Athena System Release 6.1A

Dan Geer, Henry Mensch

1. Introduction

This document describes the software changes in Athena System Release 6.1A. It contains an overview of the important changes, and detail on the release as a whole. The release notes are written as a set of changes to release 6.0R.

2. Major User-Visible Changes

2.1. All Systems

2.1.1. Time synchronization

The lack of a guarantee of time synchronization between the workstation and the Kerberos authentication server was user visible. All workstations now run an Network Time Protocol Daemon. That *ntpd* process uses the *adjtime* system call to keep the workstation clock into conformance with a network master (by slewing it gradually, not simply setting it). Support for NTP service is presumed to be available from the gateways.

2.1.2. X Window System

The development environment, libraries and include files, is relocated to predictably named lockers. Specifically, the X11R2 include files and libraries are removed from the release and placed in a locker named *X11R2*; the X11R3 include files and libraries now appear for the first time in a locker named *X11R3*. This forces developers to be explicit about their expectations.

The overmounting strategy provides for symlinks to be provided from the */urvd* to a standard place under */mit/x11* ... a developer may attach her favorite flavor of X11 to */mit/x11*. The files on the */urvd* which are so symlinked are:

```
Links for compatibility:
/usr/lib/libX.a                  -> libX11.a       (THIS CURRENTLY EXISTS)
/usr/lib/lint/llib-lX            -> llib-lX11      (for support of above link)
/usr/lib/lint/llib-lX.ln         -> llib-lX11.ln   (for support of above link)

Include files:
/usr/include/X11        -> /mit/x11/include

Libraries:
/usr/lib/libX11.a       -> /mit/x11/*lib/libX11.a
/usr/lib/libXMenu11.a   -> /mit/x11/*lib/libXMenu11.a
/usr/lib/libXaw.a       -> /mit/x11/*lib/libXaw.a
/usr/lib/libXext.a      -> /mit/x11/*lib/libXext.a
```

```
/usr/lib/libXmu.a        -> /mit/x11/*lib/libXmu.a
/usr/lib/libXt.a       -> /mit/x11/*lib/libXt.a
/usr/lib/liboldX.a        -> /mit/x11/*lib/liboldX.a
```

```
Lint libraries:
/usr/lib/lint/llib-lX11.ln        -> /mit/x11/*lib/lint/llib-lX11.ln
/usr/lib/lint/llib-lXMenu11.ln            -> /mit/x11/*lib/lint/llib-lXMenu11.ln
/usr/lib/lint/llib-lXaw.ln        -> /mit/x11/*lib/lint/llib-lXaw.ln
/usr/lib/lint/llib-lXext.ln       -> /mit/x11/*lib/lint/llib-lXext.ln
/usr/lib/lint/llib-lXmu.ln        -> /mit/x11/*lib/lint/llib-lXmu.ln
/usr/lib/lint/llib-lXt.ln         -> /mit/x11/*lib/lint/llib-lXt.ln
/usr/lib/lint/llib-loldX.ln       -> /mit/x11/*lib/lint/llib-loldX.ln
```

```
Human-readable lint libraries:
/usr/lib/lint/llib-lX11               -> /mit/x11/*lib/lint/llib-lX11
/usr/lib/lint/llib-lXMenu11        -> /mit/x11/*lib/lint/llib-lXMenu11
/usr/lib/lint/llib-lXaw               -> /mit/x11/*lib/lint/llib-lXaw
/usr/lib/lint/llib-lXext        -> /mit/x11/*lib/lint/llib-lXext
/usr/lib/lint/llib-lXmu               -> /mit/x11/*lib/lint/llib-lXmu
/usr/lib/lint/llib-lXt               -> /mit/x11/*lib/lint/llib-lXt
/usr/lib/lint/llib-loldX        -> /mit/x11/*lib/lint/llib-loldX
```

The "*" should be replaced by the machine type ("rt" or "vax") as appropriate.

Applications using the X Toolkit should convert to the X11R3 development sources post haste - with X11R3, the Toolkit Intrinsics become stable with respect to the formal processes of the X Consortium. A document on converting widgets to X11R3 is available from Athena Systems Development.

2.1.3. OLC

A new version of OLC is installed. The principal value of this version is that it permits a consultants to handle multiple concurrent conversations, a clear productivity benefit relative to the one at a time style that previously held. As this version requires a protocol change, there are some complications with respect to the server process. Both versions of clients will (be made to) work during the transition.

