks to rootvg in the

post-install phase. The amount of free space left in a VGDA, and thus the number and size of the disks added to a volume group, depends on the size and number of disks already defined for a volume group. However, this smaller size during rootvg creation implies that the user will be able to add fewer disks to rootvg than compared to a non-rootvg volume group.

If the customer requires more VGDA space in the rootvg, then they should use the "mksysb" and "migratepv" commands to reconstruct and reorganize their rootvg (the only way to change the "-d" limitation is recreation of the rootvg).

Note: It is always strongly recommended that users do not place user data onto rootvg disks. This separation provides an extra degree of system integrity.

Subject: 1.706: What are the limits on a file, filesystem?

There are other limits but these come up most often. Logical Volumes do not have to contain Journaled File Systems and therefore can be larger than 2GB even in 3.2.5.

	File	jfs-Filesystem
3.2.5	2GB	2GB
4.1.x	2GB	64GB
4.2	64GB	128GB

While it *might* be possible to create larger file systems, the limits shown here represent values that IBM has supposedly tested.

Subject: 1.707: Hints for Segate 9 GB and other disks larger than 4 GB?

[read 1.704]

Subject: 1.708: How do I fix Volume Group Locked?

>From /usr/lpp/bos/README (AIX 3.2.5) and 1.800.IBM.4FAX #2809

If you get '0516-266 publvodm: volume group rootvg is locked, try again' or something similar, you can use (putlvodm -K 'getlvodm -v <vgname>')

Subject: 1.709: How do I remove a volume group with no disks?
From: shieh@austin.ibm.com (Johnny Shieh)

This is a very common question about AIX LVM and I thought I might take some time to explain what is going on. Within a volume group is the Volume Group Descriptor Area (VGDA) is

is kinda a "suitcase" of lvm information. This is what allows you to pick up your drives and take them to another machine, importvg them, and get filesystems automatically defined.

What happens is that when you importvg the volume group, the RS/6000 goes out and reads the VGDA and finds out about all the logical volumes and filesystems that may exist on the volume group. It then checks for clashes (name conflicts, etc..) on its own machine and then, here is the important part, populates its own database with information about the new volume group and its associated logical volumes. In cases of filesystems, it will go into the /etc/filesystems file and add the new filesystem entries that came along with the imported volume group.

Okay, the key point is that you've got this independent volume group that has "docked" at the new RS/6000. What keeps the two tethered to each other is the varyonvg command. When this is started on the volume group, a software link is created where you can't separate the volume group from the AIX operating system unless the volume group is no longer seen as active by the system. In very rare cases, a situation can occur where the VGDA thinks that someone has it (the volume group) activated, but the operating system doesn't think it has the volume group opened up. This is pretty rare.

The main question I see is "I've taken away the disks, but how do I get rid of the volume group". The question should really say, "How do I get rid of the volume group INFORMATION" since that's all you have on the system. You've got possible entries in the /etc/filesystems and definitely entries in the ODM. Just do:

```
exportvg <vgname>
```

It does a reverse importvg, except it doesn't go off and read the VGDA. It nukes anything relating to the volume group in the /etc/filesystems and ODM. The only time this won't work is if the system detects that the volume group is varied on. Then, it would be like trying to change tires on a moving car, we won't let you do it!

Some people are concerned that doing an exportvg will somehow damage the volume group and/or its VGDA. As I said, all it does is affect the information about the volume group on the RS/6000 box, not on the actual disk platter itself. Thus, the volume group you exported is safe to take to another system. The only time the VGDA gets overwritten is when you create a new volume on top of it.

The second most often asked question is "How do I get rid of a disk that is no longer really in the volume group?"

In this case, you DON'T want to do an exportvg. What you want to do is tell the system you want to cut out the memory of the old, bad disk from the RS/6000 AND from the VGDA of the volume group. You simply do:

```
reducevg -d -f <vgname> <hdname>
```

or if the hdname can't be found:

reducevg -d -f <vgname> <PVID>

Be careful with this command. Unlike the exportvg command, actions done with this command WILL affect the VGDA information on the platter.

Hope this clarifies some questions about volume groups.

Subject: 1.710: What are the theoretical limits within the LVM?
From: Gerry FitzGerald <G.FitzGerald@uk22p.bull.co.uk>

LVM Limits within AIX (my perception)

The system may have 1 to 255 Volumes Groups (VG's).
Each VG may contain 1 to 32 Physical Volumes (PV's).
Each PV may contain upto 1016 Physical Partitions (PP's).
Each PP may have a size (square of 2) from 1 to 256MB (1024MB for AIX 4.3).

Therefore, if you can get hold of a 260,096 MB disk (one PV with 1016 x 256MB PPs), you can install 32 of these in a single VG giving you 8,323,072MB per VG. You may have up to 255 VG's in one AIX system so you could (in theory) create the maximum addressable AIX storage area of 2,122,383,360 MB (2,072,640 GB or 2,024 TB or approx. 2 PB). This is based on the current limitations of AIX V4.1.

The limits for file and filesystem sizes are:

[Editor's note: the original values in this mail appeared to be slightly wrong, I have corrected that to the values as per my interpretation of the AIX manual.]

AIX V3.2 Max filesystem size: 2,147,483,647 bytes (2 GB)
Max single file size: 2,147,483,647 bytes (2 GB)

AIX V4.1 Max filesystem size: 1,099,511,627,776 bytes (1 TB)
Max single file size: 2,147,483,647 bytes (2 GB)

AIX V4.2 Max filesystem size: 1,099,511,627,776 bytes (1 TB)
Max single file size: 68,589,453,312 (~64 GB)

AIX V4.3 Max filesystem size: 1,099,511,627,776 bytes (1 TB)
Max single file size: 68,589,453,312 (~64 GB)

The 1TB maximum file system size is given by the rule that each fragment must be addressable by an 28 bit number, with the largest fragment size being 4096 bytes (4096*2²⁸).

1.8 AIX 4.X

Subject: 1.800: How do I control how hostnames are resolved?
From: <kraem@ibm.de> Frank Kraemer

Information from AIX 4.1.2 Infoexplorer:

The default order can be overwritten by creating the configuration file, /etc/netsvc.conf and specifying the desired order. Both the default and /etc/netsvc.conf can be overwritten with the environment variable, NSORDER. If either the /etc/netsvc.conf file or environment variable, NSORDER are defined, then at least one value must be specified along with the option.

examples:

```
echo hosts = local,nis,bind >/etc/netsvc.conf
NSORDER=local,bind; export NSORDER
```

Subjet: 1.801: dtlogin ignores /etc/profile?
From: Trevor Bourget (trevor@thomsoft.com)

Read the /usr/dt/bin/Xsession script. You can add a file to the /etc/dt/config/Xsession.d and it will get sourced as part of the startup. The order is: \$HOME/.dtprofile, /etc/dt/config/Xsession.d/*, /usr/dt/config/Xsession.d/* (backwards, in my opinion, but CDE is a committee result after all).

>From: Ed Ravin <eravin@panix.com>

If you want your terminal session to automatically read in /etc/profile and your .profile when they start up, you need to either invoke them with the "-ls" option (which I couldn't figure out how to do, perhaps someone else can elaborate), or set up the default X resources so that they set:

```
*Dtterm*loginShell:      true
```

You could always do this with the .Xresources file in your own account, but that wouldn't fix any other users in the system. To make this change globally:

CDE configuration files are kept in /usr/dt/config

Those files warn you strenuously not to change them, since AIX upgrades will overwrite them and lose your changes. They recommend that you copy the files to /etc/dt/config and change them there, so:

```
# cd /usr
# find dt/config -print | cpio -pdvum /etc
... (files get copied)
# cd /etc/dt/config/C
# echo "*Dtterm*loginShell:      true" >> sys.resources
# cd ../en_US
```

```
# echo "*Dtterm*loginShell:      true" >> sys.resources
```

From: Olaf Meeuwissen <olaf@IMSL.shinshu-u.ac.jp>

The problem is in /usr/dt/bin/Xsession. This script only recognizes the following login shells: sh, ksh and csh (as of \$Revision: 1.7 \$). All other shells are considered non-standard.

The fix is to have your sys-admin add any other login shells in the right places in the script (twice in the "Start the session" part). Look for "case \${SHELL##*/} in" and add shells in the patterns.

Note that this script will be overwritten unconditionally by system updates :-(and, unlike much other stuff in /usr/dt/, copying it to /etc/dt/ does not work.

For which shells to add, you may want to:

```
$ grep shells /etc/security/login.cfg
```

Subject: 1.802: Where's the C compiler?

As of AIX 4.1, the C compiler has been "unbundled." It's a separate product, and you must purchase a separate license for it. IBM does offer free time limited trial licenses if you want to "try before you buy."

The GNU C compiler is available from various sources. The most convenient is probably <<http://www-frec.bull.com/>>. <<ftp://aixpdslib.seas.ucla.edu/>> is another source.

Subject: 1.803: Why doesn't Netscape work?

See question 1.515.

1.9 Miscellaneous

Subject: 1.900: SCSI-1 and SCSI-2 "interoperability" got you confused?

- A. SCSI-1 devices are supported on a SCSI-2 adapter. This config will provide SCSI-1 performance.
- B. SCSI-2 devices are supported on a SCSI-1 adapter. This config will provide SCSI-1 performance.
- C. A mix of SCSI-2 and SCSI-1 devices are supported on a SCSI-1 adapter. All devices will have SCSI-1 performance.
- D. A mix of SCSI-2 and SCSI-1 devices are supported on a SCSI-2 adapter. SCSI-2 devices will have SCSI-2 performance (10 MB/sec) and SCSI-1 devices will have SCSI-1 performance (4-5 MB/sec).

Subject: 1.901: How to get your keyboard back after unplugging it from the 6000
From: Mickey Coggins and Anne Serre and L. Mark Larsen

When you unplug your keyboard from a running system, and plug it back in, the key mapping is wrong. For example, keys like Caps Lock and Ctrl don't work as designed.

Solution: Type at the command line

```
/usr/lpp/diagnostics/da/dkbd
```

Your screen goes black, you hear a few beeps, and your keyboard is reset. It works with any environment, Xwindows, hft, NLS...

For Models 220, 230 and M20, use the following commands:

```
/usr/lpp/diagnostics/da/dkbd  
/usr/lpp/diagnostics/da/dkbdsal (for the 220)
```

After running the keyboard diagnostics to reset keyboard mappings, the repeat rate is also reset to some slow value (11, according to the man page). If the user is in X, you need to open an hft window. Do this with "xopen /bin/csh". Once you have an hft window, run "chhwkbd -r30".

Subject: 1.902: How do I set up pcsim, the DOS emulator?

[Editor's Note: this product does not exist in AIX 4.x.]

You must have a bootable DOS diskette to install pcsim. Either DOS 3.3, 4.x, or 5.0 will work. IBM do not officially support DOS 5.0 for pcsim but I have no problems with it. Just don't try to be fancy with the UMB and memory manager stuff.

With a bootable DOS disk in the drive, do:

```
$touch /u/dosdrive (this is the AIX file for DOS emulation)
$pcsim -Adiskette 3 -Cdrive /u/dosdrive
You would now get an A prompt. Type:
A> fdisk
Create the virtual C drive of whatever size you choose. Make it large
enough for your needs since you cannot enlarge it later.
A> format c: /s (to format the virtual C drive)
Now exit from pcsim with ESCpcsim (Esc key followed by pcsim).
```

Now create a simprof file. Following is a starter:

```
Adiskette   : 3
Cdrive      : /u/dosdrive
lpt1        : name of printer queue
refresh     : 50
dmode       : V
mouse       : com1
```

You can now start pcsim anytime by typing pcsim. Make sure no floppies are in the drive. For further information, refer to publication SC23-2452, Personal Computer Simulator/6000 Guide and Reference.

Subject: 1.903: How do I transfer files between AIX and DOS disks?

In the AIX package bos.dosutils are commands for transferring files between DOS diskettes and AIX. The commands are dosread, doswrite, dosdir, dosdel, and dosformat. Many users have mentioned that the mtools package from prep.ai.mit.edu is better than the native AIX programs.

Subject: 1.904: Where is the crypt program?

The crypt *program* (as opposed to the crypt subroutine) has been deleted, probably to conform to U.S. law regarding export of cryptographic technology.

Other programs such as PGP are available, but their use and/or possession may be subject to local laws and regulations.

If anyone has a better answer to this question, feel free to contribute it.

Subject: 1.905: How do I play audio CDs?
From: woan@austin.ibm.com (Ronald S. Woan)

Get xmcd by anonymous FTP from ftp.x.org in /contrib/applications/xmcd/
<URL:ftp://ftp.x.org/contrib/applications/xmcd/>

Subject: 1.906: How can I get the mouse back after unplugging it?

/usr/lpp/diagnostics/da/dmousea

Subject: 1.907: Where can I get source code to the operating system binary xxxxx?

AIX source code is not generally available. Two other UNIX OS' do make their source available, Linux & freeBSD. Check <<ftp://ftp.uu.net/systems/unix/bsd-sources/>> and <<ftp://ftp.uu.net/systems/unix/linux/>>

Subject: 1.908: What's the difference between the POWER and POWERPC architectures?

Read the POWERPC FAQ at <http://www.mot.com/SPS/PowerPC/library/ppc_faq/ppc_faq.html>

Subject: 1.909: Will there be date rollover problems in the year 2000?
From: mbrown@austin.ibm.com (Mark Brown)

IBM has a major corporate-wide push for *all* of its software products to be "safe" in this regard by the end of 1996.

<<http://www.software.ibm.com/year2000/paper.html>> is the general-purpose [Year 2000] URL for IBM.

As far as AIX is concerned, we had to fix three things in AIXv4.1.4 (some logging commands handled date ranges wrong) as PTFs, but other than that, we are there.

...and we handle the leap year issue correctly. also.

Subject: 1.910: How can I build an "installp format" file?

Jim Abbey <jim@systeledcom.com> has a tool called "lppbuild". It is now available from "aixpdslib.seas.ucla.edu" in either of

/pub/lppbuild/RISC/3.2/src/lppbuild.1.0.tar.Z
/pub/lppbuild/RISC/4.1/src/lppbuild.1.0.tar.Z

Both are identical and the procedures also work on 4.2.

Ciaran Diegnan <C.Diegnan@frec.bull.fr> has built a tool called "mklpp". You can retrieve a copy (along with many other smit-installable freeware packages) from <<http://www-frec.bull.com/>>.

Subject: 1.911: Is there a generic SCSI driver for AIX?
From: Rogan Dawes <rdawes@jhbelec.co.za>

Yes. Matthew Jacob (mjacob@feral.com) has written a generic SCSI driver for AIX 4.1. It can be found at <ftp://ftp.feral.com/pub/aix/gsc.tar.gz>.

Subject: 1.912: Viruses or virus scanning on AIX?
From: mww@microfocus.com (Michael Wojcik)

FWIW, AIX comes with a virus-scanning utility (/usr/bin/virscan), though IIRC the original version had an empty signature file (in /usr/lib/security/scan/virsig.lst) and even the later populated signature file only contains PC viruses. Quoth the man page, "at this time [virsig.lst] contains no known AIX virus signatures". Apparently we are to infer that there *were* no known AIX virus signatures.

I note that my 4.2.1 AIX system still has the 1991 signature file.

Even a DOS-only virus list could potentially be useful on a Unix file server, though. Provided, of course, that it had a recent signature list (and preferably mutant-detection and similar heuristics), which virscan probably does not.

And to be fair there are plenty of Unix vulnerabilities, and even viruses potentially among them. David Harley, keeper of the alt.comp.virus FAQ, mentioned some "lab" Unix viruses when this thread appeared in October '87, and I recall a discussion of using crypto hashes to validate major system commands on some Unix group not that long ago - which is essentially virus-scanning technology, though not necessarily for the same purpose it generally serves on PCs.

That said, viruses are not the problem for Unix systems that they are for PCs. Network security, guessable usernames and passwords, and the like should generally be a higher priority.

Subject: 1.913: How do I determine the clock frequency of a RS/6000 by software ?
From: Franz Pestenhofer <franz.pestenhofer@debis.com>

The answer seems to be "There is no way to find out the clock frequency with a piece of software".

Subject: 2.00: C/C++

Contrary to many people's belief, the C environment on the RS/6000 is not very special. The C compiler has quite a number of options that can be used to control how it works, which "dialect" of C it compiles, how it interprets certain language constructs, etc. InfoExplorer includes a Users Guide and a Reference Manual.

The compiler can be invoked with either `xlc` for strict ANSI mode and `cc` for RT compatible mode (i.e. IBM 6150 with AIX 2). The default options for each mode are set in the `/etc/xlc.cfg` file, and you can actually add another stanza and create a link to the `/bin/xlc` executable.

The file `/usr/lpp/xlc/bin/README.xlc` has information about the C compiler, and the file `/usr/lpp/bos/bsdport` (AIX 3 only) contains useful information, in particular for users from a BSD background.

The file `/etc/xlc.cfg` also shows the symbol `_IBMR2` that is predefined, and therefore can be used for `#ifdef`'ing RS/6000 specific code.

Subject: 2.01: I cannot make `alloca` work

A famous routine, in particular in GNU context, is the allocation routine `alloca()`. `Alloca` allocates memory in such a way that it is automatically free'd when the block is exited. Most implementations does this by adjusting the stack pointer. Since not all C environments can support it, its use is discouraged, but it is included in the `xlc` compiler. In order to make the compiler aware that you intend to use `alloca`, you must put the line

```
#pragma alloca
```

before any other statements in the C source module(s) where `alloca` is called. If you don't do this, `xlc` will not recognize `alloca` as anything special, and you will get errors during linking.

