AT&T

386 UNIX® System V Release 3.1

Operating System Release Notes

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Preface

These *Release Notes* contain important information about 386 UNIX System V Release 3.1 on your computers. First, they briefly describe the new features of this release. Software notes, additional information about installation, and compatibility notes are also provided. Second, the Remote File Sharing and Network Support Utilities software packages are discussed. Finally, presented in appendix B, are last minute change pages for the *Operations/System Administration Guide* and the *User's/System Administrator's Reference Manual.*

For a comprehensive description of the software and documentation available for 386 UNIX System V Release 3.1 for your computers, see the *Product Overview*. For a complete description of the procedures used in the administration of your computer running 386 UNIX System V Release 3.1, see the *Operations/System Administration Guide.*

Conventions Used in These Release Notes

In this document certain typesetting conventions are followed when command names, command line formats, files, and directory names are described. File names, directory names, path names, and references to other documents are shown in *italic* font. **Bold** font is used to indicate command names and variable names.

There are also conventions for displays of terminal input and output. The following apply to displays.

- You must type words that are in **bold** font as they appear.
- *Italic* words are variables; you substitute the appropriate values. These values may be file names or they may be data values, as applicable.
- CRT or terminal output and examples of source code are presented in `constant-width` font.
- Characters or words in square brackets, [ ], are optional. (Do not type the brackets.)

A command name followed by a number, for example, **ed**(1), refers to that command's manual page, where the number refers to the section of the manual. Manual pages from sections (2) and (3) appear in the *Programmer's Reference Manual.* Manual pages from sections (1), (1M), (4), (5), and (7) appear in the *User's/System Administrator's Reference Manual.*

Examples in these *Release Notes* show the default system prompt for UNIX System V, the dollar sign (**$**). They also show the default prompt when you log in as the superuser, the pound sign (**#**).

Features Of 386 UNIX System V

UNIX System V Release 3.1

UNIX System V Release 3.1 provides the following new features. For a more detailed description of them, see the *Product Overview.*

- Internationalization
    - □ Support for 8-bit Code Sets
    - □ Support for Alternate Date and Time Formats [see **cftime**(4) and **environ** (5) in the *User's/System Administrator's Reference Manual*]
    - □ Support for Alternate Character Classification and Conversion Rules [see **chrtbl**(1M) in the *User's/System Administrator's Reference Manual*]
- New **awk (nawk)**
- Performance Improvements
    - □ Paging the User-Area
    - □ Remote File Sharing Client Caching
    - □ Faster and Smaller **curses**
- Additional Features
    - □ Remote File Sharing Loop-Back
    - □ Improved Recovery of Files from **cpio** Archives.

Support for 8-bit Code Sets

The **cat**, **ed**, **egrep**, **expr**, **find**, **grep**, **ls**, **pg**, **sed**, **sort**, and **vi** commands and the **curses** library were changed so they no longer use the eighth bit of each byte. This change enables these commands to handle code sets where all 8 bits are used. (**nawk** provides this capability for **awk** users.) Because ASCII only uses 7 of the available 8 bits in a byte, some commands made special use of this eighth bit; other commands assumed that if the bit was set, the byte was invalid. Other commonly-used commands, such as **sh** (the shell), already support 8-bit code sets.

In addition, 8-bit characters can be sent between a terminal and the system [see the **init**(1M) and **gettydefs**(4) manual pages in the *User's/System Administrator's Reference Manual*].

Support for Alternate Date and Time Formats

The **cpio, date, ls, mount, pr,** and **sort** commands were changed to provide the date and time in the language and format determined by the value of the **LANGUAGE** environment variable. While the United States conventions remain the default, other languages can be supported by creating and installing a file for the language desired in the */lib/cftime* directory. The content of that file includes: month and weekday names (full and abbreviated), default local time, date, pre-noon, and post-noon formats, and the default output of the **date** command if the **CFTIME** environment variable is not set. In addition, time zones and alternate time zones (such as daylight time) now can be defined in terms of hours and minutes using the **TZ** environment variable.

For more information, see the **date**(1), **timezone**(4) and **environ**(5) manual pages in the *User's/System Administrator's Reference Manual.*

Support for Alternate Character Classification and Conversion Rules

cat, ed, egrep, grep, ls, pg, sed, sort, and **vi** (commands that convert characters from upper to lower case or classify characters as alphabetic, printable, uppercase or lowercase, etc.), were changed to support code sets or classification rules according to the value of the **CHRCLASS** environment variable. While ASCII remains the default for these operations, other conversion and classification rules are supported by creating and installing a file describing these rules in the */lib/chrclass* directory. A new administrative command, **chrtbl**, is used to create this file.

For more information, see the **chrtbl**(1M) and **environ**(5) manual pages in the *User's/System Administrator's Reference Manual.*

New awk (nawk)

awk is a programming language for information retrieval and data manipulation that is often used by people with no programming background. Customers using **awk** in an international environment must use the new version (**nawk**), because the old version does not support 8-bit code sets. Some of the other enhancements to this version of **awk** include:

- The ability to define functions
- New keywords: **delete**, **do**, **func**, **function**, **return**
- New built-in functions: **atan2**, **cos**, **sin**, **rand**, **srand**, **gsub**, **sub**, **match**, **close**, and **system**
- New pre-defined variables: **FNR**, **ARGC**, **ARGV**, **RSTART**, and **RLENGTH**
- The input field-separator variable, **FS**, and the third argument to **split** are treated as regular expressions
- The precedence of operations now matches C Language precedence.

Because some of these enhancements may not be compatible with some existing **awk** programs, you will get the old version when you type **awk**. To take advantage of these new features, you must use the **nawk** command. For more information, see the "**awk** Tutorial" packaged within the *Programmer's Guide, Vol. 1,* and the "Software Notes," and "Future Directions" sections of these *Release Notes.*

Paging the User Area

The user area for each process (approximately 8192 bytes) can now be paged, like the rest of each process. This enhancement significantly improves the performance of memory-limited systems, such as 2-Mbyte configurations, by making more memory available.

Remote File Sharing Client Caching

This feature enables a client system (one that is accessing data from another system) in an RFS arrangement to maintain a local copy of the data it needs. This means that when a block of data is read from, or written to, a remote system, it is placed in a local buffer where it can be accessed by subsequent requests for data by local processes. This can significantly reduce the amount of data that needs to be sent across the network, resulting in significant performance improvements for many patterns of remote file use. For example, application programs that access data from a small set of files, such as data base systems, will benefit from this feature.

Mechanisms are built into the client caching feature to ensure file consistency across the network when multiple machines have opened a file and when a process re-opens a previously closed cached file.

By default, client caching is enabled for all systems running Release 1.1 of the Remote File Sharing Utilities; however, caching can be turned off for a particular resource [see the **mount**(1M) manual page in the *User's/System Administrator's Reference Manual,* or for an entire system see the discussion of tunable parameters in the new version of the "Remote File Sharing" chapter of the *Operations/System Administration Guide.*

Administrative tools have been added to monitor caching activities. Using this information, administrators can modify several new tunable parameters to maximize caching efficiency.

This feature is provided by Release 1.1 of the Remote File Sharing Utilities. For more information, see the "Remote File Sharing" procedures and chapter in the *Operations/System Administration Guide.*

Remote File Sharing Loop-Back

The loop-back feature enables you to simulate the higher levels of Remote File Sharing (RFS) functionality within one computer. Application programs designed to use RFS can be partially tested without actually communicating with a remote computer. This feature can also be used to demonstrate RFS when only one computer is available.

This feature is provided by Release 1.1 of the Remote File Sharing Utilities. For information describing how to use this feature, see the **-o** option on the **rfadmin**(1M) manual page in the *User's/System Administrator's Reference Manual.*

Improved Recovery of Files From cpio Archives

If errors are encountered while restoring a file from floppy disk using the "Restore From Removable Media" function (described in the *Operations/System Administration Guide*) or **cpio**, you can now skip over the bad blocks and continue the restore with the next file. This procedure will automatically be invoked when you use the "Restore From Removable Media" function or use the **-k** option described on the **cpio**(1) manual page in the *User's/System Administrator's Reference Manual.*

UNIX System V Release 3.0

Following is a list of new features provided in UNIX System V Release 3.0 that are also included with Release 3.1. For more information see the *Product Overview*.

- Remote File Sharing
- Network Support Utilities
- Enhanced Basic Networking Utilities
- Shared Libraries
- Command Syntax Standard
- Signal Mechanism Enhancements
- Improved Terminal Support Facilities
    - Remote Terminal Package Enhancements
    - AT&T Windowing Utilities Package (included in Base System)
    - 80286 Binary Compatibility
    - Floating Point Co-processor Support
- Additional Features
    - **crash**(1M) Command Changes
    - New System Header Files
    - Encryption Mechanisms Repackaged

Remote File Sharing

NOTE To take advantage of Remote File Sharing, you must have Remote File Sharing Utilities, the Network Support Utilities, and a transport provider. (See "Network Support Utilities" for a description of a transport provider.)

Remote File Sharing lets you share files, directories, devices, and named pipes transparently among computers that are linked by a network. Files are shared transparently by mounting a remote directory as one would mount a file system. Each computer on the network controls which local resources are available to other computers and which remote resources local users can access. For example, with Remote File Sharing you might share a directory among several departments of your business, or a letter-quality printer or typesetter that no one department could support by itself. For more information, see the *Operations/System Administration Guide.*

Network Support Utilities

The Network Support Utilities provide STREAMS tools, the AT&T Transport Interface, and the Listener. STREAMS is a set of tools for development of communication and networking services within the UNIX System; the Transport Interface is based on the Transport Service Definition (Level 4) of the International Standards Organization (ISO) Open Systems Interconnection (OSI) reference model, and defines how a user accesses the services of a transport protocol. The Listener receives requests for network services from another system, interprets which network service is needed, and starts the appropriate process that has been named to provide the requested network service. The Listener then drops out of the communications path and continues to listen for new service requests.

For more information about the Network Support Utilities and the Listener, read these *Release Notes* and the *Operations/System Administration Guide.*

Enhanced Basic Networking Commands

NOTE Media-independent basic networking commands are provided in the Basic Networking Utilities package, but they require the installation of the Network Support Utilities package.

Basic networking commands [for example, **uucp**(1C) and **uux**(1C)] have been enhanced to conform to the AT&T Transport Interface. These utilities can communicate using any Transport Provider that conforms to the AT&T Transport Interface. The operation of the Basic Networking Utilities commands is the same regardless of whether or not you install the Network Support Utilities product.

The Network Support Utilities can show which, if any, Transport Providers are available with **nlsadmin -x**. If you install additional Transport Providers, no changes are needed to the software to accommodate the underlying media or protocols; you need only register Basic Networking Utilities services with the network Listener for those Transport Providers, and register the Transport Providers in the administrative files for the Basic Networking Utilities [see **nlsadmin**(1M) in the *User's/System Administrator's Reference Manual*].

Even with these enhancements, the syntax of the basic networking commands is no different from before. See the *Operations/System Administration Guide* for details about how to manage this facility.

Shared Libraries

The C Software Development Set package, within the 386 UNIX System V Software Development Set product, provides the Advanced Programming Utilities and the C Programming Language Utilities which allow the programmer to build a shared library of routines accessed at run-time, rather than having those routines combined with an application program at load time.

The most commonly-used routines from the C Library and the Networking Services Library are available. Most of the UNIX System commands use these two libraries, as do any applications that were built with them. For more information about generating Shared Libraries, see the chapter devoted to this topic in the *Programmer's Guide, Vol. 1.*

Command Syntax Standard

getopt(1) allows shell procedures to parse command lines to check for legal options and to process optional arguments. A new command, **getopts**(1), is an enhanced version of the **getopt**(1) command. **getopts** is consistent with and supports rules 3 through 10 of the UNIX System command syntax standard. [The standard is described on the **intro**(1) manual page.]

NOTE

You may use **getopt** in shell scripts with UNIX System V Release 3. However, you should use **getopts** instead of **getopt**, because beginning with the next major UNIX System V release, **getopt** will no longer be supported.

To assist in the conversion of shell scripts that are affected by a change from **getopt** to **getopts**, a conversion command, **/usr/lib/getoptcvt**, is provided. (See the **getopts**(1) manual page for details.)

Signal Mechanism Enhancements

A new set of system calls [see the **sigset**(2) manual page in the *Programmer's Reference Manual*] provides a mechanism to catch and hold signals without losing them during later processing and to guarantee that a process reaches the signal handler before it is interrupted by another signal. Some additional signal-handling features, provided by other popular operating systems, are also available.

Improved Facilities for Supporting Terminals

Support for terminals is improved with new features of the Remote Terminal Package, and also as part of the Base System.

Remote Terminal Package

The "Remote Terminal Package" (often called *curses/terminfo*) has the following new features:

- Expanded support for terminal filters, soft labels, and new AT&T terminals.

- New commands: **captoinfo**(1M) converts **termcap** entries to **terminfo** entries; **infocmp**(1M) compares two **terminfo** entries or prints entries in several formats. [Section (1M) is in the *User's/System Administrator's Reference Manual.*]
- New options to the **tput**(1) command to initialize, reset, and learn the "long name" of a terminal.
- An improved version of the **terminfo** compiler, **tic**.
- New documentation on the manual pages and in the "**curses and terminfo**" chapter of the *Programmer's Guide.*

AT&T Windowing Utilities (included in the Base System)

This new package contains software that is required by AT&T windowing terminals, such as AT&T's line of DMD terminals (for example, the 630). Routines included are for creating, deleting, and manipulating terminal windows, querying terminal window status, and providing statistics about using windowing routines. For more information about this package, see the **layers**(1) manual page, and the **libwindows**(3X) manual page in the *Programmer's Reference Manual.*

Additional Features (crash, encryption)

386 UNIX System V Release 3.1 provides improvements to the **crash**(1M) command, and repackaging of encryption mechanisms.

crash Command Changes

In addition to providing debugging support for the new operating system features included in Release 3.0, **crash** has been changed extensively to make it easier to use. The syntax of all the functions has been standardized so that similar functions share similar syntax. There is a **help** function within **crash**, a number base converter, a memory search function, and a disassembler capability. The **crash** (1M) manual page in the *User's/System Administrator's Reference Manual* describes the details of this new **crash** command.

Encryption

The Security Administration Package is optionally installable and consists of an encryption mechanism for encoding sensitive files. The Security Administration Package is distributed only within the United States.

New System Header Files

New header files were added to */usr/include*: **unistd.h** [definitions for symbolic constants introduced and used throughout the /usr/group Standards document; see **unistd**(4) in the *Programmer's Reference Manual*] and **limits.h** [definitions for commonly used values that vary from implementation to implementation, see **limits**(4) in the *Programmer's Reference Manual*]. Several new definitions were added to the header file */usr/include/sys/stat.h* to make it easier for programmers to write portable code.

286 Binary Compatibility

The 286 binary compatibility permits use of the 286 binary executable files compiled under the AT&T 6300 PLUS, UNIX System V Release 2.0, Version 2.0 and Version 2.5 using the SGSs provided in those systems. These 286 binary files can be loaded onto the system and executed just like 386 binary files. The 286 binary compatibility is subject to the following restrictions:

- When using the 386 console, the *TERM* type will be set to 'at386'. Some 6300 PLUS applications use their own termcap file that does not include 'at386' terminal type descriptions and the application will fail because the terminal type 'at386' cannot be found. If this happens, the terminal type must be changed to *PC6300PLUS* as follows:

  ```
  $ TERM=PC6300PLUS
  $ export TERM
  ```

  After the term type is changed, the application may be invoked. After you exit the application, you should reset your terminal type to 'at386' as follows:

  ```
  $ TERM=at386
  $ export TERM
  ```

- The 386 **sdb**(1) debugger cannot debug a 286 program because of format differences between 286 and 386 executable files and processes.
- The **ptrace**() system call is not supported. It is used only by debuggers and is not necessary for running applications.
- **prof**(1) does not report execution profiles.
- The effective maximum number of open files when a 286 program is **exec**'ed is one less than **NOFILES**. **NOFILES** should be configured to at least 21.
- The number of segment descriptors available in the LDT for 286 programs is limited to 256 unless **LDTSZ** is increased. This is sufficient to map 16 Mbytes of text and data. **LDTSZ** is defined in *sys/seg.h*, and is not a configurable parameter, because the end of the LDT could run over the end of the U block if **LDTSZ** is set too high.
- A 286 program may require more stack space running on the 386 than when running on a 286 because of increased system call and signal-handling overhead.

- The following **ioctl**(2) commands defined in *sys/termio.h* are supported. They are: **TCGETA**, **TCSETA**, **TCSETAW**, **TCSETAF**, **TCSBRK**, **TCXONC**, and **TCFLSH**.
- The 286 executable file must be readable (not simply executable) by the user that **execs** the program.

Floating Point Co-processor Support

This release provides support for the Intel 287/387 floating point co-processor. It also provides 387 emulation when the co-processor is absent.

At boot time the kernel checks for the presence of the chip and automatically configures the systems accordingly.

Boot Procedures

The following list of instructions will boot a 386 UNIX System V Release 3.1 system after the Base System has been installed. Apply power to the system and wait 1 or 2 minutes; the second-stage boot should be loaded automatically by the PROMs.

The boot program will load and give you the following message:

```
Booting UNIX System
```

If you immediately hit ANY key, the boot process will be interrupted and the following message will be displayed:

```
Enter name of a UNIX System kernel to boot (eg. /unix):
```

If you enter the name of a kernel to boot, the boot process will continue. If you don't enter anything, after 1 minute **/unix** will boot automatically; if you want to boot **/unix** immediately, press the Enter key.

386 UNIX System Base System Devices

The following list defines the contents of the master device file (*/etc/conf/cf.d/mdevice*) before any add-on packages are installed.

Device Name	character (block) device number	Nodes in /dev directory	Device or software module controlled by "device driver" (See Note 4).
asy	3	/dev/tty*	Serial Port (com1, com2)
fd	1 (1)	/dev/*dsk/f*	Floppy Disk
hd	0 (0)	/dev/*dsk/*s*	Hard Disk
kd	5	/dev/console	Keyboard
lp	7	/dev/lp*	Lineprinter (parallel interface)
mem	2	/dev/*mem	Kernel Memory Driver
rtc	8	(See Note 1)	Real time Clock
du	0	(See Note 2)	Distributed UNIX system (RFS) stubs
fp	0	(See Note 1)	Floating Point Support
cram	18	(See Note 1)	CMOS RAM (memory)
gentty	16	(See Note 2)	Generic tty (STREAMS support)
ld0	0	(See Note 2)	Line Discpline 0 (STREAMS support)
ntty	0	(See Note 2)	Network tty (STREAMS support)
s52k	0	(See Note 2)	2K File System Support stubs
ipc	0	(See Note 1)	Interprocess Communications
msg	0	(See Note 1)	IPC Messages
sem	0	(See Note 1)	IPC Semaphores
shm	0	(See Note 1)	IPC Shared Memory
sxt	14	/dev/sxt*	Shell Layers
xt	13	/dev/xt*	Layers (Bit Mapped Terminal)
prf	6	/dev/prf	Kernel Profiler
cpyrt	0	(See Note 1)	System Initialization Messages
weitek	0	(See Note 1)	Numeric Chip Support stubs
vx	0	(See Note 1)	SimulTask 386 stubs
osm	17	(See Note 3)	Kernel printout Monitor

Notes:

1. Nodes are not required for this device driver. See Note 4.
2. These devices are required to support add-on packages, or are stubs (place holders) for add-on device driver packages. The add-on packages may install nodes in the */dev* directory.

3. The base system does not have nodes for this device. Nodes can be added later via the */etc/mknod* command.
4. Several *device drivers* are software only drivers. That is, they provide a kernel software function packaged as a *device* that can be added to or removed from the system.

Shutdown Procedures

The following steps are necessary to shut down a 386 UNIX System V Release 3.1 computer properly:

1. Log in as **root** and change your directory to /.
2. Run the shutdown program with the following options:

   ```
   shutdown -y -gTIME
   ```

   where TIME is the number of seconds to be allotted before the system is actually halted. A time factor of at least 120 seconds (2 minutes) is recommended for your systems that are being used as multiuser sites. The time factor provides a means to allow users a chance to exit editors and save programs before the system goes down.

The system will proceed to shut itself down after the allotted time, and when the message

```
Boot the System Now
```

appears, the system can be turned off. The Ctrl Alt Delete key combination can be pressed, or the system can be turned off and then turned on again in order to reboot at this point.

Instructions for Updating Selected Files from the Release

If necessary, selected files may be extracted from the installation diskettes. Appendix A contains a list of all the files on the Foundation Set diskettes. All the installation diskettes, with the exception of diskette 1 of 1 of the Base System and diskette 1 of 1 of the Remote Terminal Package, are cpio diskettes. Diskette 1 of 1 of the Base System and diskette 1 of 1 of the Remote Terminal Package are mountable file systems. If the file that you want to extract is on a cpio diskette, you should insert the diskette into the floppy diskette drive and use the following command to extract the selected file:

```
cpio -icBvd < /dev/dsk/f0q15d '<filename>'
```

If the file you want to extract is on a mountable file system diskette, you should insert the diskette into the floppy diskette drive and use the following commands to extract the selected file:

```
/etc/mount -r /dev/dsk/f0q15d /mnt
cp /mnt/<filename> <newfile>
/etc/umount /dev/dsk/f0q15d
```

Uucp Notes

Uucp can be set up to connect to other UNIX System machines from your UNIX System machine. Although more detailed uucp information exists in the *Operations/System Administration Guide,* keep in mind the following things:

1. When connecting the serial lines to your system for a shared dial-in/dial-out line, make sure that the serial lines are capable of dropping DTR. If DTR is not dropped properly, your system may have a tendency to keep switching to a lower baud rate, thus making it harder to log in a second time.
2. *Uugetty* with the **-r** flag does not output anything until it first reads in input. This makes it possible for two systems to share one line and both call each other. It also requires that DTR not be tied high, and that when a user logs in to the line, carriage returns must be sent before a login prompt will show up.
3. These are basic instructions only, and the user should read the *Operations/System Administration Guide* for further information.

Software Notes

This section offers some additional information about 386 UNIX System V Release 3.1. Notes about commands, system calls, and files are listed alphabetically and are organized by the Reference Manual where those commands, system calls, or files appear. For example, the section "User Commands" contains notes about commands that are listed in the *User's/System Administrator's Reference Manual.*

User Commands

awk 3.1

These are the known incompatibilities between the Release 3.0 **awk** and Release 3.1 **awk** (**nawk**).

1. New keywords: `delete`, `do`, `func` (and `function`), and `return`. **nawk** programs may now contain user-defined functions.
2. New built-in functions: `atan2`, `cos`, `sin`, `rand`, `srand`, `gsub`, `sub`, `match`, `close`, `system`.
3. New pre-defined variables: `FNR`, `ARGC`, `ARGV`, `RSTART`, `RLENGTH`.
4. Parameters that appear before the first input file name are available to `BEGIN`. Until Release 3.1, however, they were not available until after the first input file was opened, which happened after `BEGIN`.
5. The `for (i in arrayname)` construct may produce array elements in an order different than before.
6. The input field separator variable, `FS`, now specifies a regular expression, rather than just a single character. (The third argument to `split` also behaves this way.) Previously, **awk** only used the first character in the string assigned to the input field separator if the string had more than one character.
7. Strings may contain escape sequences like their C counterparts: `\b`, `\f`, `\n`, `\r`, `\t`, `\`*ddd*. Previously, the `\`*ddd* notation was not interpreted. Also, if a backslash was not part of an escape sequence, it was retained in the string. To be consistent with C, backslashes are dropped in **nawk** if they are not part of escape sequences. For

example, **awk** prints \c for the command **print** "\c", and **nawk** prints **c**.

8. The precedence of operators has changed. **nawk** firmly establishes their precedence, which matches C precedence, but which differs from their previous **awk** precedence in some cases. Two examples of code that breaks are:

```
while ( n /= 10 > 1 ) ...

if (!"wk"    /bwk/) ...
```

The old version of **awk** is provided to avoid compatibility problems. See the section on "Future Directions" in these *Release Notes* for further information.

bc

When you enter the following command line and **bc** cannot open *file2*, the error message displayed says that **bc** cannot open *file1*:

bc *file1 file2*

Also, when you enter the following command line and **bc** cannot open *file*, the error message displayed contains garbled characters instead of the name of *file*:

bc *file*

bc

bc does not handle the following two constructs in the same way:

```
(1)     if ( expr ) {
        ...
        }

(2)     if ( expr )
        {
        ...
        }
```

The first case produces what one would expect. The second case is equivalent to an **if** followed by an empty statement, and the compound statement always is executed. If nothing else, the second case should produce a syntax error, but it does not. It dumps core silently.

bc

The **bc** command prints an incorrect remainder when dividing with a negative number.

```
$ bc
-1.2 % 1
9.8
<Ctrl-d>
```

Clearly, when dividing **-1.2** by **1**, the remainder that returns should not be **9.8**.

cdc

The **cdc**(1) command ends abnormally when you invoke it without the **-m** option on an SCCS file that does not have the **v** flag set.

cpio

cpio can overwrite files when invoked with the **-u** option. An overwrite can also occur if the files in the archive are newer than the existing files.

If an I/O error occurs while reading the archive or if the file system runs out of space, the file being created is either corrupted or truncated, and the old existing file is lost because it has been overwritten.

crypt

The **crypt** command now takes options that begin with a dash (–), such as **-k**. These can no longer be given as keys. This change will only affect those who have the Security Administration Utilities package installed on their system.

cu

When you use the **cu** command over a direct line, you should press the Enter key to get a `login:` prompt. After the `login:` prompt appears, wait about 5 seconds before entering your login. If you do not wait, the first character that you type will not be displayed on your terminal screen even though it is accepted by the computer.

cu

If you do a **cu** from machine_A to machine_B, and then do a **cu** from machine_B to machine_C, the command **~%take** *file* will not transfer *file* to machine_A.

Transfer files over one link at a time by one of two methods.

- Login to machine_A; **cu** to machine_B and then to machine_C as described above. The command **~~%take** *file* transfers *file* to machine_B. Then type **~~.**. From machine_B, use the command **~~%take** *file* to transfer *file* to machine_A.
- If possible, **cu** from machine_A to machine_C. You can successfully transfer files over a single link.

cu

Occasionally, **cu** fails with the following message even though all devices are available:

```
    NO DEVICES AVAILABLE
```

cu

If there is a command in */etc/inittab* that is respawning too rapidly and it generates an error message while the console user does a **cu** to another system, the console user will find that every command typed in is echoed twice on the console, although it is only executed once (as it should be).

date

The default timezone for **date** is now GMT.

Another change affecting **date** involves the **TZ** environment variable. Previously, if **TZ** was unset or null, the timezone used would be **EST** or **EDT**. Now the timezone used is **GMT**. For example,

```
    TZ='' date
```

now prints

```
    Thu May  1 21:29:08 GMT 1986
```

instead of

```
    Thu May  1 17:29:08 EDT 1986.
```

date also recognizes the extended syntax in the **TZ** environment variable for alternate time zones. This change should not cause problems since the old syntax continues to be recognized. The changes involving the **TZ** environment variable occur because the **date** command uses the new **cftime**(3C) function to compute the date and time. The **cpio**, **ls**, **mount**, **pr**, and **vi** commands also use **cftime**, and their functionality in displaying times is affected by the **TZ** environment variable in the same manner.

ex, vi

The **ex** and **vi** commands exit with a return code equal to the number of errors encountered during the editing session.

Because all return codes must be between 0 and 255, if more than 255 errors are encountered, the return code will not be accurate. If an integral multiple of 256 errors is found, then **ex** and **vi** exit with a zero return code.

ex, vi

The **ex** and **vi** commands no longer set the eighth bit in the characters of the % expansion of the current filename.

When the percent sign **(%)** is used in a shell escape from **ex** or **vi** via the exclamation mark **(!)**, the % is replaced with the name of the file being edited. Previously, each character in this replacement had the eighth bit set to 1 to quote it; now it is left alone.

Generally, you can use older versions of the **ex** or **vi** commands on Release 3, but you cannot use the percent sign in a shell escape via the exclamation mark, even if the file being edited has no special characters in it.

ipcs

ipcs(1) always reports the number of processes attached to shared memory segments, **NATTCH**, as zero, even when running processes are currently attached to shared memory segments.

The information in the **NATTCH** column is incorrect. To obtain the correct information, follow these steps:

Step 1 Invoke **crash** as **root**.

Step 2 Type **od shminfo 3**. The last word on the line will be the number (in hexadecimal) of shared memory identifiers.

Step 3 Now type **od shmem 6**.

Step 4 Examine the first **shmem** identifier. If the leftmost digit of the third word is in the range of 8 to f (hexadecimal) the identifier is in use, and you can get the address for the next step in the last word on the second line. If the leftmost digit is not 8-f, go to Step 6.

Step 5 Type **od** *address* **3**. The left 4 digits of the last word is a hexadecimal number for the number of processes attached to this identifier.

Step 6 To go to the next identifier, add (hexadecimal) 30 to the address reported in response to **od shmem 6** and enter **od** *address* **6**.

