EXCERPT ONLY

LTTng's Trace Filtering and beyond

(with some eBPF goodness, of course!)

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eBPF

eBPF

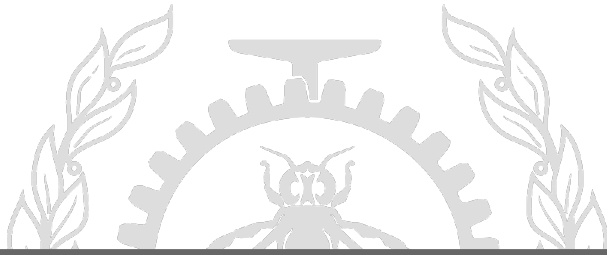
Berkeley Packet Filter (BPF)

- Filter expressions → Bytecode → Interpret
- Fast, small, in-kernel packet & syscall filtering
- Register based, switch-dispatch interpreter

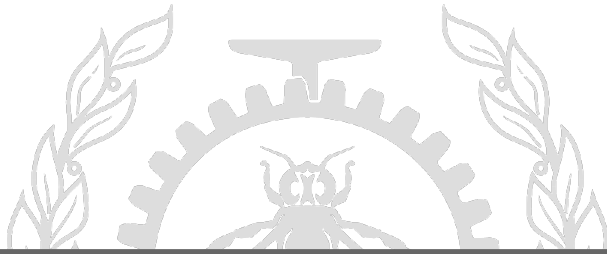
Current Status of BPF

- Extensions for trace filtering (Kprobes!! Kprobes!!)
- More than just filtering. JITed programs - FAST!
- Evolved to *extended* BPF (eBPF)
  - BPF maps, *bpf* syscall - aggregation and userspace access
  - More registers (64 bit), back jumps, tail-calls, verifier

Example BPF Session



Example eBPF Session



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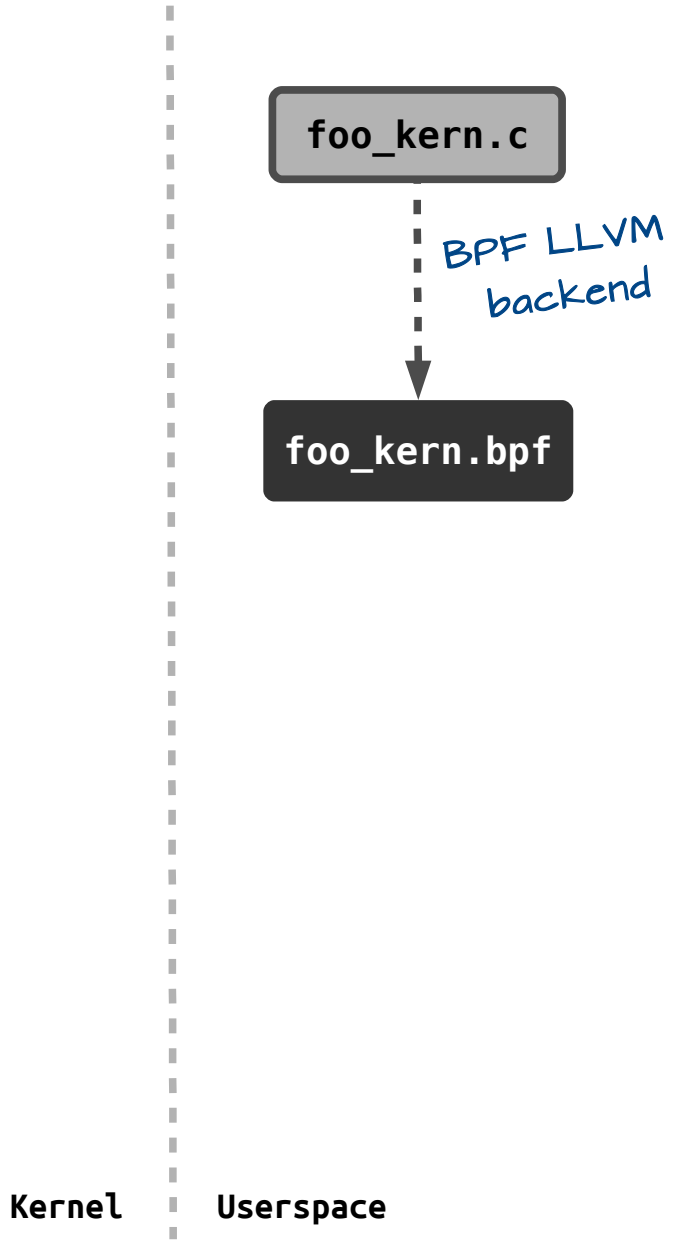