Other changes in this version of OLC:

- Kerberos authentication required for all connections. (This ensures that the user is accurately identified and non-spoofable, such as to prevent one user from reading another's log. The unauthenticated user could be given error messages indicating the nature of the failure and steps to correcting it, or the OLC server could accept unauthenticated connections but handle them differently. These authorization issues are open at this time, and are, in any case, implemented at the OLC server end.)

- Consultants able to answer questions simultaneously.

- Caching of conversation logs on client.

- Use of ACL's on server to permit finer level of authorization with respect to specialists and general OLC management.

- Restructured priority method for consultants to reflect knowledge in a topic.

- Clients check for a backup server on failure of main server.

- Some bug fixes in user client for broken status messages.

- [changes#471] Two obsolete files are deleted: */usr/athena/lib/olc/olc_topics* and */usr/athena/lib/olc/olc_database*.

2.1.4. File deletion

A new set of commands, headlined by */bin/athena/delete*, are introduced. These commands permit a user to think better of a file deletion within a reasonable amount of time, i.e. to no longer follow the aphorism "rm is forever". See the design document available from Athena Systems Development for details.

2.1.5. Automatic update of workstations

Although not a part of the release per se, an auto-update feature has existed for some time. During the propagation of release 6.0R, this mechanism was used to good effect in the public clusters. With release 6.1A, this mechanism becomes an expected part of the release. Note, however, that it is not enabled by the Release Engineering staff as part of the preparation of the release; rather it is prepared and included in the release in disabled form. Specifically, enabling automatic updating of the workstations will require the Operations Staff to modify the *srvd* pack by moving */srvd/auto_update.ready* to */srvd/auto_update*. This provides control on a per cluster basis, and note that the current script requires that the *PUBLIC* flag (from */etc/rc.conf*) must be *true* for the update to proceed automatically.

2.1.6. TeX family of text processing tools

The *TeX* and *LaTeX* family of text processing tools are installed in */usr/athena*. The complete list of items installed follows: | what is the complete list? put it here. |

2.2. RT/PC

A working version of the Fortran compiler, */usr/bin/hf77*, is installed. A symbolic link from */usr/bin/f77* points to this executable. The old *f77* can be found in */usr/bin/f77.old*. (Only this new *hf77* form is supported by IBM ACIS; *f77* has been desupported). In addition, a new Fortran library is installed.

A new version of the High C compiler is installed, but out of the normal search path. Specifically, */bin/cc* will continue to point to */bin/hc*, and a new executable, */bin/hc2*, will appear. (It is only this latter form that is the supported by IBM ACIS; *hc* has been desupported). This new compiler will not be used to build any component of this release.

/usr/unsupported/prolog/prolog now works.

2.3. VAXstations

A symbolic link is installed at */bin/pcc* pointing to */bin/cc*. This, too, is for coherence with the RT/PC environment.

3. Kernel Changes

3.1. Kernel Fixes In Common

A change to support the NFS "fascist" mode on a per-partition basis is introduced. This is principally an advantage to those few server hosts exporting a mix of licensed and public sources. Kernel source which contains this support include:

```
h/vfs.h            nfs/nfs_subr.c            nfs/nfs_server.c
```

Berkeley 4.3 UNIX, as originally implemented on both the RT and the VAX, allows a common C programming error (reading through a NULL pointer) to go undetected. Software containing this error may work on Athena's RT and VAX systems, but will fail when ported to other systems (most notably VMS and SunOS). In this release, any program which is linked using the -Z option to *ld* will fail with a bus error if it dereferences a NULL pointer. If you are concerned about porting any software you develop to other platforms, you may want to use this option. Note that if you redistribute precompiled programs to non-Athena machines, binaries compiled with -Z probably will not work. Kernel sources which reflect these changes include:

```
ca/vm_machdep.c        h/text.h
sys/kern_exec.c        sys/sys_process.c
sys/vm_text.c
```

nfs_syncwrite is now turned off. It was enabled to try to eliminate the NFS null bug. The current fix for the problem does not require this optional feature. By disabling *nfs_syncwrite*, a significant performance increase can be noticed when doing large transfers with NFS.

I don't think we publicize this.

