Booting problems in Solaris

Booting problems poses serious challenge to the system administrators as system is down and no one can use it . This article tries to cover some of the general booting problems and their possible solutions to enable understand the problem cause and bring the system up very quickly.

Following are some of the booting issues ,error messages their meaning and possible solutions discussed in this article.

1) Booting in single user mode and mounting root disk
2) Making boot device alias
3) Timeout waiting for ARP/RARP packet"? error message
4) The file just loaded does not appear to be executable – error message
5) bootblk: can't find the boot program – error message
6) boot: cannot open kernel/unix – error message
7) Error reading ELF header? – error message 😎Cannot open /etc/path_to_inst error message
9) Can't stat /dev/rdsk/c0t3d0s0 error message

1. Booting in single user mode and mounting root hard disk
Most important step in diagnosing the booting problems is booting the system in single user mode and examining the hard disk for possible errors & work out the corrective measure. Single user mode can be achieved by any of the following methods :-
ok> boot -s ;from root disk
ok> boot net -s ;from network

ok>boot cdrom -s ;from cdrom
Rebooting with command: cdrom -s
Configuring the /devices directory
Configuring the /dev directory |
INIT: SINGLE USER MODE
#
fsck /dev/rdsk/c0t3d0s0
mount /dev/dsk/c0t3d0s0 /mnt

Perform the required operation on mounted disk , now accessible through /mnt ,& unmount the hard disk after you are done ;
umount /mnt
reboot

2.Making boot device alias
In case system can not boot from primary disk and it is needed to make another boot disk to access the data , nvalias command is used .
nvalias command makes the device alias and assigns an alternate name to a physical disk.
Physical address of target disk is required which can be had by show-disk command on ok>.

ok> nvalias disk7 /iommu@f,e0000000/sbus@f,e0001000/dma@3,81000/esp@3,80000/sd2,0
The new aliased disk can be named as boot disk or can be used for booting by refering its name .
ok> setenv boot-device disk7
ok>reset
or
ok> boot disk7

3. Timeout waiting for ARP/RARP packet ?
At ok> type printenv and look for these parameters .

boot-device disk
mfg-switch? false
diag-switch? false
if you see "boot-device net " or true value for the other two parameter change it to the values
above.
In case you wants to boot from network make sure your client is properly configured in boot
server and network connections & configuration are proper.

4. The file just loaded does not appear to be executable
Boot block on the hard disk is corrupted .Boot the system in single user mode with cdrom and
reinstall boot block .

#installboot /usr/platform/`uname -i`/lib/fs/ufs/bootblk /dev/rdsk/c0t3d0s0

5. bootblk: can't find the boot program
boot block can not find the boot programe – ufsboot in Solaris .Either ufsboot is missing or
corrupted . In such cases it can be restored from the cdrom after booting from cdrom & mounting
the hard disk
cp /platform/`uname -i`/ufsboot /mnt/platform/`uname -i`

6. boot: cannot open kernel/unix
Kernel directory or unix kernel file in this directory is not found .Probably deleted during fsck or
deleted by mistake. Copy it from the cdrom or restore from the backup tape.
cp /platform/`uname -i`/kernel/unix /mnt/platform/`uname -i`/kernel

7. Error reading ELF header ?
Kernel directory or unix kernel file in this directory is corrupted.Copy it from the cdrom or
restore from the backup tape.
cp /platform/`uname -i`/kernel/unix /mnt/platform/`uname -i`/kernel

8. Cannot open /etc/path_to_inst
System can not find the /etc/path_to_install file .It might be missing or corrupted and needs to be
rebuild.
To rebuild this file boot the system with -ar option :
ok>boot -ar
Press enter to select default values for the questions asked during booting and select yes to
rebuild /etc/path_to_install
The /etc/path_to_inst on your system does not exist or is empty. Do you want to rebuild this file
[n]? y
system will continue booting after rebuilding the file.

