Linux Debugging Techniques

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Steve Best
IBM Linux Technology Center
JFS for Linux
http://oss.software.ibm.com/jfs
IBM Austin, Texas
sbest@us.ibm.com

Overview of Talk

- Types of Problems
- Tools
- Error and Debug Messages
- Handling Failures
- Kernel Investigation
- Handling a System Crash
- Oops Analysis Example
- LKCD/Lcrash

Types of Problems

- Application/User space vs. Kernel
  - Difference in difficulty
  - Problem's source
- Development vs. Production
  - Difference in tool availability
  - More difficult to reproduce

Tools

- Library and system call trace
  - strace, ltrace
- Debuggers
  - gdb,ddd
  - kgdb
  - kdb
- Built-In
  - Oops data upon a panic/crash
- Dump Facility
  - Linux Kernel Crash Dump - lkcd

Tools (continued)

- Linux Trace Toolkit
  - ltt
- Custom Kernel Instrumentation
  - dprobes
- Special console functions
  - Magic SysReq key

Error / Debug Messages

- System error logs
  - var/log/*
  - dmesg
- SysLog
- Console
- Application or Module debug level

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Handling Failures

- System Crash
  - Collect and analyze oops/panic data
  - Collect and analyze dump with lkcd
- System Hang
  - Use Magic SysReq Keys
  - NMI invoking a dump using lkcd
  - look at the hang using debugger
    - kdb or kgdb
  - ps command

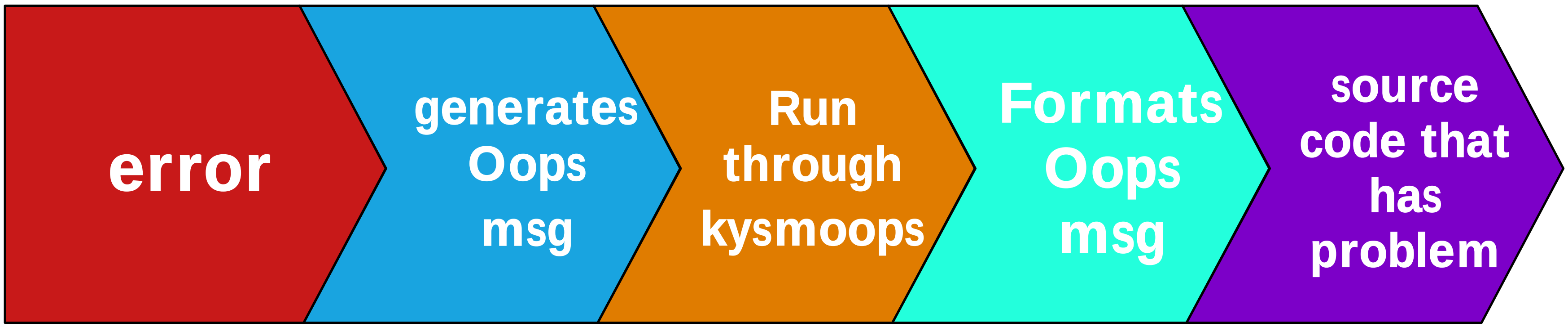
Kernel Investigation

- User mode Linux - run Linux under Linux
- Debuggers
  - Gdb and /proc/kcore
  - Remote kernel debugging
    - kgdb & serial connection
    - Kdb with or without serial connection
- Lcrash on running system
- Adding printk's in the kernel

Handling a System Crash

- Occurs when a critical system failure is detected
- Kernel routine call oops
  - Attempts to report/record system state
  - Information is limited (after the fact)
- Better to have an entire system memory dump
  - LKCD project on Sourceforge
  - Thorough analysis and investigation can be done

Panic / Oops Analysis



Panic / Oops Analysis

- Steps
  - Collect oops output, System.map, /proc/ksyms, vmlinux, /proc/modules
  - Use ksymoops to interpret oops
    - Instructions is /usr/src/linux/Documentation/oops-tracing.txt
    - Ksymoops(8) man page
- Brief analysis
  - Ksymoops disassembles the section of code
  - EIP points to the failing instruction
  - The call trace section shows how the code got there
- How to find failing line of code?