Step 7 Repeat Steps 4-6 until all identifiers in use have been displayed. (The data reported by Step 6 will be all zeros.)

login

After executing **exec login**, the following warning message will be produced intermittently:

```
no utmp entry ... execute from the lowest level shell "sh"
```

If the **who** command shows that someone is still logged in on that line, you must kill the **getty** and allow it to respawn. Otherwise, no action is required.

You can avoid the problem by executing **exec su** - *xxxx* (where *xxxx* stands for a login), or by logging out (that is, hanging up or executing an **exit** command) and calling back in.

lp

If you issue the **lp** command on *file* within a directory that has 700 permissions, the following error messages will be displayed:

```
    lp: can't access file file
    lp: request not accepted
```

cat or **pr** *file* and pipe the output to **lp**.

mailx

mailx changes the modification time of your mailbox (*/usr/mail/login*) so that the timestamp on the mailbox selects the last time new mail arrived, not the last time the mailbox was accessed and changed. In the past, the modification time was the last time the mailbox was accessed and changed.

mailx

Using the command **mailx -f** *a/b*, where *a* is a nonexistent directory, causes **mailx** to pause for a long time, as it continuously tries to access the nonexistent directory. Eventually, **mailx** will time out.

The argument supplied to the **mailx -f** option must be a valid directory.

mailx

The **mailx** command now utilizes the tunable parameter **NOFILES** to represent the maximum number of open files per process. This allows **mailx** to open as many files as are configured on the system.

mv

When using **mv(1)** to move files within a file system, the file's original owner and group attributes are retained. When a file is moved, using **mv(1)**, across file systems, the file is assigned new owner and group attributes that match the user that invokes the **mv(1)**.

od

If a file has an odd number of bytes, **od -c** will report a trailing null byte.

pr

When **pr** is used to print a file containing lines greater than the column width, 80 (for example, **pr -n -i -w80 -160 0f** *file* **¦ lp**), the printer prints a new line and carriage return <CR> and then prints the rest of the line. This causes the printer to print more than the specified number of lines on a page. If more than four or five lines wrap around in this manner, the form feed issued after printing the page will cause a blank page to appear in the listing.

ps

The **ps** command now correctly interprets a non-numeric argument to the **-g** or **-p** options as an error, where previously it was treated as zero.

You should change any shell scripts that rely on the previous incorrect behavior of the **ps** command to reflect the correct operation.

NOTE The **-g** option is used to examine the processes belonging to a particular process group leader, not to a particular user group identifier.

sar

sar produces a table in which CPU time is represented as user, system, waiting for I/O, or idle. This idle figure may not be accurate. If memory is being used extensively, the idle time reflected by the output may not be totally idle. Part of the time could be attributed to waiting for memory.

sdiff

When doing an **sdiff**, if one of the files contains more than 196 characters in one line, the **sdiff** output will lose the separator symbol (¦) or loop infinitely, or both.

Do not **sdiff** a file that contains more than 196 characters in a single line.

sh

When the command **sh -c** *string* is executed, the flag value returned is blank. The correct value is **flag=s**. If the **-c** option and the *string* are piped into the shell command, the correct value will be returned.

Do not try to execute the **sh** command using the **-t** and **-c** options together. It does not work.

sh

A trailing colon in the shell **PATH** variable causes the current directory to be included in command searches.

sh

The **test** and **[...]** commands now use the effective user and group IDs to determine permissible file access, instead of the real IDs as previously used.

The only way to invoke the **test** command with different effective and real IDs is to invoke the command, or a shell script containing it, from a compiled program that has the set user (group) ID on execution permission. Otherwise, the effective IDs are the same as the real IDs, and this change will have no effect. If your program relies on the test operators to behave as they did previously, which is to have **test** use the real user and group IDs, you should change it to use the **setuid**(2) or **setgid**(2) system calls to set the effective ID to the real ID before invoking the **test** command or shell script.

sh

The shell no longer treats the eighth bit in the characters of a command line argument specially; it also no longer strips the eighth bit from the characters of an error message.

If you have any programs that set the eighth bit of characters, they should be changed. You should use one of the standard shell-quoting mechanisms, such as the backslash, instead of setting the eighth bit.

sh

The shell **type** command displays backslashes before each character that was quoted initially.

This change is a result of the change described previously, where the eighth bit is no longer used by the shell to quote characters.

sh

The result of a parameter substitution in a command like

ls "*${a:=xyz abc} lmnop*"

is now correct.

In general, the parameter substitution

${ parameter:=word }

when used inside double quotes and when the *word* contains spaces, now works correctly. If you have programs that rely on the previous incorrect behavior, you should change them to reflect the correct behavior.

shl

If you hang up while in shell layers, */etc/utmp* may not be cleaned up (that is, the **who** command still shows that you are logged in, and the **ps** command shows a **getty** running on that line). If someone else then calls into that line, the **login** fails because the **utmp** entry cannot be found. To kill the **getty** corresponding to the affected line, follow this procedure:

Step 1 Execute **ps -ef** to find the process ID of the **getty** running on the line erroneously reported as occupied.

Step 2 Execute **kill -9** *PID* to kill the **getty**. When the **getty** automatically respawns, the problem will be cleared.

shl

When using the **shl** command, trapping a "hang-up" signal inside a layered shell suspends the layer. This renders the device unusable until the shell is killed. You receive a warning message that a layer is still running, and then you are returned to the UNIX System shell.

If your terminal does not accept input commands because of the suspended layer, you have to log in at another terminal. To kill the suspended shell, follow this procedure:

Step 1 Find the process number of the shell by executing the following command:

ps -eaf

Step 2 Look at the output of the command for the appropriate tty (for example, sxt001) and for the process number of the shell.

Step 3 Enter the following command:

kill -9 *PID*

where *PID* is the process number of the shell that you want to kill.

shl

If you are at the console in **shl** and you execute the following sequence of commands, the shell layer does not respond properly:

1. An **stty** command with a carriage return select style argument (for example, **stty cr3**)
2. An **echo** command
3. An **stty** command with a carriage return select style argument (for example, **stty cr0**)

In particular, the layer's prompt does not return until the Break or Delete key is hit. Once the prompt appears, the output of any command executed does not print fully or at all until you press the Enter key one or more times.

Return to the **shl** control layer and use the **shl** delete command to delete the layer.

shl

If you execute a background process not in a shell layer that sends output to your terminal, and then you enter shell layers [**shl**(1)], some screen output from the original process may be lost. When you enter **shl**, the output from the original process temporarily stops printing on the screen. The screen output resumes when you exit **shl**(1). Loss of data, if it occurs, is noticeable when the screen output resumes.

This is not normal use of the system, and should be avoided.

shl

When resuming a layer of **shl**, the `resuming` *xyz* prompt is often garbled.

vi

Using a named buffer twice in a **vi** map sequence results in the following error message:

```
    Can't put partial line inside macro
```

Use named buffers only once in map sequences.

who

The **who -q** command now lists the login names in space padded fields of equal size and no longer sorts the entries.

If you have any programs that process the output of the **who -q** command, you should inspect them to see if they will still work with the new form of the output.

uucp

In the */usr/lib/uucp/Permissions* file, read/write/execute permissions are defined for each **uucp** login. These permissions authorize remote hosts to read/write/execute local files using **uucp** and **uux** commands. Currently, a file is not readable by giving it read permission in the *Permissions* file.

To make a file readable, both read and write permissions should be given.

uucp

uucp and **uux** are supposed to allow the use of a tilde (˜) with a login name to designate your home directory (for example, ˜phyllis for phyllis' home directory). This works in most cases, but **uux** does not handle tilde expansion in the */usr/lib/uucp/Permissions* file correctly.

You should use the full pathname for the home directory in the *Permissions* file.

uucp

uucp logins, such as **uucp** and **nuucp**, should have distinct user ID numbers. In the */usr/lib/uucp/Permissions* file, different read/write/execute permissions are defined for each **uucp** login. Login names in this file are used to associate permissions with the login. These permissions do not work correctly if more than one **uucp** login has the same user ID. For example, if **uucpa** and **uucpb** both have user ID *10*, and **uucpa** appears before **uucpb** in the */usr/lib/uucp/Permissions* file, then whether **uucp** logs in as **uucpa** or **uucpb**, the permissions will be those of the first user ID (**uucpa**) that matches the user ID requested. Logging in as **uucpb**, which has user ID *10*, means that the permissions will be those of **uucpa**.

To avoid this problem, use distinct user ids for **uucp** logins.

uucp 3.1

The **uucp** command now utilizes the tunable parameter **NOFILES** to represent the maximum number of open files per process. This allows **uucp** to open as many files as are configured on the system.

uulog

If you specify the **f** or **number** option with **uulog** (see **uucp**(1C)), you will not receive a prompt after you execute **uulog.** To regain access to your terminal, press the Break key.

System Administrator Commands

accton

Linking message displays once an hour when system accounting is activated. When system accouting is activated, **/usr/lib/ckpacct** attempts to link **cklock1** to **cklock** even though **cklock1** already exists. This results in an annoying message, which displays every hour, informing you about the link.

adm

Console Monitor Type (monochrome or color)

When the system is installed, the default terminal type for the console is set up for monochrome monitor types. This does not present any problems provided that the console monitor connected to the system is a monochrome monitor. If the console monitor is a color monitor, the console monitor will work like a monochrome monitor. To make the color monitor work correctly, the default terminal type must be changed. This is done by changing AT386-M to AT386 in */etc/profile* and */etc/stdprofile* before users are added to the system. The files may be editted using **ed(1)** [**vi(1)** can also be used if the Editing Package has been installed]. If users have already been added to the system, then this change must be made in their *.profile* file in their home directory.

adm

Arrow keys do not place the cursor as expected

When using the arrow keys to place the cursor at different fields on the screen, the following applies:

UP moves the cursor to the next field either to the right or to the first field on the next line (whichever applies)

DOWN moves the cursor to the previous field either to the left or to the last field on the prior line (whichever applies)

LEFT places cursor at the beginning of the field

RIGHT places cursor at the end of the field

adm

'working' message should appear during input validation

The *working* message displays in the top right-hand corner to indicate that the system is processing the user's request. This message does not appear when the system is validating input entered by the user. Processing is taking place and should be indicated as such.

adm

Upper Case

Most fields require entries to be in uppercase. If the entries are not in uppercase, the entry will be rejected.

adm

SHIFT/TAB

Pressing the SHIFT/TAB keys on the console keyboard elicits a beep instead of changing to the previous form.

adm

Shutdown is Automatic

User is instructed to shut down the system when it happens automatically. When setting up a second serial port, the system displays a message instructing the user to shut down the system. The system will be shut down automatically to configure the port.

adm

Adding/Removing Second Serial Port

When adding or deleting a second serial port, the user is permitted to do this via a remote terminal. The problem is that a system shutdown must be performed during this operation, and that command can only be executed on the system console. So, the addition or deletion of the port will fail when being done remotely. The workaround is to add or delete the port on the system console only.

adm

Unmounting a file system that is not mounted

Unmounting a file system already unmounted does not display error message. When trying to unmount a file system that is already unmounted, the system displays, "Please wait while file system is being unmounted." No processing is done at this point and the system just waits. The user should press the CANCEL SLK to exit.

adm

Mount

Mount File System loops when mounting a hard disk already mounted. When trying to mount a hard disk in the "Mount File System" menu, the User Interface gets into a loop when the hard disk partition is already mounted. An error message displays informing the user that the file system is already mounted, but the user is instructed to press CONT to continue. This forces the system to try to mount the file system again resulting with the same error message and instructions. The user should press the CANCEL SLK to exit the menu.

adm

Mount Help Messages

No 'help' message when CHOICES SLK is pressed in Mount/Unmount File System menus. When in the "Mount File System" or "Unmount File System" menus in the User Interface, no *help* message appears when the CHOICES SLK is pressed.

adm

Unmount

Unmount File System displays file systems that are not currently mounted. When in the "Unmount File System" menu, the system displays file systems that are currently not mounted. It should only display those that are mounted.

adm

Creating File Systems

Creating a file system may dump core with a damaged 360 Kb floppy disk. When in the "Create File System" menu, to create a file system on a 360 Kb floppy disk, if the disk is damaged, the command can fail with a core dump.

adm

Display User Logins

No pop-up menu when there are fewer than four logins in Display User Logins. When in the "Display User Logins" form and there fewer less than four user logins in */etc/passwd,* a pop-up menu cannot be displayed. The only way to select the desired login is to toggle between them, using the CHOICES SLK.

adm

Delete User Login

Users' files are moved to */lost+found.* When deleting a user's login in the "Delete User Logins" form, the files are moved to */lost+found.* This can result in running out of space in the / directory. Check the size of */lost+found* periodically and clean it up when necessary.

adm

Formatting a Floppy Disk

Cannot format another floppy of the same density after pressing CONT SLK. After a successful format of a floppy in the "Disk Operations" menu, you are prompted to remove the floppy and press CONT to continue. The problem is that you are returned to the "Disk Operations" menu instead of being prompted if you would like to format another floppy of the same density.

adm

Printer Queue

Scrolling through the printer queue misplaces cursor. After scrolling through the list of jobs in the printer queue, the cursor is misplaced on the screen. To fix this, the user should use the up/down arrow keys to place the cursor as desired.

adm

Printer Setup

If more than one printer is configured on the system, the system will assume that the default printer is the last one to be configured via the "Printer Setup" menu. If the user wants another printer to be the default in this case, the workaround is to enter the following command at the *shell* prompt:

```
lpadmin -d <printer-name>
```

adm

Printer Setup

Filter field in Printer Setup does not display true value. When in the "Printer Setup" menu, the "filter" field value will always be displayed as YES, regardless to whether the value was changed to NO at some prior point. The system does use the appropriate *model* file (i.e., raw or filtered) even though the value being displayed may be incorrect.

adm

Printer Setup

The AT&T Administration interface (adm) does not allow two different printers of the same type to be set up. For example, if you have two AT&T 475 serial printers that you want to connect to your system, you may add the first printer using 'adm'. Then **lpadmin(1M)** must be used to add the second printer of the same type:

```
/usr/lib/lpadmin -p<name> -i<model> -v<device>
```

For example, if you already have an AT&T 475 printer connected to /dev/tty00, and you want to add a second AT&T 475 printer and connect it to /dev/tty01, you should log in as root and type the following commands:

```
/usr/lib/lpadmin -patt-475.2 -i/usr/spool/lp/model/att455 -v/dev/tty01
/usr/bin/enable att-475.2
/usr/lib/accept att-475.2
```

adm

Printer Setup

Changing the device in Printer Setup does not retain other changes. When updating, for example, the "description" field in either "Serial Setup" or "Printer Setup", if you change the device (e.g., tty port number) and then press SAVE, the "description" field update will not be saved. This is because the device is considered the "key" and changing its value forces the system to display the data for that device, overwriting all the other fields on the form. The user should press SAVE when updating other fields on the form before changing the device.

adm

System Mail

System mail names are not added to the Permissions file. When adding a new system mail name, the system is not being added to the list of "friendly" systems in */usr/lib/uucp/Permissions*. The workaround is to edit the Permissions file manually to add the system name.

at

When the system is installed, the file *at.allow* is delivered with just *root* permitted to use the **at** command. If other logins should be able to use it, the user should be instructed to update this file.

backup

If a multiple floppy diskette backup is cancelled by entering a **q** before the backup completes, the following error message is displayed:

```
An error was encountered while writing to the floppy disk.
```

This error message should be ignored.

backup

When the user invokes **backup** and selects the medium (i.e., floppy or cartridge tape), the software approximates how many floppies or cartridge tapes are needed for the backup. This calculation becomes inaccurate when large amounts of data are being backed up and the amount of removable media is underestimated. Therefore, extra media should be ready in case it is needed.

cpio

Cartridge Tape Driver hangs in rare instances when using **cpio**. This problem occurs rarely when using **cpio -i**. If the files you are reading are about 4K in size, the tape drive light may not go off even though the read has finished. **ps** verifies that the processes have indeed been killed. Upon trying to access the tape again, the user will see the message

```
/dev/rmt/c0s0:  cannot create
```

crash

The **t** command in **crash** does not work correctly. Sometimes it will cause **crash** to core dump if the kernel stack is corrupted.

crash

crash prints out swapped while the **trace** or **proc** command examines a swapped-out process. Because u-blocks are not swapped in System V Release 3.0, **trace** and **proc** have no problem with swapped-out processes. In Release 3.1, **trace** works for swapped-out processes only when **crash** is examining a live system. While reading a system dump, the Release 3.1 **crash** cannot access swapped-out u-blocks because those u-blocks are not included in the system dump. An error message will be printed out when the **trace** command is invoked on a swapped-out process. However, in Release 3.1 **proc** can get command names from both the core image and the system dump.

crash

The **crash(1M)** command now utilizes the tunable parameter **NOFILES** to represent the maximum number of open files per process. This allows **crash** to open as many files as are configured on the system.

crash

The **help** command in **crash** displays commands that are not supported. When using **help** in the **crash** command, it displays usage messages for commands that are not supported (i.e., *major* and *mmu*.)

cron

The following message means that during shutdown, **cron** processes are killed:

```
cron aborted: SIGTERM
```

This message is normal.

dcopy

The usage message issued by **dcopy** does not list all options appropriately. When summarizing, **dcopy** prints the new gap and cylinder sizes when it says that it is printing the old information. The new sizes are, however, printed correctly.

dcopy

dcopy -f recreates the file system based on the `block:inode` count given; however, the blocks specified are assumed to be logical blocks (physical blocks = 2 x the number specified), and the inode count is assumed to be 16 x the number of inodes requested. Thus, **dcopy** does not accept the inode or block count specified to be the actual number of inodes or physical blocks required, as other commands (for example, **mkfs**) do.

dd

Some floppy disk operations allow a 360 Kb diskette to be accessed as a 1.2 Mb diskette, since errors will not occur until at least 2 blocks have been read.

For example, the following will succeed:

```
dd if=/dev/rdsk/f0q15d of=/dev/null count=1
```

while this will fail because the error is detected after 2 blocks have been read:

```
dd if=/dev/rdsk/f0q15d of=/dev/null bs=15b count=3
```

dfspace

When the system has no more space available on the hard disk, the */etc/dfspace* command reports negative space available instead of no space.

dirname

The **dirname** command now properly parses the names // and // *anything* /.

errdump

When no errors have been logged, the **errdump** command does not cleanly handle it.

If messages show that **NVRAM** is invalid, or that panics occurred in January, 1970, it means that nothing has been logged.

file

The **file** command incorrectly reports that a core file is file type *English Text* instead of *Data.*

fdisk

fdisk is not completely compatible with DOS 3.3. First, it does not recognize DOS extended partitions (i.e., a second logical disk on the first physical disk drive). Second, partitions of type "other" created under the UNIX system hang the system when running DOS 3.3 **fdisk**. Finally, **fdisk** allows you to create multiple DOS partitions of which only the first one can be used under DOS 3.3.

fdisk

A problem exists when invoking **fdisk** on a hard disk which contains an odd number of cylinders. If the user enters percentages (i.e., changes the defaults) to specify the sizes of various partitions, the resulting sum will not equal 100%. The reason for this is that one cylinder is lost due to the rounding of the first cylinder selected. In the case of an odd number of cylinders, the last cylinder in the partition will always be an integer + .5, rounding up the next highest integer. As a result, the second partition will appear in the **fdisk** table as being a cylinder less than what it actually is. The entire disk is being utilized, but the table information is incorrect for this case.

format

format(1) will not complain when an attempt is made to format a 360 Kb floppy when a 1.2 Mb floppy is inserted into the drive.

For example, with a 1.2 Mb floppy diskette inserted into the drive, type:

```
format /dev/dsk/f0d9dt
```

This will not complain that the diskette that was inserted into the drive is not the correct density, and the format will appear to have been completed successfully when indeed it has not.

format

When attempting to perform some floppy disk operation without first inserting a floppy disk into the drive, the system will continue to attempt to access the floppy until a floppy disk is inserted. If this should occur on the system, a floppy disk should be inserted.

fsba

512-byte file systems are not supported. 1 Kb is the default filesystem size.

fsck

If you use **lseek** to skip over entire blocks of a file being written, the kernel assigns a block number of 0 to the skipped blocks. Reads of any bytes in those blocks correctly return a value of 0. However, because the number of "non-zeroed" blocks allocated to the file is consistent with the length of the file, an **fsck** of the file system produces the following message:

```
POSSIBLE FILE SIZE ERROR
```

Core dumps sometimes occur in these circumstances.

There is no damage to the file system. If the file size error messages are bothersome, you can eliminate them by determining the name of the file corresponding to the inode that has the "possible error" with **ncheck**(1M) and, after mounting the file system, copying that file to a temporary file and then back to its original name. Blocks are allocated on the copy to hold all the bytes with values of 0.

fsck

If */tmp* is filled up with enough file names to run the **root** file system out of inodes, an **fsck** of the file system can produce a `POSSIBLE DIR SIZE ERROR` message. The file system itself is not damaged.

If the error messages are bothersome, you can eliminate them by running **init 1**, moving the contents of the directory that provokes the message to a temporary place, removing and recreating the directory, and then moving the files back. For example:

```
# cd /
# mv tmp badtmp
# mkdir tmp
# find badtmp -print ¦ cpio -pdv tmp
# rm -rf badtmp
# init 2
```

Do not change directory modes and permissions or the modes and permissions of the files in that directory.

fuser

fuser -k *file1 file2* does not kill all processes using *file2*. It will kill the processes using *file1* (as specified on the manual page), but the **-k** flag is turned off before the processes using *file2* are found.

fuser -k *file1* **-k** *file2* works correctly.

fuser

The **fuser** command now utilizes the tunable parameter **NOFILES** to represent the maximum number of open files per process. This allows **fuser** to open as many files as are configured on the system.

getty

If a **getty** is spawned from */etc/inittab* on a non-existent terminal, it will fail after printing an appropriate error message. However, if this **getty** fails before the console **getty** opens the console terminal, it will be the first process to open it, and the console becomes the controlling tty for the failed **getty**. This action prevents the console **getty** from getting the console as the controlling tty, and you will be prevented from logging in to the console with the following error message:

```
Login incorrect
```

To correct this problem, log in to the contty or one of the ports, edit */etc/inittab* to turn off the **getty** producing the error message, and re-boot the machine.

init

init S drops the remote line and changes speed to 9600 baud when entered from a remote terminal.

Only use **init** from the console.

init

Executing **init s** from within **shl** layers causes inconsistent results. Sometimes, the machine may hang after printing the following message:

```
init: single user mode
```

Other times, the system may not really change run states. At no time within **shl** layers does **init s** do what it is supposed to do.

init

The **init** command now reads an environment file when it first begins to run. It uses the contents of that file to retrieve default environment variable settings, and it passes these settings into the environment of all processes it spawns.

The **init** command now reads the file */etc/TIMEZONE* to retrieve the **TZ** environment variable setting for the system it is running on. The retrieved **TZ** value, as well as a default **PATH** value, is then passed into the environment of every process spawned by **init**. Formerly, the only environment information passed to processes spawned by **init** was a value for **PATH**; all other environment variables were left uninitialized. Now, up to five environment variables can be specified in the */etc/TIMEZONE* file. This provides the ability to specify systemwide default values for environment variables, including values that may be useful for international systems, such as default character sets.

init

The **init** command now utilizes the tunable parameter **NOFILES** to represent the maximum number of open files per process. This allows **init** to open as many files as are configured on the system.

layers

Cannot run **layers** when *$DMD* shell variable is set. Running *layers* when the *$DMD* shell variable is set does not work because **layers** and **layersys** are located in */usr/bin* and */usr/lib* respectively. They are located in *$DMD/bin* and *$DMD/lib* on other versions of the UNIX system. In order for **layers** to work, you must not set *$DMD*. This is a limitation of the 386 system if it is to be compatible with other versions of UNIX System V.

mkpart

mkpart -A 44001 disk0 produces a warning message. When the user enters

```
mkpart -A 44001 disk0
```

to add sector number 44001 as a bad sector, the system responds with the warning message

```
WARNING: V_REMOUNT io control failed.
```

This may result from one or more of the partitions on the hard disk being open. The disk must be remounted manually or the system rebooted for any changes in the partition or alternate sectors to be usable. The bad sector is added and replaced by a good sector, but the warning message is somewhat confusing.

mkpart

When formatting a hard disk using the **-F** option to **mkpart**, the factory marked bad tracks are preserved. Also, if **mkpart** detects factory marked bad sectors, **mkpart** will mark the entire track bad. **Mkpart** will display messages when bad tracks are detected and when they are marked bad. A summary message will be displayed when **mkpart** completes formatting.

mkpart

Since automatic bad block handling is supported by this release, the **-A** option to manually map bad sectors is no longer appropriate. The **-A** option to **mkpart** should be avoided.

mkfs

512-byte file systems are not supported. 1 Kb is the default filesystem size.

mkfs

It is possible to build a file system with **mkfs** (using default inode number) larger than the size of the floppy. It is also possible to create a file larger than the actual number of blocks on this file system (2400 blocks for a 1.2 Mbyte floppy, and 720 blocks for a 368 Kbyte floppy). A later **fsck** does not complain about either anomaly. It is only when you have to read the file that the read fails.

Create file systems on floppies through the user interface instead of with **mkfs**.

mount

When a **mount** is done, the permissions used for directory access to the mounted file system are those of the mount point directory. However, the visible permissions when executing **ls -al** at the mount point are the permissions of the ".." directory in the mounted file system and are misleading. For example:

- The mount point directory before mounting the file system:

  ```
  drwxr-x---        mnt    (permissions 0750)
  ```

- The entry in the file system to be mounted:

  ```
  drwxrwxrwx        mnt    (permissions 0777)
  ```

- After the file system is mounted on the mount point directory, the visible permissions are:

  ```
  drwxrwxrwx        mnt    (permissions 0777)
  ```

  while the real permissions are:

  ```
  drwxr-x---        mnt    (permissions 0750)
  ```

Thus, any program that attempts to read */mnt/..* after the file system is mounted fails, since read access is denied because it is based on the real permissions of the mount point directory.

NOFILES

When the **NOFILES** parameter is set to 70 and above, a file table overflow occurs if you execute two processes that open the maximum number of open files. When incrementing the **NOFILES** parameter to 70 and above, you should also increase the **NFILE** parameter by 2.5 to 3 times the **NOFILES** parameter. This will alleviate any file table overflows since **NFILE**'s default value is only 150.

passwd

When attempting to change a user's password using the **passwd(1)** command, the new password can be set to a carriage return.

prfld

If the number of text symbols in **/unix** exceeds 2048, the **prfld** command will fail with the following error message:

```
error: too many text symbols.
```

A new configuration parameter, **PRFMAX**, was added to the */etc/conf/cf.d/mtune* master file. If the system contains more than 2048 symbols, the **PRFMAX** value should be updated, and the system administrator should:

```
# cd /etc/conf
# /etc/conf/bin/idbuild
# mv /unix /ounix
# mv /etc/conf/cf.d/unix /unix
# shutdown -y -i6 -g0
```

to create a system that is capable of handling more symbols.

pwd

pwd fails for path lengths greater than 512 bytes.

restore

restore incorrectly prompts the user to insert the floppy. When doing a selective restore, the screen clears and the **restore** command instructs the user to insert the floppy and not to remove it. Control returns to the User Interface so that the user can mark the files to be restored. The screen clears and **restore** prompts you again to insert the floppy.

shutdown

You cannot use **shutdown**(1M) to return to **init** state 2 from state 3. If you try, you will get the following error message:

```
shutdown: Initstate is not for system shutdown
```

shutdown

Sometimes when you **shutdown** to single-user mode, the unmount of the */usr* file system fails with the busy error. Manually unmount */usr*.

spell

Running **spell** on an executable file causes a core dump. The **spell** command dumps core when it is run on an executable file.

swap

If there is a heavy process load on a system with a small memory capacity, the **swap** command may silently fail (that is, complete without any error indication) when attempting to add a swap area.

Retry the command when the load on the system decreases. If this is a recurring problem, try to reduce the load on the system or increase the amount of memory on the machine.

sysdef

The usage message for **sysdef** is incorrect. Currently, the usage message for **/etc/sysdef** is:

```
/etc/sysdef [system_name] [master.d]]
```

Since */etc/master.d* has been replaced by */etc/conf*, the usage message should be changed to:

```
/etc/sysdef [system_name] [conf]]
```

sysdef

The **sysdef** command only lists tunable parameters. The output of the **/etc/sysdef** command lists only the tunable parameters. It does not list all hardware devices, their local bus addresses, unit count, pseudo devices, loadable modules, and system devices as might be expected.

sysdef

sysdef does not display the following tunable parameters: **SHLBMAX**, **GPGSMSK**, and **PUTBUFSZ**.

uadmin

The **uadmin** reboot option is not supported. The reboot option of the **uadmin** command is not supported on the 386. This precludes an adminstrator or installation script from rebooting the machine when a new UNIX system kernel has been configured.

uadmin

Machine can be rebooted from a remote terminal via **uadmin**. When a user is logged on via a remote terminal and uses **su** to become *root*, the machine can be rebooted from the remote terminal by executing the command, **uadmin 2 0**. This conflicts with the **shutdown** command, which cannot be executed remotely.

umount

If you attempt to **umount -d** a disk file system, the error message returned will be as follows:

```
Warning: /dev/dsk/1sx was not in mount table
```

The **-d** option is valid only for remote **umounts**.

uucheck

uucheck without any options prints nothing; you should always use the **-v** option with **uucheck**.