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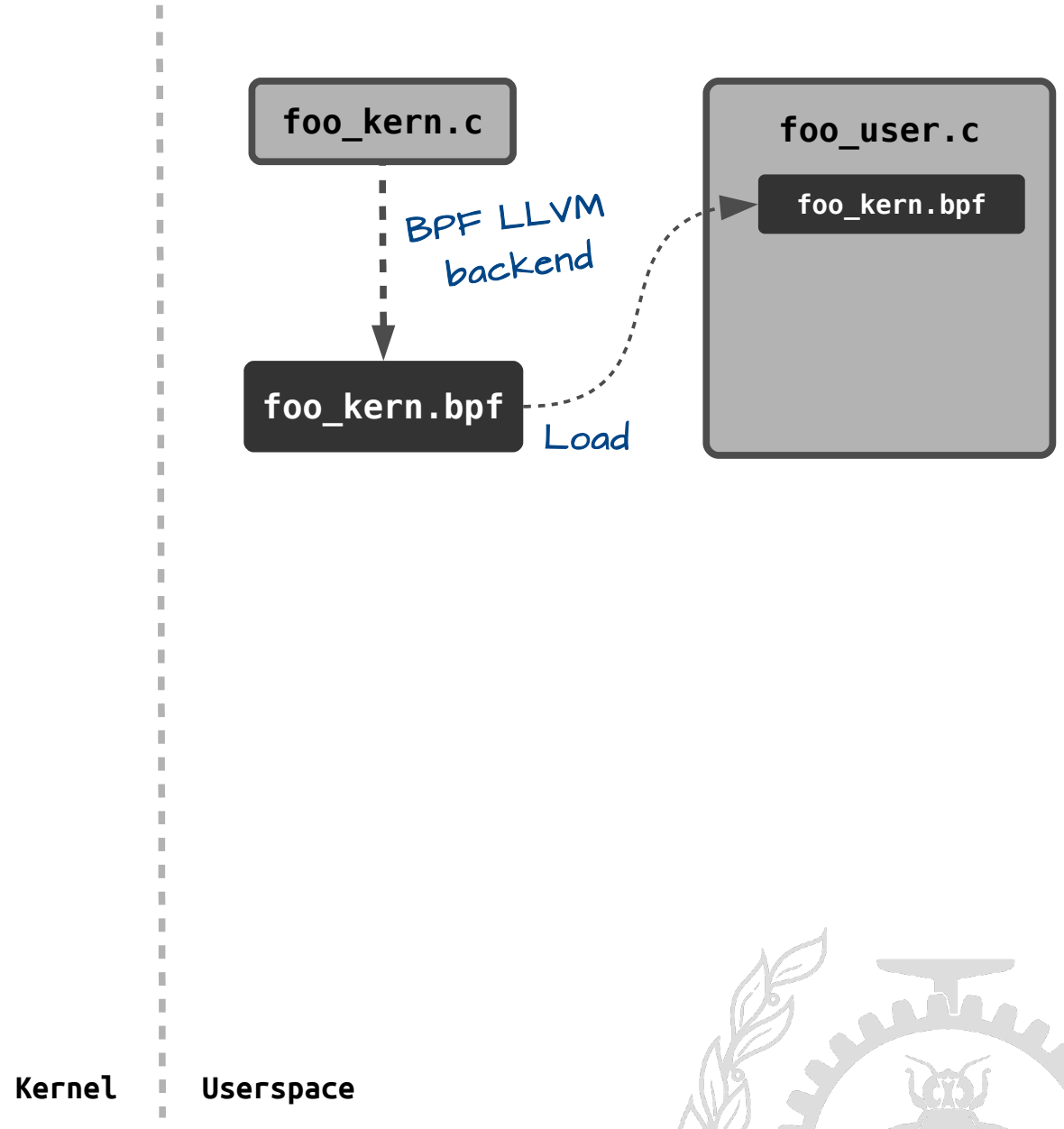