For AIX 3.2, it may be easier to use the `-ma` flag.

Subject: 2.02: How do I compile my BSD programs?

The file `/usr/lpp/bos/bsdport` contains information on how to port programs written for BSD to AIX 3. This file may be very useful for others as well.

A quick `cc` command for most "standard" BSD programs is:

```
$ cc -D_BSD -D_BSD_INCLUDES -o [loadfile] [sourcefile.c] -lbsd
```

If your software has system calls predefined with no prototype parameters, also use the `-D_NO_PROTO` flag.

Subject: 2.03: Isn't the linker different from what I am used to?

Yes. It is not at all like what you are used to:

- The order of objects and libraries is normally not important. The linker reads all objects including those from libraries into memory and does the actual linking in one go. Even if you need to put a library of your own twice on the ld command line on other systems, it is not needed on the RS/6000 - doing so will even make your linking slower.

- One of the features of the linker is that it will replace an object in an executable with a new version of the same object:

```
$ cc -o prog prog1.o prog2.o prog3.o          # make prog
$ cc -c prog2.c                               # recompile prog2.c
$ cc -o prog.new prog2.o prog                # make prog.new from prog
                                           # by replacing prog2.o
```

- The standard C library /lib/libc.a is linked shared, which means that the actual code is not linked into your program, but is loaded only once and linked dynamically during loading of your program.

- The ld program actually calls the binder in /usr/lib/bind, and you can give ld special options to get details about the invocation of the binder. These are found on the ld man page or in InfoExplorer.

- If your program normally links using a number of libraries (.a files), you can 'prelink' each of these into an object, which will make your final linking faster. E.g. do:

```
$ cc -c prog1.c prog2.c prog3.c
$ ar cv libprog.a prog1.o prog2.o prog3.o
$ ld -r -o libprog.o libprog.a
$ cc -o someprog someprog.c libprog.o
```

This will solve all internal references between prog1.o, prog2.o and prog3.o and save this in libprog.o Then using libprog.o to link your program instead of libprog.a will increase linking speed, and even if someprog.c only uses, say prog1.o and prog2.o, only those two modules will be in your final program. This is also due to the fact that the binder can handle single objects inside one object module as noted above.

If you are using an -lprog option (for libprog.a) above, and still want to be able to do so, you should name the prelinked object with a standard library name, e.g. libprogP.a (P identifying a prelinked object), that can be specified by -lprogP. You cannot use the archiver (ar) on such an object.

You should also have a look at section 3.01 of this article, in particular if you have mixed Fortran/C programs.

Dave Dennerline (d.dennerline@bull.com) claims that his experiences in prelinking on AIX does not save much time since most people have separate libraries which do not have many dependencies between them,

thus not many symbols to resolve.

Subject: 2.04: How do I statically link my program?

```
cc -o prog -bnoso -bI:/lib/syscalls.exp obj1.o obj2.o obj3.o
```

will do that for a program consisting of the three objects obj1.o, etc.

[Editor's note: You should never link programs statically that are supposed to leave your local environment, e.g. intended for distribution. Statically linked programs may fail to work after installing a new AIX version or even after installing a PTF.]

From: Marc Pawliger (marc@sti.com)

As of AIX 3.2.5, you can install a speedup for AIXwindows called Shared Memory Transport. To static link an X application after the SMT PTF has been installed, you must link with -bI:/usr/lpp/X11/bin/smt.exp and the executable will NOT run on a machine where SMT is not installed. See /usr/lpp/X11/README.SMT

Subject: 2.05: How do I make my own shared library?

To make your own shared object or library of shared objects, you should know that a shared object cannot have undefined symbols. Thus, if your code uses any externals from /lib/libc.a, the latter MUST be linked with your code to make a shared object. Mike Heath (mike@pencom.com) said it is possible to split code into more than one shared object when externals in one object refer to another one. You must be very good at import/export files. Perhaps he or someone can provide an example.

Assume you have one file, sub1.c, containing a routine with no external references, and another one, sub2.c, calling stuff in /lib/libc.a. You will also need two export files, sub1.exp, sub2.exp. Read the example below together with the examples on the ld man page.

```
---- sub1.c ----
int addint(int a, int b)
{
    return a + b;
}
---- sub2.c ----
#include <stdio.h>

void printint(int a)
{
    printf("The integer is: %d\n", a);
}
---- sub1.exp ----
#!
addint
---- sub2.exp ----
#!
```

```

    printint
---- usesub.c ----
    main()
    {
        printint( addint(5,8) );
    }

```

The following commands will build your libshr.a, and compile/link the program usesub to use it.

```

$ cc -c sub1.c
$ cc -bM:SRE -bnoentry -bE:sub1.exp -o sub1shr.o sub1.o
$ cc -c sub2.c
$ cc -bM:SRE -bnoentry -bE:sub2.exp -o sub2shr.o sub2.o
$ ar r libshr.a sub1shr.o sub2shr.o
$ cc -o usesub usesub.c -L: libshr.a
$ usesub
The integer is: 13
$

```

A similar example can be found in the AIX manual online on the web at:

<http://www.rs6000.ibm.com/doc_link/en_US/a_doc_lib/aixprgpd/genprogcd/create_shared_lib.htm>

Subject: 2.06: Linking my program fails with strange errors. Why?

Very simple, the linker (actually called the binder), cannot get the memory it needs, either because your ulimits are too low or because you don't have sufficient paging space. Since the linker is quite different >from normal Unix linkers and actually does much more than these, it also uses a lot of virtual memory. It is not unusual to need 10000 pages (of 4k) or more to execute a fairly complex linking.

If you get 'BUMP error', either ulimits or paging is too low, if you get 'Binder killed by signal 9' your paging is too low.

First, check your memory and data ulimits; in korn shell 'ulimit -a' will show all limits and 'ulimit -m 99999' and 'ulimit -d 99999' will increase the maximum memory and data respectively to some high values. If this was not your problem, you don't have enough paging space.

If you will or can not increase your paging space, you could try this:

- Do you duplicate libraries on the ld command line? That is never necessary.
- Do more users link simultaneously? Try having only one linking going on at any time.
- Do a partwise linking, i.e. you link some objects/libraries with the -r option to allow the temporary output to have unresolved references, then link with the rest of your objects/libraries. This can be split up as much as you want, and will make each step use less virtual memory.

If you follow this scheme, only adding one object or archive at a time, you will actually emulate the behavior of other Unix linkers.

If you decide to add more paging space, you should consider adding a new paging space on a second hard disk, as opposed to just increasing the existing one. Doing the latter could make you run out of free space on your first harddisk. It is more involved to shrink a paging space but easier to delete one.

Subject: 2.07: Why does it take so long to compile "hello world" with xlc?

Some systems have experienced delays of more than 60 seconds in compiling "#include <stdio.h> int main () {printf ("Hello world");}"
The problem is with the license manager contact IBM to make sure you've got the latest PTF.

Subject: 2.08: What's with malloc()?

malloc() uses a late allocation algorithm based on 4.3 BSD's malloc() for speed. This lets you allocate very large sparse memory spaces, since the pages are not actually allocated until they are touched for the first time. Unfortunately, it doesn't die gracefully in the face of loss of available memory. See the "Paging Space Overview" under InfoExplorer, and see the notes on the linker in this document for an example of an ungraceful death.

If you want your program to get notified when running out of memory, you should handle the SIGDANGER signal. The default is to ignore it. SIGDANGER is sent to all processes when paging space gets low, and if paging space gets even lower, processes with the highest paging space usage are sent the SIGKILL signal.

malloc() is substantially different in 3.2, allocating memory more tightly. If you have problems running re-compiled programs on 3.2, try running them with MALLOCTYPE=3.1.

Early Page Space Allocation (EPSA) added to AIX 3.2: see /usr/lpp/bos/README.PSALLOC - IX38211 / U422496 Allows setting of early allocation (vs. default late allocation) on a per-process basis.

Subject: 2.09: Why does xlc complain about 'extern char *strcpy()'

The header <string.h> has a strcpy macro that expands strcpy(x,y) to __strcpy(x,y), and the latter is then used by the compiler to generate inline code for strcpy. Because of the macro, your extern declaration contains an invalid macro expansion. The real cure is to remove your extern declaration but adding -U__STR__ to your xlc will also do the trick, although your program might run a bit more slowly as the compiler cannot inline the string functions any more.

Subject: 2.10: Why do I get 'Parameter list cannot contain fewer'

This is the same as above (2.9).

Subject: 2.11: Why does xlc complain about
'(sometype *)somepointer = something'

Software that is developed using gcc may have this construct. However, standard C does not permit casts to be lvalues, so you will need to change the cast and move it to the right side of the assignment. If you compile with 'cc', removing the cast completely will give you a warning, 'xlc' will give you an error (provided somepointer and something are of different types - but else, why would the cast be there in the first place?)

Subject: 2.12: Some more common errors

Here are a few other common errors with xlc:

```
305 |      switch((((np)->navigation_type) ? (*((np)->navigation_type)) :  
      |      ((void *)0)))  
      |      .a.....
```

a - 1506-226: (S) The second and third operands of the conditional operator must be of the same type.

The reason for this is that xlc defines NULL as (void *)0, and it does not allow two different types as the second and third operand of ?:. The second argument above is not a pointer and the code used NULL incorrectly as a scalar. NULL is a nil pointer constant in ANSI C and in some traditional compilers.

You should change NULL in the third argument above to an integer 0.

Subject: 2.13: Can the compiler generate assembler code?

Starting with version 1.3 of xlc and xlf the -S option will generate a .s assembly code file prior to optimization. The option -qlist will generate a human readable one in a .lst file.

There is also a disassembler in /usr/lpp/xlc/bin/dis include with the 1.3 version of xlc (and in /usr/lpp/xlc/bin/dis with the 2.1 version of xlc) that will disassemble existing object or executable files.

Subject: 2.14: Curses

Curses based applications should be linked with -lcurses and not with -lterm lib. It has also been reported that some problems with curses are avoided if your application is compiled with -DNLS.

Peter Jeffe <peter@ski.austin.ibm.com> also notes:

```
>the escape sequences for cursor and function keys are *sometimes*
>treated as several characters: eg. the getch() - call does not return
>KEY_UP but 'ESC [ C.'
```

You're correct in your analysis: this has to do with the timing of the escape sequence as it arrives from the net. There is an environment variable called ESCDELAY that can change the fudge factor used to decide when an escape is just an escape. The default value is 500; boosting this a bit should solve your problems.

Christopher Carlyle O'Callaghan <asdfjkl@wam.umd.edu> has more comments concerning extended curses:

- 1) The sample program in User Interface Programming Concepts, page 7-13 is WRONG. Here is the correct use of panes and panels.

```
#include <cur01.h>
#include <cur05.h>

main()
{
PANE *A, *B, *C, *D, *E, *F, *G, *H;
PANEL *P;

initscr();

A = ecbpns (24, 79, NULL, NULL, 0, 2500, Pdivszp, Pbordry, NULL, NULL);
D = ecbpns (24, 79, NULL, NULL, 0, 0, Pdivszf, Pbordry, NULL, NULL);
E = ecbpns (24, 79, D, NULL, 0, 0, Pdivszf, Pbordry, NULL, NULL);
B = ecbpns (24, 79, A, D, Pdivtyh, 3000, Pdivszp, Pbordry, NULL, NULL);
F = ecbpns (24, 79, NULL, NULL, 0, 0, Pdivszf, Pbordry, NULL, NULL);
G = ecbpns (24, 79, F, NULL, 0, 5000, Pdivszp, Pbordry, NULL, NULL);
H = ecbpns (24, 79, G, NULL, 0, 3000, Pdivszp, Pbordry, NULL, NULL);
C = ecbpns (24, 79, B, F, Pdivtyh, 0, Pdivszf, Pbordry, NULL, NULL);
P = ecbpls (24, 79, 0, 0, "MAIN PANEL", Pdivtyv, Pbordry, A);

ecdvpl (P);
ecdfpl (P, FALSE);
ecshpl (P);
ecrfpl (P);
endwin();
}
```

- 2) DO NOT include <curses.h> and any other <cur0x.h> file together. You will get a bunch of redefined statements.
- 3) There is CURSES and EXTENDED CURSES. Use only one or the other. If the manual says that they're backwards compatible or some other indication that you can use CURSES routines with EXTENDED, don't believe it. To use CURSES you need to include <curses.h> and you can't (see above).
- 4) If you use -lcur and -lcurses in the same link command, you will get Memory fault (core dump) error. You CANNOT use both of them at the same time. -lcur is for extended curses, -lcurses is for regular curses.

- 5) When creating PANES, when you supply a value (other than 0) for the 'ds' parameter and use Pdivszf value for the 'du' parameter, the 'ds' will be ignored (the sample program on page 7-13 in User Interface Programming Concepts is wrong.) For reasons as yet undetermined, Pdivszc doesn't seem to work (or at least I can't figure out how to use it.)
- 6) If you're running into bugs and can't figure out what is happening, try the following:


```
include -qextchk -g in your compile line
      -qextchk will check to make sure you're passing the right number of
      parameters to the functions
      -g enables debug
```
- 7) Do not use 80 as the number of columns if you want to use the whole screen. The lower right corner will get erased. Use 79 instead.
- 8) If you create a panel, you must create at least 1 pane, otherwise you will get a Memory fault (core dump).
- 9) When creating a panel, if you don't have a border around it, any title you want will not show up.
- 10) to make the screen scroll down:


```
wmove (win, 0, 0);
winsertln (win)
```
- 11) delwin(win) doesn't work in EXTENDED WINDOWS

To make it appear as if a window is deleted, you need to do the following:
for every window that you want to appear on the screen

```
touchwin(win)
wrefresh(win)
```

you must make sure that you do it in the exact same order as you put them on the screen (i.e., if you called newwin with A, then C, then B, then you must do the loop with A, then C, then B, otherwise you won't get the same screen back). The best thing to do is to put them into an array and keep track of the last window index.

- 12) mvwin(win, line, col) implies that it is only used for viewports and subwindows. It can also be used for the actual windows themselves.
- 13) If you specify the attribute of a window using wcolorout(win), any subsequent calls to chgat(numchars, mode) or any of its relatives will not work. (or at least they get very picky.)

Subject: 2.15: How do I speed up linking

Please refer to sections 2.03 and 2.06 above.

From: losecco@undpdk.hep.nd.edu (John LoSecco) and
hook@chaco.aix.dfw.ibm.com (Gary R. Hook)

From oahu.cern.ch in /pub/aix3 you can get a wrapper for the existing linker called tld which can reduce link times with large libraries by factors of 3 to 4.

Subject: 2.16: What is deadbeef?

When running the debugger (dbx), you may have wondered what the 'deadbeef' is you occasionally see in registers. Do note, that 0xdeadbeef is a hexadecimal number that also happens to be some kind of word (the RS/6000 was built in Texas!), and this hexadecimal number is simply put into unused registers at some time, probably during program startup.

Subject: 2.17: How do I make an export list from a library archive?
From: d.dennerline@bull.com (Dave Dennerline)

[This script has been moved to section 8.10]

Subject: 2.19: Building imake, makedepend
From: crow@austin.ibm.com (David L. Crow)

[Editor's note: if you have AIX 4.x, you need the X11.adt.imake LPP and probably most if not all of the X11.adt.* LPPs. Imake, xmkmf and other utilities are delivered precompiled.]

You need X11dev.src release 1.2.3.0 (ie the R5 release) [on AIX 3.2].

Unless you have an R5 release of AIXwindows, there is no xmkmf. These are the steps that I use to make imake, makedepend and all of it's config files, and then install them in the working tree (ie not the Xamples) for daily use:

```
cd /usr/lpp/X11/Xamples
make Makefile
make SUBDIRS="config util" Makefiles
make SUBDIRS="config util" linklibs
make SUBDIRS="config util" depend
make SUBDIRS="config util"
make SUBDIRS="config util" install
```

Then redo the steps everytime you apply an X11 update.

Subject: 2.20: How can tell what shared libraries a binary is linked with?

Use "dump -H <execfilename>" and see if anything other than /unix is listed in the loader section (at the bottom). The first example is /bin/sh (statically linked) and the second example is

/usr/local/bin/bash (shared).

INDEX	PATH	BASE	MEMBER
0	/usr/lib:/lib		
1	/	unix	

INDEX	PATH	BASE	MEMBER
0	./lib/readline/./lib/glob:/usr/lib:/lib		
1		libc.a	shr.o
2		libcurses.a	shr.o

The freeware tool "ldd" lists all the shared libraries needed by an executable, including those recursively included by other shared libraries. See question 2.27 "Where can I find ldd for AIX?".

Subject: 2.21: Can I get a PTF for my C/C++ compiler from the net?

<<http://service.software.ibm.com/>> contains pointers to most PTFs, including compilers. You'll need the fixdist program (see 1.142) to retrieve them.

Subject: 2.22: Why does "install"ing software I got from the net fail?

Note that the RS/6000 has two install programs, one with System V flavor in the default PATH (/etc/install with links from /usr/bin and /usr/usg), and one with BSD behavior in /usr/ucb/install.

Subject: 2.23: What is Linker TOC overflow error 12?

There is a hard coded limit in the AIX 3.2.5 linker that is fixed in AIX 4.1. A kind soul donated the following information to help people get the 3.2.5 fix

```
The LPS (paperwork)
  AIX TOC Data Binder/6000 #P91128
  Version 1.1
  Program Number 5799-QDY
  Reference No. GC23-2604-00, FC 5615
  Pre Reqs listed were AIX 3.2.5
  IBM C Set++ V2 (5765-186)
```

The above is not available any longer, see section 1.006.