You cannot ask for different levels of debugging information with **uucheck -x**.

uucheck, uucleanup, Uutry

Most of the Basic Networking Utilities commands can be executed by users. The exceptions are **uucheck** and **uucleanup**, which require either an administrative (**uucp**) login or a **root** login.

uucheck, **uucleanup**, and **Uutry** are located in the */usr/lib/uucp* directory, which is not in the search path for most logins, including those for **uucp** or **root**. Therefore, you must give the full path name, or you must be in the */usr/lib/uucp* directory to execute these three commands.

Another alternative is to link the command where it may be easily accessed, for example, */usr/bin*.

uucico

It is possible to get **uucico** into a runaway state when you use it through the STARLAN network under extremely heavy network load. For example, the process may accumulate too much time (2500 minutes of CPU time).

Suppose on machine_A you have a **uucico** to machine_B with suspiciously high CPU time. Log in to machine_B and execute **ps -ef**. Look at the output of the **ps** command for a **uucico** process talking to machine_A (that is, with a command line argument like `—s machine_A`). If there is such a process, the connection is still active. If there is not, the **uucico** on machine_A is in a runaway state.

If **uucico** is in a runaway state, do the following:

Step 1 Kill the **uucico** process with **kill -9** *PID*, where *PID* is the process ID of the looping **uucico**.

Step 2 Remove the associated lock file with

rm /usr/spool/locks/LCK..*machine*

where *machine* is the system where the **uucico** originated, for example, machine_A.

Uutry

When you are using the Basic Networking Utilities over a transport provider, and a remote system listens on an address different from that in the local *Systems* file, trying to **Uutry** to the remote system results in the following error message:

```
        Connect failed: NO DEVICES AVAILABLE
```

This message does not necessarily imply that there are no available devices on the local system. However, it does mean that **Uutry** has failed after opening a device and before achieving a connection.

This failure could be caused by a variety of problems, including no devices available on the local system or the address in the **Systems** file being incorrect. To see the local devices that are in use, type **uustat -p**.

volcopy

While executing **volcopy**(1M), you have the option of hitting Delete to obtain a shell. On exiting the shell, **volcopy** fails, dumps core and prints the error message:

```
        bus error- core dumped.
```

volcopy

Even though **volcopy -y** is supposed to answer all the questions **volcopy** asks affirmatively, you still have to reply to the first question. **-y** is an undocumented option.

volcopy

volcopy prompts you for several questions; however, if **volcopy** is run in the background, the prompts do not appear on your screen even though **volcopy** is still waiting for the response from your terminal. Do not run **volcopy** in the background.

Miscellany

Cartridge Tape Utilities

The Cartridge Tape Add-on installation changes the permissions of the 'tape.h' header file. After installing the Cartridge Tape Add-on, the installation script will have changed the permissions of *tape.h* in */usr/include/sys* from modes 444 to 755.

Floppy Operations

Some error messages from floppy operations appear only at the console, regardless of which terminal invoked the floppy command from which the error originated. This is true for all errors detected and displayed by the device drivers.

Floppy Operations

Sometimes reading from a 360 Kb disk drive may fail and it will appear as though the floppy disk drive door is not closed. If this should occur, reinsert the floppy disk and close the drive door.

Floppy Operations

On some 80386 computers, the system will not recognize that the floppy disk drive door is open if the floppy disk is completely inserted into the disk drive and the door is left open. To correct this, make sure that the floppy drive door is always closed when a floppy disk is completely inserted.

Keyboards

Some keyboard keys are not mapped properly for the console. There are three keys on the console keyboard which are not being mapped correctly due to problems with the *terminfo* entry for *at386*. They are as follows:

Prt Sc	is mapped to	*Insert*
Scroll Lock	is mapped to	*Delete*
Pause	is mapped to	*Num Lock*

Longest Allowed Pathnames

The longest pathname is now restricted to 1024 bytes. System calls that require pathnames as arguments will now fail, setting **errno** to **ENOENT**, if a longer pathname is given.

Previously, the pathname was not restricted by the UNIX Operating System; however, most programs gave an ad hoc limit to the length. Generally, these limits were well below 1024 bytes, so most programs should not be affected by this change.

The **limits.h** file defines a macro **PATH_MAX** to be the longest length of a pathname. In Release 3 this file incorrectly sets the macro to 256, but it will probably be changed in a future release to 1024. Local system administrators can safely change the value for **PATH_MAX** to 1024 without harm, since the Release 3 system internally uses the longer limit.

We encourage you to include the *limits.h* file with a statement like

```
#include <limits.h>
```

and refer to the **PATH_MAX** macro for the longest pathname allowed.

console

If you are running **shl** on the console, and you then run **shutdown -is**, the console will hang.

Exit **shl** before executing **shutdown**.

Kernel

The process accounting computation of a process's memory usage is incorrectly maintained. The value calculated for process memory usage is slightly less than the real result.

Kernel

When a program executes integer division by zero, the following error message is displayed:

```
floating exception - core dumped
```

This message does not accurately describe the error.

Kernel

Processes spawned by the kernel at boot time (**sched, /etc/init, vhand, bdflush**) have start times (**STIME**), that is the time the system was last brought down, not the time they were spawned.

Kernel

Some core dumps may have possible file size errors reported by **fsck**, but these are only warnings and can be ignored. To determine whether the possible file size errors reported are resulting from core dumps, execute **ncheck -i** *i-number*, where *i-number* is given in the **fsck** message:

```
POSSIBLE FILE SIZE ERROR I=i-number
```

ncheck will generate the pathname of a file from its inode number, *i-number*.

Kernel

If the operating system runs out of free **clists**, all input/output activity from/to terminal ports and the console will cease. No warning message is printed by the system to show that it is out of **clists**.

Kernel

The value of the **SHMALL** tunable parameter specifies the maximum number of in-use shared memory segments allowable systemwide. This parameter is not checked by the system [that is, **shmget**(2) does not check this limit].

Saving Device Files When Backing Up root File System

When you back up the **root** (/) file system, the device files (*/dev* directory) are not saved as part of the backup. To save the device files, become the superuser, mount a blank formatted floppy that has a file system on it, and enter the following commands:

```
# mount /dev/... /mnt
# find /dev -print ¦ cpio -pdl /mnt
```

where */mnt* is the directory on which the floppy disk file system is mounted. The **cpio** options are lowercase letters **p, d**, and **l**.

To restore the files, insert the floppy on which the files were saved, and enter the following commands:

```
# /etc/mount /dev/dsk/f0q15d /mnt
.
.
.
# cd /mnt
# find . -print ¦ cpio -pdl /dev
.
.
.
# /etc/umount /dev/dsk/f0q15d
```

Read/Write Permissions for Basic Networking Do Not Work

The read/write permissions for the Basic Networking Utilities do not work correctly. For a system to be able to read a directory, the target machine must also have granted the system write permissions (*/usr/lib/uucp/Permissions*). Suppose that your system has read permissions in **root** and write permissions in */usr/tmp*. The following command fails:

```
uux "A!pr A!/etc/inittab > A!/usr/tmp/B.out"
```

However, if your system has read permissions in *root* and write permissions in */usr/tmp* and */etc*, the above command line succeeds.

Converting to getopts By Hand

getoptcvt [see **getopts**(1)] adds about 30 lines of code to a shell script, so you may want to convert scripts by hand instead. Converting by hand probably will make the code cleaner and easier to understand. Also, you do not have to worry about parsing option-arguments that are also options.

Follow these guidelines to convert most scripts that currently use the **getopt**(1) command.

Step 1 Delete the old invocation line and the **if** statement that checks the exit code.

Step 2 Change the **for** loop to a **while** loop that invokes **getopt**(1).

Step 3 Change the patterns in the **case** statement from **-option** to single option letters.

Step 4 Delete the case for --.

Step 5 Add a case for '**?**'. This case may be used to print the usage message and to exit with a non-zero exit code. Note that the **?** is quoted since it is interpreted for filename expansion.

Step 6 Remove all **shift** commands within the **case** statement.

Step 7 Change **$2** to **$OPTARG** for cases that require an option argument.

Step 8 Add the statement **shift `expr $OPTIND - 1`** after the **while** loop so the remaining arguments can be referenced as before. Following is an example of a script before and after conversion:

```
# before conversion
set -- 'getopt abo: $*'
if [ $? != 0 ]
then
        echo $USAGE
        exit 2
fi
for i in $*
do
        case $i in
        -a | -b)        FLAG=$i; shift;;
        -o)     OARG=$2; shift 2;;
        --)     shift; break;;
        esac
done
```

```
# after conversion
while getopts abo: i
do
        case $i in
        a | b)  FLAG=$i;;
        o)      OARG=$OPTARG;;
        ?)      echo $USAGE
                exit 2;;
        esac
done
shift 'expr $OPTIND - 1'
```

If you want your script to work on releases before UNIX System V Release 3 (that is, use either **getopts** or **getopt**), convert it as the following example shows:

```
if [ "$OPTIND" = 1 ]
then
        while getopts abo: i
        do
                case $i in
                a | b)  FLAG=$i;;
                o)      OARG=$OPTARG;;
                ?)      echo $USAGE
                        exit 2;;
                esac
        done
        shift 'expr $OPTIND - 1'
        echo $*
else
        set -- 'getopt abo: $*'
        if [ $? != 0 ]
        then
                echo $USAGE
                exit 2
        fi
        for i in $*
        do
                case $i in
                -a | -b)        FLAG=$i; shift;;
                -o)     OARG=$2; shift 2;;
                --)     shift; break;;
                esac
        done
        echo $*
fi
```

Basic Networking Utilities: Intelligent Modems

Features have been added to the */usr/lib/uucp/Dialers* and */usr/lib/uucp/Devices* files to prevent problems that occur when using System 75s, System 85s, Hayes-compatible modems, and other intelligent modems that do not keep Carrier Detect (CD) high all the time.

Devices Adding a **,M** to the second field of an entry in the *Devices* file will cause the O_NDELAY flag to be set when the device is opened. This prevents BNU software from blocking on the device while waiting for CD. The example below shows how to add the **,M** to a *Devices* file entry for a device connected to an automatic call unit for a Hayes modem.

```
ACU tty11,M - 1200 hayes \T
```

Dialers Adding **\M** before the chat script in a *Dialers* file entry will set **CLOCAL**, preventing any change in the CD lead from resetting the state of the device. Once the conversation is established, **\m** will clear **CLOCAL**. This will allow BNU to again monitor changes in CD (for example, to notice if the line drops). The following example shows how to add **\M** and **\m** to an entry for a Hayes modem in the *Dialers* file.

```
hayes  "=,-,"  ""  \M\dAT\r\c OK\r \EATDT\T\r\c CONNECT \m\c
```

NOTE For some devices, it may be necessary to add a **\p** after the **\M**.

Security Notes

Enhancements to Security

Some improvements in security have been made in 386 UNIX System V Release 3.1. This section provides information about some of these improvements.

Sticky Bit

Public directories like */tmp, /usr/tmp,* and any other directories writable by the world or by a group, are vulnerable to the removal of their files by any process. This poses a serious problem to the integrity of files contained in those directories, as well as to the overall security of the system. To avoid potential security problems, a solution is to use the "sticky bit" on a directory to show the restriction on the removal of objects within the directory.

In this release the sticky bit is set (by default) on the public directories */tmp* and */usr/tmp*. Before a user can remove files or directories from these publically readable and writable directories, some special requirements (given later in this discussion) must be satisfied. Formerly, anyone could remove any file or directory in */tmp* and */usr/tmp*.

New in this release is the added functionality of the sticky bit on a directory being settable by a user. In previous releases of UNIX System V, the sticky bit could only be set by the superuser. If a directory is writable and the sticky bit is on, a user can only remove a file in that directory if one or more of the following is true:

1. The user owns the file.
2. The user owns the directory.
3. The file is writable by the user.
4. The user is the superuser.

For information on how to set the sticky bit, see **chown**(1) in the *User's/System Administrator's Reference Manual.*

The sticky bit on a directory is set by a regular user via the **chmod**(1) command and the **chmod**(2) system call. The new file deletion semantics will be controlled by the **unlink**(2) and **rmdir**(2) system calls, because all commands that remove files [i.e, **mv**(1), **rm**(1), and **rmdir**(1)] use those calls to do the removal.

Shadow Password

The shadow password file has been implemented in 386 UNIX System V Release 3.1. Encrypted passwords and their aging information are being moved to an access-restricted file called the "shadow password" file (*/etc/shadow*). The shadow password file will only be readable by **root**.

The shadow password file contains one entry per login. Each entry consists of the following information:

username The user's login name (ID).

password A 13 character encrypted password for the user or a *lock* string to indicate that the login is not accessible.

lastchanged The number of days since January 1, 1970 that the password has been modified.

min The minimum number of days required between password changes.

max The maximum number of days the password is valid.

User Commands

cron

When **cron**(1) completes a job, it sends a mail message to the user. This mal message had been sent by **root** but will now be sent with the ID of the user who initiated the cron job.

login

In the past, 10 login attempts were permitted before the line would be dropped. That limit is now changed to 5 attempts. After the fifth unsuccessful login attempt **login**(1) will sleep for 20 seconds before dropping the line.

mail

The following special characters are not valid in the mail forwarding line:

; & ¦ < > ' ‘ " ? * [ ] { } ( ) $ # ˜ \

If a special character is encountered in the "forward to" line, the mail will be returned to the sender with the message

```
invalid address
```

uucp

System names must not contain unprintable characters or any of these special characters:

; & ¦ < > ’ ‘ " ? * [ ] { } ( ) $ # ˜ \

The **uuxqt** daemon will not perform remote execution requests for systems whose names contain any of these characters.

System Administrator Commands

cu

A new entry called **uudirect** is defined in */usr/lib/uucp/Devices.* When doing a **cu**(1) from machine A to machine B on a direct line where **uugetty**(1M) is running on that line on the remote machine, an extra carriage return must be sent so that **uugetty** knows whether it is an incoming or outgoing line. In the */usr/lib/uucp/Systems* file, **uudirect** should be used for the *devices* field. For more information on this file, refer to the *User's/System Administrator's Guide.*

loginlog

To enhance **login**(1) security the time of last login will be displayed after logging in. To turn on the mechanism that logs unsuccessful attempts to access the system, the administrator must create the file */usr/adm/loginlog.* If the file *loginlog*(4) exists and five consecutive unsuccessful login attempts occur, all will be logged in *loginlog,* then **login** will sleep for 20 seconds before dropping the line. In other words, if a person tries five times, unsuccessfully, to log in at a terminal, all five attempts will be logged in */usr/adm/loginlog* if the file exists. The **login** component will then **sleep** for 20 seconds and drop the line. If a person has one or two unsuccessful attempts, none of them will be logged.

To enable logging, the log file should be created with read and write permission for owner only. It should be owned by **root** with group **sys**.

The */usr/adm/loginlog* file is a text file. It will contain one entry for each unsuccessful attempt. Entries in */usr/adm/loginlog* will have the following format:

login name:tty specification:time

The *login name* field contains the login name used in the failed login attempt. The *tty specification* field contains the terminal location of the login attempt, and *time* contains the approximate time of the login attempt. The default is for this file not to exist and for logging to be turned off.

lp Commands

The **disable** command can be made non-executable for regular users by logging in as **root** or **lp** and executing

```
chmod 4550 /usr/bin/disable
```

The **cancel** command can be made non-executable for regular users by logging in as **root** or **lp** and executing

```
chmod 4550 /usr/bin/cancel
```

pwconv

If you attempt to run **pwconv**(1m) on */etc/passwd* that has an incorrectly formatted line (for example, one with too many colons), **pwconv** will stop scanning at the bad line. It will complete the conversion, but the new password file and the */etc/shadow* files will both have too few lines. You will still be able to recover the original */etc/passwd* by restoring the old file stored as */etc/opasswd*. To restore the old password file, follow these directions:

Step 1: Replace the new password file with the original one.

```
mv /etc/opasswd /etc/passwd
```

Step 2: Remove the shadow password file.

```
rm /etc/shadow
```

Step 3: Find and correct the bad entries in */etc/password* using **vi**(1) or **ed**(1).

NOTE The recommended way of changing the password file is with the tools provided, not with the editors. However, because the only way to corrupt a password file is by using an editor, that becomes the only way to correct the error as well. The use of any of the editors is still NOT recommended.

Step 4: Run **/usr/bin/pwconv** again.

/usr/lib/uucp/remote.unknown

The *remote.unknown* file has been changed from a shell script to a C language executable program. *remote.unknown* is part of the Basic Networking Utilities software. When an unknown machine starts a conversation with the local machine, *remote.unknown* logs the conversation attempt.

/usr/spool/cron

The */usr/spool/cron* directory that contains directories for **at**(1), **cron**(1), and **crontab**(1) jobs will no longer be accessible by users. The directory mode will now be set to 700.

/usr/spool/uucp

Except for **root**, users will no longer be able to write in the */usr/spool/uucp* directory or any directories under it. The directory mode will now be set to 755.

Compatibility Notes

Shell Scripts

It is strongly recommended that all applications convert any shell scripts into binary programs if specific user (group) permissions are required in the shell script command lines. To pass permissions, the binary program must have the setuid (gid) mode bit on and the owner (group) of the binary program set to the ID required. Then the **exec**(2) system call can be invoked with the binary program as the argument and the correct permissions will be passed.

If it is not possible to convert the shell scripts into binary programs, then a binary interface program must be written that would have the setuid mode bit on and the owner of the file set to **root**. Next, the process would have to do a **setuid** (**gid**) system call internally with the uid (gid) that must be passed to a sub-shell. This is only possible because the **setuid** (**setgid**) system call sets both the real and effective uid (gid) when called by a process with the effective uid of **root**. Finally, the binary interface would then call the shell script. This is a potentially dangerous procedure unless the programmer is aware of all the implications.

PATH

The default **PATH** environment variable searches the current directory first. A superuser unknowingly may run a program in the current directory. The superuser should change the **ROOTPATH** so that the current directory is searched last instead of first.

login

To discourage intruders, the encrypted password and password aging information formerly found in */etc/passwd* has been moved to */etc/shadow*. This file can only be read by the superuser. Users will still be able to change their passwords using the **passwd**(1) command. Password and aging information is added to */etc/shadow* by running a new program, **pwconv**(1M). This program can only be executed by the superuser.

If you have an application or program that writes password and/or aging information into */etc/passwd*, the program will have to be modified so that **pwconv**(1M) is executed after the information is appended to */etc/passwd*. Until the modification can be made, the administrator with superuser privilege will have to run the program before the user who has been added or whose password information has been modified can log in.

ps

In 386 UNIX System V Release 3.1 the usage of **ps** has changed. Now **ps** checks and sets the user's effective UID to the real UID and the effective GID to the real GID. Therefore, only users with a real user id of **root** or a real group id of **sys** will be able to use these options to **ps**.

edit, ex, vedit, vi, view

The **edit**, **ex**, **vedit**, **vi**, and **view** commands allow separate *.exrc* files in any directory. In addition, if you change directory to another user's directory and use any of these editors to edit a file in that other user's directory, the editor will execute the *.exrc* file if it exists in the second user's directory. This functionality has security implications depending on the contents of the *.exrc* file, because the commands are executed as the user invoking the editor and not as the person who owns the *.exrc* file.

In this release a new option has been added to the **vi/ex** commands to allow you the option of reading the *.exrc* file in the current directory. Initially, the flag is NOT set. That is, the **vi/ex** command will NOT read the *.exrc* file if it exists in the current working directory. You can modify this option by inserting the line

```
set exrc
```

or the abbreviation

```
set ex
```

in the *$HOME/.exrc* file which is read when one of these editors is executed if the **EXINIT** variable is not set in the *.profile*. If you want to set the **EXINIT** variable, add the following lines to your *.profile*:

```
EXINIT="set exrc"
export EXINIT
```

However, you should note that executing **vi/ex** as another user with **su** could result in your files being compromised, since certain variables in the environment are passed when **su** is executed without the "-".

For more information, see the **ex**(1) manual page in the *User's/System Administrator's Reference Manual.*

Internationalization Software Notes

Below is a description of functionality differences that exist between 386 UNIX System V Release 3.1 international features and System V Release 3.0. The changes for each component are described along with any potential compatibility problems.

Functionality Changes

The following commands have functional differences in Release 3.1: **awk**, **cat**, **cpio**, **date**, **ed**, **egrep**, **find**, **grep**, **ls**, **make**, **mount**, **pg**, **pr**, **sed**, **sort**, and **vi**. These changes were made to implement 8-bit cleanup, date and time conventions, and character classification of different character sets. A few changes were also made to fix existing problems and for other enhancements. At the end of the section there is a list of new and changed environment variables.

Command Changes

cat 3.1

The **cat** command was changed to remove its dependency on the ASCII code set when used with the **-v**, **-e** and **-t** options. The output of **cat** depends on the character classification table used. All printable characters will be printed as the characters themselves. ASCII non-printable control characters will continue to be printed as ^**C**. Non-printable 8-bit characters will still be printed as **M-x**, where **x** is the character specified by the low order 7 bits. The environment variable **CHRCLASS** is used to determine if a character is printable.

This change should not present compatibility problems because the functionality change only occurs when the **CHRCLASS** environment variable is set.

cpio 3.1

The date output of the **-vt** option to **cpio** has changed, depending on what value the environment variable **LANGUAGE** has. In particular, the abbreviated month names will be displayed in the appropriate language.

This change should not cause compatibility problems because the changed behavior occurs only when the **LANGUAGE** variable is set.

date 3.1

The formatting software provided by the **date** utility has been moved to the **cftime** function in the C library, and **date** invokes the **cftime** routine with the appropriate arguments. **date** now supports date settings after the turn of the century and uses the environment variables **CFTIME** and **LANGUAGE** to define a default output format and to specify different languages.

These changes should not cause any compatibility problems if you do not use the internationalization features, because **date** functions differently only when the new environment variables are set, or a format string has extra characters for a century setting.

ed 3.1

ed no longer complains when a file has non-ASCII characters. The high-order bit is not stripped when reading in input and **ed** commands. If an encryption key is set, and the **CHRCLASS** environment variable is set to a non-null value and does not have the value **ascii**, **ed** now uses a different heuristic to determine if a file is encrypted. **ed**'s **l** command now prints octal codes for non-printable 8-bit characters. Also, **ed** now allows 8-bit characters in regular expressions. See the section on **regexp.h**, and the **-c** and **-x** options on the **ed**(1), **edit**(1), **ex**(1), and **vi**(1) manual pages in the *User's/System Administrator's Reference Manual.*

The changed behavior occurs only when **ed** is used with 8-bit characters. A different heuristic for determining if a file is encrypted is used only when the **CHRCLASS** environment variable is set.

egrep 3.1

egrep now allows 8-bit characters in regular expressions and matches 8-bit characters in files correctly. Also, **egrep** uses the **CHRCLASS** environment variable to convert regular expressions and text to all lowercase for the **-i** option. This should not cause any problems because the functionality change occurs only when a new environment variable is set.

expr 3.1

expr now processes 8-bit characters in regular expressions. These changes are described in detail in the section on **regexp.h**.

find 3.1

find now processes 8-bit characters. A backslash is now used as an escape character, which allows you to escape the interpretation of metacharacters. For example,

```
find . -name '\**' -print
```

prints all filenames that begin with an *. Previously, **find** would print all files whose names began with a \, and there was no way to escape the interpretation of metacharacters.

The use of a backslash as an escape character only causes problems in a shell script that uses **find** to print the names of files that have backslashes in them.

grep 3.1

grep now processes 8-bit characters in regular expressions. These changes are described in detail in the section on **regexp.h**. **grep** also uses the **CHRCLASS** environment variable to convert regular expressions and text to all lowercase for the **-i** option. This change should not cause any problems because the functionality change occurs only when a new environment variable is set.

ls 3.1

The date in the long **ls -l** format output will change based on the value of the environment variable **LANGUAGE**. In particular, the abbreviated month names will be displayed in the appropriate language (see the section on **date**.)

When **ls** is used with the **-q** or **-b** options, the determination of whether or not a character is printable is based on the character class table identified by the environment variable **CHRCLASS**.

These changes should not cause any compatibility problems because the changed functionality occurs only when new environment variables are set, or the environment variable **TZ** is unset or contains extra information for alternate time zones.

mount 3.1

If **mount** is invoked with no arguments, the date output will be based on the environment variable **LANGUAGE**. In particular, the abbreviated month and weekday names will be displayed in the appropriate language. The date and time output from **mount** is also affected differently by the **TZ** environment variable (see the section on **date**.)

These changes should not cause any compatibility problems because the functionality changes only when the **LANGUAGE** environment variable is set, or the **TZ** environment variable is unset or contains extra information for alternate time zones.

pg 3.1

pg now processes 8-bit characters in regular expressions (see the section on **regexp.h**). **pg** also correctly counts the number of printable characters on a line when it encounters 8-bit characters. This allows split lines that are longer than the screen width. The determination of whether or not a character is printable is based on the character class table identified by the environment variable **CHRCLASS**.

These functionality changes involve 8-bit characters and should not cause compatibility problems.

pr 3.1

The date output of **pr** will change based on the environment variable **LANGUAGE**. In particular abbreviated month names will be displayed in the appropriate language. These changes should not cause any compatibility problems because the functionality changes only when the **LANGUAGE** environment variable is set, or the **TZ** variable is unset or contains extra information for alternate time zones (see the section on **date**).

regexp.h 3.1

regexp.h is a header file used by **ed, expr, grep, pg,** and **sed**. It is also used by **bfs, nl, csplit,** and **acctcom**, but these commands are not part of Release 3.1 international features. **regexp.h** was modified to allow 8-bit characters in character classes. Previously, when a character call was compiled, the high-order bit would be stripped from 8-bit characters.

The changes to **regexp.h** for 8-bit characters should not cause any problems.

sed 3.1

sed now processes 8-bit characters in regular expressions (see the section on **regexp.h**) and **sed**'s **y** command. The **l** command now uses the environment variable **CHRCLASS** to determine if an 8-bit character is printable, and it will print an octal code if an 8-bit character is not printable. Previously, **sed** would have tried to print an 8-bit character even if it was not printable.

These changes should not cause any compatibility problems because they only pertain to 8-bit characters.

sort 3.1

The ASCII dependency of the **-d**, **-f**, and **-i** options to **sort** has been removed. The output now depends on the character classification table identified with the environment variable **CHRCLASS**. When the command is used with the **-M** option, the output depends on the value of the environment variable **LANGUAGE**.

The changes for the **-d**, **-f**, and **-i** options only pertain to 8-bit characters and should not cause any other compatibility problems. The change to the **-M** option takes effect only when the environment variable **LANGUAGE** is set and should not cause any compatibility problems.

vi 3.1

vi no longer strips the high-order bit from 8-bit characters read in from text files, text insertion, and editing commands. It no longer looks for magic numbers of object files when reading in a text file. It also writes out text and displays text without stripping the high-order bit. Also, **-L** and **-r** options use the environment variables **LANGUAGE** and **TZ**.

vi now displays the octal codes of non-printable 8-bit characters in the text using the **CHRCLASS** environment variable to determine if a character is printable. It will also use the **CHRCLASS** environment variable to convert between uppercase and lowercase characters for the **tilde** command and for the **ignorecase** option.

vi uses the same heuristic as **ed** to determine if a file is encrypted. The heuristic functions differently when the **CHRCLASS** environment variable is set (see the section on **ed**).

The change involving magic numbers should not cause any problems. The code looking for object file magic numbers is outdated because the object file header has changed. Also, **vi** looks for the magic numbers **0177555** and **0177545** which are only seen in old archive files. The new archive files have a string header. Also, the magic numbers contain **0377** in the high-order byte. Except for null characters, **vi** can now display an object file, and there is no reason to forbid editing of object files.

The other changes should not cause any compatibility problems because they only occur for 8-bit characters or require that the **CHRCLASS** environment variable be set.

Environment Variables

CFTIME, **CHRCLASS**, and **LANGUAGE** are new environment variables in Release 3.1. Setting them will cause the functionality of commands and C library functions to change. Also, the **TZ** environment variable may be interpreted slightly differently. The following table lists the commands and library functions that function differently with these variables.

Command/Function	Environment Variables
cat	CHRCLASS
cpio	LANGUAGE, TZ
date	CFTIME, LANGUAGE, TZ
ed	CHRCLASS
egrep	CHRCLASS
grep	CHRCLASS
ls	CHRCLASS, LANGUAGE, TZ
mount	LANGUAGE, TZ
nawk	CHRCLASS
pg	CHRCLASS
pr	LANGUAGE, TZ
sed	CHRCLASS
sort	CHRCLASS, LANGUAGE
vi,ex,edit	CHRCLASS, LANGUAGE,TZ

Future Directions

awk, nawk, oawk

With Release 3.1 there is a new **awk (nawk)** (see "Features of 386 UNIX System V Release 3.1" in these *Release Notes*). For this release **awk** is linked to **oawk** and is the default when you type **awk.** In the next major release of UNIX System V, **nawk** will be the default and will be linked to **awk**, but **oawk** will still be available.

NOTE **nawk** must be used with the international version of the software.