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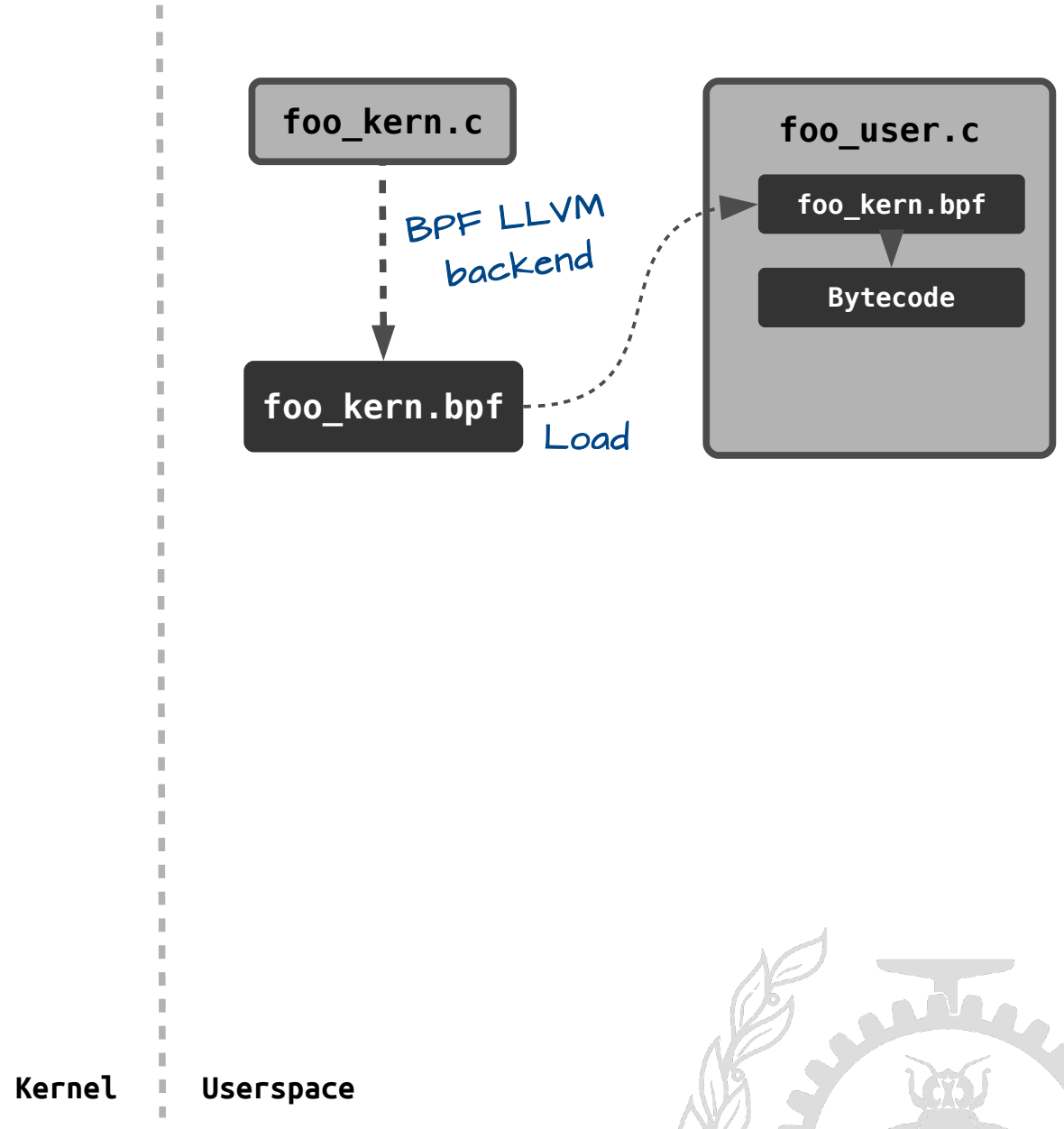