Panic / Oops Analysis

- Example that causes Oops
- Change code inside the mount code for JFS
  - add null pointer exception to the mount code
  - mount -t jfs /dev/hdb1 /jfs
  - Oops is create since the mount code isn't functioning correctly

Oops Example

Unable to handle kernel NULL pointer dereference at virtual address 00000000

c01588fc <---- EIP (Instruction Pointer)

*pde = 00000000

Oops: 0000

CPU: 0

EIP: 0010:[jfs_mount+60/704]

EFLAGS: 00010246

eax: cd83a000 ebx: 00000000 ecx: 00000001 edx: 00000003

esi: cd83a000 edi: cdf22d20 ebp: 00000000 esp: cdb71e74

ds: 0018 es: 0018 ss: 0018

Process mount (pid: 113, stackpage=cdb71000)

Stack: 00000000 000000f0 cd83a000 cdf22d20 cd859c00 00000000 c0155d4f cd83a000
cd83a044 cd83a000 cd83a07c cd839000 c0130b03 cd83a000 cd839000 00000000
00030246 ffffffea cdf371e0 cd9d2c20 cdffa320 0000000a cd860000 cd86000a

Call Trace: [jfs_read_super+287/688] [get_sb_bdev+563/736] [do_kern_mount+189/336]
do_add_mount+35/208] [do_page_fault+0/1264]

Oops Example (Cont.)

```
>>EIP; c01588fc <jfs_mount+3c/2c0>   <=====
Trace; c0155d4f <jfs_read_super+11f/2b0>
Trace; c0130b03 <get_sb_bdev+233/2e0>
Trace; c013105d <do_kern_mount+bd/150>
Trace; c013ff73 <do_add_mount+23/d0>
Trace; c010f050 <do_page_fault+0/4f0>
Trace; c0106e04 <error_code+34/40>
Trace; c01401fc <do_mount+13c/160>
Trace; c014006b <copy_mount_options+4b/a0>
Trace; c014029c <sys_mount+7c/c0>
Trace; c0106cf3 <system_call+33/40>
Code;  c01588fc <jfs_mount+3c/2c0>
```

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Oops Example (Cont.)

```
 00000000 <_EIP>:
Code;  c01588fc <jfs_mount+3c/2c0>   <=====
0:   8b 2d 00 00 00 00   mov    0x0,%ebp   <=====
Code;  c0158902 <jfs_mount+42/2c0>
6:   55                         push   %ebp
Code;  c0158903 <jfs_mount+43/2c0>
7:   68 4c 9f 20 c0          push   $0xc0209f4c
Code;  c0158908 <jfs_mount+48/2c0>
 c:   e8 f3 9b fb ff            call   fffb9c04 <_EIP+0xfffb9c04> c0112500 <printk+0/110>
 Code;  c015890d <jfs_mount+4d/2c0>
11:   6a 01                      push   $0x1
Code;  c015890f <jfs_mount+4f/2c0>
13:   56                          push   %esi
```

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Find failing line of Code

- EIP of c01588fc is within the routine jfs_mount
- Next, disassemble the routine jfs_mount using objdump
- objdump -d jfs_mount.o

```
 00000000 <jfs_mount>:
0:  55                  push %ebp
...
2c:    e8 cf 03 00 00     call   400 <chkSuper>
31:    89 c3              mov    %eax,%ebx
33:    58                 pop    %eax
34:    85 db              test   %ebx,%ebx
36:    0f 85 55 02 00 00  jne    291 <jfs_mount+0x291>
3c:    8b 2d 00 00 00 00  mov    0x0,%ebp
42:    55                 push   %ebp
```

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Find failing line of Code

- C Source Code

```
int jfs_mount(struct super_block *sb)
{
…
int *ptr;                                  /*Added line 1 */
jFYI(1, ("\nMount JFS\n"));

if ((rc = chkSuper(sb))) {
              goto errout20;
       }
108  ptr=0;                               /* Added Line 2*/
109  printk("%d\n",*ptr);                 /* Added Line 3*/
```

Debuggers

- kgdb
  - Remote host Linux kernel debugger through gdb provides a mechanism to debug the Linux kernel using gdb
  - Gives you source level type of debugging
- kdb
  - The Linux kernel debugger (kdb) is a patch for the linux kernel and provides a means of examining kernel memory and data structures while the system is operational
  - Doesn't give you source level type of debugging

