Linux port for Xtensa

- Linux git tree: https://github.com/jcmvbkbc/linux-xtensa
- Build/test tools git tree: https://github.com/jcmvbkbc/xtensa-linux-test
- Toolchain build scripts/overlays git tree: https://github.com/jcmvbkbc/xtensa-toolchain-build
- Patch review check list
- Patch/pull request check list

TODO

- dynamic ftrace
- kgdb/kdb
- kexec
- NX

In Progress

- kprobes
- Booting linux on ESP32

Done

Hibernation

Done, in the mainline:

- xtensa: add hibernation support

Coprocessors support in SMP

Done, in the mainline:

- xtensa: support coprocessors on SMP

GDBIO semihosting interface

Done, in the mainline:

- xtensa: ISS: add GDBIO implementation to semihosting interface

Seccomp and audit

Done, in the mainline:

```
da94a40f7285 xtensa: add seccomp support
ef1a935c08ea xtensa: add audit support
```

eXecute In Place

XIP done, in the mainline:

```
 7af710d98877 xtensa: add XIP kernel support
```

QEMU virt machine

Done, in the mainline:

```
775f1f7eaced xtensa: virt: add defconfig and DTS
```

support for cores with MPU

Done, in the mainline:

```
a5944195d00a xtensa: implement initialize_cacheattr for MPU cores
```

exclusive access support (l32ex/s32ex)

Done, in the mainline:

```
f7c34874f04a xtensa: add exclusive atomics support
```

ticket spinlocks

Done, in the mainline:

```
af3d890b4303 xtensa: provide xchg for sizes 1 and 2
579afe866f52 xtensa: use generic spinlock/rwlock implementation
```

support xtfpga audio hardware in ALSA

Done, in the mainline:

```
57b7068de5d0 ASoC: add xtensa xtfpga I2S interface and platform
0c7665c35602 clk: TI CDCE706 clock synthesizer driver
3a33a85401ec i2c: ocores: fix clock-frequency binding usage
e961a094afe0 i2c: ocores: add common clock support
c2c62e61fb85 xtensa: xtfpga: add audio card to xtfpga DTS
04ddc5b5ad4e xtensa: xtfpga: provide defconfig with audio subsystem
```

fixes for debuggability (continuous stack trace over exceptions at least)

Done, in the mainline:

```
b6569439f1ce xtensa: keep exception/interrupt stack continuous
```

NoMMU fixes

Done, in the xtensa-fixes branch:

```
f04f3cb xtensa: nommu: move init_mmu stub to nommu_context.h
67dbc24 xtensa: nommu: provide __invalidate_dcache_page_alias stub
ae73a13 xtensa: nommu: provide _PAGE_CHG_MASK definition
1103273 xtensa: nommu: provide MAP_UNINITIALIZED definition
de03359 xtensa: nommu: don't provide arch_get_unmapped_area
4ee9b59 xtensa: nommu: don't build most of the cache flushing code
8cd28c7 xtensa: nommu: add MMU dependency to DEBUG_TLB_SANITY
93c3d27 xtensa: nommu: fix Image.elf reset code and ld script
1b929c7 xtensa: nommu: fix load address definitions
7c5b218 xtensa: nommu: fix uImage load address
e40e0ee xtensa: move vecbase SR initialization to _startup
f698bc8 xtensa: nommu: set up cache and atomctl in initialize_mmu
48243b5 xtensa: nommu: reserve memory below PLATFORM_DEFAULT_MEM_START
ceef25a xtensa: nommu: clean up memory map dump
8fd689e xtensa: make PLATFORM_DEFAULT_MEM parameters configurable
```

Deliver signals raised in double exceptions

Not really needed. Replaced with alignment double exception fixup, special handler for user stack alignment and deprecation of fast atomic and spill syscalls. In the mainline (v3.17-rc3):

```
c3ef1f4 xtensa: add double exception fixup handler for fast_unaligned
e9500dd xtensa: make fast_unaligned store restartable
3cfc096 xtensa: don't allow overflow/underflow on unaligned stack
9184289 xtensa: deprecate fast_xtensa and fast_spill_registers syscalls
```