Regular Expressions

In Release 3.1 the implementation of regular expressions (for example in **ex, egrep, regexp.h**, and **sh**) has been extended to support 8-bit characters. The semantics for the range notation, which currently uses ordinal values for the character, are the same as in previous releases. This permits ranges to include: 7-bit characters, 8-bit characters, and 7- and 8-bit characters.

In the next major release, UNIX System V may support multiple character sets. The semantics for range expressions across character sets may change when support for multiple character sets is provided. Range expressions that contain 7- and 8-bit characters should be avoided due to this direction.

getdents(2)

The implementation of **getdents**(2) does not match the description in the **dirent**(4) manual page. The field **d_off** in **struct dirent** does not contain the file offset of the current directory entry, but rather the file offset of the following entry. This will be corrected in the next major UNIX System V release. The correction may require the re-compilation or re-linking of programs using the directory-management library routines described in **directory**(3X) (**opendir**, **closedir**, **readdir**, **telldir**, **seekdir**, **rewinddir**) and may require source changes to programs using the **getdents**(2) system call directly.

Documentation

Essential documentation is provided with the software when purchased. Separate sets of documentation for Foundation and Software Development are available and can be ordered. Consult with your AT&T Sales Representative/authorized dealer or see the *Documentation Roadmap* for more details. The *Documentation Roadmap* can be ordered separately by using the 9-digit ordering number 999-300-427. The *Product Overview* can be ordered separately by using the 9-digit ordering number 999-300-428.

Remote File Sharing Notes

Software Description

Remote File Sharing (RFS) Release 1.1 is a software package that allows computers running 386 UNIX System V Release 3.1 or later releases to share resources (directories containing files, subdirectories, devices, and named pipes) selectively across a network. Administrators for computers on an RFS network can choose directories on their systems they want to share and add them to a list of available resources on the network. From this list, they can choose resources from remote computers that they would like to use on their computers.

Each computer on a Remote File Sharing system can be grouped with others in a "domain" or can operate as an independent domain. The domain can provide a central point for administering a group of computers. Unlike other distributed file systems used with the UNIX Operating System, Remote File Sharing is built into the operating system. This approach has several advantages:

Compatibility — Once you mount a remote resource on your system, it will look to your users as though it is part of the local system. You will be able to use most standard UNIX System features on the resource. Standard commands and system calls, as well as features such as File and Record Locking, work the same on remote resources as they do locally. Applications should be able to work on remote resources without modification.

Security — Standard UNIX System file security measures will be available to protect your resources. Special means for verifying computers and restricting remote user permissions have been added for Remote File Sharing.

Flexibility — Since you can mount a remote resource on any directory on your system, you have a lot of freedom to set up your computer's view of the world. You do not have to open up all your files to every host on the network. Likewise, you do not have to make all files on the network available to your computer's users.

New Features

Two major features have been added to Remote File Sharing Release 1.1: client caching, and loop-back.

Client Caching

The client caching feature of RFS provides substantial performance improvements over non-caching systems by reducing the number of times data must be read across the network. Client refers to the computer that is using a remote resource, while caching refers to the client's ability to store data in local buffer pools.

The first time a client process reads a block of data from a remote resource, it is placed in local buffer pools. Subsequent client processes reading a server file can avoid network access by finding the data already present in local buffers. This generally causes a large reduction in network messages, resulting in improved performance.

In order for client caching to work simply and reliably, the following features were built into it.

- **Cache consistency.** Checking mechanisms are used to ensure that the cache buffers accurately reflect the contents of the remote file the user is accessing.
- **Transparency.** The only difference users should see between caching and non-caching systems is improved response time. RFS-based applications do not have to be changed to run on a Remote File Sharing system that caches remote data.
- **Administration.** By default, client caching is on. However, options are available to turn off caching for an entire system or for a particular resource. (You would probably only do this if you have an application that does its own network buffering.) There are also some tunable parameters available to fine tune your system to the way you use RFS.

Loop-Back

The loop-back feature allows you to simulate the higher levels of Remote File Sharing (RFS) within one computer. For example, you could advertise a resource and mount it in a different location on the same machine.

The main use of the loop-back feature is to test application programs and give RFS demonstrations with only one computer. For information describing how to use this feature, see the **-o** option on the **rfadmin**(1M) manual page in the *User's/System Administrator's Reference Manual.*

Software Notes

This section describes problems that may occur with Remote File Sharing and, in some cases, workarounds to those problems.

acct

The accounting file passed to the **acct**(2) system call cannot be remote. This restriction applies to user software that uses the system call directly and to the software in the optional processing accounting package. RFS does not allow the **acct** system call; if passed a remote pathname, **acct** will return an errno of **EINVAL**.

chroot

If you use the **chroot** command to change to the *root* directory of a remote machine, the **ps** command will not work properly.

Client Caching

Reads and writes of block special files are not cached because they could duplicate other data in the cache (for example, data from a regular file residing on the block device defined by the special file). However, if you write to a block device special file on a server machine, the contents of regular files on the block device may be changed. Client-cache buffers associated with these files may be out of date. (Local disk accesses do not suffer from this problem, since block-device writes go through the local buffer pool).

Users who write to block special files on file systems that are advertised remotely in a way that affects the contents of regular files should turn off caching when the resource containing the device is first mounted. (See the **-c** option of **mount**(1M).)

df

If **df** is used without options, it will list each occurrence of a remote resource that is mounted on a system and place an asterisk next to the word blocks for the second and each subsequent resource that was advertised under the same remote file system (for example, */usr/mail* and */usr/bin*). This signifies that the identical block counts for the resources reside under the same file system.

The problem is that if **df** is used with multiple remote resources passed as arguments, the asterisk never appears. In this example, the two resources are on the same remote file system, though the asterisk does not appear:

```
$df USRMAIL USRBIN
/mnt/(USRMAIL)   30402 blocks
/mnt/(USRBIN)   30402 blocks
```

fumount

The **-w** option to the **fumount** command allows a user to specify a grace period between warning clients that a resource is to be removed and actually removing the resource. The **atoi** subroutine [**strtol**(3C)] calculates the number of seconds. This routine looks for an initial numeric string and converts it to an integer. Any non-numeric character in the argument terminates the argument. For example, the argument **-w 123abc** gives a grace period of 123 seconds. Missing arguments and arguments without an initial numeric string produce an error message.

fuser

The **fuser** command does not find remote users with open local files. For example, mount a 1.2 Mbyte floppy file system as */tmp/a*. Advertise the */tmp* directory as resource **TMP**. Mount the **TMP** resource on a remote system and open a file residing in the *TMP/a* directory you just mounted. On the local system, run **fuser /dev/dsk/f0q15d** (the floppy). The remote user will not be found.

fuser

fuser may miss a process if that process gets a reference to the resource after **fuser** has begun its search. In this case, the offending process can be killed explicitly with the **kill** command. When all processes using the resource are gone, the resource can be unmounted.

idload

Many ID mapping features do not function properly with the loop-back function. Only use **global** blocks of information in mapping files (**uid.rules** and **gid.rules**). Within global blocks only **default transparent** works as intended. Specific mapping (**map** lines) or attempts to use **host** blocks will result in users and groups being mapped to **60002**.

labelit

labelit performs a check to ensure that the destination device path begins with */dev/r??* for tape devices. However, remote tape devices on an RFS network are typically mounted under a local directory or in */dev*. As a result, **labelit** cannot be used over RFS for remote tape devices.

Logs

These log files may contain information relating to RFS activities:

/usr/adm/rfuadmin.log
/usr/adm/log/rfuadmin.log
/usr/net/servers/rfs/rfs.log
/usr/net/nls/netspec/log

These files are for internal use only! Customers should not rely on the contents of these files because the information may change or the file may be deleted in future releases. Any tool written that takes advantage of the information contained in these files is not guaranteed to work in the future. (In the list above, *netspec* is replaced by the transport provider used by RFS. For the STARLAN NETWORK, the *netspec* is **starlan**.) The *rfuadmin.log* files are NOT automatically truncated. You may want to monitor them to make sure they do not get too large.

lseek

Using **lseek** with a negative offset on a remote file behaves differently than on a local file. On a local file, the call fails and returns **EINVAL**, as it always has. However, on a remote file the call succeeds and returns the negative offset.

mount

When a mount fails because of a password mismatch, the error message can be confusing. The following error messages result from a remote mount failure due to mismatched passwords:

```
negotiate: An event requires attention
mount: negotiations failed
mount: possible cause: machine password incorrect
mount: could not connect to remote machine
```

mount

When a remote resource is disconnected by a **fumount**(1M) command or a broken link, the default action in the client **rfuadmin** script is to try to remount the resource as it was mounted before. Therefore, if a resource that was originally advertised by the server as read/write is readvertised read-only, the client's automatic mount will never succeed.

An administrator can always enter **mount** directly using the latest advertised mode.

mount

The programs that automatically remount remote resources (*/etc/rmount*, */etc/rmountall*, and */usr/nserve/rfuadmin*) do not recognize the **-c** option of the **/etc/mount** command as valid. The result is that when they attempt to remount a resource that was disconnected and that was originally mounted with client caching turned off [**mount**(1M) with the **-c** option], the resource is remounted with client caching turned on (the default).

One possible workaround for this problem is for the administrator to wait until the program that does the remount completes successfully, then to unmount and to remount the resource manually using the **mount -c** command. The administrator might also consider killing the process that does the remount, but there is no assurance that other actions that the process must perform will complete successfully.

mount

The **mount** command returns a different **ERRNO** and error message than it did in UNIX System V Release 3.0. The error occurs when you try to mount a local device on a subdirectory of a Remote File Sharing resource you mounted from another machine. The previous errno was **EMULTIHOP** and the error message was:

```
mount: Multihop attempted
mount: cannot mount device
```

The new errno is **EREMOTE** and the error message is:

```
mount: Object is remote
mount: cannot mount device
```

Name Server

When the primary and secondary name servers are under heavy load, the normal passing of name server information between these machines may cause them to hang because the 1K Streams buffers have been depleted. There is one long-term and one short-term solution to the problem.

For the long term, you can increase the number of 1K Streams buffers in */etc/conf/cf.d/mtune*. The parameter is **NBLK1024**. Increasing 2K Streams buffers (**NBLK2048** parameter) may also help because the system will try to use 2K buffers when 1K buffers are depleted.

The short-term solution is that you can stop Remote File Sharing on any secondary name server that is hung and then bring it back up again; that will clear the **NBLK1024** buffers.

nsquery

The resource list printed by **nsquery** does not always reflect the current state of the domain. If a resource is advertised and the server goes down, a subsequent **nsquery** from a client may still list the resource as being available, even though it is not. An attempt to mount the resource will fail, because it is unable to contact the server. You will have to wait for the remote machine to make the resource available again.

Programs

If a program creating remote directories or files loses its link to the remote machine, and the remote resource is unmounted, the program may begin to create local directories and files. For example, if you are using the **find** command piped to **cpio** to a remote machine and the link to the remote machine goes down and the resource is then unmounted, **cpio** may begin writing on the local machine—the target directory now looks just like an ordinary local directory.

Recovery

Remote File Sharing limits the size of a resource name to 14 characters. This is intended to limit only the resource name and not the domain name (if addressing a resource from another domain).

When a resource is mounted, the stated length of domain and resource name combinations can be used. However, when a link is broken to a server machine, the client's recovery mechanism tries to unmount the server resources. In doing so, it calculates the size of the resource name including the domain and the "." that separates them. If this string exceeds 14 characters, recovery fails to unmount the resource and may not complete. The result is that users will not be able to access the resource, but the resources will still be listed when you print the names of locally mounted resources (**mount** command).

This problem can be solved in one of two ways. If the problem occurs, the administrator can manually unmount the resource that is posing the problem and then recovery will complete properly (**umount -d** *resource*). To avoid the problem altogether, the administrator should use domain names and resource names that, when concatenated together, will not exceed a total length of 14 characters.

Recovery

RFS recovery can appear to hang if too many **rmount** processes (automatic remount of disconnected resources) keep respawning, waiting for their resources to become available once again.

The problem is that */etc/rmount*, as delivered, has a retry counter that is set to 0, which means retry forever. The solution is to edit that shell script and change the line where the variable **RETRIES** is set from 0 to a number that is more realistic (such as 5). Also, the variable **TIME** can be changed from its default value of 60 to a longer time, such as 300 (5 minutes). This will allow the system a more reasonable time to wait for a resource to be re-advertised between mount attempts.

This solution will cause the **rmount** processes to stop respawning after a reasonable span of time.

Recovery

If a client loses its link to a server, any attempt to **umount** one of that server's file systems from the client tree will fail until recovery runs. Recovery from a link failure is handled by **rfuadmin**(1M) and **rfudaemon**(1M).

Recovery runs automatically when the link breaks, but not until someone tries to access the link or until at most 11 minutes have passed. (The 11-minute time interval applies if you are using STARLAN network. The time may be different for other transport providers.)

If the **umount** fails because the link is gone, the **umount** will start recovery. After recovery runs, a second **umount** will succeed.

rfadmin

The **rfadmin -p** command should not be used to pass name server responsibilities back to the primary while the RFS domain is in an unstable state. After RFS is restarted on the primary, the administrator on the secondary machine that is the current domain name server should wait until all requests to mount resources form the primary are completed. (When the primary went down **rmount** requests were placed in the background on all client machines that had mounted resources from the primary.) The secondary administrator can safely use **rfadmin -p** when the mount requests are completed.

rfadmin

The **-p** option of the **rfadmin** command returns a value of 2 if the command fails because no computer is available to take over primary name server responsibility.

In earlier releases, the **-p** option of the **rfadmin** command returned a 0 upon success or a 1 upon failure. In RFS Release 1.1, the **-p** option returns a 0 upon success, a 2 if the command fails because there is no computer available to assume primary name server responsibilities, or a 1 if the command fails for some other reason. This change gives the **rfstop**(1M) command the ability to warn the administrator if the machine being stopped will cause the domain to be without a primary name server.

rfmaster

The acting domain name server is responsible for distributing important name service information to all other accessible (secondary) name servers that are serving the same domain, with no more than a 15-minute lag, so that if the acting name server should fail, another host could assume the name server role with a minimal loss of information. However, changes to the *rfmaster* file after **rfstart** has been run are not included in the information that is distributed in this way. Because the designation of hosts as primary and secondary name servers is made in the *rfmaster* file, this has the consequence of not allowing a change to the configuration of which hosts are the primary and secondary name servers for a domain without stopping and re-starting RFS on the affected hosts. For example, adding a new secondary name server to the *rfmaster* file will not take effect until RFS is taken down on all of the existing (primary and secondary) name servers, as well as the newly designated secondary and then re-started.

This limitation should not be confused with the temporary transfer of name server responsibility to another one of the hosts already listed in the *rfmaster* file as a primary or secondary name server; this temporary transfer is performed with the **rfadmin -p** command.

rfmaster

When **rfstart** is executed, the name server process (**nserve**) scans the *rfmaster* file and reports possible errors. However, if there is an entry in the *rfmaster* file that identifies a computer as a name server (either primary or secondary), but there is not a corresponding address entry in the *rfmaster* file for that computer, it is not reported as an error, even though it should be. In attempting to contact a name server (for example, during **rfstart** or **rfadmin -p**), name servers with no address listed will be silently skipped.

rfpasswd

The **rfpasswd** command is used to change the host password used for RFS, and it is intended to parallel the **passwd** command in the way it prompts for old and new passwords. However, if a host has no password (for example, it has a null password), the **rfpasswd** command will still prompt for the old password before asking for the new one, although it should ask only for the new one.

rfstart

This problem only happens when you are issuing an **rfstart** command from one terminal and some other RFS command from another terminal.

Sometimes when you run the **rfstart** command it will prompt for a password. RFS has actually started when the password prompt occurs, so an **adv** command from another terminal would be accepted. After the password is entered, **rfstart** completes, which includes clearing the advertise table. The result is that the domain advertise table would show the advertised resource as available, while the local advertise table would not.

This problem can be avoided by not issuing additional RFS commands until the **rfstart** completes and exits to the shell. If the problem does occur, use the **adv -m** or **unadv** commands to put the two advertise tables back in agreement.

rfudaemon

User-level recovery of resources that are disconnected gracefully (the remote system shuts down) may fail if the number of lost resources exceeds half of the value of the tunable parameter **MAXGDP** in */etc/master.d/du.* By default, **MAXGDP** is 24. The failure is accompanied by one or more of the following messages:

```
rfs user-daemon queue overflow:
make sure rfudaemon is running
```

rmount

The */etc/rmount* script loops forever if the system administrator manually mounts the remote resource on a different directory during the **rmount** sleep interval. If this occurs, do a **ps -ef** to get the process ID of **rmount**, and then kill the process manually by issuing **kill -9** *pid#*.

Sticky Bit

If a program that has the sticky bit set is shared through RFS and is executed by a user on a client machine, it will become impossible to remove the program (for example, with the **rm** command). Attempts to remove the file will generate an error message of `text busy`, even though no one on any machine is currently running the program. Removing the sticky bit and trying to remove the program has no effect. A program with the sticky bit set that has never been run across RFS can be removed without complaints, even if it has been run locally.

To remove such a "stuck" sticky bit program, it is necessary to unmount the remote resource. This can be done either from the server, with the **fumount** command, or from the client, with the **umount** command.

Streams

The three system calls related to STREAMS—**getmsg**, **putmsg**, and **poll**—will not operate with a file descriptor associated with a remote file. If this is attempted, the system call will fail with errno equal to **ENOSTR**.

swap

Swap devices cannot be remote, including the swap device configured initially and any swap devices added using the **swap**(1M) command.

System Calls

When a Remote File Sharing server does not recognize an incoming request, it will return an **EREMOTE**. In Release 3.0, unrecognized system calls were ignored by the server.

Transport Provider

In 386 UNIX System V Release 3.1, RFS is protocol independent. In UNIX System V Release 3.0, RFS works on top of URP/STARLAN 1.0. With Release 3.1 RFS has been modified to work on any connection-oriented protocols that conform to the AT&T Transport Interface specification. To communicate between RFS on UNIX System V Release 3.0 and 386 UNIX System V Release 3.1, an upgraded release URP/STARLAN 1.1 is needed for running RFS Release 1.1. RFS 1.0 can use either URP/STARLAN 1.0 or 1.1.

Network Support Utilities Notes

Introduction

The Network Support Utilities (NSU) Release 1.1 package extends system capabilities to support networking applications. The package includes software support for STREAMS, the AT&T Transport Interface, and the Listener.

The Network Support Utilities package is required to take advantage of the following features of 386 UNIX System V Release 3.1: the Remote File Sharing package, STREAMS mechanisms and tools, the AT&T Transport Interface, the enhanced Basic Networking Utilities, and the Listener.

STREAMS

STREAMS is a general, flexible facility for developing UNIX System communication services. By defining standard interfaces for character input/output within the kernel, STREAMS supports development ranging from complete networking protocol suites to individual device drivers. The standard interfaces and associated tools enable modular, portable development and easy integration of network services and their components—these were used to develop protocol modules and device drivers for Release 3. STREAMS provides a broad framework that does not impose any specific network architecture. It implements a user interface consistent and compatible with the character I/O mechanism that is also available in the UNIX System.

The power of STREAMS resides in its modularity. The design reflects the layering characteristics of contemporary networking architectures. Each basic component (called a module) in a STREAMS implementation represents a set of processing functions and communicates with other modules via a standard interface. From the user level, kernel resident modules can be dynamically selected and interconnected to implement any rational processing sequence. No additional kernel programming, assembly, or link editing is required. Modularity allows for the following advantages.

- User-level programs (commands such as **uucp**) can be independent of underlying protocols and communications media so the programs need not be changed when new media or protocols between systems become available.

- Network architectures and higher-level protocols are independent of underlying protocols, drivers, and media.
- Higher-level services can be created by selecting and connecting lower-level services and protocols.

In addition to the standard interfaces, STREAMS provides a set of software tools that help source customers build modules and drivers.

AT&T Transport Interface

With Release 3, UNIX System V supports a Transport Interface based on the Transport Service Definition (Level 4) of the International Organization for Standardization (ISO) Open Systems Interconnection (OSI) reference model. The transport service supports two modes of transfer: connection mode and connectionless mode. Connection mode is circuit-oriented and supports data transfer over an established connection in a reliable, sequenced manner. The connectionless mode is message-oriented (datagrams) and supports data transfer in self-contained units with no logical relationship required among units.

The AT&T Transport Interface defines how a user accesses the services of a transport protocol, called a Transport Provider. An example of a Transport Provider is the Universal Receiver Protocol (URP). Application programs access the Transport Provider by using the Transport Interface routines in the new Network Services Library. These routines support access to a Transport Provider in a media and protocol-independent manner. The Transport Provider uses kernel level programs to send the information to the desired physical device, such as the STARLAN Network Access Unit (NAU). By using the AT&T Transport Interface, application programs will be able to access other Transport Providers that may be available in the future.

For more information, see the *Network Programmer's Guide* and the *Programmer's Reference Manual.*

Listener

The "listener" is a program that can be used with Transport Providers on a system. The purpose of the listener is to receive requests for services from another system, interpret which service is needed, and start a process that has been named to provide the requested service. The listener then drops out of the communications path and continues to listen for new service requests.

For more information about the listener, see **nlsadmin**(1M) in the *User's/System Administrator's Reference Manual.* Also, see the Basic Network Utilities and Remote File Sharing sections of the *Operations/System Administration Guide* for information on how to set up the listener for these products.

Software Notes

This section describes problems that may occur with the Network Support Utilities and, in some cases, workarounds for these problems.

Listener

- In general, when the listener has trouble binding its listening addresses during its start sequence, the actual addresses bound will be chosen by the protocol and hence will differ from the ones requested. There are two cases where this can happen: when the address requested to be bound is either already bound for listening on that network, or when that address does not conform to whatever criteria the protocol is expecting for an address.

  In both of these cases, the listener will output a message to the console stating the address returned by the protocol and

  ```
  TLI bound a different name than requested.
  ```

  Additionally, the requested address appears in the listener's log file along with the messages sent to the console. The listener will then exit.

- The listener process can now parse quoted strings in the command line in the database file.

  In the previous release, the listener did not understand quoted strings as arguments to servers. If quoted strings were required, it was necessary to specify a shell script as the server and embed the real server and the quoted string arguments there. This change eliminates the need for that indirection.

- The listener process now runs as **root** and sets both the user and group ID as specified by the user ID in the database file.

  In the previous release, the listener ran as user ID **listen**. Because of this, servers that required special permissions needed to be owned by the appropriate user with the setuser or setgroup ID bits set accordingly. The proliferation of privileged servers was deemed to be a potential security hazard. This change allows the administrator to specify in the listener database file the user ID under which the server should run:

nlsadmin -a *svc* **-c***cmd* **-w***id* **-y** *comment netspec*

The listener will perform **setuid** and **setgid** system calls based on this ID before **exec**'ing the server.

STREAMS

open

A race condition exists in clone opens from different inodes. This problem exists when two or more disk inodes with the major of the clone device and equal minors are being opened at the same time. If the window is hit, then another **open** after the first **open** may bypass the clone device entirely, thus failing. For example, if */dev/node1* was major 63 and minor 57, and */dev/node2* was also major 63 and minor 57, and if they were two different inodes, then simultaneous opens of the two devices may result in failure of the second open.

If two or more separate files are needed on disk, they should be created as links to one disk inode, thereby closing the window. In the previous example, */dev/node2* should be linked to */dev/node1* instead of being a separate inode.

read

For a STREAMS file, when a message containing one or more bytes is read and the first message block of the message contains zero bytes, the message will be erroneously treated as a zero byte message.

write

For a STREAMS file, if **write** is interrupted by a signal after some data have been written, it should return the number of bytes written. However, it returns -1 and sets errno to **EINTR**.

Even when there are no flow control restrictions, **write** will block if STREAMS internal resources are not available, regardless of the state of **O_NDELAY**.

STREAMS Programmer's Guide

In Appendix C, the initial lines of **qenable** should read as follows:

> **qenable** – enable a queue
>
> **int qenable(q)**
> **queue_t *q;**
> **qenable** places the queue pointed at by *q* ...

Transport Interface Library

Network Programmer's Guide

The reference to **tirdwr**(7) in the caution note on page 5-2 should reflect the change (in the manual page) that popping the module from a *stream* no longer causes a disconnect.

t_accept

The description of **TBADDATA** has been modified to clarify the condition under which it occurs.

[TBADDATA] The amount of user data specified exceeds the allowed amount as returned in the **info.connect** field by **t_open** or **t_getinfo**.

t_connect

The description of **TBADDATA** has been modified to clarify the condition under which it occurs.

[TBADDATA] The amount of user data specified exceeds the allowed amount as returned in the **info.connect** field by **t_open** or **t_getinfo**.

t_getstate

t_getstate will not work following an **exec**(2)/**t_sync**(3N) call sequence because there is insufficient information available to determine the state. The problem arises because the state is maintained in a user process data space, but an **exec** will overwrite that data space and the state information will be lost. If **t_getstate** is called in this case, it will fail with **t_error** set to **TSTATECHNG**.

t_rcv

The processing of expedited transport data units (ETSDU) by **t_rcv** has been modified. The function will now set the **T_EXPEDITED** flag on return, if the data are part of an expedited message. The sentence in the fourth paragraph of the DESCRIPTION now reads:

> Subsequent calls to retrieve the remaining ETSDU will have **T_EXPEDITED** set on return.

t_snddis

The description of **TBADDATA** has been modified to clarify the condition under which it occurs.

[TBADDATA] The amount of user data specified exceeds the allowed amount as returned in the **info.discon** field by **t_open** or **t_getinfo**.

t_sndudata

The paragraph describing the **EPROTO** error has been expanded as follows:

> If **t_sndudata** is issued from an invalid state, or if the amount of data specified in **udata** exceeds the **TSDU** size as returned by **t_open** or **t_getinfo**, the provider will generate an **EPROTO** protocol error (see **TSYSERR** below.) However, the **t_sndudata** may not fail because **EPROTO** errors may not be reported immediately. In this case, a subsequent call that accesses the transport endpoint will fail with the associated **TSYSERR**.

t_sync

The description of the **TBADF** value **t_errno** has been changed to the following:

[TBADF] The specified file descriptor does not refer to a transport endpoint.