Debuggers

- GNU Debugger (gdb)
  - Free Software Foundation's debugger
  - Command line
  - Several graphical tools

    Data Display Debugger (DDD)

    (http://www.gnu.org/software/ddd/)
- Ways to view process with this debugger
  - Attach to view already running process
  - Run command to start program
  - Look at an existing core file
- Debugging with GDB Tutorial
  - http://www.delorie.com/gnu/docs/gdb/gdb_toc.html

GDB commands

Some useful gdb commands

attach, at	Attach to an already running process.
backtrace, bt	Print a stack trace.
break, b	Set a breakpoint.
clear	Clear a breakpoint.
delete	Clear a breakpoint by number.
detach	Detach from the currently attached process.
display	Display the value of an expression after execution stops.
help	Display help for gdb commands.
jump	Jump to an address and continue the execution there.
list, l	Lists the 10 lines.
next, n	Step to the next machine language instruction.
print, p	Print the value of an expression.
run, r	Run the current program from the start.
set	Change the value of a variable.

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gdb Debugger

- kgdb Setup for build machine (laptop)
  - Download patch from http://kgdb.sourceforge.net
    - 2.4.18 linux-2.4.18-kgdb-1.5.patch
  - Apply the kernel patch and rebuild the kernel
  - If possible build the component into the kernel which you need to debug on
    - There is a way to debug modules (info on web page)
  - Create a file called .gdbinit and place it in your kernel source sub directory (in other words, /usr/src/linux). The file .gdbinit has the following four lines in it:
    - set remotebaud 115200
    - symbol-file vmlinux
    - target remote /dev/ttyS0
    - set output-radix 16

kgdb Debugger

- kgdb setup requires two machines

gdb Debugger

- Setup for Test machine
  - Add the append=gdb line to lilo

image=/boot/bzImage-2.4.17

label=gdb2417

read-only

root=/dev/sda8

append="gdb gdbttyS=1 gdbbaud=115200 nmi_watchdog=0"

  - Pull the kernel and modules that you built on your build machine over to the test machine.

gdb Debugger

- Setup for Test machine (Cont.)
  - script to bring kernel and modules over to test machine

```
set -x
rcp best@sfb:/usr/src/linux-2.4.17/arch/i386/boot/bzImage
 /boot/bzImage-2.4.17
rcp best@sfb:/usr/src/linux-2.4.17/System.map /boot/System.map-2.4.17
rm -rf /lib/modules/2.4.17
rsync -a best@sfb:/lib/modules/2.4.17 /lib/modules
chown -R root /lib/modules/2.4.17
lilo
```

best@sfb. Userid and machine name.

/usr/src/linux-2.4.17. Directory of your kernel source tree.

bzImage-2.4.17. Name of the kernel that will be booted on the test machine.

gdb debugger

- Connect the two machines using null-modem cable
- Build machine
  - start gdb in kernel source tree (i.e /usr/src/linux-2.4.17)
  - breakpoint () at gdbstub.c:1159
  - (gdb) **cont**
- Test machine
  - Waiting for connection from remote gdb...
- Common problem (null-modem) cable
  - not connected to the correct serial port

gdb debugger

- Build machine
- CTRL+C will get you back into the debugger
- Useful gdb commands
  - where
  - info threads
  - thread xx

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gdb debugger

- null pointer exception using mount problem
- mount -t jfs /dev/sdb /jfs (test machine)
- modified source (jfs_mount.c)

```
int *ptr;                          /* line 1 added */
jFYI(1, ("\nMount JFS\n"));
if ((rc = chkSuper(sb))) {
        goto errout20;
}
108  ptr=0;                        /* line 2 added */
109  printk("%d\n",*ptr);  /* line 3 added */
```

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gdb debugger

- gdb info displayed

  Program received signal SIGSEGV, Segmentation fault.

  jfs_mount (sb=0xf78a3800) at jfs_mount.c:109

  109 printk("%d\n",*ptr);