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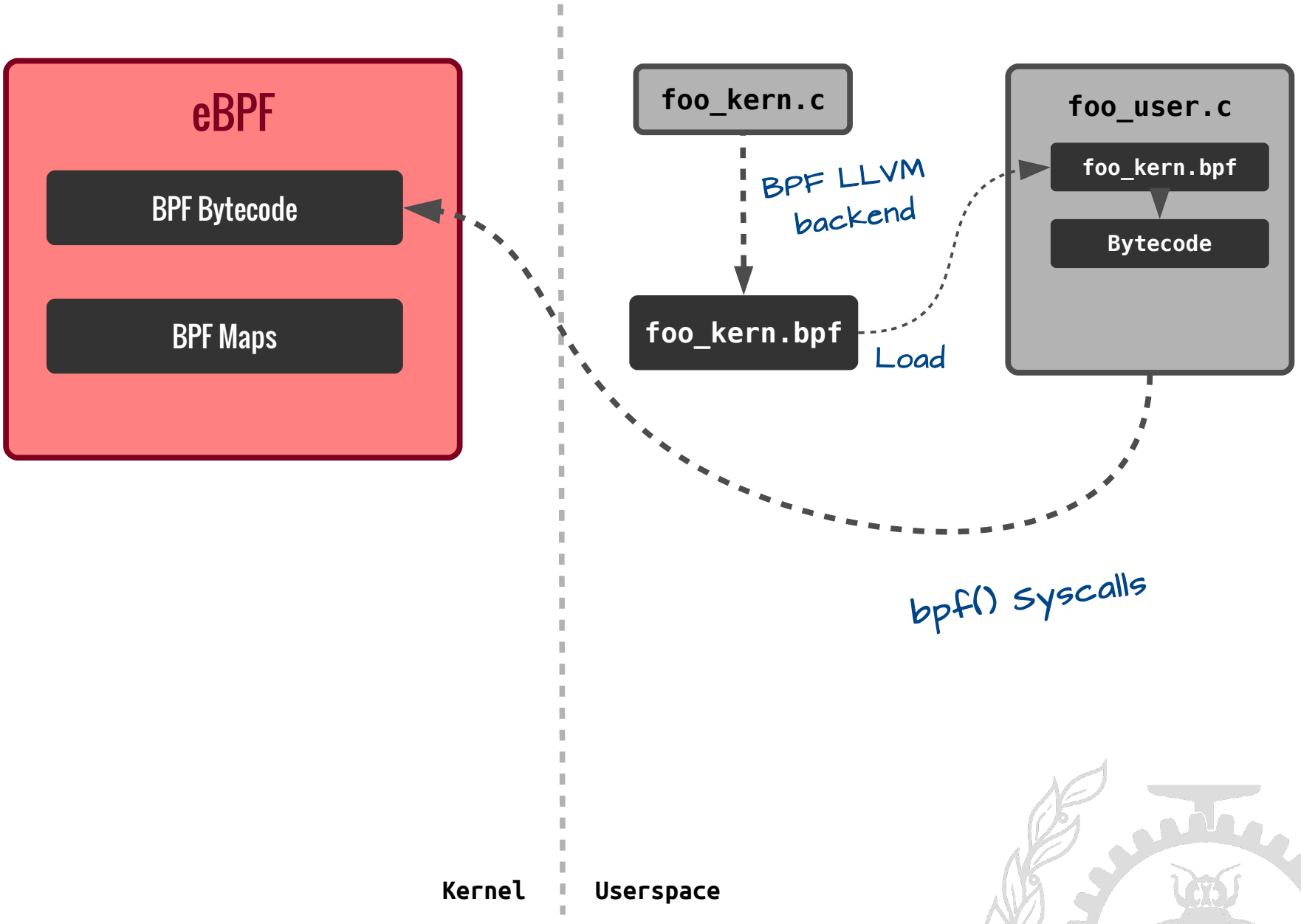

