

# Binder Driver

Contention in buffer allocations

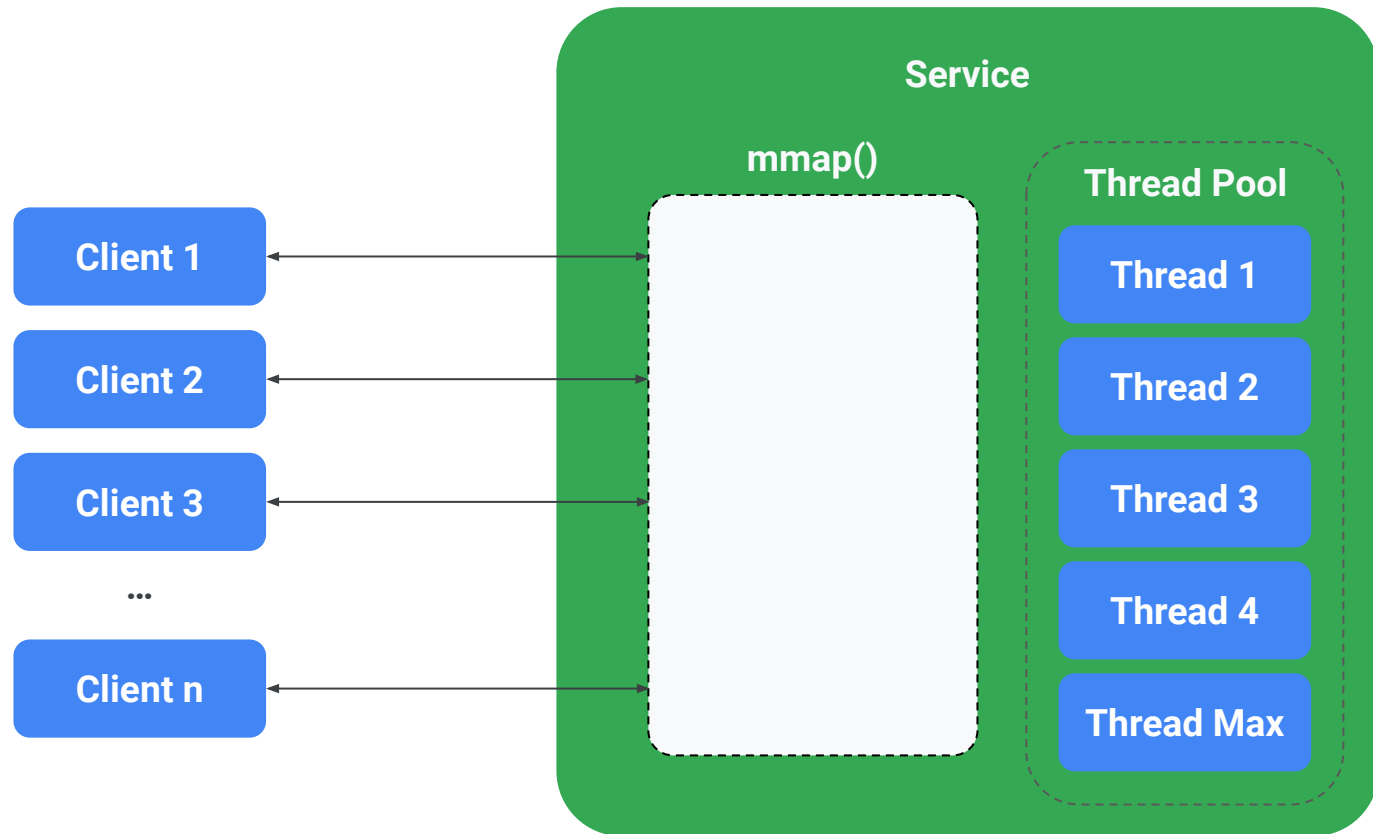


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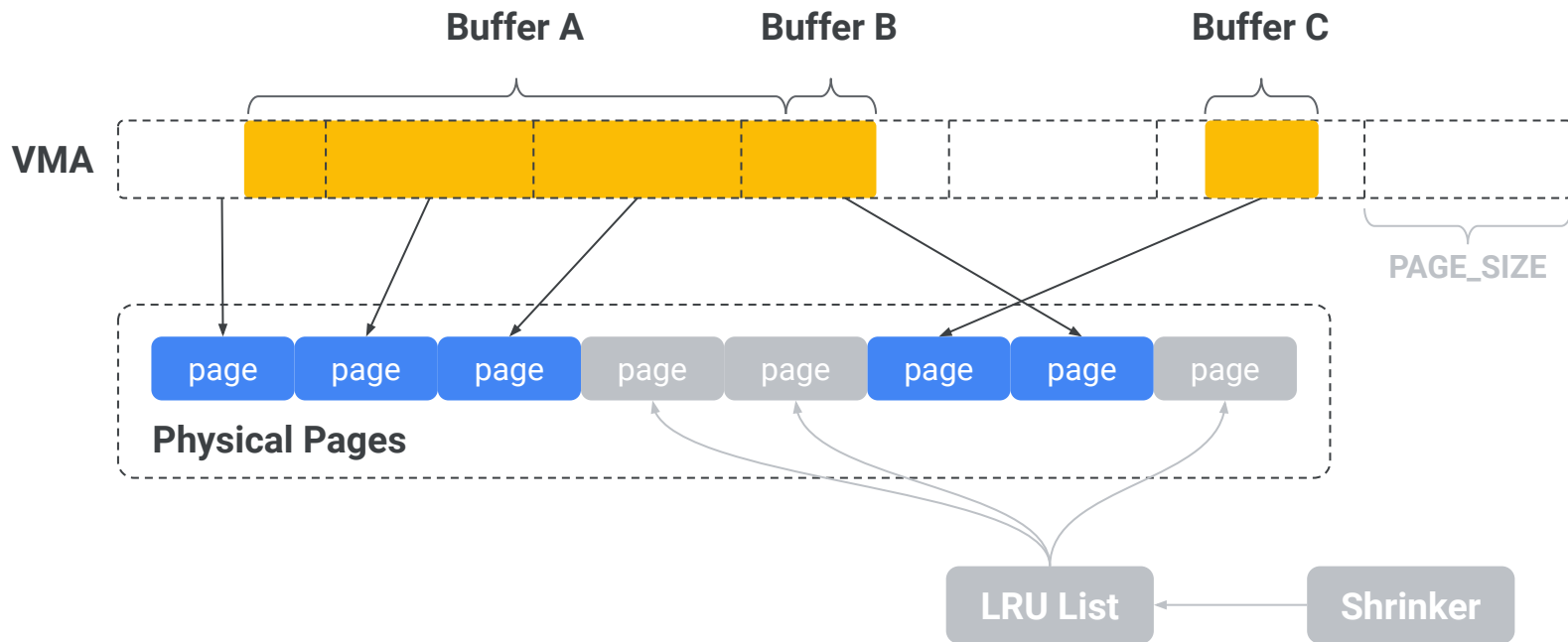
LPC Richmond, Virginia | 2023

# Problem

# Binder model



# Binder buffers



# Problem - Janks due to contention

- Requests are **serialized** via binder alloc->mutex
- Reports of major source of **contention**
- Low-priority task **sleeps** with alloc->mutex
- **mmap lock** was nested under alloc->mutex
- Memory pressure **increase** contention

# Solution

# Solution - Mitigate the contention

- Extract operations that **might\_sleep()** from alloc->mutex
- **Split** the new buffer setup from the page insertion routine
- No longer have mmap\_lock **nested** under alloc->mutex
- Convert the alloc->mutex into a **spinlock**
- **v1** submitted upstream [here](#)

# Results

- From a stress test and measured **wall-time**

before:

| sched | prio | average | max       | min     |
|-------|------|---------|-----------|---------|
| fifo  | 99   | 0.350ms | 248.730ms | 0.020ms |
| fifo  | 01   | 0.357ms | 248.817ms | 0.024ms |
| other | -20  | 0.399ms | 249.906ms | 0.020ms |
| other | 19   | 0.477ms | 297.756ms | 0.022ms |

after:

| sched | prio | average | max      | min     |
|-------|------|---------|----------|---------|
| fifo  | 99   | 0.135ms | 1.197ms  | 0.022ms |
| fifo  | 01   | 0.136ms | 5.232ms  | 0.018ms |
| other | -20  | 0.180ms | 7.403ms  | 0.019ms |
| other | 19   | 0.241ms | 58.094ms | 0.018ms |

200x faster



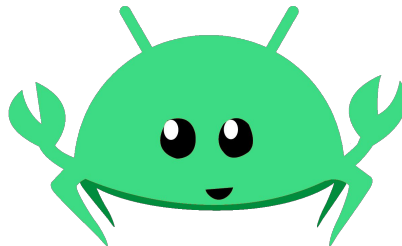
# Q&A



# Extra

# Rust binder rewrite

- Authored by Wedson Almeida Filho **[WIP]**
- Alice Ryhl submitted an **RFC** to Ikml [here](#)
- Reduces **complexity** and memory **bugs**
- Currently testing the **experiment**
- Goal is feature and performance **parity**



# Thank You