- gdb points you to exact line of failure

Installing and Configuring KDB

- kdb
  - The Linux kernel debugger (kdb) is a patch for the linux kernel and provides a means of examining kernel memory and data structures while the system is operational
  - Doesn't provide source level debugging
  - Get the patch from SGI web page
    - http://oss.sgi.com/projects/xfs/patchlist.html
    - look from the kernel that you are interested in (2.4.19)
    - file xfs-2.4.19-rc3-split-kdb-i386.bz2
    - patch kernel
    - configure kdb (under kernel hacking)
- Note:
  - United Linux 1.0 has this debugger built-in already

kdb Debugger

- kdb setup requires only one machine

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kdb Debugger

- Use kdb need to be text mode
  - CLTR+ALT+F1 (into)
  - CLTR+ALT+F7 (back)
- Everything setup correctly
  - press pause key
  - Entering kdb (current=0xc034a000, pid 0) due to keyboard Entry
  - Serial console with CTRL-A
- Ready to look at processes
  - ps will show you running processes
  - btp <pid> will show you the back strace for <pid>
  - bta will show you you all back straces

KDB can be invoked

- Early init by adding "kdb=early" lilo flag
- Serial console with CTRL-A
- Console with Pause key
- When a pre-set breakpoint is triggered
- On panic
  - ps will show you running processes
  - btp <pid> will show you the back strace for <pid>
  - bta will show you you all back straces

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kdb Debugger

- ps

Task Addr	Pid	Parent [*]	cpu	State	Thread	Command
0xc127c000	00000001	00000000	1	000 stop	0xc127c270	init
0xc1270000	00000002	00000001	1	000 stop	0xc1270270	keventd
0xcdf3c000	00000003	00000001	1	000 stop	0xcdf3c270	ksoftirqd
0xcdf3a000	00000004	00000001	1	000 stop	0xcdf3a270	kswapd
0xcdf38000	00000005	00000001	1	000 stop	0xcdf38270	bdflush
0xcdf36000	00000006	00000001	1	000 stop	0xcdf36270	kupdated
0xc12c0000	00000007	00000001	1	000 stop	0xc12c0270	jfsIO
0xc12be000	00000008	00000001	1	000 stop	0xc12be270	jfsCommit
0xc12bc000	00000009	00000001	1	000 stop	0xc12bc270	jfsSync
0xcdeea000	00000011	00000001	1	000 stop	0xcdeea270	evms_asyn

kdb Debugger

- Add three lines of code into jfs_mount
- mount -t jfs /dev/evms/hdb1 /jfs
- end up in the kdb with oops like screen

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kdb Debugger

c0180c8c

*pde = 00000000

Oops: 0000

CPU: 0

EIP: 0010:[<c0180c8c>]   Not tainted

EFLAGS: 000010246

eax: c7865a00 ebx: 00000000 ecx: 00000020 edx: cdf33be0

esi: c7865a00 edi: c8fb8f20 ebp:00000000 esp: ca511e30

ds: 0018 es: 0018 ss: 0018

Process mount (pid: 917, stackpage= ca511000)

Stack: 00000000 000000f0 c7865a00 c8fb8f20 c81d49a0

call Trace:

code:

entering kdb (current=0xca510000, pid 917) Oops: Oops

due to oops @ 0xc0180c8c

kdb>**bt**

kdb Debugger

EBP EIP Function(args)

0xc0180c8c **jfs_mount+0x3c** (0xc785a00, 0x0, 0x0, 0x0, 0x0)

0xc017dd59 jfs_super_super+0x149 (0x7865a00, 0x0,0x0, 0x336e5,...)

0xc0135ee9 get_sb_bdev=0x219 (0xc0316204, 0x0, 0xca42b000,...)

0xc01360dc do_kern_mount+x5c (0xca67000, 0x0, 0xca42b000, 0x0)

0xc0145f89 do_add_mount+0x79(0x0,0xca67000, 0xca511f64,...)