You could also put some of the application code into shared libraries or, in the case of gcc, use -mmimal-toc.

Subject: 2.24: What is the limit on number of shared memory segments I can attach?

Each process has 16 segments. One is used for private code, one for

stack, one for heap; those, if memory serves, are segments 0, 1, and 2. (If you look in sys/shm.h, you'll see that SHMLOSEG is 3 -- the lowest segment, in number and in the process' virtual address space, available to shmat.)

SHMHISEG, the highest segment you can attach to (also defined in sys/shm.h), is 12. Segments 3 through 12 are available to shmat, giving the 10 segments your program used successfully. (NSHMSEGS in sys/shm.h will give you this value, though it's of limited use, since most platforms that I've seen don't define it.)

Segment 13 is used by shared code your program has attached to; I think one of the others might be for kernel-mode data.

See also mmap.

Subject: 2.25: I deleted libc.a by accident --- how do I recover?
From: Ed Ravin <eravin@panix.com>

You can recover from this without rebooting or reinstalling, if you have another copy of libc.a available that is also named "libc.a". If you moved libc.a to a different directory, you're in luck -- do the following:

```
export LIBPATH=/other/directory
```

And your future commands will work. But if you renamed libc.a, this won't do it. If you have an NFS mounted directory somewhere, you can put libc.a on the that host, and point LIBPATH to that directory as shown above.

Failing that, turn off your machine, reboot off floppies or other media, and get a root shell. I don't think you should do "getrootfs" as you usually do when accessing the root vg this way -- AIX may start looking for libc.a on the disk, and you'll just run into the same problem. So do an importvg, varyonvg, and then mount /usr somewhere, then manually move libc.a back or copy in a new one from floppy.

Subject: 2.26: Where can I find dlopen, dlclose, and dlsym for AIX?

An implementation of these dynamic code loading functions was written by Jens-Uwe Mager <jum@anubis.han.de> and can be found at <<http://www.han.de/~jum/aix/dlfcn.shar>>

From: Gary R. Hook <hook@austin.ibm.com>

Starting with AIX 4.2 a dlopen et. al. are included in the base OS in the libdl.a library. Under AIX 4.1 this is available as SLHS (Shared Library Hookable Symbols) as APAR IX IX71849 for the runtime package and APAR IX IX72973 for the development tools.

Subject: 2.27: Where can I find ldd for AIX?
From: Jens-Uwe Mager <jum@anubis.han.de>

Try <<http://www.han.de/~jum/aix/ldd.c>>. Also the "aix.tools"
package from <<http://www-frec.bull.com>>

Subject: 2.28: How do I make my program binary executable on the
POWER, POWER2, and POWERPC architectures?

AIX will emulate those instructions not available in POWERPC processors, but
you can avoid this emulation and consequent performance degradation by
using only the common to all.

If you are using IBM's xlc (cc) compiler, the default is to use the common
instruction set. If you want to be explicit, use the -qarch=com option.

The option -mcpu=common makes GCC use the common instruction set. Please
note that (unlike xlc) this is **not** the default with GCC on AIX.

Subject: 2.29: How do I access more than 256 Megabytes of memory?

By default each program gets one segment register (see 2.24) for its
data segment. As each segment register covers 256 MB, any calls to
malloc more will fail. Also programs that declare large global or static
arrays may fail to load. To allocate more segment registers to your
program, use the linker option -bmaxdata to specify the number of bytes
you need in the data segment as follows:

```
cc -o myprog -bmaxdata:0x20000000 myprog.c
```

The example above would allocate an additional segment register to allow
for 512MB of data.

Subject: 2.30: How do I use POSIX threads with gcc 2.7.x?
From: David Edelson <dje@watson.ibm.com>

The code generated by GCC is compatible with threads, but gcc-2.7
was released so long ago that it did not provide an option to perform
the extra link steps necessary to support threads:

- 1) Compile all source files with "-D_THREAD_SAFE" macro defined.
- 2) Link with "-L/usr/lib/threads -lpthreads -lc_r /usr/lib/libc.a"
to obtain the pthreads support
and add "-nostartfiles /usr/lib/crt0_r.o" to the beginning of the
link command line (using gcc to link!) to initialize threads.

Subject: 2.31: Why does pthread_create return the error code 22?

Using Posix threads under AIX requires a special C runtime startup initialization as well as special versions of some libraries. The IBM C compiler includes these special libraries if called by the name xlc_r (or xlC_r for C++). There also other maing variations to support various defaults, consult the file /etc/xlC.cf for details.

Subject: 2.32: How do I build programs under a later AIX release that run under earlier releases as well?

IBM develops AIX only for binary compatibility with older AIX releases, not the other way around. You will thus need to build programs on the oldest AIX release the program is supposed to run on. You will also need to link programs dynamically, if you link in the system libraries statically the program will probably only run on the machine you performed the link on.

With some preparation it is appearently possible to get around that limitation. Bob Halblutzel has put together a web page describing the detailed steps how to set up such a build environment at the following web page:

<http://www.hablutzel.com/aix_compatibility_build.html>

Please not that this is not a supported way to build your programs, you will probably receive not any support by IBM if you have problems with that environment.

Subject: 3.00: Fortran and other compilers

This section covers all compilers other than C/C++. On Fortran, there seem to have been some problems with floating point handling, in particular floating exceptions.

Subject: 3.01: I have problems mixing Fortran and C code, why?

A few routines (such as `getenv`, `signal`, and `system`) exist in both the Fortran and C libraries but with different parameters. In the recent past, if you have a mixed program that calls `getenv` from both C and Fortran code, you have to link them carefully by specifying the correct library first on your command line. This is no longer needed starting with version 1.5 of the compilers.

Subject: 3.02: How do I statically bind Fortran libraries and dynamically bind C libraries?

From: `amaranth@vela.acs.oakland.edu` (Paul Amaranth)

[Editor's note: Part of this is also discussed above under the C compiler section, but I felt it was so valuable that I have left it all in. I've done some minor editing, mostly typographical.]

The linker and binder are rather versatile programs, but it is not always clear how to make them do what you want them to. In particular, there are times when you do not want to use shared libraries, but rather, statically bind the required routines into your object. Or, you may need to use two versions of the same routine (eg, Fortran & C). Here are the results of my recent experiments. I would like to thank Daniel Premer and Brad Hollowbush, my SE, for hints. Any mistakes or omissions are my own and I have tended to interchange the terms "linker" and "binder". These experiments were performed on AIX 3.1.2. Most of this should be applicable to later upgrades of 3.1.

1) I have some C programs, I want to bind in the runtime routines. How do I do this? [Mentioned in section 2.04 of this article as well, ed.]

You can put the `-bnso` binder command on the link line. You should also include the `-bI:/lib/syscalls.exp` control argument:

```
$ cc *.o -bnso -bI:/lib/syscalls.exp -o foo
```

This will magically do everything you need. Note that this will bind `_all_` required routines in. The `-bI` argument tells the linker that these entry points will be resolved dynamically at runtime (these are system calls). If you omit this you will get lots of unresolved reference messages.

2) I want to statically bind in the Fortran runtime so a) my customers do not need to buy it and b) I don't have to worry about the runtime

changing on a new release. Can I use the two binder arguments in 1) to do this?

You should be able to do so, but, at least under 3002, if you do you will get a linker error referencing getenv. In addition, there are a number of potential conflicts between Fortran and C routines. The easy way just does not work. See the section on 2 stage linking for C and Fortran on how to do this. The getenv problem is a mess, see the section on Comments & Caveats for more.

From: Gary R. Hook <hook@austin.ibm.com>

The xlf runtime is a no-charge feature, you can download and install it without having to buy it. This change was made >2 years ago.

- 3) I have a mixture of C and Fortran routines, how can I make sure that the C routines reference the C getenv, while the Fortran routines reference the Fortran getenv (which has different parameters and, if called mistakenly by a C routine results in a segmentation fault)?

From Mike Heath (mike@pencom.com):

Use -brename:symbol1,symbol2 when pre-linking the modules from one of the languages. It does not matter which one you choose.

- 4) I have C and Fortran routines. I want to bind in the xlf library, while letting the rest of the libraries be shared. How do I do this?

You need to do a 2 stage link. In the first stage, you bind in the xlf library routines, creating an intermediate object file. The second stage resolves the remaining references to the shared libraries.

This is a general technique that allows you to bind in specific system routines, while still referencing the standard shared libraries.

Specifically, use this command to bind the xlf libraries to the Fortran objects:

```
$ ld -bh:4 -T512 -H512 <your objects> -o intermediat.o \  
-bnso -bI:/lib/syscalls.exp -berok -lxlf -bexport:/usr/lib/libg.exp \  
-lg -bexport:<your export file>
```

The argument -bexport:<your export file> specifies a file with the name of all entry points that are to be visible outside the intermediate module. Put one entrypoint name on a line. The -bI:/lib/libg.exp line is required for proper functioning of the program. The -berok argument tells the binder that it is ok to have unresolved references, at least at this time (you would think -r would work here, but it doesn't seem to). The -bnso argument causes the required modules to be imported into the object. The -lxlf, of course, is the xlf library.

Then, bind the intermediate object with the other shared libraries in the normal fashion:

```
$ ld -bh:4 -T512 -H512 <C or other modules> intermediate.o \  
/lib/crt0.o -lm -lc
```

Note the absence of `-berok`. After this link, all references should be resolved (unless you're doing a multistage link and making another intermediate).

NOTE THE ORDER OF MODULES. This is extremely important if, for example, you had a subroutine named "load" in your Fortran stuff. Putting the C libraries before the intermediate module would make the C "load" the operable definition, rather than the Fortran version EVEN THOUGH THE FORTRAN MODULE HAS ALREADY BEEN THROUGH A LINK AND ALL REFERENCES TO THE SYMBOL ARE CONTAINED IN THE FORTRAN MODULE. This can be extremely difficult to find (trust me on this one :-). Is this a bug, a feature, or what?

[As mentioned in section 2.03 of this article, it is a feature that you can replace individual objects in linked files, ed.]

The result will be a slightly larger object than normal. (I say slightly because mine went up 5%, but then it's a 2 MB object :-)

Comments & Caveats:

From the documentation the `-r` argument to the linker should do what `-berok` does. It does not. Very strange results come from using the `-r` argument. I have not been able to make `-r` work in a sensible manner (even for intermediate links which is what it is supposed to be for).

Note from Mike Heath (mike@pencom.com):

'ld -r' is essentially shorthand for 'ld -berok -bnogc -bnoglink'. Certainly, using `-berok` with an export file (so garbage collection can be done) is preferable to `ld -r`, but the latter is easier.

When binding an intermediate module, use an export file to define the entry points you want visible in the later link. If you don't do this, you'll get the dreaded "unresolved reference" error. Import files name entry points that will be dynamically resolved (and possibly where).

If you are in doubt about what parameters or libraries to link, use the `-v` arg when linking and modify the exec call that shows up into an `ld` command. Some thought about the libraries will usually yield an idea of when to use what. If you don't know what an argument is for, leave it in. It's there for a purpose (even if you don't understand it).

Watch the order of external definitions (ie, libraries) when more than one version of a routine may show up, eg "load". The first one defined on the `ld` command line is the winner.

The `getenv` (and `system` and `signal`) problem is a problem that started out minor, got somewhat worse in 3003 and, eventually will be correctly fixed. Basically, you should extract the 3002 version of these three routines from `xlf.a` before doing the update and save them away, then link these routines in if you use these Fortran system services.

Subject: 3.03: How do I check if a number is NaN?
From: sdl@glasnost.austin.ibm.com (Stephen Linam)

NaN is "Not a Number". It arises because the RISC System/6000 uses IEEE floating point arithmetic.

To determine if a variable is a NaN you can make use of the property that a NaN does not compare equal to anything, including itself. Thus, for real variable X, use

```
IF (X .NE. X) THEN      ! this will be true if X is NaN
```

Floating point operations which cause exceptions (such as an overflow) cause status bits to be set in the Floating Point Status and Control Register (FPSCR). There is a Fortran interface to query the FPSCR, and it is described in the XLF Fortran manuals -- I don't have the manuals right here, but look for FPGETS and FPSETS.

The IBM manual "Risc System/6000 Hardware Technical Reference - General Information" (SA23-2643) describes what floating point exceptions can occur and which bits are set in the FPSCR as a result of those exceptions.

Subject: 3.04: Some info sources on IEEE floating point.

1. ANSI/IEEE STD 754-1985 (IEEE Standard for Binary Floating-Point Arithmetic) and ANSI/IEEE STD 854-1987 (IEEE Standard for Radix-Independent Floating-Point Arithmetic), both available from IEEE.
2. David Goldberg, "What Every Computer Scientist Should Know About Floating-Point Arithmetic", ACM Computing Surveys, Vol. 23, No. 1, March 1991, pp. 5-48.

Subject: 3.05: Why does it take so long to compile "hello world" with xlf?

[read 2.07]

Subject: 4.00: GNU and Public Domain software

GNU software comes from the Free Software Foundation and various other sources. A number of ftp sites archive them. Read the GNU license for rules on distributing their software.

Lots of useful public domain software have been and continue to be ported to the RS/6000. See below for ftp or download information.

Subject: 4.01: How do I find sources?
From: jik@GZA.COM (Jonathan Kamens)

There is a newsgroup devoted to posting about how to get a certain source, comp.sources.wanted. An archive of information about sources, including FTP sites is available from

Subject: 4.02: Are there any ftp or WWW sites?

SMIT-installable precompiled packages of popular freeware for AIX 4.x at <<http://www-frec.bull.com/>>. Download the ".exe" files with your WWW browser. These are auto-uncompressing files, just like on PCs (it uses similar technology to PKZIP). Mark the file as executable (chmod +x), then execute it to generate a .bff file. The .bff file can then be installed using "smit install_latest". For more information read the INSTALL.txt file on the server.

There are mirrors of this site at <http://www.bull.de/> and <http://ftp.univie.ac.at/aix/>.

The package explicitly referenced below are ones Ciaran considers "solid." That is, the binary has been "tested by lots of people."

Bull provides many other freeware packages as well. If you use the service, be sure and thank Ciaran and Bull.

Below are some ftp sites that are supposed to have RS/6000 specific software. I haven't verified all the entries.

US sites:

<<ftp://aixpdslib.seas.ucla.edu/pub/>>
<<ftp://aix.boulder.ibm.com/>>
<<ftp://software.watson.ibm.com/>>

European sites:

<<ftp://nic.funet.fi/pub/unix/AIX/RS6000/>>
<ftp://ftp.uni-stuttgart.de/sw/rs_aix32/>

The first one is dedicated to software running on AIX. It might not always be the latest versions of the software, but it has been ported to AIX (normally AIX version 3 only). Please use the European sites very sparingly. They are primarily to serve people in Europe and most

of the software can be found in the US sites originally.

The remaining sites are simply ones thatarchie indicated contained AIX related materials.

<ftp://ftp.u.washington.edu/pub/RS6000/>
<ftp://aixive.unb.ca/>
<ftp://ftp-aix.polytechnique.fr/pub/binaries/rios/>

Subject: 4.03: Why does "install"ing software I got from the net fail?

This answer was moved to section 2.22

Subject: 4.04: GNU Emacs

A prebuilt installp (smit) installable package is available from
<<http://www-frec.bull.com/>>.

If you get a segmentation fault in GNU EMACS 19.* during hilit19 use,
you can set locale to C (export LC_ALL=C) to get around the AIX bug.

Version 18.57 of GNU Emacs started to have RS/6000 support. Use
s-aix3-2.h for AIX 3.2. Emacs is going through rapid changes recently.
Current release is 19.x.

Emacs will core-dump if it is stripped, so don't strip when you install
it. You can edit a copy of the Makefile in src replacing all 'install -s'
with /usr/ucb/install.

Subject: 4.05: gcc/gdb

GNU C version 2.0 and later supports the RS/6000, and compiles straight
out of the box on AIX 3 and AIX 4.1 and 4.2. You may, however,
experience that compiling it requires large amounts of paging space.

On AIX 4.3, compiling gcc appears to be much more difficult due to
changes for the 64 bit environment. A precompiled gcc is available in
the form of egcs in the Bull archive at <<http://www-frec.bull.com/>>.

From: Ciaran Deignan <Ciaran.Deignan@bull.net>

Note:

- there is a link problem on AIX 4.3. Until I find a way of building
a distribution on AIX 4.3, you'll have to use 'ld'.
- The package gnu.egcs-1.1.0.0.exe does not contain the C++ compiler
(G++). However since you can't link a G++ object file with 'ld',
this is just part of the same problem.

[Editor's note: from the latest postings it appears that the latest
(post 1.1b) egcs snapshots fixes the problem with collect2. The problem
here is that there are no binary distributions yet, one has to bootstrap
this version using IBM's C compiler.]

From: Brent Burkholder <bburk@bicnet.net>

In order to compile and link using egcs on AIX you first need to download and apply fix APAR IX87327 from

<<http://service.boulder.ibm.com/cgi-bin/support/rs6000.support/downloads>>
Looking up the APAR # should allow you to download bos.rte.bind_cmds.4.3.2.2 which fixes all problems.

Subject: 4.06: GNU Ghostscript

A prebuilt installp (smit) installable package is available from <<http://www-frec.bull.com/>>.

The PostScript interpreter GNU Ghostscript Version 2.3 and later supports the RS/6000 and can be found on various ftp sites. Current version is 2.6.1.

