

LTSI workshop

Introduction of our test cases

Oct 25th, 2013

Teppei ASABA, Fujitsu Computer Technologies

- In-House Embedded Linux Distributor of Fujitsu
- Our Distribution includes LTSI Kernel and is built by Yocto Project
- Our Distribution is used for
 - Server System Controller
 - Storage System
 - Network Equipment
 - Printer
 - IVI
etc.



Kernel test cases for Our Distribution

- LTP
- LSB
- IPv6 (IPv6 Ready Logo Conformance Test)
- Security Scanner (Nessus)

■ What's LTP

<http://ltp.sourceforge.net>

■ Reason to use LTP

■ Regression test at Kernel porting

➤ Timer settings...

■ Check for System calls are changed when Kernel version is upgraded

➤ Return values of error are often changed

■ Check for System calls differences of CPUs (x86, ARM, PowerPC, MIPS...)

➤ e.g. “getcontext” is not supported by ARM

■ Check for function differences of systems

➤ e.g. “splice” is not supported by NFS (now supported)

■ Case Study

Find a bug of distribution in LTP

- Float test cases are failed on PowerPC (e500mc core) in Kernel 3.0
- Optimize option “-O2” is turned off “-fcprop-register” flag in GCC 4.4.6

```
$ powerpc-e500mc-linux-gnu-gcc -I/home/ubinux/e500mc/target/usr/include -O -g -fsigned-char ¥  
-mcpu=e500mc -Wa,-me500mc -mhard-float -g -O2 -fno-strict-aliasing -pipe -Wall ¥  
-I/home/ubinux/e500mc/target/usr/include ¥  
-I/home/ubinux/e500mc/build/ltp-full-20101031/testcases/kernel/include ¥  
-I../../../../include -I../../../../include -L/home/ubinux/e500mc/target/lib ¥  
-L../../../../lib float_exp_log.c -lltp -lpthread -lm -o float_exp_log
```

-O2 turns on all optimization flags specified by -O. It also turns on the following optimization flags:

```
-fthread-jumps  
-falign-functions -falign-jumps  
-falign-loops -falign-labels  
-fcaller-saves  
-fcrossjumping  
-fcse-follow-jumps -fcse-skip-blocks  
-fdelete-null-pointer-checks  
-fexpensive-optimizations  
-fgcse -fgcse-lm  
-findirect-inlining  
-foptimize-sibling-calls  
-fpeephole2  
-fregmove  
-freorder-blocks -freorder-functions  
-frerun-cse-after-loop  
-fsched-interblock -fsched-spec  
-fschedule-insns -fschedule-insns2  
-fstrict-aliasing -fstrict-overflow  
-ftree-switch-conversion  
-ftree-pre  
-ftree-vrp
```

No -fcprop-register!

■ Proposal to LTSI

- Should use LTP, and decide GCC, Binutils, Glibc versions
- Should decide a release criteria
 - e.g. All of Syscalls test cases are passed on x86 and ARM boards
- HTML formatted results should be opened to the public

- What's LSB

 - <https://wiki.linuxfoundation.org/en/LSB>

- LSB is test for distribution compatibility

- Sometimes find a bug of Kernel

■ Case Study

Find a bug of distribution in LSB

- fpathconf test case is failed in Kernel 2.6.36
- include/linux/pipe_fs_i.h was changed in 2.6.34..2.6.35
- Problem of combination with Glibc

```
commit 35f3d14dbbc58447c61e38a162ea10add6b31dc7
Author: Jens Axboe <jens.axboe@oracle.com>
Date: Thu May 20 10:43:18 2010 +0200

    pipe: add support for shrinking and growing pipes

    This patch adds F_GETPIPE_SZ and F_SETPIPE_SZ fcntl() actions for
    growing and shrinking the size of a pipe and adjusts pipe.c and splice.c
    (and relay and network splice) usage to work with these larger (or smaller)
    pipes.

    Signed-off-by: Jens Axboe <jens.axboe@oracle.com>

diff --git a/include/linux/pipe_fs_i.h b/include/linux/pipe_fs_i.h
index b43a9e0..65f4282 100644
--- a/include/linux/pipe_fs_i.h
+++ b/include/linux/pipe_fs_i.h
@@ -3,7 +3,7 @@
 
 #define PIPEFS_MAGIC 0x50495045

-#define PIPE_BUFFERS (16)
+#define PIPE_DEF_BUFFERS 16
```


■ Case Study

Find a bug of Kernel in LSB

- c_lflag test case is failed in Kernel 2.6.31
- n_tty driver has degraded in 2.6.28..2.6.29
- Fixed in 2.6.31..2.6.32

```
commit ee5aa7b8b98774f408d20a2f61f97a89ac66c29b
Author: Joe Peterson <joe@skyrush.com>
Date:   Wed Sep 9 15:03:13 2009 -0600

    n_tty: honor opost flag for echoes

    Fixes the following bug:

        http://bugs.linuxbase.org/show_bug.cgi?id=2692

    Causes processing of echoed characters (output from the echo buffer) to
    honor the O_OPOST flag, which is consistent with the old behavior.

    Note that this and the next patch ("n_tty: move echoctl check and
    clean up logic") were verified together by the bug reporters, and
    the test now passes.

    Signed-off-by: Joe Peterson <joe@skyrush.com>
    Cc: Linux Torvalds <torvalds@linux-foundation.org>
    Signed-off-by: Greg Kroah-Hartman <gregkh@suse.de>

diff --git a/drivers/char/n_tty.c b/drivers/char/n_tty.c
```

■ Proposal to LTSI

- Should use LSB test suites with Yocto Project
- Should decide a release criteria
 - e.g. All of Core test cases are passed
- HTML formatted results should be opened to the public

- What's IPv6 Ready Logo
<https://www.ipv6ready.org>
- IPv6 Ready Logo test suite
<http://www.tahi.org>
- Conformance test suite of IPv6 specification
- Test for IPv6 protocol stack (only Kernel)

■ Case Study

Find a bug of Kernel in IPv6 tests

■ Neighbor Discovery test cases are failed in Kernel 3.0

Section 2: RFC 4861 – Neighbor Discovery for IPv6

- ✓ 145 Part A: Unspecified FAIL
- ✓ 147 Part A: Router Lifetime Updated with Same Lifetime FAIL
- ✓ 149 Part C: Router Lifetime Set to Five; Allowed to Expire FAIL

■ Backport patches and local fix

- ✓ <http://git.kernel.org/?p=linux/kernel/git/torvalds/linux-2.6.git;a=commit;h=1716a96101c49186bb0b8491922fd3e69030235f>
- ✓ <http://git.kernel.org/?p=linux/kernel/git/torvalds/linux-2.6.git;a=commit;h=edfb5d4687d587c9f714799c7ee27517118e12e6>

■ Proposal to LTSI

- Should use IPv6 tests
- Should decide a release criteria
 - e.g. All of Core and IPsec test cases are passed
- HTML formatted results should be opened to the public

■ What's Security Scanner

- Nessus (Proprietary)

 - <http://www.tenable.com/products/nessus>

- OpenVAS (Nessus fork of Open Source)

 - <http://www.openvas.org>

■ Check for Known Vulnerability

■ Proposal to LTSI


- Should use Security Scanner

- Should decide a release criteria

- HTML formatted results should be opened to the public

- LTP, LSB, IPv6 tests and Security Scanner are
 - Valuable in Kernel
 - Run Automatic
 - HTML formatted results can be opened to the public easily

- Fujitsu will contribute to LTSI



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