Interrupt registers:

eax= 0x00000000 ebx = 0x00000000 ecx= 0xca670000 edx= 0xca511f64

esi = 0xc014624b edi= 0xca511f64 esp= 0x00000000 eip=0x00000000

Interrupt from user space, end of kernel space

kdb> go

Segmentation fault

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kdb Debugger

- Use kdb to solve a hang
- Example taking snaphot using EVMS
  - calls file system to lock and then unlock
  - jfs_write_super_lockfs
  - jfs_unlock_fs
- Dead Lock is in the jfs_unlock_fs routine by not calling txResume(sb);

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Dead Lock Example

```
static void jfs_write_super_lockfs(struct super_block *sb)
{
 struct jfs_sb_info *sbi = JFS_SBI(sb);
 struct jfs_log *log = sbi->log;

 if (!(sb->s_flags & MS_RDONLY)) {
         txQuiesce(sb);
         lmLogShutdown(log);
 }
}
```

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Dead Lock Example

```
static void jfs_unlockfs(struct super_block *sb)
{
 struct jfs_sb_info *sbi = JFS_SBI(sb);
 struct jfs_log *log = sbi->log;
 int rc = 0;

 if (!(sb->s_flags & MS_RDONLY)) {
        if ((rc = lmLogInit(log))) /* the bug was this if was wrong */
                jERROR(1,
                        ("jfs_unlock failed with return code %d\n", rc));
        else
                txResume(sb);
 }
}
```

kdb Debugger

- Use kdb to solve a hang
- Example taking snaphot using EVMS
  - Problem after snapshot the volume can't be used
  - CLTR+ALT+F1 (get you text mode)
  - pause key to get you into (kdb)
  - ps to find the copy (cp)

    0xc88e8000 **00001276** 00001256 1 000 stop 0xc88e8270 cp
  - back trace on pid 1276
  - btp 1276

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kdb Debugger

- back trace
  - 0xc019a665 txBegin+0xa5 (0xc2f9fe00, 0x0)
  - 0xc017e126 jfs_truncate_nolock+0xc6 (0xc4e54a00,0x0, 0x0)
  - 0xc017e1d1 jfs_truncate+0x41 (0xc4e54a00)
  - 0xc012260b vmtruncate+0xfb (0xc44e54a00, 0x0, 0x0,0xc88e9ee8, 0x0)
  - 0xc0144346 inode_setattr+0x26(0xc4e54a00, 0xc88e9ee8, 0x3a95a0f0,0x7, 0xc88e9f10)
- The back trace shows that txBegin is where start looking
- Use objdump -d jfs_txngmgr.o to see where in txBegin

kdb Debugger

- display instructions
  - id txBegin
    - push %ebp
    - push %esi
    - push %ebx
  - id txBegin+a5
    - mov %esi,%eax
    - mov $0x0,(%ebx)
- Set breakpoint
  - bp txBegin

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kdb Debugger

- Do operation that will cause breakpoint to hit
  - Entering kdb (current=0xc9714000,pid 902) due to Breakpoint @ 0xc019a5c0
  - btp 902 (back trace)
  - bc 0 (clear breakpoint)
  - go
- Options supported by kdb
  - kdb help
  - man pages /usr/src/linux/Documentation/kdb
    - man .kdb.mm
    - presentation called "slides"

kdb Debugger

- Use objdump -d jfs_txnmgr.o to see where in txBegin
  - 0xc019a665 txBegin+0xa5 (0xc2f9fe00, 0x0)
  - 000003e0 <txBegin>
    - push %ebp
    - push %edi
    - push %esi
    - push %ebx
    - sub %0x20,%esp
  - +a5 to start of txBegin and that is where the back trace tells us the code is

Magic SysRq keys

- Kernel must be built with CONFIG_MAGIC_SYSREQ
  - Kernel hacking section
  - turn on Magic SysRq key
  - rebuild the kernel
- Need to be in text mode (CLTR+ALT+F1)
  - Once in text mode issue the following keys
    - <ALT+ScrollLock>
    - <CLTR+ScrollLock>
  - Magic keystrokes will give stack trace of
    - running processes
    - all processes

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Magic SysRq keys

- Kernel must be built with CONFIG_MAGIC_SYSREQ
  - Look in /var/log/messages
  - if everything setup correctly
    - system will converted symbolic kernel addresses
  - back trace will be written to /var/log/messages

Magic SysRq keys

- Back trace without symbols

Aug 2 16:40:07 snow kernel: gpm   S 00000000   0 1032   1

1055 1013 (NOTLB)