Appendix A: Installation Diskette Files

Base System, Diskette 1 of 8

/unix
/INSTALL
/INSTALL2
/.profile
/LABEL
/readfloppy
/bin
/bin/chmod
/bin/chgrp
/bin/chown
/bin/find
/bin/stty
/bin/cpio
/bin/mkdir
/bin/sync
/bin/mv
/bin/sh
/bin/expr
/bin/rm
/bin/ed
/bin/dd
/bin/sleep
/bin/cp
/bin/ln
/bin/-sh
/bin/su
/shlib
/shlib/libnsl_s
/shlib/libc_s
/dev
/dev/console
/dev/dsk
/dev/dsk/0s0
/dev/dsk/0s1
/dev/dsk/0s2
/dev/dsk/0s3
/dev/dsk/0s4
/dev/dsk/1s0
/dev/dsk/1s1
/dev/dsk/1s2
/dev/dsk/1s3
/dev/dsk/1s4
/dev/dsk/f0q15d
/dev/dsk/f0q15dt
/dev/mem
/dev/null
/dev/rdsk
/dev/rdsk/0s0
/dev/rdsk/0s1
/dev/rdsk/0s2
/dev/rdsk/0s3
/dev/rdsk/0s4
/dev/rdsk/1s0
/dev/rdsk/1s1
/dev/rdsk/1s2
/dev/rdsk/1s3
/dev/rdsk/1s4
/dev/rdsk/f0q15d
/dev/rdsk/f0q15dt
/dev/syscon
/dev/systty
/dev/swap
/dev/tty
/etc
/etc/boot
/etc/getclk
/etc/group
/etc/init
/etc/fdisk
/etc/inittab
/etc/inittab2
/etc/inittab3

/etc/ioctl.syscon
/etc/mkfs
/etc/memsize
/etc/mount
/etc/umount
/etc/uadmin
/etc/mkpart
/etc/disksetup
/etc/passwd
/etc/labelit
/etc/fsck
/etc/fsck512
/etc/TIMEZONE
/etc/fixswap
/etc/mknod
/etc/emulator
/etc/mnttab
/mnt
/tmp
/yes

Base System, Diskette 2 of 8

/bin
/bin/acctcom
/bin/ar
/bin/basename
/bin/cat
/bin/cmp
/bin/date
/bin/df
/bin/diff
/bin/dirname
/bin/du
/bin/echo
/bin/env
/bin/false
/bin/file
/bin/format
/bin/grep
/bin/i286emul
/bin/idas
/bin/idld
/bin/ipcrm
/bin/ipcs
/bin/kill
/bin/line
/bin/login
/bin/ls
/bin/mail
/bin/mesg
/bin/mt
/bin/newgrp
/bin/nice
/bin/nohup
/bin/passwd
/bin/pr
/bin/ps
/bin/pwd
/bin/rmdir
/bin/sed
/bin/setpgrp
/bin/sort
/bin/su
/bin/tee
/bin/time
/bin/true
/bin/tty
/bin/uname
/bin/wc
/bin/who
/bin/write
/dev
/dev/cram
/dev/dsk/0s5
/dev/dsk/0s6
/dev/dsk/1s5
/dev/dsk/1s6
/dev/dsk/f0d8d
/dev/dsk/f0d8dt
/dev/dsk/f0d9d
/dev/dsk/f0d9dt
/dev/dsk/f1d8d
/dev/dsk/f1d8dt
/dev/dsk/f1d9d
/dev/dsk/f1d9dt
/dev/dsk/f1q15d
/dev/dsk/f1q15dt
/dev/kmem
/dev/lp
/dev/lp0
/dev/lp1
/dev/lp2
/dev/prf
/dev/rdsk/0s5
/dev/rdsk/0s6
/dev/rdsk/1s5

/dev/rdsk/1s6
/dev/rdsk/f0d8d
/dev/rdsk/f0d8dt
/dev/rdsk/f0d9d
/dev/rdsk/f0d9dt
/dev/rdsk/f1d8d
/dev/rdsk/f1d8dt
/dev/rdsk/f1d9d
/dev/rdsk/f1d9dt
/dev/rdsk/f1q15d
/dev/rdsk/f1q15dt
/dev/root
/dev/rtc
/dev/swap
/dev/sxt
/dev/sxt/000
/dev/sxt/001
/dev/sxt/002
/dev/sxt/003
/dev/sxt/004
/dev/sxt/005
/dev/sxt/006
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/dev/sxt/057
/dev/sxt000
/dev/sxt001
/dev/sxt002
/dev/sxt003
/dev/sxt004
/dev/sxt005
/dev/sxt006

/dev/sxt007
/dev/sxt008
/dev/sxt009
/dev/sxt010
/dev/sxt011
/dev/sxt012
/dev/sxt013
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/dev/sxt022
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/dev/sxt024
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/dev/sxt026
/dev/sxt027
/dev/sxt028
/dev/sxt029
/dev/sxt030
/dev/sxt031
/dev/sxt032
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/dev/sxt052
/dev/sxt053
/dev/sxt054
/dev/sxt055
/dev/sxt056
/dev/sxt057
/dev/tty
/dev/tty00
/dev/xt
/dev/xt/000
/dev/xt/001
/dev/xt/002
/dev/xt/003
/dev/xt/004
/dev/xt/005
/dev/xt/006
/dev/xt/007
/dev/xt000
/dev/xt001
/dev/xt002
/dev/xt003
/dev/xt004
/dev/xt005
/dev/xt006
/dev/xt007
/etc
/etc/brc
/etc/checklist
/etc/cleanup
/etc/dfspace
/etc/fboot
/etc/filesave
/etc/fsanck
/etc/fstyp.d
/etc/init.d

/etc/init.d/README
/etc/init.d/RMTMPFILES
/etc/init.d/disks
/etc/init.d/firstcheck
/etc/ioctl.syscon
/etc/links
/etc/motd
/usr
/usr/bin
/usr/bin/adv.nf
/usr/bin/bdiff.nf
/usr/bin/nlsadmin.nf

Base System, Diskette 3 of 8

```
/etc/.packagedate
/etc/bcheckrc
/etc/chroot
/etc/ckbupscd
/etc/clri
/etc/conf
/etc/conf/bin
/etc/conf/bin/idbuild
/etc/conf/cf.d
/etc/conf/cf.d/mdevice
/etc/conf/cf.d/mfsys
/etc/conf/cf.d/mtune
/etc/conf/cf.d/sassign
/etc/conf/cf.d/sdevice
/etc/conf/cf.d/sfsys
/etc/conf/cf.d/stune
/etc/conf/cf.d/vuifile
/etc/conf/sdevice.d
/etc/conf/sdevice.d/cpyrt
/etc/conf/sdevice.d/du
/etc/conf/sdevice.d/fp
/etc/conf/sdevice.d/gentty
/etc/conf/sdevice.d/ld0
/etc/conf/sdevice.d/mem
/etc/conf/sdevice.d/ntty
/etc/conf/sdevice.d/osm
/etc/conf/sdevice.d/prf
/etc/conf/sdevice.d/sxt
/etc/conf/sdevice.d/xt
/etc/cron
/etc/dcopy1K
/etc/dcopy2K
/etc/dcopy512
/etc/dfsck
/etc/dumpsave
/etc/ff
/etc/fsck2K
/etc/fsdb
/etc/fsdb2K
/etc/fsdb512
/etc/fsstat
/etc/fstab
/etc/fstyp
/etc/fstyp.d/S51Kfstyp
/etc/fstyp.d/S52Kfstyp
/etc/fuser
/etc/getty
/etc/gettydefs
/etc/grpck
/etc/killall
/etc/ldsysdump
/etc/mkfs2K
/etc/mkfs512
/etc/mountall
/etc/ncheck
/etc/prfdc
/etc/prfld
/etc/prfpr
/etc/prfsnap
/etc/prfstat
/etc/profile
/etc/pwck
/etc/rc0
/etc/rc0.d
/etc/rc0.d/K00ANNOUNCE
/etc/rc0.d/K70uucp
/etc/rc0.d/K75cron
/etc/rc1
/etc/rc2
/etc/rc2.d
/etc/rc2.d/S01MOUNTFSYS
/etc/rc2.d/S05RMTMPFILES
/etc/rc2.d/S20sysetup
/etc/rc2.d/S21perf
```

/etc/rc3
/etc/rc3.d
/etc/rstab
/etc/setmnt
/etc/shutdown
/etc/swap
/etc/sysdef
/etc/umountall
/etc/whodo
/lib
/lib/idcomp
/lib/idcpp
/usr/bin/cut
/bin/tail
/bin/touch
/usr/bin/join
/usr/bin/paste
/usr/bin/pg
/usr/bin/tr

Base System, Diskette 4 of 8

/etc/conf/bin/idcheck
/etc/conf/bin/idconfig
/etc/conf/bin/idinstall
/etc/conf/bin/idmaster
/etc/conf/bin/idmkenv
/etc/conf/bin/idmkinit
/etc/conf/bin/idmknod
/etc/conf/bin/idmkunix
/etc/conf/bin/idreboot
/etc/conf/bin/idspace
/etc/conf/bin/idtune
/etc/conf/cf.d/init.base
/etc/conf/init.d
/etc/conf/mfsys.d
/etc/conf/mfsys.d/s5
/etc/conf/node.d
/etc/conf/node.d/asy
/etc/conf/node.d/lp
/etc/conf/pack.d
/etc/conf/pack.d/asy
/etc/conf/pack.d/asy/Driver.o
/etc/conf/pack.d/asy/space.c
/etc/conf/pack.d/clock
/etc/conf/pack.d/clock/space.c
/etc/conf/pack.d/cpyrt
/etc/conf/pack.d/cpyrt/Driver.o
/etc/conf/pack.d/cpyrt/space.c
/etc/conf/pack.d/cram
/etc/conf/pack.d/cram/Driver.o
/etc/conf/pack.d/disp
/etc/conf/pack.d/disp/Driver.o
/etc/conf/pack.d/disp/space.c
/etc/conf/pack.d/du
/etc/conf/pack.d/du/stubs.c
/etc/conf/pack.d/fd
/etc/conf/pack.d/fd/Driver.o
/etc/conf/pack.d/fp
/etc/conf/pack.d/fp/Driver.o
/etc/conf/pack.d/gentty
/etc/conf/pack.d/gentty/Driver.o
/etc/conf/pack.d/hd
/etc/conf/pack.d/hd/Driver.o
/etc/conf/pack.d/ipc
/etc/conf/pack.d/ipc/Driver.o
/etc/conf/pack.d/kd
/etc/conf/pack.d/kd/Driver.o
/etc/conf/pack.d/kd/space.c
/etc/conf/pack.d/kernel
/etc/conf/pack.d/kernel/io.o
/etc/conf/pack.d/kernel/locore.o
/etc/conf/pack.d/kernel/os.o
/etc/conf/pack.d/kernel/space.c
/etc/conf/pack.d/kernel/start.o
/etc/conf/pack.d/ld0
/etc/conf/pack.d/ld0/Driver.o
/etc/conf/pack.d/ld0/space.c
/etc/conf/pack.d/lp
/etc/conf/pack.d/lp/Driver.o
/etc/conf/pack.d/mem
/etc/conf/pack.d/mem/Driver.o
/etc/conf/pack.d/msg
/etc/conf/pack.d/msg/Driver.o
/etc/conf/pack.d/msg/space.c
/etc/conf/pack.d/msg/stubs.c
/etc/conf/pack.d/ntty
/etc/conf/pack.d/ntty/Driver.o
/etc/conf/pack.d/ntty/space.c
/etc/conf/pack.d/osm
/etc/conf/pack.d/osm/Driver.o
/etc/conf/pack.d/pic
/etc/conf/pack.d/pic/space.c
/etc/conf/pack.d/prf
/etc/conf/pack.d/prf/Driver.o
/etc/conf/pack.d/prf/space.c

/etc/conf/pack.d/prf/stubs.c
/etc/conf/pack.d/rtc
/etc/conf/pack.d/rtc/Driver.o
/etc/conf/pack.d/s5
/etc/conf/pack.d/s5/Driver.o
/etc/conf/pack.d/s52k
/etc/conf/pack.d/s52k/stubs.c
/etc/conf/pack.d/sem
/etc/conf/pack.d/sem/Driver.o
/etc/conf/pack.d/sem/space.c
/etc/conf/pack.d/sem/stubs.c
/etc/conf/pack.d/shm
/etc/conf/pack.d/shm/Driver.o
/etc/conf/pack.d/shm/space.c
/etc/conf/pack.d/shm/stubs.c
/etc/conf/pack.d/sxt
/etc/conf/pack.d/sxt/Driver.o
/etc/conf/pack.d/sxt/space.c
/etc/conf/pack.d/sxt/stubs.c
/etc/conf/pack.d/vx
/etc/conf/pack.d/vx/space.c
/etc/conf/pack.d/vx/stubs.c
/etc/conf/pack.d/weitek
/etc/conf/pack.d/weitek/Driver.o
/etc/conf/pack.d/weitek/space.c
/etc/conf/pack.d/weitek/stubs.c
/etc/conf/pack.d/xt
/etc/conf/pack.d/xt/Driver.o
/etc/conf/pack.d/xt/space.c
/etc/conf/pack.d/xt/stubs.c
/etc/conf/rc.d
/etc/conf/sd.d
/etc/conf/sdevice.d/asy
/etc/conf/sdevice.d/cram
/etc/conf/sdevice.d/fd
/etc/conf/sdevice.d/hd
/etc/conf/sdevice.d/ipc
/etc/conf/sdevice.d/kd
/etc/conf/sdevice.d/lp
/etc/conf/sdevice.d/msg
/etc/conf/sdevice.d/rtc
/etc/conf/sdevice.d/s52k
/etc/conf/sdevice.d/sem
/etc/conf/sdevice.d/shm
/etc/conf/sdevice.d/vx
/etc/conf/sdevice.d/weitek
/etc/conf/sfsys.d
/etc/conf/sfsys.d/s5
/etc/crash
/etc/issue

Base System, Diskette 5 of 8

/etc/idrc.d
/etc/idsd.d
/etc/link
/etc/magic
/etc/mvdir
/etc/setclk
/etc/unlink
/usr/adm
/usr/adm/acct
/usr/adm/acct/fiscal
/usr/adm/acct/nite
/usr/adm/acct/sum
/usr/adm/sa
/usr/bin/asa
/usr/bin/at
/usr/bin/awk
/usr/bin/banner
/usr/bin/batch
/usr/bin/bc
/usr/bin/cal
/usr/bin/calendar
/usr/bin/cancel
/usr/bin/captoinfo
/usr/bin/checkeq
/usr/bin/chrtbl
/usr/bin/cpset
/usr/bin/crontab
/usr/bin/ct
/usr/bin/cu
/usr/bin/dc
/usr/bin/disable
/usr/bin/enable
/usr/bin/factor
/usr/bin/getopt
/usr/bin/graph
/usr/bin/id
/usr/bin/infocmp
/usr/bin/logname
/usr/bin/lp
/usr/bin/mailx
/usr/bin/oawk
/usr/bin/tar
/usr/bin/tic
/usr/bin/tplot
/usr/bin/tput
/usr/include
/usr/include/sys
/usr/include/sys/fs
/usr/lib/uucp
/usr/lib/uucp/Devconfig
/usr/lib/uucp/Devices
/usr/lib/uucp/Dialcodes
/usr/lib/uucp/Dialers
/usr/lib/uucp/Maxuuscheds
/usr/lib/uucp/Maxuuxqts
/usr/lib/uucp/Permissions
/usr/lib/uucp/Poll
/usr/lib/uucp/SetUp
/usr/lib/uucp/Sysfiles
/usr/lib/uucp/Systems
/usr/lib/uucp/Uutry
/usr/lib/uucp/remote.unknown
/usr/lib/uucp/uucheck
/usr/lib/uucp/uucico
/usr/lib/uucp/uucleanup

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/bin/crypt.nf
/etc/diskadd
/usr/bin/ismpx
/usr/bin/jterm
/usr/bin/jwin
/usr/bin/layers
/usr/bin/lpstat
/usr/bin/mcs
/usr/bin/news
/usr/bin/sag
/usr/bin/sar
/usr/bin/shl
/usr/bin/spline
/usr/bin/tabs
/usr/bin/timex
/usr/bin/units
/usr/bin/uucp
/usr/bin/uulog
/usr/bin/uuname
/usr/bin/uupick
/usr/bin/uustat
/usr/bin/uuto
/usr/bin/uux
/usr/bin/xargs
/usr/bin/xtd
/usr/bin/xts
/usr/bin/xtt
/usr/include/agent.h
/usr/include/pn.h
/usr/include/sys/acct.h
/usr/include/sys/adv.h
/usr/include/sys/alttbl.h
/usr/include/sys/asy.h
/usr/include/sys/at_ansi.h
/usr/include/sys/bitmasks.h
/usr/include/sys/buf.h
/usr/include/sys/callo.h
/usr/include/sys/cdump.h
/usr/include/sys/cirmgr.h
/usr/include/sys/clock.h
/usr/include/sys/clockcal.h
/usr/include/sys/cmn_err.h
/usr/include/sys/comm.h
/usr/include/sys/conf.h
/usr/include/sys/cram.h
/usr/include/sys/crtctl.h
/usr/include/sys/debug.h
/usr/include/sys/debugreg.h
/usr/include/sys/dir.h
/usr/include/sys/dirent.h
/usr/include/sys/dma.h
/usr/include/sys/elog.h
/usr/include/sys/erec.h
/usr/include/sys/err.h
/usr/include/sys/errno.h
/usr/include/sys/fblk.h
/usr/include/sys/fcntl.h
/usr/include/sys/fd.h
/usr/include/sys/fdisk.h
/usr/include/sys/file.h
/usr/include/sys/filsys.h
/usr/include/sys/flock.h
/usr/include/sys/fp.h
/usr/include/sys/fs/prfcntl.h
/usr/include/sys/fs/s5dir.h
/usr/include/sys/fs/s5fblk.h
/usr/include/sys/fs/s5filsys.h
/usr/include/sys/fs/s5inode.h
/usr/include/sys/fs/s5macros.h
/usr/include/sys/fs/s5param.h
/usr/include/sys/fsid.h
/usr/include/sys/fstyp.h
/usr/include/sys/gate.h
/usr/include/sys/gdpstr.h

/usr/include/sys/getpages.h
/usr/include/sys/hd.h
/usr/include/sys/hetero.h
/usr/include/sys/idtab.h
/usr/include/sys/immu.h
/usr/include/sys/inline.h
/usr/include/sys/ino.h
/usr/include/sys/inode.h
/usr/include/sys/iobuf.h
/usr/include/sys/ioctl.h
/usr/include/sys/ipc.h
/usr/include/sys/ipl.h
/usr/include/sys/istk.h
/usr/include/sys/ivlab.h
/usr/include/sys/jioctl.h
/usr/include/sys/kd.h
/usr/include/sys/ld0.h
/usr/include/sys/lihdr.h
/usr/include/sys/lock.h
/usr/include/sys/log.h
/usr/include/sys/lp.h
/usr/include/sys/macro.h
/usr/include/sys/map.h
/usr/include/sys/message.h
/usr/include/sys/mount.h
/usr/include/sys/msg.h
/usr/include/sys/nami.h
/usr/include/sys/nserve.h
/usr/include/sys/ntty.h
/usr/include/sys/open.h
/usr/include/sys/page.h
/usr/include/sys/param.h
/usr/include/sys/pfdat.h
/usr/include/sys/pic.h
/usr/include/sys/pit.h
/usr/include/sys/poll.h
/usr/include/sys/proc.h
/usr/include/sys/que.h
/usr/include/sys/queue.h
/usr/include/sys/ramd.h
/usr/include/sys/rbuf.h
/usr/include/sys/rdebug.h
/usr/include/sys/recover.h
/usr/include/sys/reg.h
/usr/include/sys/region.h
/usr/include/sys/rfsys.h
/usr/include/sys/rtc.h
/usr/include/sys/seg.h
/usr/include/sys/sem.h
/usr/include/sys/sema.h
/usr/include/sys/shm.h
/usr/include/sys/signal.h
/usr/include/sys/stat.h
/usr/include/sys/statfs.h
/usr/include/sys/stermio.h
/usr/include/sys/stream.h
/usr/include/sys/strlog.h
/usr/include/sys/stropts.h
/usr/include/sys/strstat.h
/usr/include/sys/swap.h
/usr/include/sys/sxt.h
/usr/include/sys/sysi86.h
/usr/include/sys/sysinfo.h
/usr/include/sys/sysmacros.h
/usr/include/sys/systm.h
/usr/include/sys/termio.h
/usr/include/sys/tihdr.h
/usr/include/sys/times.h
/usr/include/sys/timod.h
/usr/include/sys/tiuser.h
/usr/include/sys/trace.h
/usr/include/sys/trap.h
/usr/include/sys/tss.h
/usr/include/sys/ttold.h
/usr/include/sys/tty.h
/usr/include/sys/tuneable.h
/usr/include/sys/types.h
/usr/include/sys/uadmin.h
/usr/include/sys/user.h
/usr/include/sys/ustat.h

/usr/include/sys/utsname.h
/usr/include/sys/v86.h
/usr/include/sys/var.h
/usr/include/sys/vt.h
/usr/include/sys/vtoc.h
/usr/include/sys/weitek.h
/usr/include/sys/xt.h
/usr/include/sys/xtproto.h
/usr/lbin
/usr/lib
/usr/lib/libp
/usr/vmsys
/usr/vmsys/OBJECTS

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```
/etc/volcopy
/etc/wall
/usr/bin/300
/usr/bin/300s
/usr/bin/4014
/usr/bin/450
/usr/bin/backup
/usr/bin/greek
/usr/bin/hp
/usr/bin/installpkg
/usr/bin/message
/usr/bin/pwdmenu
/usr/bin/removepkg
/usr/bin/restore
/usr/bin/xtract
/usr/lbin/Install.sh
/usr/lbin/fsinfo
/usr/lbin/installpkg.r
/usr/lbin/removepkg.r
/usr/lib/ATT455
/usr/lib/ATT473
/usr/lib/ATT475
/usr/lib/ATT_sf
/usr/lib/accept
/usr/lib/acct
/usr/lib/acct/acctcms
/usr/lib/acct/acctcon1
/usr/lib/acct/acctcon2
/usr/lib/acct/acctdisk
/usr/lib/acct/acctdusg
/usr/lib/acct/acctmerg
/usr/lib/acct/accton
/usr/lib/acct/acctprc1
/usr/lib/acct/acctprc2
/usr/lib/acct/acctwtmp
/usr/lib/acct/chargefee
/usr/lib/acct/ckpacct
/usr/lib/acct/diskusg
/usr/lib/acct/dodisk
/usr/lib/acct/fwtmp
/usr/lib/acct/holidays
/usr/lib/acct/lastlogin
/usr/lib/acct/monacct
/usr/lib/acct/nulladm
/usr/lib/acct/prctmp
/usr/lib/acct/prdaily
/usr/lib/acct/prtacct
/usr/lib/acct/ptecms.awk
/usr/lib/acct/ptelus.awk
/usr/lib/acct/remove
/usr/lib/acct/runacct
/usr/lib/acct/shutacct
/usr/lib/acct/startup
/usr/lib/acct/turnacct
/usr/lib/acct/wtmpfix
/usr/lib/calprog
/usr/lib/cron
/usr/lib/cron/.proto
/usr/lib/cron/at.allow
/usr/lib/cron/at.deny
/usr/lib/cron/cron.allow
/usr/lib/cron/cron.deny
/usr/lib/cron/queuedefs
/usr/lib/diffh
/usr/lib/getoptcvt
/usr/lib/layersys
/usr/lib/layersys/lsys.8;7;3
/usr/lib/layersys/relogin
/usr/lib/layersys/set_enc.j
/usr/lib/layersys/wtinit
/usr/lib/lib.b
/usr/lib/lib300.a
/usr/lib/lib300s.a
/usr/lib/lib4014.a
```

/usr/lib/lib450.a
/usr/lib/libgen.a
/usr/lib/libplot.a
/usr/lib/libvt0.a
/usr/lib/libwindows.a
/usr/lib/lpadmin
/usr/lib/lpmove
/usr/lib/lpsched
/usr/lib/lpshut
/usr/lib/mailx
/usr/lib/mailx/mailx.help
/usr/lib/mailx/mailx.help.~
/usr/lib/mailx/rmmail
/usr/lib/mv_dir
/usr/lib/reject
/usr/lib/sa
/usr/lib/sa/sa1
/usr/lib/sa/sa2
/usr/lib/sa/sadc
/usr/lib/t300
/usr/lib/t300s
/usr/lib/t4014
/usr/lib/t450
/usr/lib/terminfo
/usr/lib/terminfo/A
/usr/lib/terminfo/A/AT386
/usr/lib/terminfo/A/AT386-M
/usr/lib/terminfo/a
/usr/lib/unittab
/usr/lib/uucp/uudemon.admin
/usr/lib/uucp/uudemon.cleanu
/usr/lib/uucp/uudemon.hour
/usr/lib/uucp/uudemon.poll
/usr/lib/uucp/uugetty
/usr/lib/uucp/uusched
/usr/lib/uucp/uuxqt
/usr/lib/vplot
/usr/mail
/usr/mail/:saved
/usr/news
/usr/spool
/usr/spool/cron
/usr/spool/cron/atjobs
/usr/spool/cron/crontabs
/usr/spool/cron/crontabs/adm
/usr/spool/cron/crontabs/root
/usr/spool/cron/crontabs/sys
/usr/spool/locks
/usr/spool/lp
/usr/spool/lp/class
/usr/spool/lp/interface
/usr/spool/lp/member
/usr/spool/lp/model
/usr/spool/lp/model/att435S
/usr/spool/lp/model/att455
/usr/spool/lp/model/att470
/usr/spool/lp/model/att473
/usr/spool/lp/model/att474
/usr/spool/lp/model/hplaserjtS
/usr/spool/lp/pstatus
/usr/spool/lp/qstatus
/usr/spool/lp/request
/usr/spool/uucp
/usr/spool/uucp/.Admin
/usr/spool/uucp/.Corrupt
/usr/spool/uucp/.Log
/usr/spool/uucp/.Log/uucico
/usr/spool/uucp/.Log/uucp
/usr/spool/uucp/.Log/uux
/usr/spool/uucp/.Log/uuxqt
/usr/spool/uucp/.Old
/usr/spool/uucp/.Sequence
/usr/spool/uucp/.Status
/usr/spool/uucp/.Workspace
/usr/spool/uucp/.Xqtdir
/usr/spool/uucppublic
/usr/tmp

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/etc/.cpiopc
/etc/.useradm
/etc/adduser
/etc/deluser
/etc/stdprofile
/etc/termcap
/usr/bin/displaypkg
/usr/bin/menu_add
/usr/bin/menu_del
/usr/bin/passmgmt
/usr/bin/pwconv
/usr/include/shadow.h
/usr/include/sys/bootinfo.h
/usr/lib/libsec.a
/usr/vmsys/OBJECTS/Menu.admin
/usr/vmsys/OBJECTS/Menu.office
/usr/vmsys/OBJECTS/Text.exit
/usr/vmsys/OBJECTS/Text.sysinf
/usr/vmsys/OBJECTS/backup
/usr/vmsys/OBJECTS/backup/Menu.backup
/usr/vmsys/OBJECTS/backup/Text.history
/usr/vmsys/OBJECTS/backup/Text.privil
/usr/vmsys/OBJECTS/backup/private
/usr/vmsys/OBJECTS/backup/private/Form.backdir
/usr/vmsys/OBJECTS/backup/private/Menu.backdv2
/usr/vmsys/OBJECTS/backup/private/Menu.backdv3
/usr/vmsys/OBJECTS/backup/private/Menu.backpri
/usr/vmsys/OBJECTS/backup/private/Menu.device2
/usr/vmsys/OBJECTS/backup/private/Menu.device3
/usr/vmsys/OBJECTS/backup/system
/usr/vmsys/OBJECTS/backup/system/Form.backsel
/usr/vmsys/OBJECTS/backup/system/Menu.backdv2
/usr/vmsys/OBJECTS/backup/system/Menu.backdv3
/usr/vmsys/OBJECTS/backup/system/Menu.backdv4
/usr/vmsys/OBJECTS/backup/system/Menu.backpri
/usr/vmsys/OBJECTS/backup/system/Menu.backsys
/usr/vmsys/OBJECTS/backup/system/Menu.device2
/usr/vmsys/OBJECTS/backup/system/Menu.device3

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/usr/vmsys/OBJECTS/backup/system/Menu.users
/usr/vmsys/OBJECTS/date
/usr/vmsys/OBJECTS/date/Form.d1
/usr/vmsys/OBJECTS/date/Form.date
/usr/vmsys/OBJECTS/date/Text.datecfm
/usr/vmsys/OBJECTS/date/Text.datpriv
/usr/vmsys/OBJECTS/date/Text.dcfm
/usr/vmsys/OBJECTS/dskopts
/usr/vmsys/OBJECTS/dskopts/Menu.dskopts
/usr/vmsys/OBJECTS/dskopts/Text.ac
/usr/vmsys/OBJECTS/dskopts/Text.csf
/usr/vmsys/OBJECTS/dskopts/Text.fcwarn
/usr/vmsys/OBJECTS/dskopts/Text.ffd
/usr/vmsys/OBJECTS/dskopts/Text.ftfc
/usr/vmsys/OBJECTS/dskopts/Text.fwwarn
/usr/vmsys/OBJECTS/dskopts/Text.rdf
/usr/vmsys/OBJECTS/dskopts/Text.rff
/usr/vmsys/OBJECTS/dskopts/Text.rsf
/usr/vmsys/OBJECTS/dskopts/Text.wdf
/usr/vmsys/OBJECTS/fs
/usr/vmsys/OBJECTS/fs/Form.crtfil
/usr/vmsys/OBJECTS/fs/Form.dsk
/usr/vmsys/OBJECTS/fs/Form.mt
/usr/vmsys/OBJECTS/fs/Menu.filsys
/usr/vmsys/OBJECTS/fs/Menu.seldev
/usr/vmsys/OBJECTS/fs/Text.busy
/usr/vmsys/OBJECTS/fs/Text.cf
/usr/vmsys/OBJECTS/fs/Text.crfcfm
/usr/vmsys/OBJECTS/fs/Text.fmtd
/usr/vmsys/OBJECTS/fs/Text.hmount
/usr/vmsys/OBJECTS/fs/Text.hmtd
/usr/vmsys/OBJECTS/fs/Text.hmountw
/usr/vmsys/OBJECTS/fs/Text.humount
/usr/vmsys/OBJECTS/fs/Text.insert
/usr/vmsys/OBJECTS/fs/Text.minsert
/usr/vmsys/OBJECTS/fs/Text.mount
/usr/vmsys/OBJECTS/fs/Text.mountw
/usr/vmsys/OBJECTS/fs/Text.mtd
/usr/vmsys/OBJECTS/fs/Text.mtdir
/usr/vmsys/OBJECTS/fs/Text.mtwrt
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/usr/vmsys/OBJECTS/fs/Text.nmt
/usr/vmsys/OBJECTS/fs/Text.priv
/usr/vmsys/OBJECTS/fs/Text.rename
/usr/vmsys/OBJECTS/fs/Text.umount
/usr/vmsys/OBJECTS/fs/Text.wait
/usr/vmsys/OBJECTS/fs/Text.wrt
/usr/vmsys/OBJECTS/hwset
/usr/vmsys/OBJECTS/hwset/Form.232
/usr/vmsys/OBJECTS/hwset/Form.comp
/usr/vmsys/OBJECTS/hwset/Form.mod
/usr/vmsys/OBJECTS/hwset/Form.other
/usr/vmsys/OBJECTS/hwset/Form.par
/usr/vmsys/OBJECTS/hwset/Form.ps
/usr/vmsys/OBJECTS/hwset/Form.ser
/usr/vmsys/OBJECTS/hwset/Menu.hard
/usr/vmsys/OBJECTS/hwset/Menu.port2
/usr/vmsys/OBJECTS/hwset/Menu.psetup
/usr/vmsys/OBJECTS/hwset/Text.add
/usr/vmsys/OBJECTS/hwset/Text.boot1
/usr/vmsys/OBJECTS/hwset/Text.boot2
/usr/vmsys/OBJECTS/hwset/Text.busy
/usr/vmsys/OBJECTS/hwset/Text.cmpl
/usr/vmsys/OBJECTS/hwset/Text.compcfm
/usr/vmsys/OBJECTS/hwset/Text.conerr
/usr/vmsys/OBJECTS/hwset/Text.conuse
/usr/vmsys/OBJECTS/hwset/Text.inuse
/usr/vmsys/OBJECTS/hwset/Text.noncfm
/usr/vmsys/OBJECTS/hwset/Text.nop
/usr/vmsys/OBJECTS/hwset/Text.noport
/usr/vmsys/OBJECTS/hwset/Text.not
/usr/vmsys/OBJECTS/hwset/Text.privil
/usr/vmsys/OBJECTS/hwset/Text.prterr
/usr/vmsys/OBJECTS/hwset/Text.rscfm
/usr/vmsys/OBJECTS/hwset/Text.sercfm
/usr/vmsys/OBJECTS/hwset/Text.set
/usr/vmsys/OBJECTS/hwset/Text.termcfm
/usr/vmsys/OBJECTS/hwset/Text.tscfm
/usr/vmsys/OBJECTS/logins
/usr/vmsys/OBJECTS/logins/Form.add
/usr/vmsys/OBJECTS/logins/Form.change

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/usr/vmsys/OBJECTS/logins/Form.delete
/usr/vmsys/OBJECTS/logins/Form.delfile
/usr/vmsys/OBJECTS/logins/Form.display
/usr/vmsys/OBJECTS/logins/Menu.logins
/usr/vmsys/OBJECTS/logins/Text.addcfm
/usr/vmsys/OBJECTS/logins/Text.addpriv
/usr/vmsys/OBJECTS/logins/Text.chgcfm
/usr/vmsys/OBJECTS/logins/Text.chgpriv
/usr/vmsys/OBJECTS/logins/Text.delcfm
/usr/vmsys/OBJECTS/logins/Text.delpriv
/usr/vmsys/OBJECTS/logins/Text.privil
/usr/vmsys/OBJECTS/mailset
/usr/vmsys/OBJECTS/mailset/Form.mail1
/usr/vmsys/OBJECTS/mailset/Form.maila
/usr/vmsys/OBJECTS/mailset/Form.mailc
/usr/vmsys/OBJECTS/mailset/Form.maild
/usr/vmsys/OBJECTS/mailset/Form.maildel
/usr/vmsys/OBJECTS/mailset/Form.new
/usr/vmsys/OBJECTS/mailset/Menu.mail
/usr/vmsys/OBJECTS/mailset/Menu.mailot
/usr/vmsys/OBJECTS/mailset/Text.a1
/usr/vmsys/OBJECTS/mailset/Text.c1
/usr/vmsys/OBJECTS/mailset/Text.del
/usr/vmsys/OBJECTS/mailset/Text.mail2
/usr/vmsys/OBJECTS/mailset/Text.malpriv
/usr/vmsys/OBJECTS/mailset/Text.new2
/usr/vmsys/OBJECTS/mailset/Text.nodel
/usr/vmsys/OBJECTS/mailset/Text.none
/usr/vmsys/OBJECTS/mailset/Text.noned
/usr/vmsys/OBJECTS/prt
/usr/vmsys/OBJECTS/prt/Form.prrst
/usr/vmsys/OBJECTS/prt/Menu.propt
/usr/vmsys/OBJECTS/prt/Menu.queue
/usr/vmsys/OBJECTS/prt/Text.pqcfm
/usr/vmsys/OBJECTS/prt/Text.privil
/usr/vmsys/OBJECTS/prt/Text.restart
/usr/vmsys/OBJECTS/prt/Text.rsterr
/usr/vmsys/OBJECTS/prt/Text.status
/usr/vmsys/OBJECTS/restore
/usr/vmsys/OBJECTS/restore/Menu.restore
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```
/usr/vmsys/OBJECTS/restore/Text.privil
/usr/vmsys/OBJECTS/restore/private
/usr/vmsys/OBJECTS/restore/private/Form.overwr
/usr/vmsys/OBJECTS/restore/private/Form.overwr2
/usr/vmsys/OBJECTS/restore/private/Menu.device
/usr/vmsys/OBJECTS/restore/private/Menu.device2
/usr/vmsys/OBJECTS/restore/private/Menu.private
/usr/vmsys/OBJECTS/restore/private/Menu.select
/usr/vmsys/OBJECTS/restore/system
/usr/vmsys/OBJECTS/restore/system/Form.overwr
/usr/vmsys/OBJECTS/restore/system/Form.overwr2
/usr/vmsys/OBJECTS/restore/system/Menu.device
/usr/vmsys/OBJECTS/restore/system/Menu.device2
/usr/vmsys/OBJECTS/restore/system/Menu.select
/usr/vmsys/OBJECTS/restore/system/Menu.system
/usr/vmsys/OBJECTS/shutdown
/usr/vmsys/OBJECTS/shutdown/Form.grace
/usr/vmsys/OBJECTS/shutdown/Text.privil
/usr/vmsys/OBJECTS/shutdown/Text.privil2
/usr/vmsys/OBJECTS/shutdown/Text.shut
/usr/vmsys/admin
/usr/vmsys/admin/.chkuser
/usr/vmsys/admin/Pclear.sh
/usr/vmsys/admin/Shutdown
/usr/vmsys/admin/backup
/usr/vmsys/admin/backup/dirchk
/usr/vmsys/admin/backup/filechk
/usr/vmsys/admin/backup/filemsg
/usr/vmsys/admin/backup/owrchk
/usr/vmsys/admin/backup/runback
/usr/vmsys/admin/backup/runback2
/usr/vmsys/admin/backup/runback3
/usr/vmsys/admin/backup/runback4
/usr/vmsys/admin/backup/runstore
/usr/vmsys/admin/backup/runstore2
/usr/vmsys/admin/backup/setquote
/usr/vmsys/admin/backup/uidchk
/usr/vmsys/admin/date
/usr/vmsys/admin/date/Date
/usr/vmsys/admin/date/dt
```

