# GCC BPF status and discussion

Jose E. Marchesi

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# Follow-up on GNU Tools Cauldron 2025

## New goal: become the primary BPF compiler

- BPF declaration and type tags in GCC
  - By David Faust.
  - Support is now upstream.
- Verifiable code testsuite in GCC
  - By Piyush Raj, GSOC 2025
  - Still to be installed.
  - Will be in GCC 16.
- -fverifiable
- smtgcc ported to BPF, https://github.com/kristerw/smtgcc
  - It found several bugs in the GCC BPF backend.
- Improve the CO-RE built-ins
  - Suggestions by Andrew Pinski
- Generalized CO-RE



# What are we up to

#### Assembler

```
[PR 32176] support may_goto
```

## Compiler

```
[PR bpf/121419] GCC emits libcalls to __clzdi2 in udev-hid-bpf
[PR bpf/113453] line_info is missing in .BTF.ext
[PR bpf/116717] fix built-in functions for memory model aware atomic operations
[PR bpf/116718] support bpf fastcall attribute
[PR bpf/117068] add support for preserve_static_offset attribute
[PR bpf/120241] preserve_access_index in "nested" struct types
```

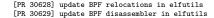
#### Verification issues

```
[PR bpf/114523] GCC optimization ssa-phiopt generates unverifiable code
```

#### Kernel selftests

```
[PR bpf/123021] GCC emits set-but-unused warning building progs/free_timer.c
[PR bpf/xxxxxx] invalid labels generated for iters_looping.bpf.c
[PR bpf/xxxxxx] again problems with overflown immediates in pyperf tests
[PR bpf/xxxxxx] verifier_gotox: .size expression does not evaluate to a constant
[PR bpf/xxxxxx] ELF relo #0 in section #2 points to missing symbol #4
```

## **Elfutils**





# Support and usage

#### **Distros**

- Oracle Linux
- Gentoo and derivatives
- Debian/Ubuntu
- Fedora, RHEL and derivatives

## **Programs**

- udev-hid-bpf
- bpftune
- systemd
- dtrace



## A few challenges

- Staffing, attention span
- Engagement with the BPF community. Getting better.
- glibc headers still included in BPF selftests, fixed case by case
- Getting rid of clang-specific stuff, like push/pop attributes
- libcalls, internal and external linking
- ABI
- Compiling Rust to BPF, gccrs
- BPF variants want attention, like sBPF (Solana, blockchain)



Any other point to discuss?