Netwatch capability has been added to the RT and VS2000 kernel; this capability already existed for the VS2 kernel. On the RT/PC, the following kernel sources reflect these changes:

```
ca/Locore.c            net/if.h
ca/machdep.c           net/netisr.h
caif/if_lan.c          net/nip.c
caif/if_un.c           net/nip.h
h/ioctl.h              net/nit.c
h/socket.h             net/nit.h
netinet/if_ether.h     net/raw_cb.c
```

On the VS2000, the following kernel sources reflect these changes:

```
vaxif/if_se.c          vaxif/if_se_data.c
```

A virtual memory bug is fixed. This bug resulted in a *panic: bad rmfree*. Changes were made to:

```
sys/vm_drum.c          sys/vm_text.c
```

3.2. VAX Kernel Fixes

The support for the 3600, i.e. the *VAX_650* code, is now integrated into the standard kernel. Kernel source which reflects these changes includes:

```
conf/files.vax         vaxuba/sg_data.c
```

```
h/cpuconf.h              vaxuba/sguser.h
sys/vm_sw.c              vaxuba/tmscp.c
vax/autoconf.c           vaxuba/torek_uda.c
vax/clock.c              vaxuba/torek_udareg.h
vax/cpu.h                vaxuba/ts.c
vax/cpudata.c            vaxuba/uba.c
vax/ka650.h              vaxuba/ubareg.h
vax/locore.s             vaxuba/ubavar.h
vax/machdep.c            vaxuba/uda.c
vax/mscp.c               vax/mscp.h
vax/mscpvar.h            vax/pte.h
vax/torek_mscp.h         vax/vmparam.h
```

3.3. RT/PC Kernel Fixes

IBM provided several kernel modifications which included support for the HD310 hard
disks (which are also listed in /etc/disktab , minor fixes to some device drivers as well as a
new floating point scheme required by the new Fortran and C compilers. (This is why the
note about the *hf77* Fortran compiler is possible). Kernel sources which reflect these
changes include:

```
ca/autoconf.c        caio/adunload.c      h/buf.h
ca/clock.c           caio/asy.c           h/ioctl.h
ca/conf.c            caio/asyreg.h        h/reboot.h
ca/emul.c            caio/dma.c           h/socket.h
ca/float.c           caio/dmareg.h        h/tty.h
ca/float.h           caio/fd.c            sys/kern_acct.c
ca/fpa.c             caio/fdreg.h         sys/vfs_pathname.c
ca/in_cksum.c        caio/fdvar.h         ca/debug.h
ca/locore.c          caio/hd.c            ca/fp.h
ca/mc881.c           caio/hdconfig.h      ca/fpa.h
ca/mem.c             caio/ioccvar.h       ca/io.h
ca/swapgeneric.c     caio/mouse.c         ca/fpalrtnes.c
ca/trap.c            caio/speaker.c       ca/ieeetrap.h
cacons/kls.c         caio/st.c            ca/rdb.h
ca/mmu.h             ca/machparam.h       ca/rtflops.h
ca/scr.h             ca/fpglue.s          ca/cpu.h
```

[changes#353] A fix for a serious network bug is introduced. The bug caused stray
packets to sometimes be transmitted during the initialization of the ethernet card.

4. Manual Page Updates

4.1. New Manual Pages

```
dcm.8          reg_svr.8         sms.1          sms.3
smsd.8         smslist.1         startdcm.8     startreg.8
startsms.8     update_server.8 userreg.1        Xibm.8
hf77.1         setquota.8
```

4.2. Updated Manual Pages

The following manual pages have been updated.

a.out.5	zaway.1	macsyma.1	chfn.1
cc.1	zbrowser.1	prochart.1	chpobox.1
ld.1	zctl.1	inetd.8	chsh.1
more.1	zleave.1	netsyslog.8	dcmmaint.1
tcsh.1	zlocate.1		listmaint.1
file.1	znol.1		smscheck.1
	zwgc.1		usermaint.1
	zwrite.1		smstest.8
	zhm.8		
	zpopnotify.8		
	zshutdown_notify.8		

4.3. Deleted Manual Pages

The following manual pages have been deleted.

up.1	attachmaint.1
down.1	clustermaint.1
rvdmaint.1	nfsmaint.1

5. Bug Fixes

[changes#99] /usr/ucb/more is fixed so that the -c flag no longer causes tabs to be expanded to six spaces rather than the standard eight.

[changes#467] pstat -f used to give a segmentation violation; a fix to the Makefile fixed this problem.

[changes#303] A bug with /usr/athena/finger which caused it to fail with the message finger: Can't stat /dev/somewsnamehere:0 when used to look up non-local users has been fixed.

[changes#394] The -l flag to more no longer causes a extra blank line to be output.