9. Can't stat /dev/rdsk/c0t3d0s0
When booted from cdrom and done fsck the root partition comes out to be fine but on booting
from root disk this error occurs. The device name for / is missing from /dev/dsk directory and to
resolve the issue /dev & /devices directories has to be restored from root backup tapes .

Checking and Repairing Unix File system with fsck

fsck is a Unix utility for checking and repairing file system inconsistencies . File system can
become inconsistent due to several reasons and the most common is abnormal shutdown due to
hardware failure , power failure or switching off the system without proper shutdown. Due to
these reasons the superblock in a file system is not updated and has mismatched information
relating to system data blocks, free blocks and inodes .

fsck – Modes of operation :

fsck operates in two modes interactive and non interactive :

Interactive – fsck examines the file system and stops at each error it finds in the file system and gives the problem description and ask for user response whether to correct the problem or continue without making any change to the file system.

Non interactive :fsck tries to repair all the problems it finds in a file system without stopping for user response useful in case of a large number of inconsistencies in a file system but has the disadvantage of removing some useful files which are detected to be corrupt .

If file system is found to have problem at the booting time non interactive fsck is run and all errors which are considered safe to correct are corrected. But if still file system has problems the system boots in single user mode asking for user to manually run the fsck to correct the problems in file system

Running fsck :
fsck should always be run in a single user mode which ensures proper repair of file system . If it is run in a busy system where the file system is changing constantly fsck may see the changes as inconsistencies and may corrupt the file system .

If the system can not be brought in a single user mode fsck should be run on the partitions ,other than root & usr , after unmounting them . Root & usr partitions can not be unmounted . If the system fails to come up due to root/usr files system corruption the system can be booted with CD and root/usr partitions can be repaired using fsck.

command syntax

fsck [-F fstype] [-V] [-yY] [-o options] special

-F fstype type of file system to be repaired (ufs , vxfs etc)

-V verify the command line syntax but do not run the command

-y or -Y Run the command in non interactive mode – repair all errors encountered without waiting for user response.

-o options Three options can be specified with -o flag

b=n where n is the number of next super block if primary super block is corrupted in a file system .

p option used to make safe repair options during the booting process.

f force the file system check regardless of its clean flag.

special – Block or character device name of the file system to be checked/repaired – for example /dev/rdsk/c0t3d0s4 .Character device should be used for consistencies check & repair

fsck phases
fsck checks the file system in a series of 5 pages and checks a specific functionality of file system in each phase.

** phase 1 – Check Blocks and Sizes
** phase 2 – Check Pathnames
** phase 3 – Check Connectivity
** phase 4 – Check Reference Counts
** phase 5 – Check Cylinder Groups

fsck error messages & Corrective action :

1. Corrupted superblock – fsck fails to run
If the superblock is corrupted the file system still can be repaired using alternate superblock which are formed while making new file system .

the first alternate superblock number is 32 and others superblock numbers can be found using the following command :

newfs -N /dev/rdsk/c0t0d0s6

for example to run fsck using first alternate superblock following command is used

fsck -F ufs -o b=32 /dev/rdsk/c0t0d0s6

2. Link counter adjustment
fsck finds mismatch between directory inode link counts and actual directory links and prompts for adjustment in case of interactive operation. Link count adjustments are considered to be a safe operation in a file system and should be repaired by giving 'y' response to the adjust ? prompt during fsck.

3. Free Block count salvage
During fsck the number of free blocks listed in a superblock and actual unallocated free blocks count does not match. fsck inform this mismatch and asks to salvage free block count to synchronize the superblock count. This error can be corrected without any potential problem to the file system or files.

4. Unreferenced file reconnection
While checking connectivity fsck finds some inodes which are allocated but not referenced – not attached to any directory . Answering y to reconnect message by fsck links these files to the lost+found directory with their inode number as their name .

To get more info about the files in lost+found 'file' command can be used to see the type of files and subsequently they can be opened in their applications or text editors to find out about their contents. If the file is found to be correct it can be used after copying to some other directory and renaming it.