Aug 2 16:40:07 snow kernel: Call Trace: [<c01233cc>]

Aug 2 16:40:07 snow kernel: [<c0123340>]

Aug 2 16:40:07 snow kernel: [<c014c90f>]

Aug 2 16:40:07 snow kernel: [<c014ccb9>]

Aug 2 16:40:07 snow kernel: [<c013d017>]

Aug 2 16:40:07 snow kernel: [<c0108c3b>]

Aug 2 16:40:07 snow kernel:

Magic SySRq keys

- Back trace with symbols

Sep 4 08:57:27 sfb1 kernel: kswapd   S CA4FC820 5720   4   1
5   3 (L-TLB)

Sep 4 08:57:27 sfb1 kernel: Call Trace: [kswapd+136/192]
[kswapd+0/192] [stext+0/48] [kernel_thread+38/48] [kswapd+0/192]

Sep 4 08:57:27 sfb1 kernel: Call Trace: [<c012b568>] [<c012b4e0>]
[<c0105000>] [<c0107086>] [<c012b4e0>]

Sep 4 08:57:27 sfb1 kernel: bdflush   S C030FC20 6640   5   1
6   4 (L-TLB)

Sep 4 08:57:27 sfb1 kernel: Call Trace: [interruptible_sleep_on+60/96]
[bdflush+168/176] [stext+0/48] [kernel_thread+38/48] [bdflush+0/176]

Sep 4 08:57:27 sfb1 kernel: Call Trace: [<c011262c>] [<c01350e8>]
[<c0105000>] [<c0107086>] [<c0135040>]

Sep 4 08:57:27 sfb1 kernel: kupdated   S 00200286 5892   6   1
7   5 (L-TLB)

Magic SySRq keys

- Back trace without symbols
- How to fix
  - klogd with -x option and this Omits EIP translation and therefore doesn't read the System.map file.
  - System.map file in /boot

Magic SySRq keys

- back trace

bash S CA4FC780 0 1258 1256 1276 1257 (NOTLB)

Call Trace: [sys_wait4+900/960] [system_call+51/64]

Call Trace: [<c0117bd4>] [<c0108873>]

cp **D** 00000080 0 1276 1258 (NOTLB)

Call Trace: [txBegin+165/752] [jfs_truncate_nolock+198/304] [jfs_truncate+65/91] [jfs_truncate+0/91] [vmtruncate+251/288]

Call Trace: [<c019a665>] [<c017e126>] [<c017e1d1>] [<c017e190>] [<c012260b>]

[inode_setattr+38/224] [notify_change+156/256] [cached_lookup+16/80] [do_truncate+70/96] [open_namei+1013/1328] [dentry_open+227/400]

[<c0144346>] [<c01444fc>] [<c0139d90>] [<c012fad6>] [<c013b0a5>] [<c0130a63>]

- The back trace shows that txBegin is place to start looking

Questions

Linux Kernel Crash Dump (LKCD)

- Set of utilities and kernel patch that allow crash dump to be captured
- LKCD must be installed before a failure occurs!
- When is a crash dump taken?
  - A kernel Oops occurs
  - A kernel panic occurs
  - Administrator initiates a crash dump (Alt+SysRq+c)
- Version 4 of LKCD supports following architectures
  - i386
  - ia64
  - alpha
- 4.1-1 is latest release

Linux Kernel Crash Dump (LKCD)

- Home page
  - **http://lkcd.sourceforge.net/**
- Add kernel patch
  - cd /usr/src/linux-2.4.18
  - patch -p1 --dry-run < /usr/src/lkcd/lkcd-4.1-1-2.4.18.patch
    - check if the patch goes on cleanly
  - patch -p1 < /usr/src/lkcd/lkcd-4.1-1-2.4.18.patch
- Kernel hacking section
  - Linux Kernel Crash Dump (LKCD) support (turn on)
  - rebuild the kernel
  - cp Kerntypes /boot
- Check to see if /proc/sys/dump exists
  - ls -d /proc/sys/dump

Linux Kernel Crash Dump (LKCD)