[changes#217] The staff_ln03filter on the 6.0R packs was the wrong one. This is fixed. Also, the ln03_filter has been removed, as staff_ln03filter performs the same functions correctly.

[changes#322] /usr/athena/scheme is removed from the release; scheme programmers should use the version in the scheme locker. A message to that effect replaces the executable. This needs further definition of the service level expected and/or provided for this language.

[changes#246] The script in /usr/athena/saber is changed to look for the .saberinit file in the user's home directory rather than the current working directory. The existing situation more or less works, but leaves random .saberinit files all over the place and, more importantly, will fail in directories that are not writeable by the user.

[changes#354] Manual pages for up and down have been removed.

[changes#475] The symlinks /bin/athena/up and /bin/athena/down, which point to the

executable */bin/athena/rvdclient*, are removed as obsolete.

The *othello* entry is removed from */etc/services*. (The othello server on CHARON.MIT.EDU has long been out of commission).

The symbolic link from */usr/athena/.login* to */srvd/site/usr/athena/.login* is now in place. Previously, this had been a hard file, VAX side only.

[changes#260,436] The directory */usr/new* is purged of any X Window System clients. (Such items as */usr/new/xclock*, */usr/new/xinit*, */usr/new/xnwm*, and */usr/new/xset*).

[changes#472] The bootblocks on the boot floppies for the VS2 were incorrect. The correct ones now exist in the *source* and *bootkit* filesystems as appropriate.

[changes#473] A patch to *inetd.c* which fixes a problem with turning on and off datagram "wait"-style service is made.

[changes#327] */usr/new/jot* is fixed. It used to run forever on the RT; the problem was uninitialized variables.

[changes#466] */usr/ucb/man* now searches section 8 similarly for the RT/PC as it always did for the VAX, i.e. it looks for "8rv" manual pages on the RT and "8v" manual pages on the VAX.

[changes#293] A fix to the *KUIDUPURGE* code of */usr/etc/rpc.mountd* was made (for *nfsid -r* to work). Also, NFS per-filesystem "fascism" is a feature of this version of this *rpc.mountd*

[changes#239,450] A bug in *newsyslog* which prevented the ownership of log files from being transferred to the next generation of log files is fixed. An optional field which specifies the owner.group of particular files is added to */etc/athena/newsyslog.conf*, and the manual page for *newsyslog* has been updated.

[changes#460] An aesthetic bug fix to */bin/sed* was made, specifically to add a newline after an error message.

[changes#486] An entry for *snmp-trap* was added to */etc/services*. (This is in addition to the *snmp_trap* entry distributed in the last release, and is identical thereto except for that one character of punctuation).

[changes#496] *fsplit* now causes its output files to be named correctly.

[changes#452, 477] Bug fixes to */etc/rc* as follows:

- It cleans */tmp* iff *PUBLIC=true*.

- A new mail configuration file is copied over, if necessary, before *sendmail* is started up.

- */usr/lib/sendmail -bz* is only run if a new mail configuration file is copied over or if the *sendmail* daemon is started.

- The modes of */usr/tmp* and */tmp* are reset to *1777*.

6. Other Changes

- The default output device for *scribe* is now *PostScript*. It used to be LPTLN; most of the Athena-provided printers in public clusters are now PostScript printers.

- *scribe* support for two-up landscape printing has been added.

- A more recent version of *sendmail* (Version 5.60) replaces the current version; the new version provides (among other things) support for MX (mail forwarder) nameserver records.

- The *discuss* conferencing system is moved into the release proper. What had been available as */mit/sipb/{rt,vax}bin/discuss* will now appear as */usr/athena/discuss*.

- The OLC stock answer browser is moved into the release proper. What had been available as */mit/consult/bin/olc_answers* will now appear as */usr/athena/olc_answers*.

- A full set of install kits, including that for servers, is introduced. In the case of workstations, this new system provides a single install floppy for each machine type supported, rather than a requirement for a separate set per subnet, and does so in a read-only mode, rather than read-write. This feature presupposes the existence of some per-subnet support for install-time address assignment. This support is presumed to be available from the gateways.

- Existing autoupdate code, as modified by Athena Operations for the 6.0R release, is made official (moved into the standard source tree and provided on all packs). As before, this autoupdate will not run for the case where the *PUBLIC* flag is *false* in */etc/rc.conf*. This autoupdate script will appear as */srvd/autoupdate.ready*; moving it to */srvd/autoupdate* is a decision made and effected by Athena Operations.