Compile time problems:

Compile idict.c and zstack.c `_without_` optimization, add the following to the Makefile:

```
idict.o: idict.c
        $(CC) -c idict.c
```

```
zstack.o: zstack.c
        $(CC) -c zstack.c
```

Run time problems:

Running ghostview-1.5 with ghostscript-2.6.1, I get
gs: Malformed ghostview color property.

Solution: replace buggy version of ghostscript-2.6.1 X11 driver with at least 2.6.1pl4

Subject: 4.07 TeX - Document processing
From: "Patrick TJ McPhee" <ptjm@ican.net>

TeX can be retrieved via ftp from the comprehensive TeX archive network (CTAN). The principle sites are
<ftp.tex.ac.uk> (UK)
<ftp.dante.de> (Deutschland)
<ftp.tug.org> (USA)
but there are many mirrors. finger ctan@ftp.tex.ac.uk for a list.

Subject: 4.08 Perl - Scripting language

A prebuilt installp (smit) installable package is available from <<http://www-frec.bull.com/>>.

If you want the source code, <<http://www.perl.com/perl/>> is good place to start.

Subject: 4.09: X-Windows

AIX 4.x ships with X11R5 and Motif 1.2.

On AIX 3.2 the base version has X11R4 and Motif 1.1 and the extended version has X11R5 as AIXwindows 1.2.3. See question 1.500 for more information about determining your revision.

AIXwindows version 1.2.0 (X11rte 1.2.0) is X11R4 with Motif 1.1
AIXwindows version 1.2.3 (X11rte 1.2.3) is X11R5 with Motif 1.1
'lspp -h X11rte.motif1.2.obj' should tell you if you are running Motif 1.2.

Subject: 4.10 Bash - /bin/ksh alternative from FSF

Bash is an alternative to ksh and is available from prep.ai.mit.edu and places that mirror the GNU software. /etc/security/login.cfg needs to be modified if this will be used as a default shell.

A prebuilt installp (smit) installable package is available from <<http://www-frec.bull.com/>>.

Subject: 4.11: Elm

A very nice replacement for mail. Elm should be pretty straightforward, the only thing to remember is to link with -lcurses as the only curses/termlib library. You may also run into the problem listed under point 2.13 above.

A prebuilt installp (smit) installable package is available from <<http://www-frec.bull.com/>>.

Subject: 4.12: Oberon 2.2
From: afx@muc.ibm.de (Andreas Siegert)

Oberon is Wirth's follow on to Modula-2, but is not compatible. A free version of Modula-3 is available from DEC/Olivetti at gatekeeper.dec.com. This is not a Modula-2 replacement but a new language. There are currently two M2 compilers for the 6000 that I know of. One from Edinburgh Portable Compilers, +44 31 225 6262 (UK) and the other from Gardens Point is available through A+L in Switzerland (+41 65 520311) or Real Time Associates in the UK (info@rtal.demon.co.uk).

Oberon can be obtained via anonymous ftp from neptune.inf.ethz.ch (129.132.101.33) under the directory Oberon/RS6000 or gatekeeper.dec.com (16.1.0.2).

Subject: 4.13: Kermit - Communications
From: Frank da Cruz <fdc@watsun.cc.columbia.edu>

Available for all versions of AIX on RS/6000, PowerPC, PS/2, RT PC,
and 370-Series mainframes. For complete information on Kermit software
for AIX and hundreds of other platforms, visit the Kermit Web site:

<<http://www.columbia.edu/kermit/>>

C-Kermit 6.0 was announced November 30, 1996:

<<http://www.columbia.edu/kermit/ck60.html>>

The nonprofit Kermit Project is funded primarily by manual sales.
For C-Kermit 6.0 the manual is the new second edition of "Using C-Kermit":

<<http://www.columbia.edu/kermit/ck60manual.html>>

For RS/6000 and PowerPC with AIX 3.x or 4.x:

<<ftp://kermit.columbia.edu/kermit/archives/cku192.tar.Z>> (or .gz)

Uncompress, untar (tar xvf cku192.tar) then:

```
make rs6aix32c <-- For AIX 3.x
make rs6aix41c <-- For AIX 4.x
```

This produces an executable called "wermit". Before installing, read the
instructions in ckuins.doc from the tar file.

If you don't have a C compiler, you can get binaries at:

<<http://www.columbia.edu/kermit/ck60ubin.html>>

Send questions to kermit-support@columbia.edu.

Subject: 4.14: Gnu dbm
From: doug@cc.ysu.edu (Doug Sewell)

Here's the fixes for RS/6000's:

apply this to testgdbm.c:

```
158c158
< char opt;
---
> int opt;
166c166
< while ((opt = getopt (argc, argv, "rn")) != -1)
---
> while ((opt = getopt (argc, argv, "rn")) != EOF)
```

Apply this to systems.h:

```
111a112,114
```

```
> #ifdef RS6000
> #pragma alloca
> #else
112a116
> #endif
```

To compile, edit the Makefile. Set CC to `bsdcc` (see `/usr/lpp/bos/bsdport` if you don't have 'bsdcc' on your system) and set CFLAGS to `-DRS6000` and whatever options (`-g`, `-O`) you prefer. Don't define SYSV.

Subject: 4.15 tcsh - an alternative shell
From: cordes@athos.cs.ua.edu (David Cordes)

tcsh is available from <ftp://ftp.deshaw.com/pub/tcsh>
Compiles with no problems. You must edit `/etc/security/login.cfg` to permit users to change to this shell (chsh), adding the path where the shell is installed (in my case, `/usr/local/bin/tcsh`).

>From: "A. Bryan Curnutt" <bryan@Stoner.COM>

Under AIX 3.2.5, you need to modify the "config.h" file, changing
#define BSDSIGs
to
#undef BSDSIGs

Subject: 4.16: Kyoto Common Lisp

The sources are available from cli.com. The kcl package is the needed base; also retrieve the latest akcl distribution. akcl provides a front-end that "ports" the original kcl to a number of different platforms. The port to the 6000 worked with no problems. However, you must be root for make to work properly with some memory protection routines.

Subject: 4.17 Tcl/Tk - X-Windows scripting

Current versions: Tcl 8.0b2 and Tk 8.0b2. They are available from <ftp://ftp.sunlabs.com/pub/tcl/>. The Tcl/Tk web page is at <http://sunscript.sun.com/>.

Prebuilt installp (smit) installable packages for several versions of Tcl and Tk are available from <http://www-frec.bull.com/>.

Subject: 4.18: Expect
From: Doug Sewell <DOUG@YSUB.YSU.EDU>

To build the command-interpretor version, you must have the tcl library built successfully. The expect library doesn't require tcl. Note: Expect and its library are built with `bsdcc`, so applications using

the library probably also need to be developed with bsdcc.

I ftp'd expect from ftp.cme.nist.gov.

You need to change several lines in the makefile. First you need to customize source and target directories and files:

```
#
TCLHDRDIR = /usr/include
TCLLIB = -ltcl
MANDIR = /usr/man/man1 (local man-pages)
MANEXT = 1
BINDIR = /u/local/bin
LIBDIR = /usr/lib
HDRDIR = /usr/include
```

...
Next set the compiler, switches, and configuration options:

```
#
CC = bsdcc
CFLAGS = -O
...
PTY_TYPE = bsd
...
INTERACT_TYPE = select
```

...
Then you need to make these changes about line 90 or so:

```
comment out CFLAGS = $(CLFLAGS)
un-comment these lines:
CFLAGS = $(CLFLAGS) $(CPPFLAGS)
LFLAGS = ($CLFLAGS)
```

Then run 'make'.

You can't run some of the examples without modification (host name, etc). I don't remember if I ran all of them or not, but I ran enough that I was satisfied it worked.

Subject: 4.19: Public domain software on CD
From: mbeckman@mbeckman.mbeckman.com (Mel Beckman)

The Prime Time Freeware CD collection is a package of two CD's and docs containing over THREE GIGABYTES of compressed Unix software. It costs \$69 >from Prime Time Freeware, 415-112 N. Mary Ave., Suite 50, Sunnyvale, CA 94086. Phone 408-738-4832 voice, 408-738-2050 fax. No internet orders as far as I can tell.

I've extracted and compiled a number of the packages, and all have worked flawlessly so far on my 220. Everything from programming languages to 3D solid modeling is in this bonanza!

[Ed: The O'Reilly book, Unix Power Tools, also contains a CD-ROM with lots of useful programs compiled for the RS/6000, among other platforms.]

Subject: 4.20: Andrew Toolkit

From: Gary Keim <gk5g+@andrew.cmu.edu>

The Andrew Toolkit Consortium of Carnegie Mellon University's School of Computer Science has released new versions of the Andrew User Environment, Andrew Toolkit, and Andrew Message System.

The Andrew User Environment (AUE) is an integrated set of applications beginning with a 'generic object' editor, ez, a help system, a system monitoring tool (console), an editor-based shell interface (typescript), and support for printing multi-media documents.

The Andrew Toolkit (ATK) is a portable user-interface toolkit that runs under X11. It provides a dynamically-loadable object-oriented environment wherein objects can be embedded in one another. Thus, one could edit text that, in addition to containing multiple fonts, contains embedded raster images, spreadsheets, drawing editors, equations, simple animations, etc. These embedded objects can also be nested.

The Andrew Message System (AMS) provides a multi-media interface to mail and bulletin-boards. AMS supports several mail management strategies and implements many advanced features including authentication, return receipts, automatic sorting of mail, vote collection and tabulation, enclosures, audit trails of related messages, and subscription management. It has interfaces that support ttys, personal computers, and workstations.

Release 5.1 of Andrew contains many bug fixes and updates. There is now support for the new Internet MIME (Multipurpose Internet Mail Extensions) standards for multipart, and multimedia mail. For more information on MIME, please see the CHANGES files in the ftp directory on emsworth.andrew.cmu.edu.

This release can be obtained as follows. The sources are available via anonymous ftp from export.lcs.mit.edu (18.30.0.238) in the ./contrib/andrew tree. For details, see ./contrib/andrew/README.

PATCH for AIX3.2: A patch to the AUIS 5.1 sources can be ftp'ed from emsworth.andrew.cmu.edu (128.2.45.40) in ./aixpatch. For those without internet access, a 3.5" diskette can be ordered for a nominal fee of \$10 by sending, or faxing, a purchase order to the Consortium address below.

Andrew, as well as a variety of other CMU software, can also be ftp'ed >from emsworth.andrew.cmu.edu (128.2.30.62). Those with AFS access look at /afs/andrew.cmu.edu/itc/sm/releases/X.V11R5/ftp.

Remote Andrew Demo Service

This network service allows you to run Andrew Toolkit applications without obtaining or compiling the Andrew software. You need a host machine running X11 on the Internet. A simple "finger" command will let you experience ATK applications firsthand. You'll be able to compose multimedia documents, navigate through the interactive Andrew Tour, and use the Andrew Message System to browse through CMU's three thousand bulletin boards and newsgroups.

To use the Remote Andrew Demo service, run the following command:

finger help@atk.itc.cmu.edu

The service will give you further instructions.

Information Sources

Your bug reports are welcome; kindly send them to info-andrew-bugs@andrew.cmu.edu and we will periodically post a status report to the mailing list info-andrew@andrew.cmu.edu. To be added to the mailing list or make other requests, send mail to info-andrew-request@andrew.cmu.edu.

We also distribute the following related materials:

ATK and AMS sources and binaries on CDROM. Binaries are available for the following system types:

- IBM RiscSystem/6000
- Sun SparcStation
- HP 700 Series
- DECstation

ATK and AMS sources on QIC and Iotamat tapes Hardcopies of the documentation for ATK and AMS. Introductory video tape: Welcome to Andrew: An Overview of the Andrew System. Technical video tape: The Andrew Project: A Session at the Winter 1988 Usenix Conference.

More information about these materials is available from:

- Information Requests
- Andrew Toolkit Consortium
- Carnegie Mellon University
- 4910 Forbes Avenue, UCC 214
- Pittsburgh, PA 15213-3890
- USA
- phone: +1-412-268-6710
- fax: +1-412-621-8081
- info-andrew-request@andrew.cmu.edu

There is also a netnews distribution list, comp.soft-sys.andrew, which is identical to the info-andrew list except that it does not support the multi-media capabilities of info-andrew.

Subject: 4.21: sudo

Sudo (superuser do) allows a system administrator to give certain users (or groups of users) the ability to run some (or all) commands as root while logging all commands and arguments. Sudo operates on a per-command basis, it is not a replacement for the shell.

The latest version of sudo is cu-sudo v1.5. There is a web page for sudo at <<http://www.courtesan.com/courtesan/products/sudo/sudo.html>>. The program itself can be obtained from <<ftp://ftp.courtesan.com/pub/sudo/>>. Sudo's author, Todd Miller <Todd.Miller@courtesan.com> reports that sudo works on both AIX 3.2.X and 4.1.X.

Subject: 4.22: Flexfax/HylaFax and other fax software
From: Christian Zahl <czahl@cs.tu-berlin.de>

Sam Leffler has released a new version of FlexFax called HylaFax. It is available from <ftp://sgi.com/sgi/fax/>. There is a HylaFax web page at <http://www.vix.com/hylafax/>. Version V3.0pl1 supported many types of Class 1/2 fax modems and several UNIX systems including AIX 3.2.3 or greater. There is also a fax modem review document at the same site as <ftp://sgi.com/pub/fax/bakeoff>. The FlexFax related files on sgi.com are replicated on ftp.bsc.no as well.

>From: michael@hal6000.thp.Uni-Duisburg.DE (Michael Staats)

We're using mgetty+sendfax for the basic modem I/O, I wrote a printer backend for the modem so that users can send faxes as easy as they print postscript. I also wrote a little X interface composer to generate a fax form that makes sending faxes very easy. You can find these programs at hal6000.thp.Uni-Duisburg.DE under /pub/source.

program	comment
mgetty+sendfax-0.14.tar.gz	basic modem I/O, needs hacking for AIX
X11/xform-1.1.tar.gz	small and simple X interface composer with an example fax form. Needs libxview.a incl. headers.
faxiobe.tar.gz	fax backend, needs configuring for your local site

If you need a binary version of libxview.a and the headers you'll find them under /pub/binaries/AIX-3-2/lxview.tar.gz.

Subject: 4.23: lsof - LiSt Open Files
From: abe@purdue.edu (Vic Abell)

Q. How can I determine the files that a process has opened?
Q. How can I locate the process that is using a specific network address?
Q. How can I locate the processes that have files open on a file system?

A. Use lsof (LiSt Open Files).

From: "Juan G. Ruiz Pinto" <jgruiz@cyber1.servtech.com>

Lsof is available via anonymous ftp from
<ftp://vic.cc.purdue.edu/pub/tools/unix/lsof/lsof.tar.Z>
(for the most current version). There are binary distributions in the
"binary" directory.

A prebuilt installp (smit) installable package is available from
<http://www-frec.bull.com/>. The installation scripts in this package
automatically creates a group "kmem" during the install
and uses "acledit" to allow the kmem group to read /dev/mem and /dev/kmem.

This configuration is recommended by Vic Abell <abe@purdue.edu>, the author of lsof.

Subject: 4.24: popper - POP3 mail daemon

The POP server is available via anonymous ftp from
ftp.qualcomm.com:/quest/unix/servers/popper

The makefile supports AIX
ftp.CC.Berkeley.EDU (128.32.136.9, 128.32.206.12).

There are two versions in the pub directory: a compressed tar file
popper-version.tar.Z and a Macintosh StuffIt archive in BinHex format
called MacPOP.sit.hqx.

Problems building some versions of popper can sometimes be resolved by
compiling with bsdcc or -D_BSD.

The pine 3.95 package on <<http://www-frec.bull.com/>> contains "plug
and play" support for both POP3 and IMAP mail reading protocols. You
can also get a compiled version of qpopper 2.2 there also.

Subject: 4.26: mpeg link errors version 2.0
From: Nathan Lane <nathan@seldon.foundation.tricon.com>

.XShmCreateImage
.XShmDetach
.XShmAttach
.XShmGetEventBase
.XShmPutImage
.XShmQueryExtension

... are for the Shared Memory extension of the X server.
You can either choose to build it with shared memory or without. I
always do it without the performance increase is not really
incredible, except on something like a 2x0 machine with the local bus
graphics adapter. Just take out "DSH_MEM" in the CFLAGS in the
makefile for mpeg_play. There is more information about shared memory
link errors in section 1.513.

Also, in the module "video.c" for mpeg_play it will complain about not
having enough memory to fully optimize one of the loops. You can get
around that by specifying "qmaxmem=8000" in your cflags line, BUT,
the extra optimization does little good in my tests.

Subject: 4.27: NNTP, INN

Link errors compiling nntp may occur because your machine lacks the
"patch" command. Patch can be obtained from GNU repositories. See question
4.29 for more information on patch.

Subject: 4.28: Zmodem - File transfer

RZSZ is Chuck Forsberg's script for Z-modem. It is available by ftp at <ftp://oak.oakland.edu/pub/unix-c/xyzmodem/rzsz9305.tar.Z> or directly from Forsberg at Omen Technology BBS at 503-621-3746.

Hints:

0. Build with "make posix"
1. Use an 8-bit clean version of rlogin or telnet (Note: below)
2. Set the system to be transparent, I use "terminal download"
3. Ensure hardware flow-control

Note, carlson@xylogics.com (James Carlson) suggests: Rlogin is "slightly" unclean -- if an FF FF 73 73 appears in the datastream, it can be ripped out by rlogind as a 'window size change' request.

