

LLVMLinux on x86  
state of the union

LLVM microconference  
LPC 2015

# Overall status

- Patches currently in the queue:
  - 22 for all architectures (down 15)
    - (kbuild, Makefile, lib, drivers)
  - 5 for x86 (down 2)
    - boot-workaround-PR18415.patch
    - export-memcpy-clang-x86\_64.patch
    - hweight-x86.patch
    - vlais-xen-mmio.patch
    - workaround\_align\_jump.patch

# Known broken

x86:

- AES-NI (intel, crypto, assembly)
- arch\_hweight flags (x86)
  - (flags hardcoded in Kconfig, no switch, not yet upstream)
- -falign-jump=1/-falign-loop=1
  - came up in 4.2-rc, investigating

General

- VLAIS in drivers (whack-a-mole)

# AES\_NI (crypto)

- `aes_ctrby8_avx-x86_64.c`

```
arch/x86/crypto/aes_ctrby8_avx-x86_64.S: Assembler messages:
```

```
arch/x86/crypto/aes_ctrby8_avx-x86_64.S:552: Error: bad expression
```

```
arch/x86/crypto/aes_ctrby8_avx-x86_64.S:552: Error: junk at end of line,  
first unrecognized character is `x'
```

- Tracking bug:

[https://llvm.org/bugs/show\\_bug.cgi?id=24494](https://llvm.org/bugs/show_bug.cgi?id=24494)

# New: HOSTCC=clang & kbuild

```
kernel/bounds.c:18:2: error: unexpected token at start of statement
```

```
    DEFINE(NR_PAGEFLAGS, __NR_PAGEFLAGS);
```

```
    ^
```

```
include/linux/kbuild.h:5:18: note: expanded from macro 'DEFINE'
```

```
    asm volatile("\n@->" #sym " %0 " #val : : "i" (val))
```

```
        ^
```

```
<inline asm>:2:2: note: instantiated into assembly here
```

```
@->NR_PAGEFLAGS $23 __NR_PAGEFLAGS
```

```
    ^
```

# New: HOSTCC=clang & kbuild

- workaround: `scripts/Makefile.build` (integrated-as is meanwhile default on x86)

```
cmd_cc_s_c      = $(CC) $(c_flags) -no-integrated-as $(DISABLE_LTO)
-fverbose-asm -S -o $@ $<
```

- Similar/related to our patch `kbuild-asm-defines.patch` (which just mitigates the problem for `-no-integrated-as`)
- As this no „real“ assembly, we cannot expect clang to support it.
- Here we need to add `-no-integrated-as` depending on which compiler is used. Possibly:
  - check in `scripts/Makefile.build` (also) for `COMPILER` and export variable similar to `DISABLE_LTO`.
- This is pre-Kconfig early in the Make process.
- Patch WIP.

# New: ALTERNATIVE (IA on)

```
clang -Wp,-MD,arch/x86/entry/.entry_64.o.d -nostdinc -isystem [...] -c -o
arch/x86/entry/entry_64.o arch/x86/entry/entry_64.S
<instantiation>:4:8: error: expected absolute expression
    .skip -(((144f-143f)-(141b-140b)) > 0) * ((144f-143f)-(141b-140b)),0x90
        ^
arch/x86/entry/entry_64.S:599:2: note: while in macro instantiation
    ALTERNATIVE "", ".byte 0x0f,0x01,0xca", ( 9*32+20)
    ^
<instantiation>:4:8: error: expected absolute expression
    .skip -(((144f-143f)-(141b-140b)) > 0) * ((144f-143f)-(141b-140b)),0x90
        ^
<instantiation>:2:2: note: while in macro instantiation
    ALTERNATIVE "", ".byte 0x0f,0x01,0xca", ( 9*32+20)
    ^
arch/x86/entry/entry_64.S:774:1: note: while in macro instantiation
apicinterrupt3 0x20 irq_move_cleanup_interrupt smp_irq_move_cleanup_interrupt
^
```

# New: ALTERNATIVE

Tracked here:

[https://llvm.org/bugs/show\\_bug.cgi?id=24487](https://llvm.org/bugs/show_bug.cgi?id=24487)



# Goal allyesconfig

- Not there, yet
- lots of small/large issues to be fixed everywhere (mostly VLAIS, quirks in drivers)
- Definitely broken (and probably wontfix)
  - CONFIG\_GCOV\_KERNEL
    - (gcda functions not present – has to be coded)
  - CONFIG\_MISDN
  - CONFIG\_SCSI\_QLA\_FC / \_TCM\_QLA2XXX

- [http://lvm.linuxfoundation.org/index.php/Broken\\_kernel\\_options](http://lvm.linuxfoundation.org/index.php/Broken_kernel_options)
  - Xen patch available
  - Down to disabling these:
    - CONFIG\_CRYPTOAES\_NI\_INTEL
    - BUILD\_DOCSRC
    - CONFIG\_GCOV\_KERNEL
    - CONFIG\_RANDOMIZE\_BASE
  - → defconfig !!

# Goal defconfig

- Workable target.
  - gotchas:
    - Needs llvm/clang from git HEAD
    - make CC="clang -no-integrated-as" \  
HOSTCC="clang -no-integrated-as"

# Plans/ToDo

- x86 defconfig ready (just CC=clang)
- bring defconfig to 0-day builder
- expand driver coverage
- We need you !
  - test, contribute patches,
  - review/submit patches upstream