- The contents of */srvd/patch* are moved to their rightful locations.
  - */srvd/patch/inc* to */usr/athena/inc*
  - */srvd/patch/help* to */usr/athena/help* (RT/PC only) (Although the file is also rewritten).
  - */srvd/patch/passwd* to */usr/athena/passwd* (RT/PC only)
  - */srvd/patch/xdef2res* to */usr/athena/xdef2res* (RT/PC only)
  - */srvd/patch/xlsfonts* to */usr/bin/X11/xlsfonts* (RT/PC only)

- A new version of */etc/ftpd* from [changes#387, 457, 458] is installed. No new functions are added; the new version fixes a security problem.

- A new version of */etc/fingerd* similarly.

- Significant improvements in the real operability of the Parallax equipped workstations are made. Details are already known to the development community of interest, and are available to others from Athena Systems Development.

- All server processes appear on the RVD packs. This means that installation of a server requires no support other than that available to a normal activated workstation.

- Hesiod has been fixed so that inter-realm references of the form *hes_to_bind(foo@pika.mit.edu, pcap)* become correctly mapped to *foo.pcap.ns.pika.mit.edu*, i.e. so inter-realm hesiod resolutions work correctly. Thus you don't have to hack */etc/named** configuration files to understand where the "*pika*" domain, say, is located.

MOIRA

- This release contains SMS 2.0 clients.

  - *dcmmaint, listmaint, usermaint, attachmaint, clustermaint, nfsmaint*, and *rvdmaint* have all been replaced by a single program called *sms*. This contains menus for all of the services maintained by SMS. It contains more consistency checking than the older programs, and is more user friendly as well. It may also be invoked by the old names *listmaint, dcmmaint*, or *usermaint*, in which case it drops immediately into the specified sub-menu.

  - *chsh, chfn*, and *chpobox* now display when and who last changed the information.

  - *chpobox* has new option switches since only a single pobox is allowed to each user, rather than a list as in the previous system.

  - *smslist* is a new program for manipulating lists. It takes command line arguments and uses *stdin* and *stdout*, rather than the menus that *listmaint* uses.

  - *smstest* has several new commands to deal with multiple versions of the SMS protocol, connecting to different SMS servers, and triggering the DCM.

  - The include files *sms.h, sms_app.h*, and *infodefs.h* as well as *libsms.a* and a *lint* library are included in the release to ease development of new clients.

  - The copyright message has been added to every source file, header file, and *Makefile*.

  - The *smsconnect()* library routine now takes an argument which is the server to connect to. The define SMS_SERVER in sms_app.h is "SMS.MIT.EDU:sms_db". This makes it easier to support more than one SMS database.

  - *salvager, counts, extractdb*, and *testcl* are no longer built.

  - *chsh* and *chfn* were re-written so that there is no AT&T source code in them.

  - Various fixes to error and help messages.

  - The initial types stored in the database by *newsms* have been updated.

  - A "bug" that was considered a feature in the DCM which caused hosts to be updated more frequently than the documented algorithm has now been coded cleanly.

  - There have been lint fixes to *rpc/menu.c*.

  - *smsd* doesn't log "child started successfully" as it exits.

  - Clients linked with *libsmsglue* (i.e. reg_svr) will now have dates recorded in the journal file.

  - The modtime is now updated on a service that was referenced in lowercase.

- Log each deadlock occurance, and don't attempt to abort a transaction that has already deadlocked.

- Make readlocks exclusive on queries that will modify the database.

- Don't coredump *smsd* if a query is given more than 20 arguments.

- Have version 1 protocol list routines do access checks correctly.

- *smstest* no longer causes exit status.

- *mailmaint* no longer prompts over a previously-displayed line of data.

- Zephyr

  - Bugfix to *ZGetWGPort()* (return int, not short)

  - Workaround for *select()* problem on RT's

  - Bugfix to *Zinternal.c* (was *free()*'ing non-allocated storage)

  - Bugfixes to *zwgc*, including a bug which caused blank windows to appear when a notice fragment appeared without the corresponding other fragments or when a notice was re-transmitted.

  - Fix Hesiod support & command-line support (to completely override Hesiod) in *zhm*

  - [changes#474] Fix *zhm* to randomly choose a Zephyr server unless a primary server is listed in Hesiod. (It currently starts with the first server on the list, which means that every workstation chooses one server as the primary).

  - Fix *zctl* exit status

  - Merge new Berkeley code into *zleave*; detect logout and exit

  - *zlocate*: use *printf* rather than home-grown formatting

  - Clean up *zmailnotify*

  - *zwrite*: do signatures better

    - 1) always include signature field

    - 2) fix default description to use signature field in the displayed message.