[Ed note: The important part is using an 8-bit clean application, since there are several implemenations of rlogin and telnet available you may need to try both and hunt down manuals to find the right flags for your system]

Subject: 4.29: Patch - automated file updates

AIX 3.2.5 does not ship with patch, a utility to apply the differences between two files to make them identical. This tool is often used to update source code.

<ftp://ftp.x.org/pub/R6untarred/xc/util/patch/>
<ftp://prep.ai.mit.edu/pub/gnu/patch-2.1.tar.gz>

Subject: 4.30: XNTP - network time protocol, synchronizes clocks
From: Joerg Schumacher <schuma@ips.cs.tu-bs.de>

AIX 4: xntpd in bos.net.tcp.client
source: ftp://ftp.udel.edu/pub/ntp/
WWW: http://www.eecis.udel.edu/~ntp/

Subject: 4.31: GNU Screen and AIX 4.1.x

Once again, binaries can be had from <http://www-frec.bull.com/>.

Subject: 4.32: SCSI scanner software

There is the SANE project that strives to deliver an open source scanner solution for Unix:

<http://www.mostang.com/sane/>

Subject: 4.33: Pager/Paging software

There is information on Paging, Paging programs and listing of the Archive sites to download at the web site:
<<ftp://ftp.airnote.net:/pub/paging-info/ixo.faq>>.

HylaFAX (see 4.22) supports sending messages to alphanumeric pagers.

Commercially there is: AlphaPage(r) MD2001 from Information Radio Technology, Inc. in Cleveland, OH.

Subject: 4.34: JAVA Development Kit
From: Curt Finch <curt@tkg.com>

<<http://ncc.hursley.ibm.com/javainfo/>>

Subject: 4.35: Sendmail

<<ftp://ftp.sendmail.org/sendmail/>>

If you want to use SRC to start and stop BSD sendmail, do the following after installing it:

```
chssys -s sendmail -S -n 15 -f 9 -a -d99.100
```

This tells SRC that sendmail may be stopped with signals 15 and 9. It also arranges for sendmail not to daemonize itself, since it will run under SRC.

Subject: 5.00: Third party products

[Ed.: Entries in this section are edited to prevent them from looking like advertising. Prices given may be obsolete. Companies mentioned are for reference only and are not endorsed in any fashion.]

Subject: 5.01: Non-IBM AIX hosts.

Bull <<http://www.bull.com/>> manufactures and sells AIX systems. To find a distributor in your country, check the web page at <<http://www.bull.com/contact/cscall.htm>> and/or <http://www.bull.com/bullsite/bsit01_a.htm>.

Other vendors and manufactures include Motorola, Harris, General Automation and Apple.

Kenetics Technology Inc.
35 Campus Drive
Edison NJ 08837
Contact : Brian Walsh
Phone - 908-805-0998
Fax - 908-346-1288

Manufactures a Power PC based RS-6000 clone that runs AIX versions 3.2.5 and 4.1.4.

A typical configuration with a 100 MHz Power PC 601 and 32 MB RAM, and 2 GB Hard drive, monitor, keyboard and networking is about \$4995.00

Subject: 5.02: Disk/Tape/SCSI
From: anonymous

- Most SCSI disk drives work (IBM resells Maxtor, tested Wren 6&7 myself); use osdisk when configuring (other SCSI disk).
- Exabyte: Unfortunately only the ones IBM sells are working. A few other tape drives will work; use ostape when configuring (other SCSI tape).
- STK 3480 "Summit": Works with Microcode Version 5.2b

>From: bell@hops.larc.nasa.gov (John Bell)

In summary, third party tape drives work fine with the RS/6000 unless you want to boot from them. This is because IBM drives have 'extended tape marks', which IBM claims are needed because the standard marks between files stored on the 8mm tape are unreliable. These extended marks are used when building boot tapes, so when the RS/6000 boots, it searches for an IBM tape drive and refuses to boot without it.

>From: jrogers@wang.com (John Rogers)

On booting with non-IBM SCSI tape drives: I haven't tried it myself but someone offered:

Turn machine on with key in secure position.
Wait until LED shows 200 and 8mm tape has stopped loading.
Turn key to service position.

>From: amelcuk@gibbs.clarku.edu (Andrew Mel'cuk)

The IBM DAT is cheap and works. If you get all the patches beforehand (U407435, U410140) and remember to buy special "Media Recognition System" tapes (Maxell, available from APS 800.443.4461 or IBM #21F8758) the drive can even be a pleasure to use. You can also flip a DIP switch on the drive to enable using any computer grade DAT tapes (read the hardware service manual).

Other DAT drives also work. I have tried the Archive Python (works) and experimented extensively with the Archive TurboDAT. The TurboDAT is a very fast compression unit, is not finicky with tapes and doesn't require the many patches that the IBM 7206 does. Works fine with the base AIX 3.2 'ost' driver.

>From: pack@acd.ucar.edu (Daniel Packman)

>>You can boot off of several different brands of non-IBM Exabytes.
>>At least TTI and Contemporary Cybernetics have done rather complete
>>jobs of emulating genuine IBM products.

A model that has worked for us from early AIX 3.1 through 3.2 is a TTI CTS 8210. This is the old low density drive. The newer 8510 is dual density (2.2gig and 5gig). Twelve dip switches on the back control the SCSI address and set up the emulation mode. These drives have a very useful set of lights for read-outs (eg, soft error rate, tape remaining, tape motion, etc.).

Subject: 5.03: Memory

Nordisk Computer Services (Portland 503-598-0111, Seattle 206-242-7777) is reputed to have memory for use on AIX platforms.

5xx machines have 8 memory slots, 3x0s have 2, and 3x5s have only one. You need to add memory in pairs for the 5xx machines excepting the 520.

RS/6000 Models 220, 230 and 250 can use "PS/2" style SIMM memory. All have 8 SIMM sockets. 60ns or better is needed for the 250, 70ns should be OK in the 220 and 230. The 220 and 230 are limited to 64MB of memory, the 250 is limited to 256MB.

Subject: 5.04: Others
From: anonymous

IBM RISC System/6000 Interface Products

National Instruments Corporation markets a family of instrumentation interface products for the IBM RISC System/6000 workstation family. The interface family consists of three products that give the RISC System/6000 connectivity to the standards of VMEbus, VXibus and GPIB. For more information, contact National Instruments Corporation, 512-794-0100 or 1-800-433-3488.

Subject: 5.05: C++ compilers

Several C++ compilers are available. You can choose from Glockenspiel, Greenhills, IBM's xlc (sold seperately :), and GNU's g++. Glockenspiel may now be part of Computer Associates. Comeau Computing (718-945-0009) offers Comeau C++ 3.0 with Templates. For a full development environment there's ObjectCenter's C++ (formerly Saber C++).

Subject: 5.06: Memory leak detectors

IBM's xlc comes with a product called the HeapView debugger that can trace memory problems in C and C++ code.

SENTINEL has full memory access debugging capabilities including detection of memory leaks. Contact info@vti.com (800) 296-3000 or (703) 430-9247.

Insight from ParaSoft (818) 792-9941.
There is also a debug_malloc posted in one of the comp.sources groups.

A shareware dmalloc is available. Details at
<<http://www.letters.com/dmalloc/>>.

TestCenter is now available for the RS/6000. It supports AIX 3.2.5 and AIX 4.1 on POWER, POWER2 and PowerPC machines. More information is available from <<http://www.centerline.com/>>.

Purify (408) 720-1600 is not available for the RS/6000.

ZeroFault detects memory violations and leaks without recompiling or relinking. Works on all RS/6000 systems running AIX 3.2.5 or later, DCE and pthreads. Contact The Kernel Group, Inc. +1 512 433 3333, email <ZeroFault@tkg.com>, <<http://www.tkg.com/>>.

Subject: 5.07: PPP

PPP does not come with AIX 3.2.x (only SLIP).

PPP support was announced for AIX 4.1.4, see:

<<http://www.austin.ibm.com/software/OS/aix414.html>>

David Crow caught the announcement of a non-IBM ppp package that claims to support AIX 4.x. More information is available from <<http://www.thoughtport.com:8080/PPP/>> or <<ftp://dcssoft.anu.edu.au/pub/ppp/ppp-2.2b1.tar.gz>>

A comercial PPP for AIX is available from Morningstar (sales@morningstar.com or marketing@morningstar.com) (800) 558 7827.

Subject: 5.08: Graphics adapters

Abstract Technologies Inc. (Austin TX, 512-441-4040, info@abstract.com) has several high performance graphics adapters for the RS/6000. 1600x1200, 24-bit true-color, and low cost 1024x768 adapters are available. Retail prices are between US\$1000-2000.

Subject: 5.09: Training Courses

Email training@skilldyn.com with "help" in the body of the message for information about how to receive a list course descriptions for AIX* and/or UNIX* courses offered by Skill Dynamics.

Subject: 5.10: Hardware Vendors

New & Used RS6000s, peripherals

Core Systems Inc
1605 12th Ave
Seattle WA 98122
Phone (800) 329-2449
Fax (206) 329-3799
<<http://www.corsys.com/homeworld>>

Optimus Solutions
5825-A Peachtree Corners East
Norcross GA 30092
Phone 770-447-1951
Fax 678-291-9201
email mark@optimussolutions.com
<<http://www.optimussolutions.com/>>

Subject: 5.11: Debugging aides
From: Curt Finch <curt@tkg.com>

SCTrace reports system calls (and more) made by an AIX process. SCTrace from SevOne Software <<http://www.tkg.com>>. It is \$199 and a demo is available from <<ftp://ftp.tkg.com/pub/sevone/sctrace-demo.tar.Z>>.

Subject: 6.00: Miscellaneous other stuff

Information that defies catagories. ;-)

Subject: 6.01: Can I get support by e-mail?

In general, no, <aixbugs@austin.ibm.com> and <services@austin.ibm.com> are no longer supported.

IBM does maintain a fee based system, the AIX Support Family Services at 1-800-CALL-AIX (1-800-225-5249) option 8.

In Canada:

Gary Tomic mentioned that Canadian customers can get support from their BBS, cac.toronto.ibm.com at 142.77.253.16.

In Germany:

Thomas Braunbeck reported that German customers with ESS (extended software service) contracts can get support by e-mail too. They can obtain information by sending mail with Subject: help to aixcall@aixserv.mainz.ibm.de.

Various flavors of service offerings are available. Contact your IBM rep for details.

Subject: 6.02: List of useful faxes

You can get some informative faxes by dialing IBM's Faxserver at 1-800-IBM-4FAX. 1-415-855-4329 from outside the US. If you're calling for the first time, push 3 then 2 to request a list of RS/6000 related faxes.

IBM's AIX Support WWW site, <<http://service.software.ibm.com/www/support/aix/index.html>>, contains many of the same documents. Select a country or region from the menu, then look for "Technical Tips from IBM" on the returned page.

Subject: 6.03: IBM's gopher, WWW, aftp presence.

There is now a new section dedicated to AIX on IBM's main web server:

<<http://www.ibm.com/servers/aix>>

The following are various other resources:

(verified Aug 9 1996 by Frank Wortner)
Thanks to Ronald S. Woan <woan@austin.ibm.com>

<<http://service.software.ibm.com/>> (FixDist ptfs)
<<ftp://software.watson.ibm.com/pub/>> (rlogin fixes & more)
<<gopher://gopher.ibm.link.ibm.com>> (anonouncements & press releases)
<<http://www.austin.ibm.com/>> (software, hardware, service & support)

General IBM information like product announcements and press releases are available through World Wide Web at <<http://www.ibm.com/>>.

Specific information on the RISC System/6000 product line and AIX (highlights include marketing information, technology White Papers and the POWER 2 technology book online before it hits the presses, searchable APAR database and AIX support FAX tips online so you don't have to type in all those scripts) is available at <<http://www.austin.ibm.com/>>

Subject: 6.04: Some RS232 hints
From: graeme@ccul.aukuni.ac.nz, sactoh0.SAC.CA.US!jak

Q: How do you connect a terminal to the RS232 tty ports when not using the standard IBM cable & terminal transposer?
A: 1- Connect pins 2->3, 3->2, 7->7 on the DB25's
2- On the computer side, most of the time cross 6->20 (DSR, DTR).
Some equipment may require connecting 6, 8, and 20 (DSR, DCD, DTR).

Also, pin 1 (FG) should be a bare metal wire and the cable should be shielded with a connection all the way through. Most people don't run pin 1 because pins 1 & 7 (SG) are jumpered on many equipment.

When booting from diskettes, the port speed is always 9600 baud. If you use SMIT to set a higher speed (38400 is nice) for normal use, remember to reset your terminal before booting.

Q: How do you connect a printer to the RS232 tty ports
A: 1- Connect pins 2->3, 3->2, 7->7 on the DB25's
2- On the computer side, loop pins 4->5 (CTS & RTS)

Subject: 6.05 What publications are available for AIX and RS/6000?

Publications list:
http://www.rs6000.ibm.com/resource/aix_resource/Pubs/

AIXpert magazine: <http://www.developer.ibm.com/library/aixpert/>

AIXpert
IBM Corporation
Mail Stop 36
472 Wheelers Farms Road
Milford, CT 06460
FAX: (203) 783-7669

These manuals should be available from your favorite IBM office.

SC23-2204-02 Problem Solving Guide
SC23-2365-01 Performance Monitoring and Tuning Guide for AIX 3.2
SA23-2629-07 Service Request Number Cross Reference, Ver 2.2
SA23-2631-05 Diagnostic Programs: Operator Guide
SA23-2632-05 Diagnostic Programs: Service Guide
SA23-2643-01 Hardware Technical Reference: General Information
SA23-2646-01 Hardware Technical Reference: Options and Devices

IBM's International Technical Support Center produces redbooks - practical, how-to manuals - on a wide range of technical topics including AIX migration, system management, internet security, and RS/6000 hardware. Abstracts and ordering information are available from the redbooks homepage <<http://www.redbooks.ibm.com/>>. (See Question 6.09 also.)

Computer bookstores often carry many of the following:

"Power RISC System/6000: Concepts, Facilities, Architecture", Chakravarty
McGraw-Hill ISBN 0070110476
"PowerPC: Concepts, Facilities, Architecture", Chakravarty/Cannon
McGraw-Hill ISBN 0070111928
"The Advanced Programmer's Guide to AIX 3.x", Colledge
McGraw-Hill ISBN 007707663X
"AIX Companion" , Cohn
Prentice-Hall ISBN 0132912201
"AIX for RS/6000: System & Administration Guide", DeRoest
McGraw-Hill ISBN 0070364397
"A Guide to AIX 3.2", Franklin
Metro-Info Systems 05/1993
"IBM RS6000 AIX System Administration", Hollicker
Prentice-Hall ISBN 0134526163
"IBM RISC SYSTEM/6000 - A Business Perspective", Hoskins
John Wiley & Sons ISBN 0471599352
"The Advanced Programmer's Guide to AIX 3.x", Phil Colledge
McGraw-Hill, 1994, ISBN: 0-07-707663-x
"AIX Performance Tuning", Frank Waters
Prentice-Hall 1996 ISBN 0-13-386707-2
"The AIX Survival Guide", Andreas Siegert
Addison-Wesley 1996 ISBN 1-201-59388-2

Subject: 6.06: Some acronyms

APAR - Authorized Program Analysis Report
BOS - Base Operating System
DCR - design change request
LPP - Licensed Program Product
ODM - Object Data Manager
PRPQ - programming request for price quotation
PTF - Program Temporary Fix
SMIT - System Management Interface Tool

Subject: 6.07: How do I get this by mailserver or ftp?

Since the articles are crossposted to news.answers, any archive carrying that newsgroup will also have these articles. In particular, try ftp'ing to rtfm.mit.edu and checking the directory pub/usenet/news.answers. This FAQ is archived as "aix-faq/part[12345]".

The FAQ is also available via email using the address mail-server@rtfm.MIT.edu two examples of how you might use this from a UNIX prompt follow:

```
echo help | mail mail-server@rtfm.MIT.edu
echo send usenet/news.answers/aix-faq/part1 | mail mail-server@rtfm.MIT.edu
```

Subject: 6.08: Hypertext version of the FAQ

United States:

<<http://www.emerson.emory.edu/services/aix-faq/>>
<<http://www.cis.ohio-state.edu/hypertext/faq/usenet/aix-faq/top.html>>

New Zealand:

<<http://www.abstract.co.nz/aix-faq/faq.html>>

France:

<<http://www-resus.univ-mrs.fr/Us/CS/RS6k/>>

Canada:

<<http://auk.uwaterloo.ca/aixgroup/aix-faq>>

Subject: 6.09: IBM AIX documentation on the WWW.

<<http://www.ibm.com/servers/aix/library/>> contains links to IBM documentation, this includes links to the redbooks site (how to documents) as well as links to the AIX 4.3 manuals.

Subject: 6.10: Comp.unix.aix archive available on the WWW

Michael Staats & Fred Hucht have informed me that a searchable archive of comp.unix.aix is available at:

<<http://www.thp.Uni-Duisburg.DE/cuaix/cuaix.html>>.

Subject: 6.11: How can I access the comp.unix.aix newsgroup
via email (or Web)?

From: Ciaran Deignan <C.Deignan@frec.bull.fr>

It is possible to get "digests" of the AIX newsgroup by email. Each digest contains a summary (just the subject lines from each post) plus the contents of a series of news articles posted to the newsgroup. Each digest is about 800 lines long, and the newsgroup typically generates 5 digest mails per day.

To get these digests, you have to subscribe to a mailing list. Send an email to the address majordomo@dmshome.youngstown.oh.us, and put

the text "subscribe aix-digest" in the body of the message.