/usr/vmsys/admin/date/hours
/usr/vmsys/admin/dskopts
/usr/vmsys/admin/dskopts/Ckcopyin.sh
/usr/vmsys/admin/dskopts/Ckcopyout.sh
/usr/vmsys/admin/dskopts/Ckdensity
/usr/vmsys/admin/dskopts/Ckfwrite
/usr/vmsys/admin/dskopts/Fcopyin.sh
/usr/vmsys/admin/dskopts/Fcopyout.sh
/usr/vmsys/admin/dskopts/Fformat.sh
/usr/vmsys/admin/dskopts/chkmnt.sh
/usr/vmsys/admin/errmsg
/usr/vmsys/admin/filsys
/usr/vmsys/admin/filsys/diskumount
/usr/vmsys/admin/filsys/hcheck
/usr/vmsys/admin/filsys/labelfsname
/usr/vmsys/admin/filsys/makefsys
/usr/vmsys/admin/filsys/mname
/usr/vmsys/admin/filsys/mountfsys
/usr/vmsys/admin/filsys/part
/usr/vmsys/admin/filsys/part2
/usr/vmsys/admin/filsys/permit.ck
/usr/vmsys/admin/filsys/umountfsys
/usr/vmsys/admin/hw
/usr/vmsys/admin/hw/Printers.sh
/usr/vmsys/admin/hw/RS232.sh
/usr/vmsys/admin/hw/RSfree.sh
/usr/vmsys/admin/hw/chkcon
/usr/vmsys/admin/hw/chkport
/usr/vmsys/admin/hw/chktype
/usr/vmsys/admin/hw/dvc
/usr/vmsys/admin/hw/getname
/usr/vmsys/admin/hw/mkdvc
/usr/vmsys/admin/hw/modlist
/usr/vmsys/admin/hw/plist
/usr/vmsys/admin/hw/pnum
/usr/vmsys/admin/hw/port2ad
/usr/vmsys/admin/hw/port2rm
/usr/vmsys/admin/hw/pports
/usr/vmsys/admin/hw/slist
/usr/vmsys/admin/hw/speed

```
/usr/vmsys/admin/hw/sports
/usr/vmsys/admin/hw/used
/usr/vmsys/admin/logins
/usr/vmsys/admin/logins/cdlog
/usr/vmsys/admin/logins/cglog
/usr/vmsys/admin/logins/chgfull
/usr/vmsys/admin/logins/chguser
/usr/vmsys/admin/logins/confirm
/usr/vmsys/admin/logins/delcfm
/usr/vmsys/admin/logins/dellog
/usr/vmsys/admin/logins/full
/usr/vmsys/admin/logins/homechk
/usr/vmsys/admin/logins/homedir
/usr/vmsys/admin/logins/lgid
/usr/vmsys/admin/logins/lgname
/usr/vmsys/admin/logins/privgid
/usr/vmsys/admin/logins/seeklg
/usr/vmsys/admin/logins/userid
/usr/vmsys/admin/mailset
/usr/vmsys/admin/mailset/check.date
/usr/vmsys/admin/mailset/chg.Systems
/usr/vmsys/admin/mailset/looksys
/usr/vmsys/admin/mailset/mail.check
/usr/vmsys/admin/mailset/nuucp.pwd
/usr/vmsys/admin/pcheck
/usr/vmsys/admin/prtq
/usr/vmsys/admin/prtstat
/usr/vmsys/admin/qcheck
/usr/vmsys/admin/qpermit
/usr/vmsys/admin/rst.name
/usr/vmsys/admin/sysinfo
/usr/vmsys/admsets
/usr/vmsys/admsets/base-adm
/usr/vmsys/bin
/usr/vmsys/bin/adm
/usr/vmsys/bin/fmli
/usr/vmsys/bin/initial
/usr/vmsys/bin/suspend
```

Editing Package, Diskette 1 of 1

/Size
/vi
/unpack
/spellprog
/spellin
/hashmake
/hashcheck
/exrecover
/expreserve
/diff3prog
/uniq
/split
/sdiff
/pack
/nl
/newform
/fgrep
/egrep
/deroff
/ctags
/csplit
/comm
/col
/bfs
/bdiff
/sum
/od
/paste
/touch
/tail
/join
/tr
/pg
/cut
/exstrings
/compress
/hstop
/hlistb
/hlista
/spell
/dircmp
/diff3
/spellhist
/Remove
/Install
/Files
/Name

Network Support Utilities, Diskette 1 of 1

/Size
/clone/Master
/clone/System
/clone/Driver.o
/log/Master
/log/System
/log/Node
/log/Space.c
/log/Driver.o
/timod/Master
/timod/System
/timod/Space.c
/timod/Driver.o
/tirdwr/Master
/tirdwr/System
/tirdwr/Space.c
/tirdwr/Driver.o
/libnsl_s.a
/listen
/listen.h
/libnls.a
/nlsadmin
/strace
/strerr
/strclean
/Files
/Name
/Install
/Remove
/tiuser.h

Remote File Sharing, Diskette 1 of 1

/Size
/du/System
/du/Space.c
/du/Driver.o
/dufst/Master
/dufst/System
/dufst/Mfsys
/dufst/Sfsys
/dufst/Driver.o
/sp/Master
/sp/System
/sp/Node
/sp/Space.c
/sp/Driver.o
/adv
/dname
/fumount
/fusage
/idload
/nserve
/nsquery
/rfadmin
/rfpasswd
/rfsetup
/rfstart
/rfstop
/rfuadmin
/rfudaemon
/rmntstat
/rmount
/rmountall
/rumountall
/unadv
/fumounts
/rfs
/rumounts
/adv.init
/Files
/Name
/Install
/Remove

Remote Terminal Package, Diskette 1 of 1

```
/install
/install/Rlist
/install/UNINSTALL
/install/INSTALL
/install/setup
/install/adds.ti
/install/annarbor.ti
/install/ansi.ti
/install/att.ti
/install/beehive.ti
/install/cdc.ti
/install/colorscan.ti
/install/contel.ti
/install/datamedia.ti
/install/dec.ti
/install/diablo.ti
/install/fortune.ti
/install/general.ti
/install/hardcopy.ti
/install/hazeltine.ti
/install/hds.ti
/install/heath.ti
/install/homebrew.ti
/install/hp.ti
/install/lsi.ti
/install/microterm.ti
/install/misc.ti
/install/pc.ti
/install/perkinelmer.ti
/install/print.ti
/install/special.ti
/install/sperry.ti
/install/tektronix.ti
/install/teleray.ti
/install/televideo.ti
/install/ti.ti
/install/tymshare.ti
/install/visual.ti
/new
/new/usr
/new/usr/lib
/new/usr/lib/terminfo
/new/usr/lib/tabset
/new/usr/lib/tabset/3101
/new/usr/lib/tabset/beehive
/new/usr/lib/tabset/std
/new/usr/lib/tabset/teleray
/new/usr/lib/tabset/vt100
/new/usr/lib/tabset/xerox1720
/new/usr/options
/new/usr/options/terminf.name
```

Security Administration Package, Diskette 1 of 1

/Size
/makekey
/crypt
/libcrypt.a
/Remove
/Files
/Install
/Name

Two Kilobyte File System Package, Diskette 1 of 1

/Size
/Driver.o
/Master
/Mfsys
/Sfsys
/System
/Space.c
/Stubs.c
/Name
/Files
/Install
/Remove
/fsba

Appendix B: Documentation Updates

Documentation Updates

The following change pages reflect last minute changes to the *Operations/System Administration Guide* and the *User's/System Administrator's Reference Manual.*

UNIX SYSTEM V RELEASE 3.1
VERSION 1
OPERATIONS/SYSTEM ADMINISTRATION GUIDE
UPDATE TO ISS. 1

This update involves the following actions:

1. **ACTION:** Replace existing pages 2-13 through 2-26 with the new pages.
2. **ACTION:** Replace existing pages 4-31 through 4-34 with the new pages.
3. **ACTION:** Replace existing pages 4-73 and 4-74 with the new pages.
4. **ACTION:** Replace existing pages 4-165 and 4-166 with the new pages.
5. **ACTION:** Replace existing pages 4-171 through 4-174 with the new pages.
6. **ACTION:** Replace existing pages 6-23 through 6-26 with the new pages.
7. **ACTION:** Replace existing pages 8-39 and 8-40 with the new pages.
8. **ACTION:** Replace existing pages 9-11 through 9-14 with the new pages.

the UNIX system partition is being scanned, you will see the following message:

```
Checking cylinder: nnn
```

where "nnn" is updated for each cylinder scanned.

5. If, during the identification of defective blocks, the table overflows, you will see the following message, the installation aborts, and you will be left at the UNIX system prompt:

```
Error: Your UNIX System partition has too many bad
blocks. A UNIX System cannot be installed
on it. Please restart the installation procedure
by typing "INSTALL" at the UNIX System prompt and
repartition your hard disk so that the UNIX System
partition is located elsewhere.

Installation aborted.
```

If this occurs, restart the installation process by typing **INSTALL**. When you perform the fdisk procedure ("Partition the Hard Disk") on Page 2-6, manually place the UNIX system partition somewhere else. If this does not clear the problem, contact the manufacturer regarding the integrity of the hard disk.

Create UNIX System File Systems

1. When the surface analysis is completed, the system calculates the optimal amount of space on your hard disk for swap, user, and/or *root*(/) file systems.

   You will see a message that begins as follows:

```
The UNIX System partition has nnn cylinders assigned to it.
nn cylinders will be used for alternate sectors.
This leaves nnn cylinders (nnnnn bytes) available.


The following seems like a reasonable partitioning of
your UNIX System disk space:
```

NOTE: Throughout this procedure, "nnn" depends on the partition size.

2. You will see the file system size selections in the following messages:

   If no separate */usr* file system was called for, based on your partition size you will see the following message:

```
A combined root/user filesystem of nnn cylinders(nnnnnnn bytes),
```

   Otherwise, you will see the following message:

```
A root filesystem of nnn cylinders (nnnnnnn bytes),
a user (usr) filesystem of nnn cylinders (nnnnnnn bytes),
```

   In either case, if an additional */usr2* file system were called for, you will see the following message:

```
an extra user filesystem (/usr2) of nnn cylinders (nnnnnnn
bytes),
```

   The message will be completed with:

```
and a swap/paging area of nnn cylinders (nnnnnnn bytes).
```

3. You will see the following prompt message:

```
Is this allocation acceptable to you (y/n)?
```

If this allocation is acceptable, type **y**, strike Enter and then proceed to Step 11.

If not acceptable, type **n** and strike Enter.

4. You will see the following message:

```
Do you wish to have separate root and user filesystems (y/n)?
```

If you wish to have separate root and user file systems, type **y** and strike Enter.

If you wish that root and user be combined, type **n** and strike Enter.

NOTE	With many users and limited hard disk space (less than 68 megabytes), it is advisable to create separate root and user file systems.

5. You will see the following message:

```
Do you want an additional /usr2 filesystem (y/n)?
```

Generally, an additional */usr2* file system is not necessary. However, if you wish to have an additional */usr2* file system, type **y** and strike Enter.

If you do not want the above, type **n** and strike Enter.

Go on to the next step.

6. You will see the following message:

```
You will now be given the opportunity to specify the
size, in cylinders, of each filesystem. (One megabyte
of disk space is approximately nn.n cylinders).
```

followed by the prompt message:

```
How many cylinders would you like for swap/paging (1-nnn)?
```

NOTE: In the above message, nnn is the maximum legal size of swap space, calculated as the total space (UNIX system partition less cylinders reserved for alternates) minus 20 megabytes.

Enter the desired parameter and strike Enter. If your answer was not in the given range, you will see the following message and Step 6 will be repeated:

```
Illegal value: nnn; try again.
```

If only one file system was selected, you will see the following message:

```
The remaining nnn cylinders will be assigned to root/usr.
```

NOTE In the above message, nnn is the remaining space after swap space is subtracted.

If only one file system was selected, then proceed to Step 9.

7. You will see the following message:

```
How many cylinders would you like for root (1-nnn)?
```

NOTE In the above message, nnn is the maximum legal size for *root* (/), which is the amount of space remaining after swap space has been subtracted.

Enter the desired parameter and strike Enter.

If your answer is not in the given range, you will see the following message and Step 7 will be repeated:

```
Illegal value: nnn; try again.
```

If there is no space left after subtracting the *root(/)* file system, only one file system shall be used, you will see the following message, then proceed to Step 9.

```
No space remaining for a user filesystem.
Assuming single root/usr filesystem.
```

If an additional */usr2* file system was not selected, you will see the following message, then proceed to Step 9.

```
The remaining nnn cylinders will be assigned to /usr.
```

If an additional */usr2* file system was selected, you will see the following message:

```
The remaining nnn cylinders will be assigned to /usr2.
```

8. You will see the following message:

```
How many cylinders would you like for /usr (1-nnn)?
```

NOTE

In the above message, nnn is the maximum legal size for */usr,* which is the amount of space remaining after *root*(*/*) has been subtracted.

Enter the desired parameter and strike Enter.

If the answer is not in the given range, you will see the following message and this step will be repeated:

```
Illegal value: nnn, try again.
```

If there is no space after subtracting the */usr* file system, only two file systems shall be used, you will see the following message, and the process continued with Step 9:

```
No space remaining for a /usr2 filesystem.
Assuming just root and /usr filesystems.
```

Otherwise, you will see the following message:

```
The remaining nnn cylinders will be assigned to /usr2.
```

9. You will see the following message:

```
You have specified the following disk allocation:
```

Return to Step 2.

10. For each selected file system, you will see the following message:

```
A xxx filesystem will now be created on your hard disk...
```

NOTE In the above message, xxx is either "*root(/)*", "*/usr*", or "*/usr2.*"

Skip Step 11 and go directly to the procedure to "Verify Successful File System Creation."

11. You will see the following message:

```
UNIX System file system(s) will now be created
  on your hard disk...
```

Verify Successful File System Creation

1. If an error was encountered in the creation of any of the UNIX system file system(s), you will see the following message:

```
An error has occurred while setting up your hard disk.
Strike ENTER to install again.
```

If you see this message, strike Enter to install again and go back to the procedure to "Partition Your Hard Disk."

NOTE If you strike Break, the Abort Message and procedure on Page 2-2 will be deployed.

2. If the mkfs commands were performed successfully, you will see the following message:

```
UNIX System file system(s) have been created
in your active UNIX System partition.

A UNIX System will now be installed on your
hard disk.....
```

Go on to the next step.

Complete Installation of Diskette Number 1

1. The *root(/)* file system is mounted. If this fails, you will see the following message (up to three times):

```
Mounting root file system failed, trying again ...
```

   If the mount attempt fails three times, you will see the following message:

```
Cannot mount the root file system.
Please notify your AT&T services representative for further
assistance.
```

   If the above occurs, the installation will abort and you will be left in single-user mode with the hard disk unmounted.

2. All files on diskette number 1 are copied to their respective directories on the hard disk.

3. You will see the following message:

```
Please standby.

When you are prompted to reboot your system,
remove the floppy disk from the diskette drive,
and strike CTL-ALT-DEL.

Please wait for the prompt.
```

When the system is ready to be rebooted, you will see the following message:

```
Reboot the system now.
```

NOTE If you strike any key other than Ctrl, Alt, and Del simultaneously, it will be ignored by the system and not echoed.

4. Strike Ctrl, Alt, and Del simultaneously to reboot the system.

Change Password

A password is a code word that should be known only by its creator. The password secures your login so no unauthorized person can enter the computer and have access to your files. Once a password has been assigned, it must be entered with your login when you want to use the computer.

After you have responded to the `login:` prompt, the password prompt appears on the screen. When you type in your password, it will not appear on the screen. This protects your password from being seen by someone else.

Each password is required to be at least six characters or longer. The password must have two alphabetic characters and at least one numeric character in the first eight characters.

Choose a password that is not common and is hard to guess. Your password should be changed from time to time to safeguard its secrecy.

You can only change passwords for your own login name. See Appendix C for a procedure to change the password for other users.

Changing Your Own Password

To change the password that is associated with your login, use the following procedure.

1. Log in using the login name associated with the password you want to change.
2. From the Administration menu, highlight Change Password and strike Enter. The screen clears and the UNIX system **passwd** command is executed. At the top of the screen, the following message is printed.

```
Strike Break or Del to return to AT&T Administration
without changing your password.
```

3. When prompted for your current password (Old password:) type the password you used when you logged in.

CAUTION

If you strike Del or Ctrl Break before you type your old password, your password will be unchanged. If you strike Del or Ctrl Break after you type your old password, your password will be locked and you will not be able to log on to the system.

4. When prompted for the new password (`New password:`), enter the new password you want.

The password you enter will not be displayed on the screen.

You will receive an error message in the following circumstances:

- If you enter the old password incorrectly
- If the new password is not six character long
- If the new password does not have two alphabetic characters and at least one special character in the first eight

- If the password resembles the login name by being a reverse or circular shift
- If the new password does not differ from the old password by three or more characters
- If the new password includes a space or a ":"
- If you enter the new password incorrectly the second time.

5. When prompted to repeat the new password (`Reenter new password:`), type your new password again.

   If the two password entries are the same, the password is assigned. If the two password entries do not match, the message

   ```
   They don't match; try again.
   New password:
   ```

   appears. If this message appears, type the new password again and then reenter the new password again.

6. After you reenter the new password, you will be prompted to:

   ```
   Strike RETURN to continue with AT&T Administration.
   ```

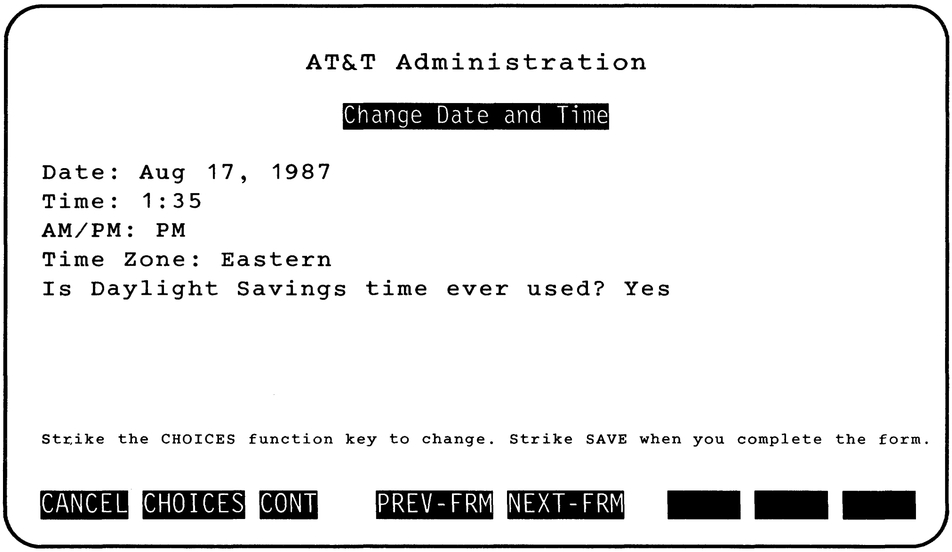
   Strike [Enter] to return to the Administration menu.

Date and Time

The system clock can be changed using the Date and Time feature. You must have system administration privileges to change the date and time. You can use the Date and Time form to display the current setting, change a value as desired, and verify that the appropriate changes have been made.

Before re-setting the date or time, notify all users that the date is being reset. Changing the date and/or time may disrupt **make, cron**, a compile, or any applications that rely on the current date thus disturbing other users' work. To set the UNIX system clock, use the following procedure.

1. From the Administration menu, highlight Date and Time and strike (Enter). The Date and Time form appears as follows:



```
                    AT&T Administration

                   Change Date and Time

Date: Aug 17, 1987
Time: 1:35
AM/PM: PM
Time Zone: Eastern
Is Daylight Savings time ever used? Yes




Strike the CHOICES function key to change. Strike SAVE when you complete the form.

CANCEL CHOICES CONT     PREV-FRM NEXT-FRM
```

2. Use the arrow keys to move the cursor to the field to be changed.

3. Once the cursor is resting on the field to be changed, strike the CHOICES key. If only two or three choices are available, the choice will toggle when the CHOICES key is striked. If more than three choices are available for you to enter into each field a pop-up menu will appear. Use the arrow keys to move to the appropriate entry and select by striking (Enter).

Mail Setup

The Mail Setup menu item enables you to give your computer a node name so that other systems can send mail to your system and you can send mail to other systems.

To exchange electronic mail or files with another computer, you and the other computer user must set up and exchange some information. In general, you must do the following:

- Physically install the communication line to be used. You must network (connect) the computers together in some fashion such as a:

  modem

  direct connection

  data switch.

  You should exchange system names, mail names, passwords, data phone numbers if using a modem, and data communication line speeds.

- Assign your computer a mail name.
- Assign the mail login a password so that only other trusted systems can log in to your computer.
- Provide the users of other systems with your mail name and mail login password.
- Enter information about the computer receiving your mail (information you receive from the other computer administrator/operator).

If you have not installed the Electronic Mail feature, you can still use the basic UNIX system mail feature. Refer to the *UNIX System V User Guide* in the section "Communication Tutorial" for some instructions in using UNIX system mail. This document will not be included with the documents you are provided. To obtain a copy, consult your Documentation Roadmap for ordering information.

CAUTION

If you strike Del or Ctrl Break while assigning a password, the mail login for your system will be locked and you will not be able to receive mail.

Set Up the Communication Line

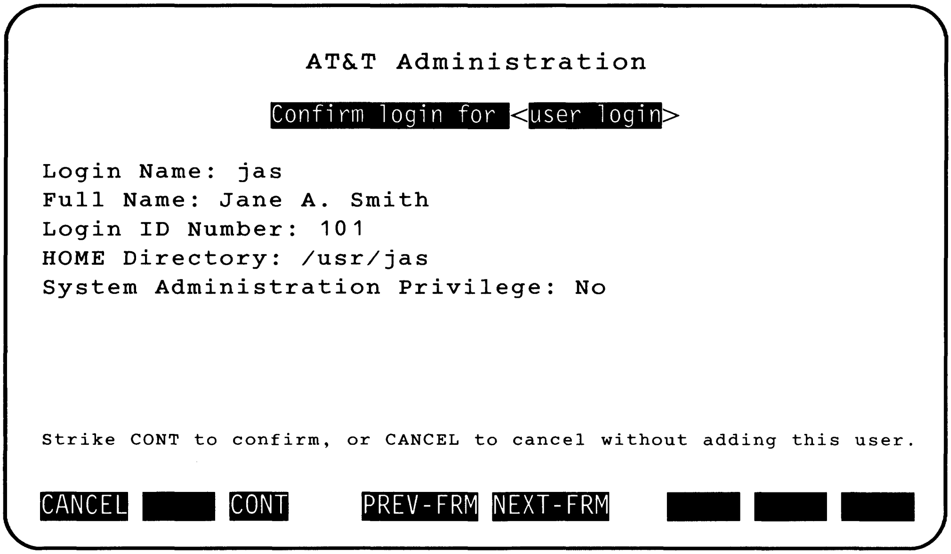
Before sending or receiving mail, you must configure the port using the Serial Ports Setup function from the Peripherals Setup menu in this chapter.

