Linux TDX guest for plumbers

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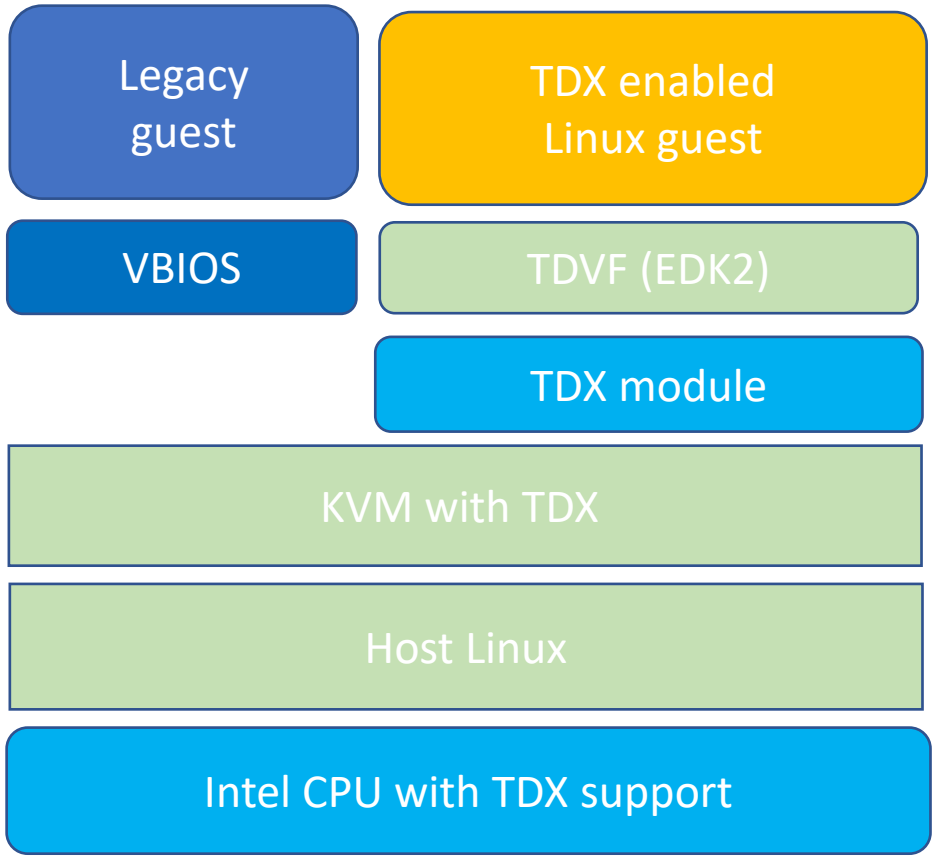
Based on earlier work from Sean Christopherson

TDX overview



- Guest only uses TDCALL and shared memory to communicate
- Guest kernel handles MSRs/MMIO/Port IO/CPUID through TDCALLs
- IO through virtio

Performance

- Exits to the host have extra overhead due to TDX module
  - Normal timer interrupt slightly more expensive, likely due to TSC deadline MSR write
    - Use periodic mode when possible?
  - In general optimizations to reduce exits are good
- Untuned swiotlb for virtio adds overhead
  - Split up spinlocks: single lock significant bottleneck
  - Better reuse of swiotlb buffers
  - Further tuning possible?

Lazy accept

- Guest to “accept” memory before it can be used
  - Doing it upfront in TDVF is a serious boot time performance problem
- Kernel has to track what memory is already accepted
- Using 2MB granularity bitmap allocated in decompressor
- Then page allocator accepts in 2MB chunks as needed

- Open issue:
  - How to pass bitmap to kexec, including handling shared memory

Security

- Guest is protected, but can be still attacked through host communication
  - Like “server on untrusted network”
- Disabling as much code as possible
- Device filtering to minimize drivers
  - Mostly done at driver model level using allow list, but some need manual changes
  - Also using opt-in for shared MMIO and IO port filter
- Hardening allowed drivers and non-driver communication
- Adding fuzzing hooks for more testing
- How can the security be ensured long term?

- Elena’s separate talk at Security Summit going into more details