[Editor's note: The above address does not appear to work any longer, if anyone knows of a functional equivalent please drop me a note.]

It is equally possible to post articles to the newsgroup via email. Any mail sent to the address aixnews@cc.ysu.edu will be forwarded to the comp.unix.aix newsgroup.

These services are provided by Doug Sewell <doug@cc.ysu.edu>.

Comp.unix.aix can be accessed from the web via <http://www.deja.com/>

8.00 Program listings

Subject: 8.03: How do I set up postscript accounting?

[formerly in section 1.118]

```
/* pswrap.c
```

```
compile with: cc pswrap.c -o pswrap -lqb
(for doc on the qb library see "understanding backend routines in libqb")
```

```
BTW: The log_charge() function doesn't seem to do anything,
      but log_pages() updates the accounting info.
```

Ephraim Vider, original author

--

Feb 10, 1993

You can set pswrap up to use either the accounting file specified in /etc/qconfig (which means that you need to get your data from 'pac') or you can comment out the #define WANT_PAC line and then the accounting data will only go into the ACCTFILE.

Also modified the logging to the ASCII acctfile so that it looks more readable.

Vince Taluskie

```
*/
```

```
#include <stdio.h>
#include <string.h>
#include <ctype.h>
#include <fcntl.h>
#include <signal.h>
#include <setjmp.h>
#include <sys/wait.h>
#include <IN/backend.h>
#include <IN/standard.h>
#include "qprocs.h"

char      *nextword (char *p);
char      *skipvalue (char *p);

#define LOGDIR      "/tmp"
#define ACCTFILE    "/usr/adm/acct/lpr/ps-acct"
/* #define WANT_PAC    1 */      /* this define will also send accounting
                                info to the acctfile specified in
                                /etc/qconfig file.  If this define is
                                commented out then accounting info will
                                only go to ACCTFILE */

char      pcprog[] = "statusdict begin pagecount = end\n\x04";
```

```

char    *keyw[] = {
    "idle",
    "busy",
    "waiting",
    "printing",
    "initializing",
    NULL
};
enum    { PS_IDLE, PS_BUSY, PS_WAIT, PS_PRINT, PS_INIT, PS_UNKNOWN };

void    giveup();
jmp_buf jumper;

char    logfname[30];
FILE    *logfile, *acctfile;

main (argc, argv)
int argc;
char    *argv[];
{
    char *devname;
    int  pagcnt, c;
    int  pid;
    int  w, status;

    if (argc < 2) {
        fprintf(stderr, "Usage: psbe file\n");
        exit(-1);
    }
    if (log_init(argv[1]) < 0) {
        fprintf(stderr, "log_init failed!\n");
        exit(EXITBAD);
    }
    sprintf(logfname, "%s/%s.log", LOGDIR, get_device_name());
    if ((logfile = fopen(logfname, "a")) == NULL) {
        fprintf(stderr, "Can't open logfile.\n");
        exit(EXITBAD);
    }

    if ((acctfile = fopen(ACCTFILE, "a")) == NULL) {
        fprintf(stderr, "Can't open logfile.\n");
        exit(EXITBAD);
    }

    setvbuf(logfile, NULL, _IOLBF, BUFSIZ);
    setvbuf(acctfile, NULL, _IOLBF, BUFSIZ);

    setvbuf(stdin, NULL, _IONBF, 0);
    setvbuf(stdout, NULL, _IONBF, 0);
    fprintf(logfile, "start Job no. %d, queued on %s\n", get_job_number(),
        get_qdate());
    log_status(WAITING);
    pagcnt = getpagecnt();
    log_status(RUNNING);
    if ((pid = fork()) < 0) {
        perror("fork");
        exit(EXITBAD);
    }
}

```

```

    }
    if (pid == 0) {
        argv[0] = "piobe";
        execv("/usr/lpd/piobe", argv);
        perror("exec");
        exit(EXITBAD);
    }
    while ((w = wait(&status)) != pid)
        if (w == -1) {
            perror("wait");
            exit(EXITBAD);
        }
    if (WEXITSTATUS(status) != 0)
        exit(WEXITSTATUS(status));
    log_status(WAITING);

    if (pagcnt > 0 && (c = getpagecnt()) > 0) {
#ifdef WANT_PAC
        log_pages(c - pagcnt);
#endif
    }

    fprintf(logfile, "end Job no. %d, queued on %s\n", get_job_number(),
            get_qdate());

/* the accounting file format is
pages_printed      user      queue_printed_on  time_queued
*/

    fprintf(acctfile, "%d %35s %7s    %s \n", (c - pagcnt), get_from(),
            get_queue_name(), get_qdate());

    fclose(logfile);
    fclose(acctfile);
    exit(EXITOK);
}

void      giveup ()
{
    longjmp(jumper, 1);
}

getpagecnt ()
{
    int  pc = 0, pstat;
    char buf[81];

    if (setjmp(jumper) != 0) {
        fprintf(logfile, "giving up on status\n");
        return (0);
    }
    alarm(60 * 2);
    signal(SIGALRM, giveup);
    do {
        if (!gets(buf)) {

```

```

        sleep(5);
        putchar('\x14'); /* ^T returns status */
        sleep(1); /* wait for answer from printer */
        if (!gets(buf))
            return (0);
    }
    fprintf(logfile, "%s\n", buf);
    if ((pstat = getstatus(buf)) == PS_WAIT) {
        putchar('\x04');
        sleep(1);
    }
} while (pstat != PS_IDLE);
alarm(0);
while (gets(buf))
    fprintf(logfile, "%s\n", buf);
printf("%s", pcprog);
sleep(1); /* wait for answer from printer */
if (!gets(buf))
    return (0);
if (sscanf(buf, "%d", &pc) != 1)
    return (0);
fprintf(logfile, "%d\n", pc);
return (pc);
}

/*
 * Parser for printer status messages
 */

getstatus (p)
char *p;
{
    char *t;
    int i;

    if ((p = strchr(p, '%')) == NULL)
        return (PS_UNKNOWN);
    if (strncmp(p, "%%", 3) != 0)
        return (PS_UNKNOWN);
    for (p = nextword(p + 3) ; p != NULL ; p = skipvalue(p)) {
        t = p;
        p = strchr(p, ':');
        *p++ = '\0';
        p = nextword(p);
        if (strcmp(t, "status") == 0)
            break;
    }
    if (p == NULL)
        return (PS_UNKNOWN);
    t = p;
    p = strchr(p, ' ');
    if (p[-1] == ';')
        p--;
    *p = '\0';
    for (i = 0 ; keyw[i] != NULL ; i++)
        if (strcmp(t, keyw[i]) == 0)
            break;
}

```

```

    return (i);
}

char    *nextword (p)
char    *p;
{
    while (isspace(*p))
        p++;
    if (strncmp(p, "]", 3) == 0)
        return (NULL);
    return (p);
}

char    *skipvalue (p)
char    *p;
{
    char *t;

    while (p != NULL) {
        p = strchr(p, ' ');
        t = p;
        p = nextword(p);
        if (t[-1] == ';')
            break;
    }
    return (p);
}

/*****      qprocs.h      *****/
/* functions for communication between qdaemon and the backend */

char    *get_from();
char    *get_to();
char    *get_qdate();
char    *get_queue_name();
char    *get_device_name();
char    *get_title();

```

Subject: 8.04: How can I find out the machine type?
From: anonymous

[formerly in section 1.126]

```

#!/bin/ksh
# Determine machine type
# Jim O'Quinn 2/28/93
# AIX Software Support
# This does not represent my employer, use at own risk.....
# Changed to report newer machines and unknown ids. /Fred
# More new machines. /David

```

```

MachType=`uname -m | cut -c9-10`
case $MachType
in

```

```

02) nMachType="7015/930";;
10) nMachType="7013/530 or 7016/720 or 7016/730";;
11|14) nMachType="7013/540";;
18) nMachType="7013/53H";;
1C) nMachType="7013/550";;
20) nMachType="7015/930";;
2E) nMachType="7015/950 or 7015/950E";;
30) nMachType="7013/520 or 7018/740 or 7018/741";;
31) nMachType="7012/320";;
34) nMachType="7013/52H";;
35) nMachType="7012/32H or 7012/320E";;
37) nMachType="7012/340 or 7012/34H";;
38) nMachType="7012/350";;
41) nMachType="7011/220 or 7011/22W or 7011/22G or 7011/230";;
42) nMachType="7006/41T or 7006/41W";;
43) nMachType="7008/M20";;
45) nMachType="7011/220 or 7011/M20 or 7011/230 or 7011/23W";;
46) nMachType="7011/250";;
47) nMachType="7011/230";;
48) nMachType="7009/C10";;
49) nMachType="7011/250";;
4C) nMachType="604/43P";;
4D) nMachType="601/40P";;
57) nMachType="7012/390 or 7012/3BT or 7030/3BT or 7032/3AT or 7011/390";;
58) nMachType="7012/380 or 7012/3AT or 7030/3BT";;
59) nMachType="3CT or 39H";;
5C) nMachType="7013/560";;
63) nMachType="7015/970 or 7015/97B";;
64) nMachType="7015/980 or 7015/98B";;
66) nMachType="7013/580 or 7013/58F or 7015/580";;
67) nMachType="7013/570 or 7013/770 or 7013/771 or 7013/R10 or 7015/570";;
70) nMachType="7013/590";;
71) nMachType="7013/58H";;
72) nMachType="7013/59H or 7013/R12 or 7013/58H";;
75) nMachType="7012/370 or 7012/375 or 7012/37T";;
76) nMachType="7012/360 or 7012/365 or 7012/36T";;
77) nMachType="7012/315 or 7012/350 or 7012/355 or 7012/510 or 7012/55H or
7012/55L";;
78) nMachType="7012/315 or 7013/510";;
79) nMachType="7013/590";;
80) nMachType="7015/990";;
82) nMachType="7015/R00 or 7015/R24";;
90) nMachType="IBM C20";;
91) nMachType="604/42T";;
A0) nMachType="7013/J30 or 7013/R30";;
A3) nMachType="7013/R30";;
A6) nMachType="7012/G30";;
C4) nMachType="F40";;
E0) nMachType="603/MOTOROLA PowerStack";;
*) nMachType="Unknown($MachType)"
esac
echo "Machine type: "$nMachType"

```

From: Jan Just Keijser <KeijserJJ@logica.com>

I've attached a C program which determines the model and the amount of memory installed in C code (by querying the ODM directly). It can be

compiled using

```
cc -o model model.c -lcfg -lodm
```

```
#include <stdio.h>
#include <sys/utsname.h>
#include <unistd.h>

#include <string.h>
#include <cf.h>
#include <sys/cfgodm.h>
#include <sys/cfgdb.h>

void main (void)
{
    struct utsname  name;
    int             memsize;

    char           s[3];
    int            model;

    struct CuAt *odm_obj;
    int            how_many;

    uname(&name);

    printf( "sysname  = %s\n", name.sysname );
    printf( "nodename = %s\n", name.nodename );
    printf( "release  = %s\n", name.release );
    printf( "version  = %s\n", name.version );
    printf( "machine  = %s\n", name.machine );

    printf( "model    = " );
    /* On AIX, the model is encoded in the last 2 non-zero digits
       of the model code (uname -m)
    */
    s[0] = name.machine[ strlen( name.machine ) - 4 ];
    s[1] = name.machine[ strlen( name.machine ) - 3 ];
    s[2] = '\0';
    model = strtol(s, NULL, 16);

    switch (model)
    {
        case 0x10:  puts ( "Model 530/730" );
                   break;
        case 0x11:
        case 0x14:  puts ( "Model 540" );
                   break;
        case 0x18:  puts ( "Model 530H" );
                   break;
        case 0x1C:  puts ( "Model 550" );
                   break;
        case 0x20:  puts ( "Model 930" );
                   break;
        case 0x2E:  puts ( "Model 950/950E" );
                   break;
        case 0x30:  puts ( "Model 520 or 740/741" );
                   break;
    }
}
```

```
case 0x31: puts ( "Model 320" );
           break;
case 0x34: puts ( "Model 520H" );
           break;
case 0x35: puts ( "Model 32H/320E" );
           break;
case 0x37: puts ( "Model 340/34H" );
           break;
case 0x38: puts ( "Model 350" );
           break;
case 0x41: puts ( "Model 220/22W/22G/230" );
           break;
case 0x42: puts ( "Model 41T/41W" );
           break;
case 0x43: puts ( "Model M20" );
           break;
case 0x45: puts ( "Model 220/M20/230/23W" );
           break;
case 0x46:
case 0x49: puts ( "Model 250" );
           break;
case 0x47: puts ( "Model 230" );
           break;
case 0x48: puts ( "Model C10" );
           break;
case 0x4C: puts ( "PowerPC 603/604 model" );
           break;
case 0x4D: puts ( "Model 40P" );
           break;
case 0x57: puts ( "Model 390/3AT/3BT" );
           break;
case 0x58: puts ( "Model 380/3AT/3BT" );
           break;
case 0x59: puts ( "Model 39H/3CT" );
           break;
case 0x5C: puts ( "Model 560" );
           break;
case 0x63: puts ( "Model 970/97B" );
           break;
case 0x64: puts ( "Model 980/98B" );
           break;
case 0x66: puts ( "Model 580/58F" );
           break;
case 0x67: puts ( "Model 570/770/R10" );
           break;
case 0x70: puts ( "Model 590" );
           break;
case 0x71: puts ( "Model 58H" );
           break;
case 0x72: puts ( "Model 59H/58H/R12/R20" );
           break;
case 0x75: puts ( "Model 370/375/37T" );
           break;
case 0x76: puts ( "Model 360/365/36T" );
           break;
case 0x77: puts ( "Model 315/350/355/510/550H/550L" );
           break;
```

```

    case 0x79: puts ( "Model 591" );
               break;
    case 0x80: puts ( "Model 990" );
               break;
    case 0x81: puts ( "Model R24" );
               break;
    case 0x82: puts ( "Model R00/R24" );
               break;
    case 0x89: puts ( "Model 595" );
               break;
    case 0x90: puts ( "Model C20" );
               break;
    case 0x91: puts ( "Model 42T" );
               break;
    case 0x94: puts ( "Model 397" );
               break;
    case 0xA0: puts ( "Model J30" );
               break;
    case 0xA1: puts ( "Model J40" );
               break;
    case 0xA3: puts ( "Model R30" );
               break;
    case 0xA4: puts ( "Model R40" );
               break;
    case 0xA6: puts ( "Model G30" );
               break;
    case 0xA7: puts ( "Model G40" );
               break;
    case 0xC4: puts ( "Model F30" );
               break;
    default:  printf( "Model code: %s\n", s );
               break;
}

/* Get the amount of installed memory */
odm_set_path("/etc/objrepos");
/* Get a single ODM object */
odm_obj = getattr("sys0", "realmem", 0, &how_many);
memsize = atoi(odm_obj->value) / 1024;
odm_terminate();
printf( "Memory    = %d MB\n", memsize );

/* Print the number of processors */
printf("#processor configured = %d\n", sysconf(_SC_NPROCESSORS_CONF));
printf("#processor online    = %d\n", sysconf(_SC_NPROCESSORS_ONLN));
}

```

Subject: 8.05: Updating to 3.2.5

[formerly in section 1.127]

===== cut here =====

```

#!/bin/ksh
# @(#) mktape2disk.sh  creates files from tape on disk.