Configure the serial port for a modem, computer, or other (e.g., data switch) depending on the physical connection between your system and the other system.

Set Up This System to Receive Mail

To set up your system to receive mail from other systems, use the following procedure:

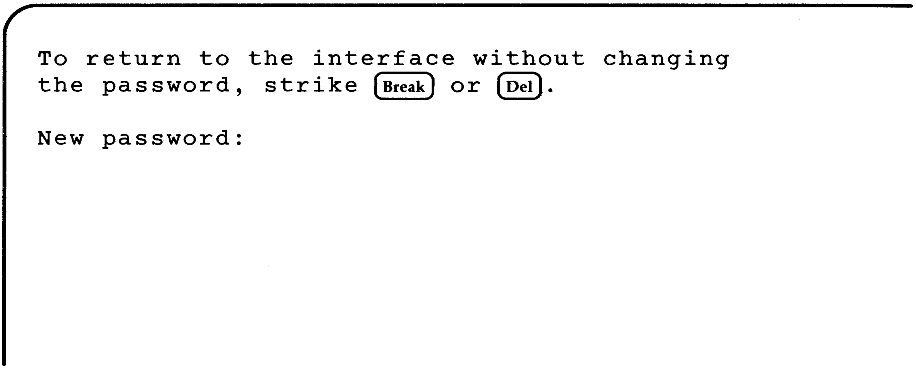
1. Highlight `Mail Setup` and strike Enter from the Administration menu. The Mail Setup menu appears as follows:



```
                    AT&T Administration

              Confirm login for <user login>

Login Name: jas
Full Name: Jane A. Smith
Login ID Number: 101
HOME Directory: /usr/jas
System Administration Privilege: No




Strike CONT to confirm, or CANCEL to cancel without adding this user.
```

9. Strike CONT if the information is correct. If the information is not correct, strike CANCEL.

10. After you strike CONT, you will be prompted for a password. The screen clears and appears as follows:



```
To return to the interface without changing
the password, strike [Break] or [Del].

New password:
```

CAUTION If you strike [Del] or [Ctrl] [Break] while assigning a password, the login will be locked and the user will not be able to log on to the system using the login.

Respond to the prompts to assign a password for the new user login name. When you have assigned a password, you will be prompted as follows:

Strike RETURN to continue.

Strike [Enter].

NOTE A password is required for every login. If you do not provide a password, the users login will not be installed.

11. After you provide a password, you will return to the User Logins menu.

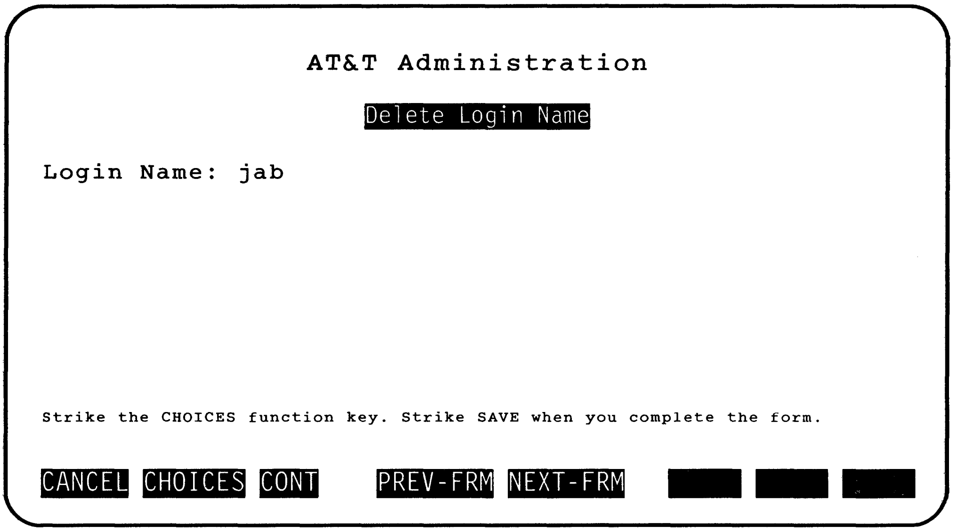
Delete User Logins

When you no longer need a login, it should be removed.

1. From the Administration menu, highlight User Logins and strike Enter.
2. From the User Logins menu, highlight Delete and strike Enter.

NOTE A validation check determines if you have special system administration privileges. If you do not, you will receive a warning message. You must have special system administration privileges to delete a login even if it is your own.

The Delete Login Name form appears as follows:



```
                    AT&T Administration

                    Delete Login Name

Login Name: jab





Strike the CHOICES function key. Strike SAVE when you complete the form.
```

3. While the cursor is resting on the Login Name field, strike CHOICES and select the desired login from the pop-up menu of user logins. Move to an item with the arrow keys and strike the Enter key to select. The login to be deleted is now entered into the Login Name field.

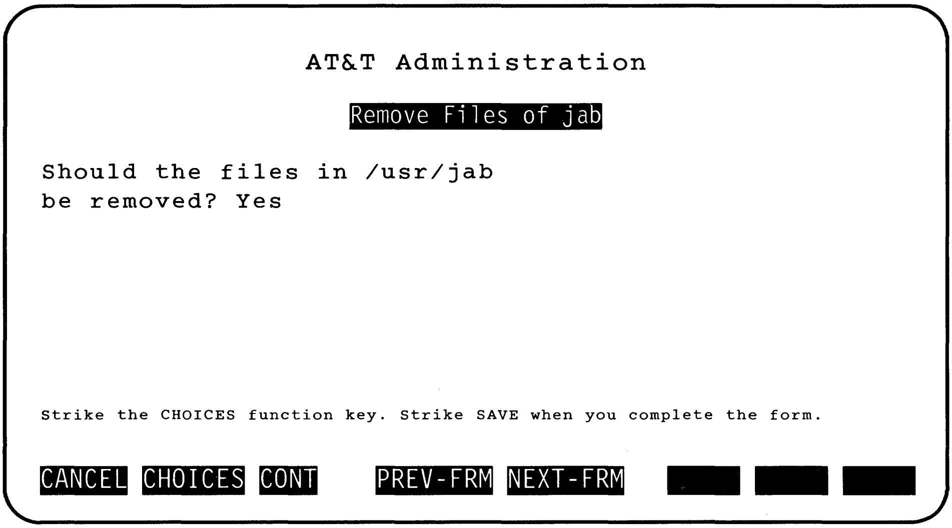
You can also type in the login name that you want to delete. If you type the login name incorrectly, the following message appears:

```
That is not a valid login name.
Strike CHOICES for valid choices.
```

If the user you select is currently logged on, the deletion is denied and the following message appears:

```
"username" is currently logged in.
You may not delete this user at this time.
```

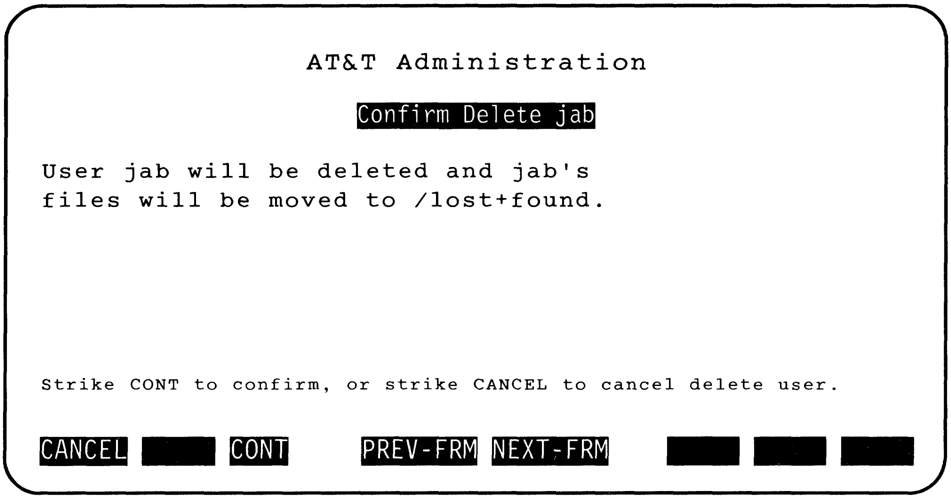
4. When you delete a user login name, you must decide if you want to remove all the files from the user's HOME directory. The Remove Files of <user login> form appears as follows:



```
                    AT&T Administration

                    Remove Files of jab

Should the files in /usr/jab
be removed? Yes







Strike the CHOICES function key. Strike SAVE when you complete the form.
```

5. The default decision is Yes. Strike CHOICES (Yes or No) until your decision appears (toggle). When you complete the form, strike SAVE.

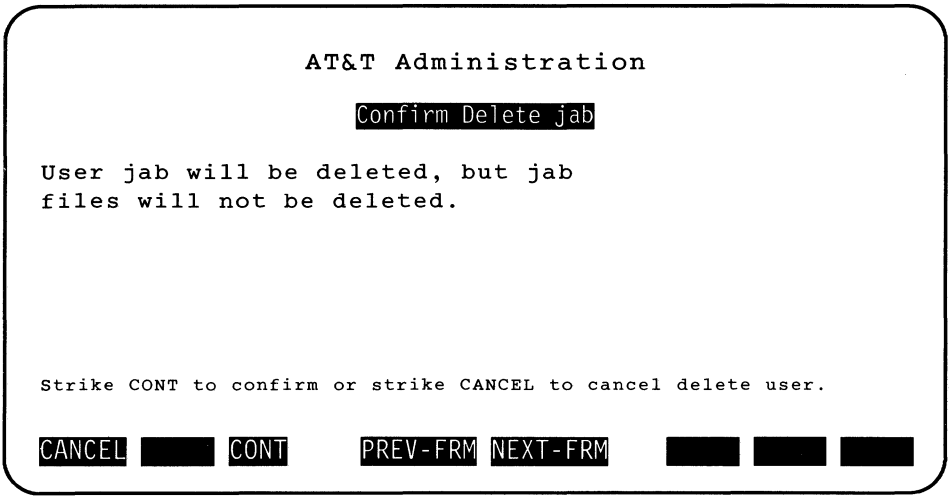
   If you responded Yes to delete the files the following confirm frame appears:



```
                AT&T Administration

                Confirm Delete jab

User jab will be deleted and jab's
files will be moved to /lost+found.




Strike CONT to confirm, or strike CANCEL to cancel delete user.
```

The files will be stored temporarily in */lost+found*. Then they will be deleted.

Responding "No" to delete the files causes the following confirm frame to appear:



```
                    AT&T Administration

                    Confirm Delete jab

User jab will be deleted, but jab
files will not be deleted.




Strike CONT to confirm or strike CANCEL to cancel delete user.
```

6. Strike CONT if you're sure you want to delete the login. If you do not want to delete the login, strike CANCEL.

   When you strike CONT the Confirm message closes and the User Logins menu becomes active. You can remove another login if desired or go to another menu.

Recovery From Major Hard Disk Damage

When the file system becomes corrupted to the point where the system is inoperable, try the following:

1. Insert the first floppy disk of the Foundation Set into the floppy disk drive and strike RESET.
2. When you see the message asking if you are ready to install the UNIX system, strike Ctrl and Break at the same time.
3. Run **fsck** from the **root** prompt by typing:

   ```
   # /etc/fsck /dev/rdsk/0s1 Enter
   ```

   The **fsck** command will either run with no errors or will request action from the user on repairing the file system. Most of the time answering yes to the questions ask by **fsck** will be sufficient, but be aware this could remove some files.
4. Remove diskette and reboot the system by striking RESET.

Recovery of the UNIX System

There may be a time when booting up the computer you will see the message `/unix is missing or corrupted.` If this should occur, you'll need to replace */unix* with the default */unix*. When */unix* is corrupted, the results are unpredictable. In either case, try the following:

1. Insert the first floppy disk of the Base Foundation Set into the floppy disk drive and strike RESET.
2. When you see the message asking if you are ready to install the UNIX system, break out by striking Ctrl Break at the same time.
3. Run **fsck** from the **root** prompt by typing:

   ```
   # /etc/fsck /dev/rdsk/0s1 Enter
   ```

4. Mount the device **0s1** by typing:

   ```
   # /etc/mount /dev/dsk/0s1 /mnt Enter
   ```

5. Copy the **/unix** directory by typing:

   ```
   # cp /unix /mnt/unix Enter
   ```

6. Unmount the device **0s1** by typing:

   ```
   # /etc/umount /dev/dsk/0s1 Enter
   ```

7. Reboot the system by striking RESET.

Warning: When you get the UNIX system prompt, make sure you are logged in as root. You should then reinstall all drivers previously installed. This can be done via the ***idbuild*** **command. See the manual page** *idbuild* **in the** *UNIX system V Release 3.1 User's/System Administrator's Reference Manual.*

Alternate Recovery of the UNIX System

If you have added device drivers or changed configuration, you may want to use this alternate recovery procedure. Yo can copy */unix* to */unix.orig* and reboot from */unix.orig*. The advantage of doing this is that you do not have to reinstall all drivers previously installed. The disadvantage is that */unix.orig* will occupy additional disk space.

If you see the message */unix* is missing or corrupted, replace /unix with the backup */unix.orig*. When */unix* is corrupted, try the following:

1. Insert the first floppy disk of the Base Foundation Set into the floppy disk drive and strike RESET.

2. When you see the message asking if you are ready to install the UNIX system, break out by striking Ctrl Break at the same time.

3. Run **fsck** from the **root** prompt by typing:

   ```
   # /etc/fsck /dev/rdsk/0s1 Enter
   ```

4. Mount the device **0s1** by typing:

   ```
   # /etc/mount /dev/dsk/0s1 /mnt Enter
   ```

5. Copy /unix.orig to /unix by typing:

   ```
   # cp /unix /mnt/unix Enter
   ```

6. Unmount the device **0s1** by typing:

   ```
   # /etc/umount /dev/dsk/0s1 Enter
   ```

7. Reboot the system by striking HARDWARE RESET. When the boot prompt is
   tEoo

Creating Backup Copies and Recovering Lost Files

The value of backing up a file is sometimes not appreciated until it's too late and data is lost. Backing up a system takes time, but recovering data that was not backed up takes much longer. The purpose of system backup is to back up your software on floppy disks (or tape) so that you will have it in case data is lost.

Refer to Chapter 4, System Administration for procedures on disk backup and restore.

Poll File

The *Poll* file (*/usr/lib/uucp/Poll*) contains information for polling specified Machines. Each entry in the *Poll* file contains the name of the remote machine to call, followed by a TAB character, and finally the hours the machine should be called. The entry:

```
eagle	0 4 8 12 16 20
```

will provide polling of machine eagle every 4 hours.

NOTE It should be understood that **uudemon.poll** does not actually perform the poll, it merely sets up a polling work (C.) file in the spool directory that will be seen by the scheduler, started by **uudemon.hour**. Refer to the discussion on **uudemon.poll**.

Maxuuxqts File

The *Maxuuxqts* (*/usr/lib/uucp/Maxuuxqts*) file contains an ASCII number to limit the number of simultaneous **uuxqt** programs running. This file is delivered with a default entry of 2. This may be changed to meet local needs. If there is a lot of traffic from **mail**, it may be advisable to increase the number of **uuxqt** programs that will run to reduce the time it takes for the mail to leave your system. However, keep in mind that the load on the system increases with the number of **uuxqt** programs running.

Maxuuscheds File

The *Maxuuscheds* (*/usr/lib/uucp/Maxuuscheds*) file contains an ASCII number to limit the number of simultaneous **uusched** programs running. Each **uusched** running will have one **uucico** associated with it; limiting the number will directly affect the load on the system. The limit should be less than the number of outgoing lines used by UUCP (a smaller number is often desirable). This file is delivered with a default entry of 2. Again, this may be changed to meet the needs of the local system. However, keep in mind that the load on the system increases with the number of **uusched** programs running.

remote.unknown

The **remote.unknown** program (**/usr/lib/uucp/remote.unknown**) is a C program that is executed when a remote site that is not in the **Systems** file calls in to start a conversation. The C program will append the name of the system and the time of the call to the file **/usr/spool/uucp/.Admin/Foreign**.

Administrative Tasks

There is a minimum amount of maintenance that must be applied to your computer to keep the files updated, to ensure that the network is running properly, and to track down line problems. When more than one remote machine is involved, the job becomes more difficult because there are more files to update and because users are much less patient when failures occur between machines that are under local control. The **uustat** program provides you with information about the latest attempts to contact various machines and the age and number of jobs in the queue for remote machines. The following sections describe the routine administrative tasks that must be performed by someone acting as the UUCP administrator or are automatically performed by the UUCP daemons (demons).

The biggest problem in a dialup network like UUCP is dealing with the backlog of jobs that cannot be transmitted to other machines. The following cleanup activities should be routinely performed.

Setting Up RFS

After installing RFS, as described in Chapter 2, Software Installation, the basic RFS configuration and reconfiguration can be handled using the tasks in this section.

These tasks are run from the shell. They should be run initially in the order described.

Once these tasks are completed, go to the "Starting/Stopping RFS" section for information on starting RFS.

Prerequisites

Before you begin setting up RFS, the following must be installed and running: UNIX System V Release 3.1 (or later) software, Remote File Sharing Utilities, Networking Support Utilities, and transport provider software. (See the *Remote File Sharing Release Notes* and the transport provider manuals that accompany the product for installation instructions.)

You must also log in as **root**.

Set Node Name

CAUTION

Changing the node name of your computer requires careful coordination with all machines that communicate with yours using Remote File Sharing or other communications packages that rely on node name.

Check to see if your computer's node name is set to the name you want (**uname -n**). If it's not, set it by typing:

```
uname -S nodename
```

You will be asked to type in your computer's node name. A node name that is valid for Remote File Sharing can consist of up to eight characters of letters (uppercase and lowercase), digits, hyphens (-), and underscores (_). Some networks, such as the STARLAN network, require that every node name in the network be different. Remote File Sharing, however, only requires that every node name in a domain be different.

Set Up Network Listener

If you have installed the Networking Support Utilities, the AT&T implementation of the STARLAN network, and Remote File Sharing in the order described in the Chapter 2, Software Installation, you can skip this task. The listener will already be installed and set up to run automatically and Remote File Sharing will be listed as an available service.

If you are using another transport provider, or suspect that your STARLAN network listener is set up improperly, this task will show how to manually set up the listener. In the following example the STARLAN network is used. To set up the listener for other networks compatible with the AT&T Transport Interface, you should replace **starlan** with the name of the network (network specification) you are installing. [For more details, see the **nlsadmin**(1M) manual page.]

To determine if the listener is properly installed and set up for use by RFS, type the following:

```
nlsadmin -v starlan
```

If service code 105 is listed, then the listener is configured to be used for Remote File Sharing.

Run the following commands if the listener is not properly set up. If you run any of these commands and they have already been run, you will receive a message telling you so. This will not harm your listener configuration. Type:

```
nlsadmin -i starlan
```

to initialize the files needed for the listener process for the network specified, in this case **starlan**.

Next, type:

```
nlsadmin -a 105 -c /usr/net/servers/rfs/rfsetup -y "rfsetup" starlan
```

to add the Remote File Sharing service (**rfsetup**) to the list of services available to the **starlan** listener.

Use the following command line to report the status of the **starlan** listener process installed on this machine (ACTIVE or INACTIVE):

```
nlsadmin -x
```

Next, type:

```
nlsadmin -l "nodename.serve" -t "nodename" starlan
```

to register the network addresses of your machine. The listener will listen for requests for these addresses on the network. Only the **-l** address is required by Remote File Sharing. The **-t** address is used only for terminal services and may not be needed on all networks.

To start the listener, type:

```
nlsadmin -s starlan
```

Normally, it will be started automatically when your machine enters multiuser mode (**init 2**).

Set the Domain Name

Set the domain name by typing:

dname -D *domain*

where *domain* is replaced by the domain of which your machine will be a member. The domain name must:

- Contain no more than 14 characters
- Consist of any combination of letters (uppercase or lowercase), digits, hyphens, and underscores
- Be different from the name of any other domain used on the network if there is more than one domain on your network.

You can check the current domain name by typing:

```
dname
```

Set the Transport Provider

To identify the network, you must tell Remote File Sharing the network (transport provider) it should use. (In our example, this is **starlan** for the STARLAN network.)

```
dname -N starlan
```

This command indicates the device, relative to the */dev* directory, that is used for the transport provider.

Create rfmaster File

The *rfmaster* file should only be created manually on the primary. If your machine is not the primary, you should skip this task; the *rfmaster* file for your domain will automatically be placed on your machine the first time you start RFS (**rfstart -p** *primary_addr*).

If you are on the primary, you can create an *rfmaster* file in the */usr/nserve* directory using any standard file editor. The contents of this file will define:

- The primary name server for your domain
- Secondary name servers for your domain
- Network addresses for each of these machines.

(See the section on "Multiple Domain Name Service" in this chapter for a description of other information you may want to put into the *rfmaster* file.)

Here is an example of an *rfmaster* file for a domain called **peanuts**, whose primary and secondary name servers' node names are **charlie, linus**, and **lucy**. Adding each machine's domain name (**peanuts**) to its node name, separated by a period, forms its full Remote File Sharing machine name. Each line of the example translates as follows.

- For domain **peanuts** the primary is **peanuts.charlie**.
- For domain **peanuts** a secondary is **peanuts.linus**.
- For domain **peanuts** another secondary is **peanuts.lucy**.

UNIX SYSTEM V RELEASE 3.1
VERSION 1
USER'S/SYSTEM ADMINISTRATOR'S REFERENCE MANUAL
UPDATE TO ISS. 1

This update involves the following actions:

1. **ACTION:** Replace AT(1) page 1/AT(1) page 2 with the new page.
2. **ACTION:** Replace AWK(1) page 3/BACKUP(1M) page 1 with the new page.
3. **ACTION:** Replace CRASH(1M) page 4/CRASH(1M) page 5 with the new page.
4. **ACTION:** Replace CRASH(1M) page 6/CRASH(1M) page 7 with the new page.
5. **ACTION:** Replace FACTOR(1) page 1/FDISK(1M) page 1 with the new page.
6. **ACTION:** Replace IDLOAD(1M) page 3/IDMKINIT(1M) page 1 with the new page.
7. **ACTION:** Add new page IDMKINIT(1M) page 2/blank side.
8. **ACTION:** Replace MKDIR(1) page 1/MKFS(1M) page 1 (Base System) with the new page.
9. **ACTION:** Replace MKFS(1M) page 2 (Base System)/MKFS(1M) page 1 (2K File System) with the new page.
10. **ACTION:** Replace MKFS(1M) page 2 (2K File System)/MKNOD(1M) page 1 with MKFS(1M) page 2 (2K File System)/MKFS(1M) page 3 (2K File System).

11. **ACTION:** Add new page MKNOD(1M) page 1/blank side.
12. **ACTION:** Replace REMOVEPKG(1) page 1/RESTORE(1M) page 1 with the new page.
13. **ACTION:** Replace TAR(1) page 2/TEE(1) page 1 with the new page.
14. **ACTION:** Replace RTC(7) page 1/STREAMIO(7) page 1 with the new page.

NAME

at, batch – execute commands at a later time

SYNOPSIS

at *time* [*date*] [+ *increment*]
at -r job ...
at -l [*job* ...]

batch

DESCRIPTION

The *at* and *batch* commands read commands from standard input to be executed at a later time. *at* allows you to specify when the commands should be executed, while jobs queued with *batch* will execute when system load level permits. *at* may be used with the following options:

-r Removes jobs previously scheduled with *at*.

-l Reports all jobs scheduled for the invoking user.

Standard output and standard error output are mailed to the user unless they are redirected elsewhere. The shell environment variables, current directory, umask, and ulimit are retained when the commands are executed. Open file descriptors, traps, and priority are lost.

Users are permitted to use *at* if their name appears in the file **/usr/lib/cron/at.allow**. If that file does not exist, the file **/usr/lib/cron/at.deny** is checked to determine if the user should be denied access to *at*. If neither file exists, only root is allowed to submit a job. If **at.deny** is empty, global usage is permitted. The allow/deny files consist of one user name per line. These files can only be modified by the super-user.

The *time* may be specified as 1, 2, or 4 digits. One-and two-digit numbers are taken to be hours, four digits to be hours and minutes. The time may alternately be specified as two numbers separated by a colon, meaning *hour:minute*. A suffix **am** or **pm** may be appended; otherwise a 24-hour clock time is understood. The suffix **zulu** may be used to indicate GMT. The special names **noon, midnight, now**, and **next** are also recognized.

An optional *date* may be specified as either a month name followed by a day number (and possibly year number preceded by an optional comma) or a day of the week (fully spelled or abbreviated to three characters). Two special "days", **today** and **tomorrow** are recognized. If no *date* is given, **today** is assumed if the given hour is greater than the current hour and **tomorrow** is assumed if it is less. If the given month is less than the current month (and no year is given), next year is assumed.

The optional *increment* is simply a number suffixed by one of the following: **minutes, hours, days, weeks, months**, or **years**. (The singular form is also accepted.)

Thus legitimate commands include:

```
at 0815am Jan 24
at 8:15am Jan 24
at now + 1 day
at 5 pm Friday
```

at and *batch* write the job number and schedule time to standard error.

The **at -r** command removes jobs previously scheduled by *at* or *batch*. The job number is the number given to you previously by the *at* or *batch* command. You can also get job numbers by typing **at -l**. You can remove only your own jobs unless you are the super-user.

EXAMPLES

The *at* and *batch* commands read from standard input the commands to be executed at a later time. *sh*(1) provides a different ways of specifying standard input. Within your commands, it may be useful to redirect standard output.

This sequence can be used at a terminal:

```
batch
sort filename >outfile
<control-D> (hold down 'control' and depress 'D')
```

This sequence, which demonstrates redirecting standard error to a pipe, is useful in a shell procedure (the sequence of output redirection specifications is significant):

```
batch <<!
sort filename 2>&1 >outfile | mail loginid
!
```

To have a job reschedule itself, invoke *at* from within the shell procedure, by including code similar to the following within the shell file:

```
echo "sh shellfile" | at 1900 thursday next week
```

FILES

/usr/lib/cron	main cron directory
/usr/lib/cron/at.allow	list of allowed users
/usr/lib/cron/at.deny	list of denied users
/usr/lib/cron/queue	scheduling information
/usr/spool/cron/atjobs	spool area

SEE ALSO

cron(1M), kill(1), mail(1), nice(1), ps(1), sh(1), sort(1).

DIAGNOSTICS

Complains about various syntax errors and times out of range.

Add up first column, print sum and average:

```
               { s += $1 }
        END    { print "sum is", s, " average is", s/NR }
```

Print fields in reverse order:

```
        { for (i = NF; i > 0; --i) print $i }
```

Print all lines between start/stop pairs:

```
        /start/, /stop/
```

Print all lines whose first field is different from previous one:

```
        $1 != prev { print; prev = $1 }
```

Print file, filling in page numbers starting at 5:

```
        /Page/  { $2 = n++; }
                { print }
```

command line: awk –f program n=5 input

SEE ALSO

grep(1), sed(1).
lex(1), printf(3S) in the *Programmer's Reference Manual.*

BUGS

Input white space is not preserved on output if fields are involved.
There are no explicit conversions between numbers and strings. To force an expression to be treated as a number, add 0 to it; to force it to be treated as a string, concatenate the null string (" ") to it.

NAME

backup – performs backup functions

SYNOPSIS

backup [-t] [**-p** | **-c** | **-f** <files> | **-u** "<user1> [user2]"]
  -d <device>

backup -h

DESCRIPTION

-h produces a history of backups. Tells the user when the last complete and incremental/partial backups were done.

-c complete backup. All files changed since the system was installed are backed up.

-p incremental/partial backup. If an incremental/partial backup was done, all files modified since that time are backed up, otherwise all files modified since the last complete backup are backed up. A complete backup must be done before a partial backup.

-f backup files specified by the *<files>* argument. File names may contain characters to be expanded (i.e., *, .) by the shell. The argument must be in quotes.

-u backup a user's home directory. All files in the user's home directory will be backed up. At least one user must be specified but it can be more. The argument must be in quotes if more than one user is specified. If the user name is "all", then all the user's home directories will be backed up.

-d used to specify the device to be used. It defaults to **/dev/rdsk/f0q15d** (the 1.2M floppy).

-t used when the device is a tape. This option must be used with the **-d** option when the tape device is specified.

A complete backup must be done before a partial backup can be done. Raw devices rather than block devices should always be used. The program can handle multi-volume backups. The program will prompt the user when it is ready for the next media. The program will give you an estimated number of floppies/tapes that will be needed to do the backup. Floppies MUST be formatted before the backup is done. Tapes do not need to be formatted. If backup is done to tape, the tape must be rewound.