- Get the Linux Kernel Crash Dump utilities
  - lkcdutils-4.1-1.src.rpm
  - tar zxvf lkcdutils-4.1-1.tar.gz
  - cd lkcdutils-4.1
- Build the lkcdutils
  - ./configure
  - make
  - make install
- Edit system startup scripts to configure LKCD and save crash dumps
  - Add startup script
    - /sbin/lkcd config
    - /sbin/lkcd save

Linux Kernel Crash Dump (LKCD)

- Last step is to configure you dump device
  - example use the /dev/hdb1 disk partition as dump device
  - symbolic link to this partition
    - ln -s /dev/hdb1 /dev/vmdump
- Update the kernel with this new device
  - /sbin/lkcd config

Linux Kernel Crash Dump (LKCD)

```
<4>Pid: 4315, comm:            pdosd
<4>EIP: 0010:[<c01145f3>] CPU: 0
<4>EIP is at __wake_up [kernel] 0x4f (2.4.18-3lcrash)
<4> EFLAGS: 00000286    Tainted: PF
<4>EAX: c79c122c EBX: c79c122c ECX: c204c02c EDX: c204c000
<4>ESI: 00000001 EDI: c79c1228 EBP: c204de4c DS: 0018 ES: 0018
<4>CR0: 8005003b CR2: 40013000 CR3: 04c0d000 CR4: 00000010
<4>Call Trace: [<c880f90a>] do_get_write_access [jbd] 0x10a
<4>[<c880fd01>] journal_get_write_access_R5a493269 [jbd] 0x35
<4>[<c8821a9c>] ext3_reserve_inode_write [ext3] 0x30
<4>[<c8821b28>] ext3_mark_inode_dirty [ext3] 0x18
<4>[<c8823953>] ext3_unlink [ext3] 0x14b
<4>[<c8822569>] ext3_lookup [ext3] 0x71
<4>[<c013e848>] vfs_permission [kernel] 0x78
<4>[<c014085f>] vfs_unlink [kernel] 0x147
<4>[<c013f7ca>] lookup_hash [kernel] 0x6a
<4>[<c0140936>] sys_unlink [kernel] 0x96
<4>[<c887dd26>] nct_unlink [kaznmod_BASE] 0x4a
<4>[<c887dd57>] nct_unlink [kaznmod_BASE] 0x7b
<4>[<c01085f7>] system_call [kernel] 0x33
```

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Linux Kernel Crash Dump (LKCD)

<4>Pid: 1254, comm: pdosauditd

<4>EIP: 0010:[<c0114832>] CPU: 0

<4>EIP is at sleep_on [kernel] 0x4a (2.4.18-3lcrash)

<4> EFLAGS: 00000286 Tainted: PF

<4>EAX: c79c122c EBX: c79c122c ECX: 00000000 EDX: c204de3c

<4>ESI: 00000286 EDI: c7f77000 EBP: c4541df0 DS: 0018 ES: 0018

<4>CR0: 8005003b CR2: 40013000 CR3: 04bc2000 CR4: 00000010

<4>Call Trace: [<c880faa2>] **do_get_write_access [jbd] 0x2a2**

<4>[<c880fd01>] journal_get_write_access_R5a493269 [jbd] 0x35

<4>[<c8821a9c>] ext3_reserve_inode_write [ext3] 0x30

<4>[<c88177f0>] .rodata.str1.1 [jbd] 0x30

<4>[<c8815317>] __jbd_kmalloc [jbd] 0x1b

<4>[<c8821b28>] ext3_mark_inode_dirty [ext3] 0x18

<4>[<c8821bc7>] ext3_dirty_inode [ext3] 0x83

<4>[<c0147b76>] __mark_inode_dirty [kernel] 0x2e

<4>[<c0149065>] update_atime [kernel] 0x51

<4>[<c0128520>] do_generic_file_read [kernel] 0x4d0

<4>[<c0128815>] generic_file_read [kernel] 0x9d

<4>[<c01286f4>] file_read_actor [kernel] 0x0

<4>[<c01360c9>] sys_read [kernel] 0x95

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Linux Kernel Crash Dump (LKCD)

This trace shows that you have dead lock in do_get_write_access [jbd] which is journaling part for the ext3 file system. The source for do_get_write_access is in /usr/src/linux/fs/jbd/transaction.c.