```

```

# change name prefix here
NAME="f"

# from file #i to file #j
integer i=1
integer j

# test arguments
if [ -z "${1}" ]
then
    echo "\nusage: $(basename ${0}) <drive_no> <#files>\n"
    echo "\t<drive_no>: tape drive number (e.g. 0)"
    echo "\t<#files> : number of files to copy from the tape\n"
    exit 1
fi
device=/dev/rmt${1}.1

# test arguments
if [ -z "${2}" ]
then
    echo "\nusage: $(basename ${0}) <drive_no> <#files>\n"
    echo "\t<drive_no>: tape drive number (e.g. 0)"
    echo "\t<#files> : number of files to copy from the tape\n"
    exit 1
fi
j=${2}

tctl -f ${device} rewind
if [ $? -ne 0 ]
then
    exit 1
fi

# create tape
while [ ${i} -le ${j} ]
do
    echo "Copy file #${i} of #${j} from (${device}) to disk as (${NAME}${i})."
    dd if=${device} of="${NAME}${i}" bs=200k
    i=i+1
done
tctl -f ${device} rewind
exit 0
===== cut here =====

```

5) Create a new .toc file

```

# cd /pub/pmp3250
# inutoc .
# pg .toc

```

6) Place the following file named 'runme.sh' in the PMP directory

```

===== cut here =====
#!/bin/ksh
# @(#) runme.sh for PMP3250
#

```

```

INSTP="/usr/sbin/installp"
LOG="/tmp/installp.log"
TEE="/usr/bin/tee"
PATCHDIR=$(pwd)
#
/usr/bin/cp /usr/lpp/info/data/ispaths /usr/lpp/info/data/ispaths.save
#
INFODIR="/usr/lpp/info/$LANG/aixmin"
/usr/bin/mkdir ${INFODIR} 2>/dev/null >/dev/null
if [ ! -w ${INFODIR} ]
then
    print "\n\t*ERROR* Can not (write) access [${INFODIR}]."
    print "\tPlease unmount CD or NFS filesystems.\n"
    exit -1
fi
#
# Commit all ptf's
#
${INSTP} -Xc all 2>&1 | ${TEE} ${LOG}.0
#
# Install latest installp patch
#
${INSTP} -BXacgq -d ${PATCHDIR} bos.obj 3.2.0.0.U422463 2>&1 | ${TEE} ${LOG}.1
#
# Install latest installp patch
#
${INSTP} -BXacgq -d ${PATCHDIR} bos.obj 3.2.0.0.U422467 2>&1 | ${TEE} ${LOG}.6
#
# Run the ptfdirclean utility.
#
/usr/sbin/ptfdirclean -y -f -v 2>&1 | ${TEE} ${LOG}.2
#
# Install the PMP.    Version 1
#
/usr/lib/instl/sm_inst installp_cmd \
    -T m -q -a -g -B \
    -d ${PATCHDIR} \
    -S '3250 AIX Maintenance Level U493250' \
    -c -N -X \
    2>&1 | ${TEE} ${LOG}.3
#
# Install the PMP.    Version 2
#
# /usr/sbin/update_all
#
# Install latest installp patch
#
/usr/bin/lppchk -v | ${TEE} ${LOG}.4
#
# Show level of installp patch
#
/usr/bin/lslpp -m bos.obj | ${TEE} ${LOG}.5
#
# Guess you should reboot now.
#
sync;sync
print - "\n\n\tDone.....guess you should reboot now !!\n"

```

```

exit 0
===== cut here =====

7) To run the update on your server

====> Please read the Installation Instructions first <==

# cd /pub/pmp3250
# ./runme.sh

                .....WAIT.....

# /etc/shutdown -Fr

8) NFS export the PMP dir as READ-ONLY to all your clients.

9) To update a client system

    a - Mount the PMP filesystem from the server
    b - cd <mounted_filesystem>
    c - execute ./runme.sh
    d - Unmount PMP filesystem
    e - reboot

10) To create a copy 1:1 of the tape you received use the script 'mktape.sh'

# cd /pub/pmp3250
# mktape.sh 0

===== cut here =====
#!/bin/ksh
# @(#) mktape.sh: creates a bootable tape from images on disk

# change name prefix here
NAME="f"

# usage: mktape drive_no
#         drive_no = tape drive number
# test arguments
if [ -z "${1}" ]
then
    echo "\nusage: mktape <drive_no>"
    echo "         <drive_no>: tape drive number (e.g. 0)\n"
    exit 1
fi
device=/dev/rmt${1}.1

tctl -f ${device} rewind
if [ $? -ne 0 ]
then
    exit 1
fi

# create tape
i=1
while test -r "${NAME}${i}"
do

```

```

echo "copy ${i}"
if [ $i -le 3 ]
then
    dd if="${NAME}${i}" of=${device} conv=sync bs=1k
else
    dd if="${NAME}${i}" of=${device} bs=200k
fi
let i=${i}+1
done
tctl -f ${device} rewind
exit 0

```

Subject: 8.06: How do I do remote backup?
From: kraemerf@franvm3.VNET.IBM.COM (Frank Kraemer)

[formerly in section 1.201]

```

#!/bin/ksh
# @(#) Create a backup tape of the private user data.
#=====#
#   Script :  usave.sh                               #
#   Author :  F. Kraemer                             #
#   Date   :  92/02/19                               #
#   Update :  92/10/29                               #
#   Info   :  the ultimative backup script          #
#   Example: usave.sh /dev/rmt0      - save to local tape #
#             usave.sh /save/save.me - save to local file #
#             usave.sh /tmp/pipe     - save to remote tape #
#-----#
PS4="(+) "
#set -x
PROG=$(basename $0)
HOST=$(hostname)
TODAY=$(date +%H:%M:%S)
#
# cleanup
#
cleanup ()
{
ec=$1
error=$2
case "$ec"
in
"$USAGE_EC")    # usage error
    error="Usage:\t$PROG DeviceName\n" 1>&2
    ;;
"$NOTAP_EC")    # Tape error
    error="error:\t$PROG: $DEVICE is not available on the system.\n" 1>&2
    ;;
"$LISTE_EC")    # list error
    error="error:\t$PROG: could not create tar list for $LOGNAME.\n" 1>&2
    ;;
"$NOTAR_EC")    # tar command error
    error="error:\t$PROG: tar command failed.\n" 1>&2
    ;;

```

```

"$PIPEP_EC")    # pipe error
    error="error:\t$PROG: mknod command failed.\n" 1>&2
    ;;
"$NORSH_EC")    # rsh error
    error="error:\t$PROG: rsh - Remote Shell command failed.\n" 1>&2
    ;;
"$RHOST_EC")    # remote host error
    error="error:\t$PROG: Remote Host unknown.\n" 1>&2
    ;;
*)
    ;;
esac
case "$DEVICE"
in
    #
    # Fix the block size if $DEVICE is a tape device
    #
    /dev/rmt[0-9]*)
        echo "\n\t$PROG: Rewinding tape to begin.....(please wait)\n"
        tctl -f $DEVICE rewind 2>/dev/null
        ;;
    *) ;;
esac
rm -f ${LIST} ${PIPE} 2>/dev/null
[ -n "$error" ] && echo "\n${error}\n"
trap '' 0 1 2 15
exit "$ec"
}
#
# Variables
#
USAGE_EC=1          # exit code for usage error
NOMNT_EC=2         # exit code wrong device name
NOTAP_EC=3         # exit code no tape available
LISTE_EC=4         # exit code backup list error
NOTAR_EC=5         # exit code for wrong tar
TRAPP_EC=6         # exit code for trap
PIPEP_EC=7         # exit code for pipe
RHOST_EC=8         # exit code for bad ping
NORSH_EC=9         # exit code for bad rsh
DEVICE="$1"        # device to tar into
LIST="/tmp/.tar.$LOGNAME.$$" #
REMOTEH=""         # Remote host for backup
REMOtet=""         # Remote tape for backup
tapedev=""         #
PIPE="/tmp/pipe"   # Pipe for remote backup
#
# main()
#
tput clear
echo "\n\t$PROG started from $LOGNAME@$HOST on $TERM at $TODAY.\n"
rm -f $LIST 2>/dev/null
#
# Trap on exit/interrupt/break to clean up
#
trap "cleanup $TRAPP_EC \"Abnormal program termination. $PROG\"" 0 1 2 15
#

```

```

# Check command options
#
[ "$#" -ne 1 ] && cleanup "$USAGE_EC" ""
#
# Check device name
#
[ `expr "$DEVICE" : "[/]"` -eq 0 ] && cleanup "$NOMNT_EC" \
"$PROG: Backup device or file name must start with a '/'."
#
# Check tape device
#
case "$DEVICE"
in
#
# Fix the block size if $DEVICE is a tape device
#
/dev/rmt[0-9]*)
#
echo "\n\t$PROG: Verify backup media ($DEVICE).....\n"
#
# see if a low or high density tape device was specified
# (eg rmt0.1)
density=`expr $DEVICE : \
"/dev/rmt[0-9]*\.\([0-9]*\)``"
#
# strip /dev/ from device name and
# get the base name (eg translate:
# /dev/rmt0.2 to rmt0)
#
tapedev=`expr $DEVICE : \
"/dev/\(rmt[0-9]*\)[\.]*[0-9]*``"
#
# Check if the tape is defined in the system.
lsdev -C -c tape -S Available -F "name" | grep $tapedev >/dev/null 2>&1
rc=$?
[ "$rc" -ne 0 ] && cleanup "$NOTAP_EC" ""
#
# Restore old tape name.
#
[ "${density:-1}" -lt 4 ] && density=1 || density=5
DEVICE="/dev/${tapedev}.${density}"
echo "\n\t$PROG: Insert a tape in ($DEVICE).....(press enter)\n"
read TEMP
echo "\n\t$PROG: Rewinding tape to begin.....(please wait)\n"
tctl -f $DEVICE rewind 2>/dev/null
;;
#
# Backup is done on remote host. The remote shell facility
# must be set up and running.
#
${PIPE}*)
#
echo "\n\t$PROG: Assuming remote backup via network.\n"
echo "\t$PROG: Enter name of Remote Host ==> \c"
read REMOTEH
echo "\n\t$PROG: Pinging Remote Host to test connection.\n"
ping ${REMOTEH} 1 1 >/dev/null 2>&1

```

```

rc=$? # give up unknown host
[ "$rc" -ne 0 ] && cleanup "$RHOST_EC" ""
JUNK=$(rsh ${REMOTEH} "/usr/sbin/lsdev -C -c tape -S Available")
rc=$? # give up rsh failed
[ "$rc" -ne 0 ] && cleanup "$NORSH_EC" ""
echo "\t$PROG: Available Tapes on ${REMOTEH} are :\n\n\t\t${JUNK}\n"
echo "\t$PROG: Enter name of Remote Tape (e.g. /dev/rmt0) ==> \c"
read REMOTET
echo "\n\t$PROG: Insert tape on ${REMOTEH} in ${REMOTET}..(press enter)"
read TEMP
echo "\t$PROG: Rewinding Remote Tape ${REMOTET} on ${REMOTEH}.\n"
rsh ${REMOTEH} "tctl -f ${REMOTET} rewind"
rc=$? # give up rsh failed
[ "$rc" -ne 0 ] && cleanup "$NOTAP_EC" ""
rm -f ${PIPE} 2>/dev/null
mknod ${PIPE} p
rc=$? # give up mknod failed
[ "$rc" -ne 0 ] && cleanup "$PIPEP_EC" ""
cat ${DEVICE} | rsh ${REMOTEH} "dd of=${REMOTET} obs=100b 2>/dev/null" &
;;
*) ;;
esac
#
# Prepare the list
#
echo "\n\t$PROG: Create list of files to be saved...."
find $HOME -print > $LIST
rc=$?
[ "$rc" -ne 0 ] && cleanup "$LISTE_EC" ""
#
# tar the files
#
echo "\n\t$PROG: Changing current directory to (/)...."
cd / > /dev/null 2>&1
echo "\n\t$PROG: Running tar format backup from user ($LOGNAME)...."
tar -cvf "$DEVICE" -L "$LIST"
rc="$?"
[ "$rc" -ne 0 ] && cleanup "$NOTAR_EC" ""
#
# Backup completed
#
TODAY=$(date +%H:%M:%S)
echo "\n\t$PROG ended at $TODAY.....\n\n"
cleanup 0

```

Subject: 8.06: How do I do remote backup? (cont.)
From: Henk van Doorn <hvdoorn@xs4all.nl>

```

#!/bin/ksh
#####
#      rmksysb                                     #
#####
#
# Description:                                     #
#      creates a bootable mksysb backup of a remote system running #

```

```

#       AIX 3.x or lists the Table of Contents of the current tape       #
#                                                                           #
# Usage:                                                                     #
#       ./rmksysb $1 [$2]                                                    #
#           $1 - remote host to be backed up                               #
#           $2 - optional: local tape device (default: rmt0)              #
#       or:                                                                     #
#       ./rmksysb -l [$2]                                                    #
#           to list Table of Contents saveset on tape in $2              #
#           (only useful on tapes created by rmksysb)                      #
#                                                                           #
# Output:                                                                     #
#       a bootable mksysb of the remote system                             #
#       or a listing of the TOC saveset on the current tape                #
#                                                                           #
# Remarks:                                                                     #
#       . rmksysb can only be used by root                                  #
#       . this script will use tapedevice .1, so if                         #
#         a >2.3GB drive is used: check density_set_1                      #
#       . the remote host needs /.rhosts to include the local host        #
#         for root access (+ shell enabled in /etc/inetd.conf)            #
#       . you will need some room (>1.5MB) on /tmp on the remote host     #
#         for standard mksysb .archive.list.* etc.                        #
#       . remote standard output & standard error (except dd/chdev)     #
#         will go to local stdout & stderr                                  #
#       . redirecting stdout can create quite large log-files (2MB)       #
#       . AIX versions should not be too far apart as the boot-saveset   #
#         comes from the local system & the rest from the remote         #
#         (tested on AIX 3.2.5, AIX 4+ definitely won't work!!!)        #
#       . most likely this script will fail with multi-tape mksysb's:    #
#         another incentive to keep rootvg as small as possible!         #
#                                                                           #
# Author:                                                                     #
#       Henk van Doorn                                                       #
#       Email: hvdoorn@xs4all.nl                                             #
#                                                                           #
#       Thanks to all who contributed. Esp. Paul Wynn (AIXpert '93),     #
#       my colleagues Dominic Dinardo & Douwe van Terwisga              #
#       + the input from Usenet were stimulating; thanks folks!          #
#       I would welcome any additions & changes for the better...       #
#                                                                           #
#####
#           CHANGES
#####
# ID   WHO   DATE           DESC
# --   ---   -
# X000   HvD   6Jan95   Created this file.
# X001   HvD   2Feb95   Final version
#####

set +u

# Global variable definitions.
UMASK='umask'
BLK_SZ=1024
BOOT_BLK_SZ=512

```

```

HOST=${1}

# TAPE = $2 with /dev/ & .* removed, defaulting to rmt0
TAPE=${2:-rmt0}
TAPE=${TAPE#/dev/}
TAPE=${TAPE%.*}

usage()
{
    echo "Usage: ./rmksysb <remote_host_name> [<tape_device>] or" >&2
    echo "          ./rmksysb -l [<tape_device>]" >&2
    echo "          with <tape_device>= e.g. rmt1" >&2
    echo "Default <tape_device>=rmt0" >&2
    return
}

check_parms()
{
    if [ "${HOST}" = "" ]
    then
        usage
        exit 1
    fi

    if [ "${HOST}" = "-l" ]
    then
        # show TOC block which contains some backup details on rmksysb tapes
        get_tape_block_size
        chdev -l ${TAPE} -a block_size=${BOOT_BLK_SZ} >/dev/null 2>&1
        mt -f /dev/${TAPE} rewind
        mt -f /dev/${TAPE}.1 fsf 2
        dd if=/dev/${TAPE} count=1 2>/dev/null
        chdev -l ${TAPE} -a block_size=${OLD_BLK_SZ} >/dev/null 2>&1
        exit
    fi
}

check_host()
{
    rsh ${HOST} hostname >/dev/null 2>&1
    if [ $? -ne 0 ]
    then
        echo "Check hostname & rsh access" >&2
        exit 1
    fi
}

get_tape_block_size()
{
    VALID=
    `lsdev -Cc tape | cut -f1 -d" " | grep ${TAPE} 2>&1 >/dev/null` &&
    {
        OLD_BLK_SZ=`lsattr -El ${TAPE} -a block_size | cut -f2 -d" "`
        VALID=true
    }
}

if [ "$VALID" = "" ]

```

```

then
    echo "Tape drive $TAPE is not a valid local drive!" >&2
    exit 1
fi
}

#
# The main procedure is analogous to its C counterpart,
# This is the basic driver routine.
#
main()
{

if [ "`id | grep 'uid=0'" = "" ]
then
    echo "rmksysb can only be run as root!" >&2
    exit 2
fi
umask 022

check_parms
check_host
get_tape_block_size

# display some info on this rmksysb session
echo "`date`\n\nRemote System Backup from remote ${HOST} to local `hostname` on
device:\n`lscfg -v -l ${TAPE} | sed -n '3,6p' | grep "[a-z]"` \n"

# Here the action starts
rsh $HOST -n /usr/bin/mkszfile
rsh $HOST -n "echo ${BLK_SZ} > /tapeblksz"

rsh $HOST -n "rm -f /tmp/pipe.rmksysb"
rsh $HOST -n "rm -f /tmp/pipe.rmksysb.out"
rsh $HOST -n "rm -f /tmp/pipe.rmksysb.err"

rsh $HOST -n "/etc/mknod /tmp/pipe.rmksysb p"
rsh $HOST -n "/etc/mknod /tmp/pipe.rmksysb.out p"
rsh $HOST -n "/etc/mknod /tmp/pipe.rmksysb.err p"

# create remote startup file for mkinsttape
rsh $HOST -n "echo '#!/bin/ksh\nexport PATH=$PATH ; /usr/sbin/mkinsttape
/tmp/pipe.rmksysb >/tmp/pipe.rmksysb.out 2>/tmp/pipe.rmksysb.err &' >
/tmp/mkinsttape.start "
rsh $HOST -n "chmod 700 /tmp/mkinsttape.start"

chdev -l $TAPE -a block_size=${BOOT_BLK_SZ} >/dev/null 2>&1
tctl -f /dev/${TAPE} retension

echo
echo
echo ">>> SAVESET 1: BOS boot image from `hostname`"
echo
bosboot -d /dev/${TAPE}.1 -a

echo
echo