  - Man pages:

    - fix copyright notices on all of them

    - *zaway(1)*: add usage comments

    - *zleave(1)*: add UCB copyright

    - *zlocate(1)*: add "Zephyr" to summary line

    - *znol(1)*: ditto

    - *zwgc(1)*: various fixes

    - *zwrite(1)*: document -*n*, -*s*, -*u* flags; fix *zwrite*-signature

    - *zhm(8)*: describe new argument semantics

- A new version of */usr/athena/lib/libss.a* is introduced. It offers these

advantages:
- Handling of quoted strings.
- Miscellaneous bugfixes.
- Maybe man pages. Probably one or two minimal ones, and/or just references to other docs.

- A new version of */usr/athena/lib/libcomm_err.a* is introduced. It offers these advantages:
  - Handling of format strings with arguments (*printf*-style).
  - An include file is provided, *<com_err.h>*. Documentation is provided
  - Changed generated routine names (no more abbreviations).
  - Manual pages are supplied (*com_err*, *compile_et*, *error_message*, *make_commands*, and *ss*).
  - Miscellaneous bugfixes.

- A new version of */usr/athena/lib/libgdb.a* is introduced. This version represents the final form of GDB.

- Along with the GDB library, there is also the */usr/athena/whatsup* client.

- [changes#442] The obsolete files */etc/athena/makeproject*, */etc/athena/makeuser*, and *passwdtomakeuser* (shell scripts) are removed.

- [changes#476] A line is added to */etc/services* in anticipation of LPS40 TCP support.

```
        print-srv    170/tcp     # Digital IP PrintServer protocol
```

- */etc/syslog.conf* will indicate a central collection point for Zephyr transmitted log messages of hardware and configuration failures. A client program, */usr/ucb/logger*, will enable shell scripts to log errors through this mechanism.

- A new option to */usr/bin/find* to parse files on the basis of the "change time" of the file was added. This option, *-ctime*, behaves synonymously with that of *-atime* and/or *-utime*.

- The */usr/lib/crontab* entry for pushing out queued mail,

```
        42 * * * *      root     /usr/lib/sendmail -q
```

is replaced by a similar line which provides for a pseudo-random sleep before starting the sendmail queue processing.

- */usr/athena/emacs* is modified to flip the default value of *inhibit-local-variables* to *t*. This is a security issue.

- A change to user-level *rpc.mountd* code and a bug fix to *nfs-subr.c* now permit enforcement of the read-only export of filesystems via NFS. Previously, there was no way to enforce a read-only export without also mounting that filesystem read-only on the server host because the code was slightly broken in how it handled mappings, a brokeness that only showed up when setting export flags.

- Some changes were made to the Berkeley line printer spooling system, as follows:

- In *printjob.c*, abortpr was changed so that the lock file is closed immediately, so that other lpd's can start printing other files. Also, 30 seconds after the output filters receive a SIGTERM, if they have not exited yet, abortpr sends them a SIGKILL to wipe them out.

- In *lpd.c*, MAX_ATHENA_SUBNET was changed to be 18.141 instead of 18.92 so that the PIKA living group subnet is included as part of the "Athena network", so that a hostname check is not necessary.

- Also in *lpd.c*, a version of startdaemon which forks a child (which ultimately becomes the printer daemon) is used instead of the version found in startdaemon.c, which opens a connection to *lpd* and commands it to start a printer daemon.

- Some error messages handled in *s_displayq.c* were cleaned up.

- In *rmjob.c* and *printjob.c*, a race condition in the locking mechanism is fixed which often caused *lpd* to hang.

7. Third-Party Software

- Scribe version 6.0 is moved from the *scribe6* locker into */usr/athena/scribe6*. The existing scribe is likewise moved to */usr/athena/scribe5*. The command */usr/athena/scribe* becomes a symbolic link to the latter, i.e. no change from the point of view of the user typing the *scribe* command. (See entries [93], [163], [174], [209], [216], [219], and [220], all of which stand some chance of being fixed by Scribe version 6).

- If and when it becomes available, MATLAB (a mathematical modelling package from MathWorks, Inc.) will be made available in a locker.

- If and when it becomes available, a BASIC of some variety will be made available in a locker. At this time, it would appear that the issue is not the highest quality BASIC, but the one with maximum opportunity for software importation.

- If and when it becomes available, version 2 of *2020* will be made available in a locker.