Highmem on cores with aliasing cache

Done, in the mainline (v3.17-rc3):

```
22def76 xtensa: make fixmap region addressing grow with index
dec7305 xtensa: allow fixmap and kmap span more than one page table
7128039 xtensa: fix TLBTEMP_BASE_2 region handling in fast_second_level_miss
a91902d xtensa: implement clear_user_highpage and copy_user_highpage
32544d9 xtensa: support aliasing cache in k[un]map_atomic
8504b50 xtensa: support aliasing cache in kmap
270eec7 xtensa: support highmem in aliasing cache flushing code
```

Highmem support

Done, in the mainline:

```
6555910 xtensa: add HIGHMEM support
```

Limit PHY connected to OpenCores MAC to 10/100 MBits/s speeds

Done, in the mainline:

```
445a48c net: ethoc: don't advertise gigabit speed on attached PHY
a13aff0 net: ethoc: set up MII management bus clock
```

SMP support

Done, in the mainline:

```
99d5040 xtensa: keep a3 and excsave1 on entry to exception handlers
5515daa xtensa: fix arch spinlock function names
6235153 xtensa: update clockevent setup for SMP
cbd1de2 xtensa: move built-in PIC to drivers/irqchip
26a8e96 xtensa: add MX irqchip
f615136 xtensa: add SMP support
49b424f xtensa: implement CPU hotplug
```

Clean up and fix ISS networking

Done, in the mainline:

```
3f3cd60b xtensa: ISS: clean up iss-network driver
8c8ad85 xtensa: ISS: fix command line parameter name
358b181 xtensa: ISS: init network interface name before the probe
8991fd8 xtensa: ISS: drop IP setup, clean up MAC setup
f6ac5a1 xtensa: ISS: enable iss_net_set_mac
35e14b4 xtensa: ISS: always use fixed tuntap config
```

```
a6e16b9 xtensa: ISS: clean up diagnostic, increase verbosity
```

oprofile

~~8c502ca703956e56bf191774e4169752f0f71c8e, 7dd1d39e70769f2dd7a6a508d58b187ed8d1cb95~~

Done, in the mainline:

```
e6ffe17 xtensa: add support for oprofile
74f5bf0 xtensa: fix oprofile building as module
```

simdisk

~~1a955825662fa378d447b91485d9fe2438124b0a, 8bcbc3adb5c5bfdbd96078c1e68916be859c832d~~

Done, in the mainline:

```
b6c7e87 xtensa: ISS: add host file-based simulated disk
```

Medium level interrupts in less hacky way

~~489fb47c75772e3a41ef3e988eb0c0e512592085~~

Done, in the mainline:

```
2d1c645 xtensa: dispatch medium-priority interrupts
895666a xtensa: disable IRQs while IRQ handler is running
```

Interrupt management

Done, in the mainline:

```
2206d5d xtensa: add IRQ domains support
```

Cache aliasing aware mmap

Done, in the mainline:

```
de73b6b xtensa: avoid mmap cache aliasing
```

Atomics (arch/xtensa/include/asm/atomic.h, bitops.h, spinlock.h) and check for S32C1I

Merged in the eb0a9bf31fdbcee9463c0f42fbf4a292ef149a7d, pick up from individual files.

Done, in the mainline:

```
2f6ea6a xtensa: display s32c1i feature flag in cpuinfo
733536b xtensa: save and restore scompare1 SR on kernel entry
c622b29 xtensa: initialize atomctl SR
28570e8 xtensa: add trap_set_handler function
0027312 xtensa: add s32c1i sanity check
219b1e4 xtensa: add s32c1i-based atomic ops implementations
e5a9f6a xtensa: add s32c1i-based bitops implementations
71872b5 xtensa: add s32c1i-based spinlock implementations
599bf77 xtensa: fix mb and wmb definitions
```

Generic kernel_thread & friends

Done, in the mainline:

```
3306a72 xtensa: switch to generic kernel_thread()
f0a1bf0 xtensa: switch to generic kernel_execve()
dc241f2 xtensa: switch to generic sys_execve()
```

Support for Tensilica FPGA boards (xtfpga)

- [+] serial
- [+] ethernet
- [+] FLASH
- [-] audio

In the mainline:

```
0d456ba xtensa: add support for the XTFPGA boards
5584b4d xtensa: add XTFPGA DTS
```

Device trees support

Done, in the mainline:

```
da844a8 xtensa: add device trees support
```

MMU v3

Done, in the mainline:

```
e85e335 xtensa: add MMU v3 support
93e294a xtensa: document MMUv3 setup sequence
```

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