SEE ALSO

qt(7).

file [**-e**] [**-w** file] [[**-p**] table_entry ...]
Alias: **f**.
Print the file table.

findaddr [**-w** file] table slot
Print the address of *slot* in *table*. Only tables available to the *size* function are available to *findaddr*.

findslot [**-w** file] virtual_address ...
Print the table, entry slot number, and offset for the address entered. Only tables available to the *size* function are available to *findslot*.

fs [**-w** file] [[**-p**] table_entry ...]
Print the file system information table.

gdp [**-e**] [**-f**] [**-w** file] [[**-p**] table_entry ...]
Print the gift descriptor protocol table.

gdt [**-e**] [**-w** file] [[**-p**] table_entry ...]
Print the global descriptor table.

help [**-w** file] function ...
Print a description of the named function, including syntax and aliases.

idt [**-e**] [**-w** file] [[**-p**] table_entry ...]
Print the interrupt descriptor table.

inode [**-e**] [**-f**] [**-w** file] [[**-p**] table_entry ...]
Alias: **i**.
Print the inode table, including file system switch information.

kfp [**-w** file] [value]
Print the frame pointer for the start of a kernel stack trace. If the value argument is supplied, the kfp is set to that value.

lck [**-e**] [**-w** file] [[**-p**] table_entry ...]
Alias: **l**.
Print record-locking information. If the **-e** option is used or table address arguments are given, the record lock list is printed. If no argument is entered, information on locks relative to inodes is printed.

ldt [**-e**] [**-w** file] [**-s** process] [[**-p**] table_entry ...]
Print the local descriptor table for the given process, or for the current process if none is given.

linkblk [**-e**] [**-w** file] [[**-p**] table_entry ...]
Print the linkblk table.

map [**-w** file] mapname ...
Print the map structure of the given mapname.

mbfree [**-w** file]
Print free streams message block headers.

mblock [**-e**] [**-w** filename] [[**-p**] table_entry ...]
Print allocated streams message block headers.

mode [**-w** file] [mode]
Set address translation of arguments to virtual (**v**) or physical (**p**) mode. If no mode argument is given, the current mode is printed. At the start of a *crash* session, the mode is virtual.

mount [**-e**] [**-w** file] [[**-p**] table_entry ...]
Alias: **m**.
Print the mount table.

nm [**-w** file] symbol ...
Print value and type for the given symbol.

od [**-p**] [**-w** file] [-format] [-mode] [**-s** process] start_addr [count]
Alias: **rd**.
Print *count* values starting at the start address in one of the following formats: character (**-c**), decimal (**-d**), hexadecimal (**-x**), octal (**-o**), ASCII (**-a**), or hexadecimal/character (**-h**), and one of the following modes: long (**-l**), short (**-t**), or byte (**-b**). The default mode for character and ASCII formats is byte; the default mode for decimal, hexadecimal, and octal formats is long. The format **-h** prints both hexadecimal and character representations of the addresses dumped; no mode needs to be specified. When format or mode is omitted, the previous value is used. At the start of a *crash* session, the format is hexadecimal and the mode is long. If no count is entered, 1 is assumed.

panic
Print the latest system notices, warnings, and panic messages from the limited circular buffer kept in memory.

pcb [**-w** file] [process]
Print the process control block (TSS) for the given process. If no arguments are given, the active TSS for the current process is printed.

pdt [**-e**] [**-w** file] [**-s** process] [**-p**] start_addr [count]
The page descriptor table of the designated memory *section* and *segment* is printed. Alternatively, the page descriptor table starting at the start address for *count* entries is printed. If no count is entered, 1 is assumed.

pfdat [**-e**] [**-w** file] [[**-p**] table_entry ...]
Print the pfdata table.

proc [**-e**] [**-f**] [**-w** file] [[**-p**] table_entry ... #procid ...]

or

proc [**-f**] [**-w** file] [**-r**]
Alias: **p**.
Print the process table. Process table information may be specified in two ways. First, any mixture of table entries and process ids may be entered. Each process id must be preceded by a **#**.

Alternatively, process table information for runnable processes may be specified with the runnable option (**-r**). The full option (**-f**) details most of the information in the process table as well as the region table for that process.

qrun [**-w** file]
Print the list of scheduled streams queues.

queue [**-e**] [**-w** file] [[**-p**] table_entry ...]
Print streams queues.

quit Alias: **q**.
Terminate the *crash* session.

rcvd [**-e**] [**-f**] [**-w** file] [[**-p**] table_entry ...]
Print the receive descriptor table.

redirect [**-w** file] [**-c**]

or

redirect [**-w** file] [file]
Used with a file name, redirects output of a *crash* session to the named file. If no argument is given, the file name to which output is being redirected is printed. Alternatively, the close option (**-c**) closes the previously set file and redirects output to the standard output.

region [**-e**] [**-w** file] [[**-p**] table_entry ...]
Print the region table.

sdt [**-e**] [**-w** file] [**-s** process] section

or

sdt [**-e**] [**-w** file] [**-s** process] [**-p**] start_addr [count]
The segment descriptor table for the current process is printed.

search [**-p**] [**-w** file] [**-m** mask] [**-s** process] pattern start_addr count
Print the long words in memory that match *pattern,* beginning at the start address for *count* long words. The mask is anded (&) with each memory word and the result compared against the pattern. The mask defaults to 0xffffffff.

size [**-w** file] [**-x**] [structure_name ...]
Print the size of the designated structure. The (**-x**) option prints the size in hexadecimal. If no argument is given, a list of the structure names for which sizes are available is printed.

sndd [**-e**] [**-f**] [**-w** file] [[**-p**] table_entry ...]
Print the send descriptor table.

srmount [**-e**] [**-w** file] [[**-p**] table_entry ...]
Print the server mount table.

stack [**-w** file] [process]
Alias: **s**.
Dump stack. If no arguments are entered, the kernel stack for the current process is printed. The interrupt stack and the stack for the

current process are not available on a running system.

stat [-**w** file]
Print system statistics.

stream [-**e**] [-**f**] [-**w** file] [[-**p**] table_entry ...]
Print the streams table.

strstat [-**w** file]
Print streams statistics.

trace [-**w** file] [-**r**] [process]
Alias: **t**.
Print kernel stack trace. The kfp value is used with the **-r** option.

ts [-**w** file] virtual_address ...
Print closest text symbol to the designated address.

tty [-**e**] [-**f**] [-**w** file] [-**t** type [[-**p**] table_entry ...]]
Valid types: **kdb** and **asy**.
Print the tty table. If no arguments are given, the tty table for the console is printed. If the **-t** option is used, the table for the single tty type specified is printed. If no argument follows the type option, all entries in the table are printed. A single tty entry may be specified from the start address.

user [-**f**] [-**w** file] [process]
Alias: **u**.
Print the ublock for the designated process.

var [-**w** file]
Alias: **v**.
Print the tunable system parameters.

vtop [-**w** file] [-**s** process] start_addr ...
Print the physical address translation of the virtual start address.

FILES

/dev/mem	system image of currently running system

NAME

factor – obtain the prime factors of a number

SYNOPSIS

factor [integer]

DESCRIPTION

When you use *factor* without an argument, it waits for you to give it an integer. After you give it a positive integer less than or equal to 10^{14}, it factors the integer, prints its prime factors the proper number of times, and then waits for another integer. *factor* exits if it encounters a zero or any non-numeric character.

If you invoke *factor* with an argument, it factors the integer as described above, and then it exits.

The maximum time to factor an integer is proportional to $\sqrt{n}$. *factor* will take this time when n is prime or the square of a prime.

DIAGNOSTICS

factor prints the error message, "Ouch," for input out of range or for garbage input.

NAME

fdisk – create or modify hard disk partition table

SYNOPSIS

fdisk [device]

DESCRIPTION

This command is used to create and modify the partition table that is put in the first sector of the hard disk. This table is used by DOS and by the first-stage bootstrap to identify parts of the disk reserved for different operating systems, and to identify the partition containing the second-stage bootstrap (the *active* partition). The optional argument can be used to specify the raw device associated with the hard disk; the default value is **/dev/rdsk/0s0.**

The program displays the partition table as it exists on the disk, and then presents a menu allowing the user to modify the table. The menu, questions, warnings, and error messages are intended to be self-explanatory.

If there is no partition table on the disk, the user is given the option of creating a default partitioning or specifying the initial table values. The default partitioning allows 10% of the disk for MS-DOS and 90% for the UNIX system, and makes the UNIX system partition active. In either case, when the initial table is created, *fdisk* also writes out the first-stage bootstrap code [see *hd*(7)] along with the partition table. After the initial table is created, only the table is changed; the bootstrap is not modified.

Menu Options

The following are the menu options given by the *fdisk* program:

Create a partition
: This option allows the user to create a new partition. The maximum number of partitions is 4. The program will ask for the type of the partition (MS-DOS, UNIX system, or other). It will then ask for the size of the partition as a percentage of the disk. The user may also enter the letter **c** at this point, in which case the program will ask for the starting cylinder number and size of the partition in cylinders. If a **c** is not entered, the program will determine the starting cylinder number where the partition will fit. In either case, if the partition would overlap an existing partition, or will not fit, a message is displayed and the program returns to the original menu.

Change Active (Boot from) partition
: This option allows the user to specify the partition where the first-stage bootstrap will look for the second-stage bootstrap, otherwise known as the *active* partition.

Delete a partition
: This option allows the user to delete a previously created partition. Note that this will destroy all data in that partition.

Exit
: This option writes the new version of the table created during this session with *fdisk* out to the hard disk, and exits the program.

cannot map by remote name in **global** blocks.)

NOTE: **idload** will always output warning messages for **map all**, since password files always contain multiple administrative user names with the same id number. The first mapping attempt on the id number will succeed; each subsequent attempt will produce a warning.

Remote File Sharing doesn't need to be running to use **idload**.

EXIT STATUS

On successful completion, **idload** will produce one or more translation tables and return a successful exit status. If **idload** fails, the command will return an exit status of zero and not produce a translation table.

ERRORS

If (1) either rules file cannot be found or opened; (2) there are syntax errors in the rules file; (3) there are semantic errors in the rules file; (4) **host** password or group information could not be found; or (5) the command is not run with super-user privileges, an error message will be sent to standard error. Partial failures will cause a warning message to appear, though the process will continue.

FILES

/etc/passwd
/etc/group
/usr/nserve/auth.info/*domain/nodename/*[**user | group**]
/usr/nserve/auth.info/uid.rules
/usr/nserve/auth.info/gid.rules

SEE ALSO

mount(1M).
"Remote File Sharing" chapter of the *System Administrator's Guide* for detailed information on ID mapping.

NAME

idmkinit – reads files containing specifications

SYNOPSIS

/etc/conf/bin/idmkinit

DESCRIPTION

This command reads the files containing specifications of **/etc/inittab** entries from **/etc/conf/init.d** and constructs a new **inittab** file in **/etc/conf/cf.d**. It returns 0 on success and a positive number on error.

The files in **/etc/conf/init.d** are copies of the Init modules in device Driver Software Packages (DSP). There is at most one Init file per DSP. Each file contains one line for each **inittab** entry to be installed. There may be multiple lines (i.e., multiple **inittab** entries) per file. An **inittab** entry has the form (the *id* field is often called the *tag*):

```
id:rstate:action:process
```

The Init module entry must have one of the following forms:

```
action:process

rstate:action:process

id:rstate:action:process
```

When *idmkinit* encounters an entry of the first type, a valid **id** field will be generated, and an **rstate** field of 2 (indicating run on init state 2) will be generated. When an entry of the second type is encountered only the **id** field is prepended. An entry of the third type is incorporated into the new **inittab** unchanged.

Since add-on **inittab** entries specify init state 2 for thier **rstate** field most often, an entry of the first type should almost always be used. An entry of the second type may be specified if you need to specify other than state 2. DSP's should avoid specifying the **id** field as in the third entry, since other add-on applications or DSPs may have already used the **id** value you have chosen. The */etc/init* program will encounter serious errors if one or more **inittab** entries contain the same **id** field.

Idmkinit determines which of the three forms above is being used for the entry by requiring each entry to have a valid **action** keyword. Valid **action** values are as follows:

```
off
respawn
ondemand
once
wait
boot
bootwait
powerfail
powerwait
initdefault
sysinit
```

The *idmkinit* command is called automatically upon entering init State 2 on the next system reboot after a kernel reconfiguration to establish the correct **/etc/inittab** for the running **/unix** kernel. *Idmkinit* can be called as a user level command to test modification of **inittab** before a DSP is actually built. It is also useful by installation scripts that do not reconfigure the kernel, but need to create **inittab** entries. In this case the **inittab** generated by *idmkinit* must be copied to **/etc/inittab**, and a *telinit q* command must be run to make the new entry take affect.

The command line options are:

-o directory **Inittab** will be created in the directory specified rather than **/etc/conf/cf.d**.

-i directory The ID file **init.base**, which normally resides in **/etc/conf/cf.d**, can be found in the directory specified.

-e directory The Init modules that are usually in **/etc/conf/init.d** can be found in the directory specified.

-# Print debugging information.

ERROR MESSAGES

An exit value of zero indicates success. If an error was encountered, *idmkinit* will exit with a non-zero value, and report an error message. All error messages are designed to be self-explanatory.

SEE ALSO

idbuild(1), idinstall(1m), idmknod(1m), init(1m).

inittab(4) in the *Programmer's Reference Manual.*

NAME

mkdir – make directories

SYNOPSIS

mkdir [**-m** mode] [**-p**] dirname ...

DESCRIPTION

The *mkdir* command creates the named directories in mode *777* [possibly altered by *umask*(1)].

Standard entries in a directory (e.g., the files **.**, for the directory itself, and **..**, for its parent) are made automatically. *mkdir* cannot create these entries by name. Creation of a directory requires write permission in the parent directory.

The owner ID and group ID of the new directories are set to the process's real user ID and group ID, respectively.

Two options apply to *mkdir*:

-m This option allows users to specify the mode to be used for new directories. Choices for modes can be found in *chmod*(1).

-p With this option, *mkdir* creates *dirname* by creating all the non-existing parent directories first.

EXAMPLE

To create the subdirectory structure **ltr/jd/jan**, type:

```
mkdir -p ltr/jd/jan
```

SEE ALSO

chmod(1), sh(1), rm(1), umask(1).

intro(2), mkdir(2) in the *Programmer's Reference Manual*.

DIAGNOSTICS

The *mkdir* command returns exit code 0 if all directories given in the command line were made successfully. Otherwise, it prints a diagnostic and returns non-zero. An error code is stored in *errno*.

NAME

mkfs – construct a file system

SYNOPSIS

/etc/mkfs special blocks[:i-nodes] [gap blocks/cyl]
/etc/mkfs special proto [gap blocks/cyl]

DESCRIPTION

The *mkfs* command constructs a file system by writing on the *special* file using the values found in the remaining arguments of the command line. The command waits 10 seconds before starting to construct the file system. During this 10-second pause, the command can be aborted by entering a delete (DEL).

If the second argument is a string of digits, the size of the file system is the value of *blocks* interpreted as a decimal number. This is the number of *physical* (512-byte) disk blocks the file system will occupy. If the number of i-nodes is not given, the default is the number of *logical* (1024-byte) blocks divided by 4. *mkfs* builds a file system with a single empty directory on it. The boot program block (block zero) is left uninitialized.

If the second argument is the name of a file that can be opened, *mkfs* assumes it to be a prototype file *proto*, and will take its directions from that file. The prototype file contains tokens separated by spaces or new-lines. A sample prototype specification follows (line numbers have been added to aid in the explanation):

```
1.    /stand/ diskboot
2.    4872 110
3.    d--777 3 1
4.    usr  d--777 3 1
5.         sh   ---755 3 1 /bin/sh
6.         ken  d--755 6 1
7.              $
8.         b0   b--644 3 1 0 0
9.         c0   c--644 3 1 0 0
10.        $
11.   $
```

Line 1 in the example is the name of a file to be copied onto block zero as the bootstrap program.

Line 2 specifies the number of *physical* (512-byte) blocks the file system is to occupy and the number of i-nodes in the file system.

Lines 3-9 tell *mkfs* about files and directories to be included in this file system.

Line 3 specifies the root directory.

Lines 4-6 and 8-9 specifies other directories and files.

The $ on line 7 tells *mkfs* to end the branch of the file system it is on, and continue from the next higher directory. The $ on lines 10 and 11 end the process, since no additional specifications follow.

File specifications give the mode, the user ID, the group ID, and the initial contents of the file. Valid syntax for the contents field depends on the first character of the mode.

The mode for a file is specified by a 6-character string. The first character specifies the type of the file. The character range is **-bcd** to specify regular, block special, character special and directory files respectively. The second character of the mode is either **u** or - to specify set-user-id mode or not. The third is **g** or - for the set-group-id mode. The rest of the mode is a 3-digit octal number giving the owner, group, and other read, write, execute permissions [see *chmod*(1)].

Two decimal number tokens come after the mode; they specify the user and group IDs of the owner of the file.

If the file is a regular file, the next token of the specification may be a path name whence the contents and size are copied. If the file is a block or character special file, two decimal numbers follow which give the major and minor device numbers. If the file is a directory, *mkfs* makes the entries **.** and **..** and then reads a list of names and (recursively) file specifications for the entries in the directory. As noted above, the scan is terminated with the token **$**.

The final argument in both forms of the command specifies the rotational *gap* and the number of *blocks/cyl*. The following gap size values are recommended:

CONTROLLER	GAP SIZE
ST506 3:1	2
ST506 1:1	22
ESDI 3:1	4
ESDI 1:1	10

If the *gap* and *blocks/cyl* are not specified or are considered illegal values, default values of gap size 7 and 400 blocks/cyl are used.

FILES

/etc/vtoc/*

SEE ALSO

chmod(1).

dir(4), fs(4) in the *Programmer's Reference Manual.*

BUGS

With a prototype file, it is not possible to copy in a file larger than 64K bytes, nor is there a way to specify links. The maximum number of i-nodes configurable is 65500.

NAME

mkfs – construct a file system

SYNOPSIS

/etc/mkfs special blocks[:i-nodes] [gap blocks/cyl] [–b blocksize]
/etc/mkfs special proto [gap blocks/cyl] [–b blocksize]

DESCRIPTION

mkfs constructs a file system by writing on the *special* file using the values found in the remaining arguments of the command line. The command waits 10 seconds before starting to construct the file system. During this 10-second pause the command can be aborted by entering a delete (DEL).

The *–b blocksize* option specifies the logical block size for the file system. The logical block size is the number of bytes read or written by the operating system in a single I/O operation. Valid values for *blocksize* are 512, 1024, and 2048. The default is 1024. A block size of 2048 may be chosen only if the 2K file system package is installed. If the **-b** option is used it must appear last on the command line.

If the second argument to *mkfs* is a string of digits, the size of the file system is the value of *blocks* interpreted as a decimal number. This is the number of *physical* (512 byte) disk blocks the file system will occupy. If the number of i-nodes is not given, the default is approximately the number of *logical* blocks divided by 4. *mkfs* builds a file system with a single empty directory on it. The boot program block (block zero) is left uninitialized.

If the second argument is the name of a file that can be opened, *mkfs* assumes it to be a prototype file *proto*, and will take its directions from that file. The prototype file contains tokens separated by spaces or new-lines. A sample prototype specification follows (line numbers have been added to aid in the explanation):

```
 1.   /stand/ diskboot
 2.   4872 110
 3.   d--777 3 1
 4.   usr  d--777 3 1
 5.        sh    ---755 3 1 /bin/sh
 6.        ken   d--755 6 1
 7.              $
 8.        b0    b--644 3 1 0 0
 9.        c0    c--644 3 1 0 0
10.        $
11.   $
```

Line 1 in the example is the name of a file to be copied onto block zero as the bootstrap program.

Line 2 specifies the number of *physical* (512 byte) blocks the file system is to occupy and the number of i-nodes in the file system.

Lines 3-9 tell *mkfs* about files and directories to be included in this file system.

Line 3 specifies the root directory.

Lines 4-6 and 8-9 specifies other directories and files.

The $ on line 7 tells *mkfs* to end the branch of the file system it is on, and continue from the next higher directory. The $ on lines 10 and 11 end the process, since no additional specifications follow.

File specifications give the mode, the user ID, the group ID, and the initial contents of the file. Valid syntax for the contents field depends on the first character of the mode.

The mode for a file is specified by a 6-character string. The first character specifies the type of the file. The character range is **-bcd** to specify regular, block special, character special and directory files respectively. The second character of the mode is either **u** or - to specify set-user-id mode or not. The third is **g** or - for the set-group-id mode. The rest of the mode is a 3 digit octal number giving the owner, group, and other read, write, execute permissions [see *chmod*(1)].

Two decimal number tokens come after the mode; they specify the user and group IDs of the owner of the file.

If the file is a regular file, the next token of the specification may be a path name whence the contents and size are copied. If the file is a block or character special file, two decimal numbers follow which give the major and minor device numbers. If the file is a directory, *mkfs* makes the entries . and .. and then reads a list of names and (recursively) file specifications for the entries in the directory. As noted above, the scan is terminated with the token **$**.

The *gap* and *blocks/cyl* arguments in both forms of the command specifies the rotational gap and the number of blocks/cylinder. The following gap size values are recommended:

CONTROLLER	FILESYSTEM SIZE	GAP SIZE
ST506 3:1	1K	2
ST506 1:1	1K	22
ESDI 3:1	1K	4
ESDI 1:1	1K	10
ST506 3:1	2K	4
ST506 1:1	2K	24
ESDI 3:1	2K	40
ESDI 1:1	2K	12

FILES

/etc/vtoc/*

SEE ALSO

chmod(1).

dir(4), fs(4) in the *Programmer's Reference Manual.*

BUGS

With a prototype file, it is not possible to copy in a file larger than 64K bytes, nor is there a way to specify links. The maximum number of i-nodes configurable is 65500.

NAME

mknod – build special file

SYNOPSIS

/etc/mknod name **b** | **c** major minor
/etc/mknod name **p**

DESCRIPTION

The *mknod* command makes a directory entry and corresponding i-node for a special file.

The first argument is the *name* of the entry. The UNIX System convention is to keep such files in the /dev directory.

In the first case, the second argument is **b** if the special file is block-type (disks, tape) or **c** if it is character-type (other devices). The last two arguments are numbers specifying the *major* device type and the *minor* device (e.g., unit, drive, or line number). They may be either decimal or octal. The assignment of major device numbers is specific to each system. The information is contained in the system source file **conf.c**. You must be the super-user to use this form of the command.

The second case is the form of the *mknod* that is used to create FIFO's (a.k.a named pipes).

WARNING

If **mknod** is used to create a device in a remote directory (Remote File Sharing), the major and minor device numbers are interpreted by the server.

SEE ALSO

mknod(2) in the *Programmer's Reference Manual.*

NAME

removepkg – remove installed package

SYNOPSIS

removepkg [software_package]

DESCRIPTION

The *removepkg* command will remove the software package specified as an arguement to *removepkg* or will remove the software package the user selects if no argument is given to *removepkg.*

If an argument is specified, *removepkg* will search the list of previously installed packages and remove the first name it matchs. If no name is matched, the user is given an error message.

If no argument is specified, *removepkg* will query the user, via a menu, which package to remove.

You will need to be *root* to remove some packages.

LIMITATIONS

You must envoke *removepkg* on the console.

SEE ALSO

displaypkg(1), installpkg(1).

NAME

restore – restore file to original directory

SYNOPSIS

restore [**-c**] [**-i**] [**-o**] [**-t**] [**-d** <device>] [pattern [pattern]...]

DESCRIPTION

-c complete restore. All files on the tape are restored.

-i gets the index file off of the medium. This only works when the archive was created using backup. The output is a list of all the files on the medium. No files are actually restored.

-o overwrite existing files. If the file being restored already exists it will not be restored unless this option is specified.

-t indicates that the tape device is to be used. MUST be used with the **-d** option when restoring from tape.

-d *<device>* is the raw device to be used. It defaults to **/dev/rdsk/f0q15d** (the 1.2M floppy).

When doing a restore, one or more patterns can be specified. These patterns are matched against the files on the tape. When a match is found, the file is restored. Since backups are done using full pathnames, the file is restored to its original directory. Metacharacters can be used to match multiple files. The patterns should be in quotes to prevent the characters from being expanded before they are passed to the command. If no patterns are specified, it defaults to restoring all files. If a pattern does not match any file on the tape, a message is printed.

When end of medium is reached, the user is prompted for the next media. The user can exit at this point by typing "q". (This may cause files to be corrupted if a file happens to span a medium.) In general, quitting in the middle is not a good idea.

If the file already exists and an attempt is made to restore it without the **-o** option, the file name will be printed on the screen followed by a question mark. This file will not be restored.

In order for multi-volume restores to work correctly, the raw device MUST be used.

SEE ALSO

qt(7), sh(1).

the function letter. With the **t** function, **v** gives more information about the tape entries than just the name.

w What. This causes *tar* to print the action to be taken, followed by the name of the file, and then wait for the user's confirmation. If a word beginning with **y** is given, the action is performed. Any other input means "no". This is not valid with the **t** key.

f File. This causes *tar* to use the *device* argument as the name of the archive instead of **/dev/rmt/c0s0**. If the name of the file is –, *tar* writes to the standard output or reads from the standard input, whichever is appropriate. Thus, *tar* can be used as the head or tail of a pipeline. *tar* can also be used to move hierarchies with the command:

```
cd fromdir; tar cf – . | (cd todir; tar xf –)
```

l Link. This tells *tar* to complain if it cannot resolve all of the links to the files being dumped. If **l** is not specified, no error messages are printed.

m Modify. This tells *tar* not to restore the modification times. The modification time of the file will be the time of extraction.

o Ownership. This causes extracted files to take on the user and group identifier of the user running the program, rather than those on tape. This is only valid with the **x** key.

FILES

/dev/rmt/*

SEE ALSO

cpio(1), ls(1).

DIAGNOSTICS

Complaints about bad key characters and tape read/write errors.

Complaints if enough memory is not available to hold the link tables.

BUGS

There is no way to ask for the *n -th* occurrence of a file.

Tape errors are handled ungracefully.

The **u** option can be slow.

The current limit on file name length is 100 characters.

tar doesn't copy empty directories or special files.

NAME

tee – pipe fitting

SYNOPSIS

tee [**-i**] [**-a**] [file] ...

DESCRIPTION

The *tee* command transcribes the standard input to the standard output and makes copies in the *files*. The

-i ignore interrupts;

-a causes the output to be appended to the *files* rather than overwriting them.

NAME

rtc – real time clock interface

DESCRIPTION

The rtc driver supports the real time clock chip, allowing it to be set with the correct local time, and allowing the time to be read from the chip.

Ioctl Calls

RTCRTIME

This call is used to read the local time from the real time clock chip. The argument to the *ioctl* is the address of a buffer of **RTCNREG** unsigned characters (**RTCNREG** is defined as <**sys/rtc.h**>). The *ioctl* will fill in the buffer with the contents of the chip registers. Currently, **RTCNREG** is 14, and the meanings of the byte registers are as follows:

Register	Contents
0	Seconds
1	Second alarm
2	Minutes
3	Minute alarm
4	Hours
5	Hour alarm
6	Day of week
7	Date of month
8	Month
9	Year
A	Status register A
B	Status register B
C	Status register C
D	Status register D

For further information on the functions of these registers, see your hardware technical reference manual.

RTCSTIME

This call is used to set the time into the real time clock chip. The argument to the *ioctl* is the address of a buffer of **RTCNREGP** unsigned characters (**RTCNREGP** is defined as <**sys/rtc.h**>). These bytes should be the desired chip register contents. Currently, **RTCNREGP** is 10, representing registers 0–9 as shown above. Note that only the superuser may open the real time clock device for writing, and that the **RTCSTIME** *ioctl* will fail for any other than the superuser.

FILES

/dev/rtc

NAME

streamio – STREAMS ioctl commands

SYNOPSIS

```
#include <stropts.h>
int ioctl (fildes, command, arg)
int fildes, command;
```

DESCRIPTION

STREAMS [see *intro*(2)] ioctl commands are a subset of *ioctl*(2) system calls which perform a variety of control functions on *streams.* The arguments *command* and *arg* are passed to the file designated by *fildes* and are interpreted by the *stream head.* Certain combinations of these arguments may be passed to a module or driver in the *stream.*

fildes is an open file descriptor that refers to a *stream. command* determines the control function to be performed as described below. *arg* represents additional information that is needed by this command. The type of *arg* depends upon the command, but it is generally an integer or a pointer to a *command*-specific data structure.

Since these STREAMS commands are a subset of *ioctl,* they are subject to the errors described there. In addition to those errors, the call will fail with *errno* set to EINVAL, without processing a control function, if the *stream* referenced by *fildes* is linked below a multiplexer, or if *command* is not a valid value for a *stream.*

Also, as described in *ioctl,* STREAMS modules and drivers can detect errors. In this case, the module or driver sends an error message to the *stream head* containing an error value. This causes subsequent system calls to fail with *errno* set to this value.

COMMAND FUNCTIONS

The following *ioctl* commands, with error values indicated, are applicable to all STREAMS files:

I_PUSH Pushes the module whose name is pointed to by *arg* onto the top of the current *stream,* just below the *stream head.* It then calls the open routine of the newly-pushed module. On failure, *errno* is set to one of the following values:

[EINVAL]	Invalid module name.
[EFAULT]	*arg* points outside the allocated address space.
[ENXIO]	Open routine of new module failed.
[ENXIO]	Hangup received on *fildes.*

I_POP Removes the module just below the *stream head* of the *stream* pointed to by *fildes. arg* should be 0 in an I_POP request. On failure, *errno* is set to one of the following values:

[EINVAL]	No module present in the *stream.*
[ENXIO]	Hangup received on *fildes.*