GWP-ASAN

Finding the worst bugs in prod

Dmitry Vyukov, dvyukov@

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More bugs!

But WHY? ¯_(ツ)_/¯

Not all bugs are equal!

Want: **BAD** bugs...

that affect **production**

GWP-ASAN to the rescue!

"**G**WP-ASan **W**ill **P**rovide **A**llocation **SAN**ity"

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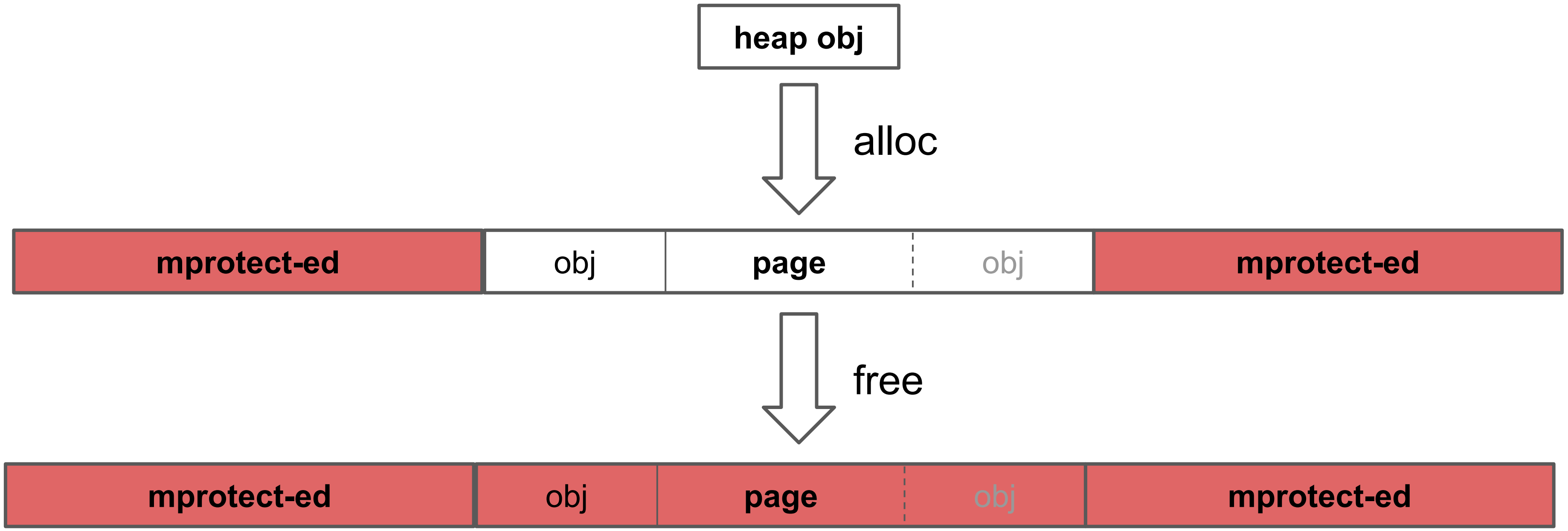
- **~~2x slowdown, ~~2x memory overhead**

:(

Electric fence (Page Heap, Page Guard)



Electric fence

- Pro: Detects bugs!
- Pro: No instrumentation -- can be enabled at runtime
- Con: Really expensive
    - Horrible heap fragmentation
        - A 1-byte allocation requires a full 4KB page for buffer overflow detection
        - Most allocations are much smaller than 4KB
    - Slow
        - malloc/free require a system call to mmap/mprotect (DTLB flush)

:(

Use the **sampling**, Luke!

Electric fence + Sampling

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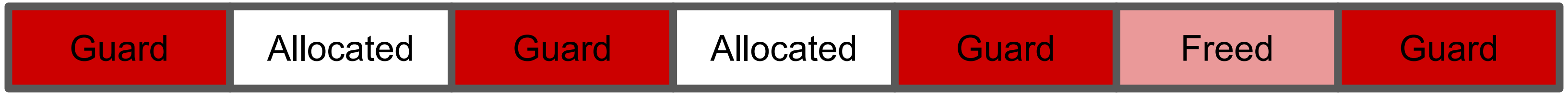
- Ideally: applied to a large set of machines

Memory layout

Fixed number of pages preallocated on startup



128 * 8KB = 1MB

Metainfo

- Alloc/free stack, PID, ...
- Provide actionable reports
- Stored somewhere on the side
- Updated only on slow-paths

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- Android
    - WIP

Potential kernel uses

- Distros
- Cloud/datacenters
- Consumer/industrial devices
- [your use case here]

kmalloc fast-path

Can we do it with zero overhead?

Piggyback on some existing slow-path?

Potential tunables

- enable/disable
- panic/don't panic
- memory overhead
- sampling rate

Small devices

Feasible?

Less code/workload -> fewer allocations

Sampling strategy

- persistent objects deplete the pool
- infrequent reboots
- don't sample during boot?
- start sampling after X uptime?
- don't sample some allocations

Volunteers?

Thanks!

Q&A

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