```

```

echo ">>> SAVESET 2: BOS install utilities from ${HOST} (backup format)"
echo
rsh $HOST -n "nohup /tmp/mkinsttape.start" &

# get remote standard out & err to local stdout & err
rsh $HOST -n "dd if=/tmp/pipe.rmksysb.out 2>/dev/null" | dd 2>/dev/null &
rsh $HOST -n "dd if=/tmp/pipe.rmksysb.err 2>/dev/null" | ( dd 2>/dev/null ) >&2
&

# get remote mkinsttape to local tape device
rsh $HOST -n "dd if=/tmp/pipe.rmksysb 2>/dev/null" | dd 2>/dev/null | dd
of=/dev/${TAPE}.1 conv=sync 2>/dev/null

echo
echo
echo ">>> SAVESET 3: Backup information (list with ./rmksysb -l [<tapedevice>])"
echo
# add dummy TOC to tape with some backup information
echo "`date`\n\nRemote System Backup from remote ${HOST} to local `hostname` on
device:\n`lscfg -v -l ${TAPE} | sed -n '3,6p' | grep "[a-z]" '\n' | dd
of=/dev/${TAPE}.1 conv=sync 2>/dev/null

# change blocksize to 1024 for better performance
chdev -l ${TAPE} -a block_size=${BLK_SZ} >/dev/null 2>&1

# rewind & skip first 3 savesets
mt -f /dev/${TAPE} rewind
mt -f /dev/${TAPE}.1 fsf 3

echo
echo
echo ">>> SAVESET 4: mksysb (rootvg backup) from ${HOST} (tar format)"
echo
# start the actual remote mksysb
echo "The contents of the /.fs.size file on ${HOST} are:"
rsh $HOST -n "cat /.fs.size"
echo

rsh $HOST -n "nohup /usr/bin/mksysb /tmp/pipe.rmksysb >/tmp/pipe.rmksysb.out
2>/tmp/pipe.rmksysb.err &" &

# get remote standard out & err to local stdout
rsh $HOST -n "dd if=/tmp/pipe.rmksysb.out 2>/dev/null" | dd 2>/dev/null &
rsh $HOST -n "dd if=/tmp/pipe.rmksysb.err 2>/dev/null" | ( dd 2>/dev/null ) >&2
&

# get remote mksysb to local tape device
rsh $HOST -n "dd if=/tmp/pipe.rmksysb 2>/dev/null" | dd obs=${BLK_SZ}
2>/dev/null | dd of=/dev/${TAPE} bs=${BLK_SZ} conv=sync 2>/dev/null

# cleaning up
rsh $HOST -n "rm -f /tmp/pipe.rmksysb"
rsh $HOST -n "rm -f /tmp/pipe.rmksysb.out"
rsh $HOST -n "rm -f /tmp/pipe.rmksysb.err"
rsh $HOST -n "rm -f /tmp/mkinsttape.start"

chdev -l ${TAPE} -a block_size=${OLD_BLK_SZ} >/dev/null 2>&1

```

```

umask $UMASK

# display some closing info on this rmksysb session
echo "Remote System Backup from remote ${HOST} to local 'hostname' is
finished.\n'date'\n"

} #end of main

# Call the driver
main

-----

Subject: 8.07: How to configure dialup SLIP

[ formerly in section 1.606 part 5 ]

#!/bin/ksh

# SLIP login .profile
# Adapted from comp.unix.aix FAQ
# by Davide Migliavacca (davide.migliavacca@inferentia.it)
# $Revision: 1.12 $

# Set this variable != 0 to allow multiple logins from this userid

ALLOW_MULTIPLE_LOGINS=0

# NOTE: script currently determines destination IP address from the SLIP
# interface attributes, but it assumes a correspondence
#      ttyxx <-> slipxx
# (see the "IPADDRESS=" awk line)
# It relies on a client being able to read the IP address from
# the logon procedure output.

PATH=/usr/bin:/etc:/usr/sbin:/usr/ucb:$HOME/bin:/usr/bin/X11:/sbin:/usr/local/bi
n:

export PATH ENV HISTSIZE

#
# Search for a LCK-File for our tty if there is one
#
TTYDEV=`tty`
TTYBASENAME=`basename $TTYDEV`
TTYNUMBER=`echo $TTYBASENAME | sed -n -e "s/tty\([0-9]\{1,\}\)/\1/p"`

if [ -f /etc/locks/LCK..$TTYBASENAME ];
then SHPID=`cat /etc/locks/LCK..$TTYBASENAME`;
else {
/usr/bin/logger -t SLIP -p error "No LCK file for $TTYDEV"
exit 64;
}
fi;

```

```

# Search for another login from this userid

OTHERSLIP=`ps -fu$USER |
    sed -n -e "s/^ *$USER *[0-9][0-9]* .*-.*\usr\sbin\slattach \(\tty[0-
9]\{1,\}\) *$/\1/p`;
if [ ! -z "$OTHERSLIP" ];
then
    if [ $ALLOW_MULTIPLE_LOGINS -eq 0 ];
    then
        echo "Sorry, you are already connected to $OTHERSLIP.";
        echo "Multiple logins are NOT allowed.";
        echo "For any question, contact helpdesk@inferentia.it";
        /usr/bin/logger -t SLIP -p warn "$USER: attempt to connect on
$TTYBASENAME when already connected on $OTHERSLIP - refused";
        exit 64;
    fi
#else...
    /usr/bin/logger -t SLIP -p warn "$USER: multiple login allowed, now using
also $TTYBASENAME";
fi
#
# Search for our own Shell to get the PID for checking against LCK-File
#

SH2PID=`ps -ft$TTYNUMBER |
    sed -n -e "s/^ *$USER *\([0-9][0-9]*\) .*-.*sh *$/\1/p`

#
# Is it the the same PID as in the LCK File so that we can start working ??
DEBUG=0
if [ $DEBUG -eq 1 ];
then
    echo TTYDEV: $TTYDEV
    echo TTYBASENAME: $TTYBASENAME
    echo USER: $USER
    echo SHPID: $SHPID
    echo SH2PID: $SH2PID
fi
if [ "$SHPID" -eq "$SH2PID" ];
then
# remove the LCK-File because slattach does not like it.
rm -rf /etc/locks/LCK..$TTYBASENAME
# Add RTS/CTS Handshakeing to our own tty: Better do it in /etc/rc,
# using the program from the comp.unix.aix FAQ.
# stty add rts
SLIPLINE=`echo $TTYBASENAME | awk '{print substr($1,4);}'`
IPADDRESS=`lsattr -E -l sl$SLIPLINE -a dest 2>/dev/null | awk '{print
$2;}'`
if [ -z "$IPADDRESS" ]
then
    /usr/bin/logger -t SLIP -p error "$USER: attempt to use tty with no slip
interface defined ($TTYBASENAME)"
    echo "This tty ($TTYBASENAME) has not been enabled for SLIP. Please try
another one or contact the system administrator."
    exit 64
fi
echo SLIP starting. Your IP address is $IPADDRESS

```

```

/usr/sbin/slattach $TTYBASENAME
# Get the pid of slattach so that we can kill him later on.
SLPID=`ps -aef |
    sed -n -e "s/^ *$USER *\[([0-9][0-9]*\) .*-.*\/usr\/sbin\/slattach
$TTYBASENAME *$\/\1/p`
# Just say that we are up.
logger -t SLIP -p info "$USER: Starting up daemon (pid $SLPID) for
[$IPADDRESS] on $TTYDEV"
else
# Something must be wrong with the LCK-File
SH3PID=`ps -aef | awk ' {print $2}' | grep $SHPID`

if [ ".$SH3PID" = "." ]
then
    SH3PID="NO_SUCH_PROCESS"
fi

if [ $SHPID = $SH3PID ]
then
# There is a living process which owns the LCK-File !!
/usr/bin/logger -t SLIP -p error "$USER: Cannot remove LCK file for $TTYDEV
(not owner)"
    exit 64
else
# Who the hell didn't remove the LCK-File (should never happen)
/usr/bin/logger -t SLIP -p error "$USER: LCK file for $TTYDEV found with no
owner"
    #echo `date` " LCK-File with no owner found !!!" >>$SLIPLOG
    exit 64
fi
fi

if [ $DEBUG -eq 1 ]
then
/usr/bin/logger -t SLIP -p debug "$USER: going to trap signals..."
fi
Nov 28 11:18:46 sauternes rexecd[21420]: connect from brachetto.inferentia.it

#
terminated )
trap "kill $SLPID; /usr/bin/logger -t SLIP -p info \"\$USER: Killing daemon (pid
$SLPID) for $TTYDEV\"; exit 0" 1

if [ $DEBUG -eq 1 ]
then
trap "/usr/bin/logger -t SLIP -p debug \"\$USER: trap ERR\" " ERR
trap "/usr/bin/logger -t SLIP -p debug \"\$USER: trap 0\" " 0
trap > /tmp/trap.$TTYBASENAME.log
/usr/bin/logger -t SLIP -p debug "$USER: trap returns $?..."
fi

# We will have a nice sleep and nice dreamings
if [ $DEBUG -eq 1 ]
then
/usr/bin/logger -t SLIP -p debug "$USER: going to sleep-loop..."
fi

```

```
while [ true ];
do
sleep 60;
done

# Sanity check (should never happen...)
/usr/bin/logger -t SLIP -p error "$USER: ERROR: .profile broken"
```

Subject: 8.08: Disabling software flow control; using RTS/CTS.

[formerly in section 1.613]

/* This program is an adaptation of a program provided by IBM Defect Support.
It is provided without warrantee, or support.

The syntax of the command is:

```
setrts tty [tty [tty [...]]]
```

The program will loop through each tty provided on the command line, and turn on the 'rts' line discipline. The program does not require that the Carrier Detect signal be held high to keep the serial device from blocking on the attempt to open it. The program works for all valid ttys.

BUGS: None that are known; however, using the program to set 'ptys' may cause the 'pty' to become unusable.

This program was written by Robin D. Wilson, Pencom Software (with the specific 'ioctl()' call provided by the IBM Defect Support Center.

I call it: "setrts"

To compile:
cc -O -o setrts setrts.c
strip setrts

(Funny, but if you strip with the compiler (i.e., cc -s), you end up with 120 extra bytes in the executable...)

*/

```
#include <stdio.h>
#include <fcntl.h>
#include <termios.h>
#include <sys/tty.h>
#include <string.h>
#include <sys/param.h>
#include <unistd.h>

#define DEVDIR      "/dev/"
#define LINEDISP    "rts"

main (argc, argv)
int argc;
char **argv;
{
```

```

int tty;
char ttyname[MAXPATHLEN];

/* Give a 'usage' recommendation if they don't provide an argument */
if (argc < 2) {
    fprintf(stderr, "usage: %s <ttyn> [ttyn [ttyn [...]]]\n",argv[0]);
    exit(-1);
}
/* Otherwise, loop through all the arguments... */
else while (--argc >= 1) {
    argv++;
/* Check to see if they input the 'tty' names with the DEVDIR on them...
* If not, put it on...
*/
        if (strncmp(DEVDIR, argv[0], strlen(DEVDIR)) != 0) {
            strcpy(ttyname, DEVDIR);
            strcat(ttyname, argv[0]);
        }
        else
            strcpy(ttyname, argv[0]);

/* Open the tty. Use the non-blocking open (O_NDELAY) to open without a
* carrier (CD) present on the line...
*/
        if ((tty = open(ttyname, O_RDWR|O_NDELAY)) < 0) {
            fprintf(stderr, "%s: couldn't open tty device.\n",ttyname);
            exit (-2);
        }
/* Add the 'rts' line discipline... */
        (void)ioctl(tty, TXADDCD, LINEDISP);
        (void)close(tty);
    }
}

```

Subject: 8.09: How can I hack libc.a to alter how hostnames are resolved?

[formerly in section 1.618]

[Editor's note: You might want to see Question 2.07 for advice on recovering from a deleted or corrupted libc.a before attempting this hack. Note that this procedure is for AIX 3.2 ONLY --- AIX 4.x already has a supported method of controlling name resolution. See question 1.800.]

1. get the resolv+ source (I see a copy on ftp.uu.net in networking/ip/dns and there are likely copies elsewhere). We are using version 2.1.1, which appears to be the latest available. gethostnamadr.c needs a couple of additions:

```

23a24,26
> #ifdef _AIX
> #include <sys/time.h>
> #endif
35a39,41
> #ifdef _AIX
> #include <sys/ioctl.h>          /* for SIOCGIFCONF */

```

```
> #else
36a43
> #endif
```

2. Use the following instead of the supplied shlib/Makefile:

```
LIBP= gethostnamadr.o herror.o res_data.o res_query.o res_mkquery.o \  
      sethostent.o res_send.o res_debug.o res_comp.o res_init.o  
CFLAGS=      -O -D_BSD=43 -D_NO_PROTO -DNIS -DDEBUG -U__STR__
```

```
all: shr.o
```

```
shr.o:      $(LIBP) setup  
          ld -o $@ /lib/syscalls.exp $(LIBP) tmp.o -bM:SRE -bE:shr.exp -  
bE:/lib/syscalls.exp -bI:crypt.imp -H512 -T512 -bh:4 -lc
```

```
setup:
```

```
rm -f libc.a crypt.imp  
cp /lib/libc.a .  
chmod 755 libc.a  
ar xv libc.a shr.o  
/bin/dump -nv shr.o | grep EXP | awk '{print $$NF}' > shr.exp  
ld -o tmp.o -bnso shr.o -r  
@ echo '#!' > crypt.imp  
@ echo __crypt >> crypt.imp  
@ echo __setkey >> crypt.imp  
@ echo __encrypt >> crypt.imp
```

```
clean:
```

```
rm -f shr.o tmp.o crypt.imp shr.exp $(LIBP) libc.a
```

```
install_libc:      install_libc.c  
                  cc -o $@ install_libc.c -bnso -bI:/lib/syscalls.exp
```

```
herror.o: ../herror.c  
          $(CC) $(CFLAGS) -c ../herror.c
```

```
res_comp.o: ../res_comp.c  
           $(CC) $(CFLAGS) -c ../res_comp.c
```

```
res_debug.o: ../res_debug.c  
            $(CC) $(CFLAGS) -c ../res_debug.c
```

```
res_data.o: ../res_data.c  
           $(CC) $(CFLAGS) -c ../res_data.c
```

```
res_init.o: ../res_init.c  
           $(CC) $(CFLAGS) -c ../res_init.c
```

```
res_mkquery.o: ../res_mkquery.c  
              $(CC) $(CFLAGS) -c ../res_mkquery.c
```

```
res_query.o: ../res_query.c  
            $(CC) $(CFLAGS) -c ../res_query.c
```

```
res_send.o: ../res_send.c  
           $(CC) $(CFLAGS) -c ../res_send.c
```

```
gethostnamadr.o: ../gethostnamadr.c
$(CC) $(CFLAGS) -c ../gethostnamadr.c
```

```
sethostent.o: ../sethostent.c
$(CC) $(CFLAGS) -c ../sethostent.c
```

```
strpbrk.o: ../strpbrk.c
$(CC) $(CFLAGS) -c ../strpbrk.c
```

```
strerror.o: ../strerror.c
$(CC) $(CFLAGS) -c ../strerror.c
```

3. As shipped, IBM's /lib/syscalls.exp contains an entry for fork(). This needs to be removed as it will cause the new shr.o to use the system call entry point rather than the library wrapper and this can cause some rather odd behavior. For example, I ran across one using the '!' command in vi where the error/informational messages were corrupted.
4. You can use "ar r libc.a shr.o" but that will leave a big hole in libc.a, since the new shr.o is slightly bigger than the original. I always extract all the .o's from libc.a and build a brand new one - suit yourself.
5. Before the next step, you'll want to set up the two configuration files. The first is /etc/resolv.conf and it is basically the same as before except for the new keyword "search" - intended to replace the "domain". See the resolver.5 manual page for details (included with the resolv+ source). The other file is /etc/host.conf, which is where you set the order of search. See resolv+.8 for information on this.
6. Now, the only tricky part left is to get the new libc.a installed. You'll note the Makefile has a target for install_libc. Just put the following in install_lib.c and run "make install_libc" to build.

```
----- begin install_libc.c -----
#include <stdio.h>

static char *nodns[] = { "/usr/ccs/lib/libc.a" , "/usr/ccs/lib/libc.a.ORIG" };
static char *hasdns[] = { "/usr/ccs/lib/libc.a.NEW" , "/usr/ccs/lib/libc.a" };

#define OLD      (0)
#define NEW     (1)

main()
{
    if(link(nodns[OLD],nodns[NEW])) {
        perror("link");
        exit(1);
    }

    if(unlink(nodns[OLD])) {
        perror("unlink");
        exit(1);
    }

    if(link(hasdns[OLD],hasdns[NEW])) {
```

```

        perror("link");
        exit(1);
    }

    if(unlink(hasdns[OLD])) {
        perror("unlink");
        exit(1);
    }

    exit(0);
}
----- end install_libc.c -----

```

7. You'll want to do this on a quiet machine. Move the new libc.a to /usr/ccs/lib/libc.a.NEW, then run install_libc. It is probably a good idea to reboot afterwards (though not strictly required). We have a similar program called restore_libc (exercise for the reader) for backing out the change.

Rather than do this on every machine (we have 170+ RS/6000's), I simply put this new libc.a into my network-installable image, which I blasted out over the year-end holiday break (I created a method for loading a new image onto machines without having to boot off of floppies and turn keys).

Of course, for the really cautious, you can always make the change after booting off of the maintenance floppies...

Subject: 8.10: How do I make an export list from a library archive?

[formerly in section 2.17]

This script will only extract the "export"able names and should be useful in starting the shared library creation process. The user must determine which names should be included in the import and export lists. It's only been tested on a few library archives.

```

#!/bin/ksh
#
# mkexps - make export list
# This program creates an export list by combining all the "." and normal names
# into one list.
#
if [[ "$#" -ne 1 ]]
then
    print "Usage: mkexps ArchiveFile"
    exit -2
fi
if [[ ! -f $1 ]]
then
    print "mkexps: Cannot open file \"$1\""
    exit -1
fi
dump -g $1 | awk '
BEGIN {
    top = 1

```

```
}
/^[ ]*[0-9][0-9]*/ {
  if ( (n = index( $2, "." )) > 0 ) {
    export_array[ top++ ] = substr( $2, n+1, length( $2 ) )
  }
  else {
    export_array[ top++ ] = $2
  }
}

END {
  for ( i = 1; i < top; i++ )
  {
    print export_array[ i ]
  }
}' | sort | uniq
```

Subject: 9.00: Contributors

The following persons have contributed to this list. If you want to contribute anonymously, just let me know - but do tell me who you are. I apologize if I omitted anyone.

Thank you all, this would definitely not be the same without `_your_` input.

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