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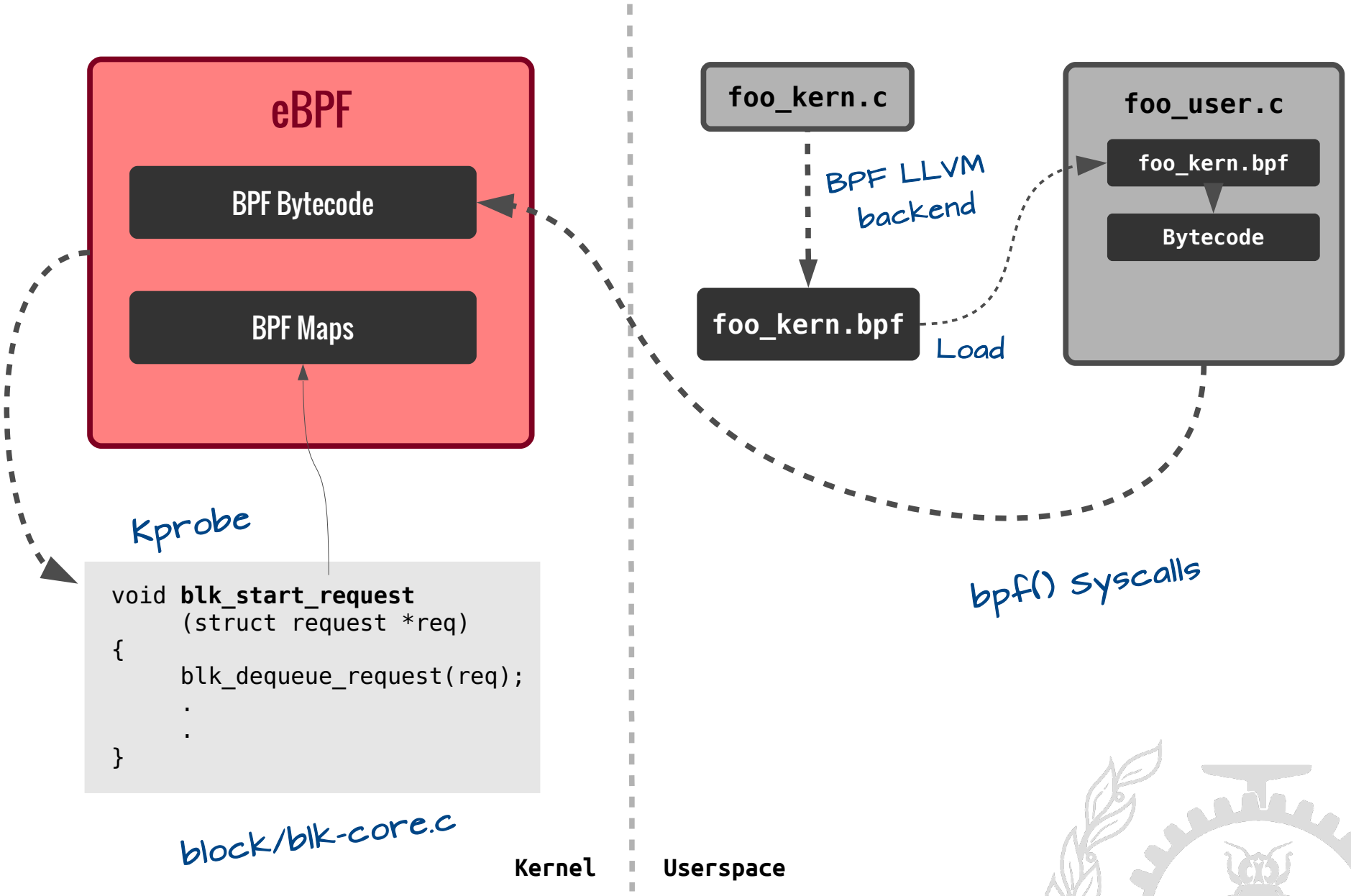
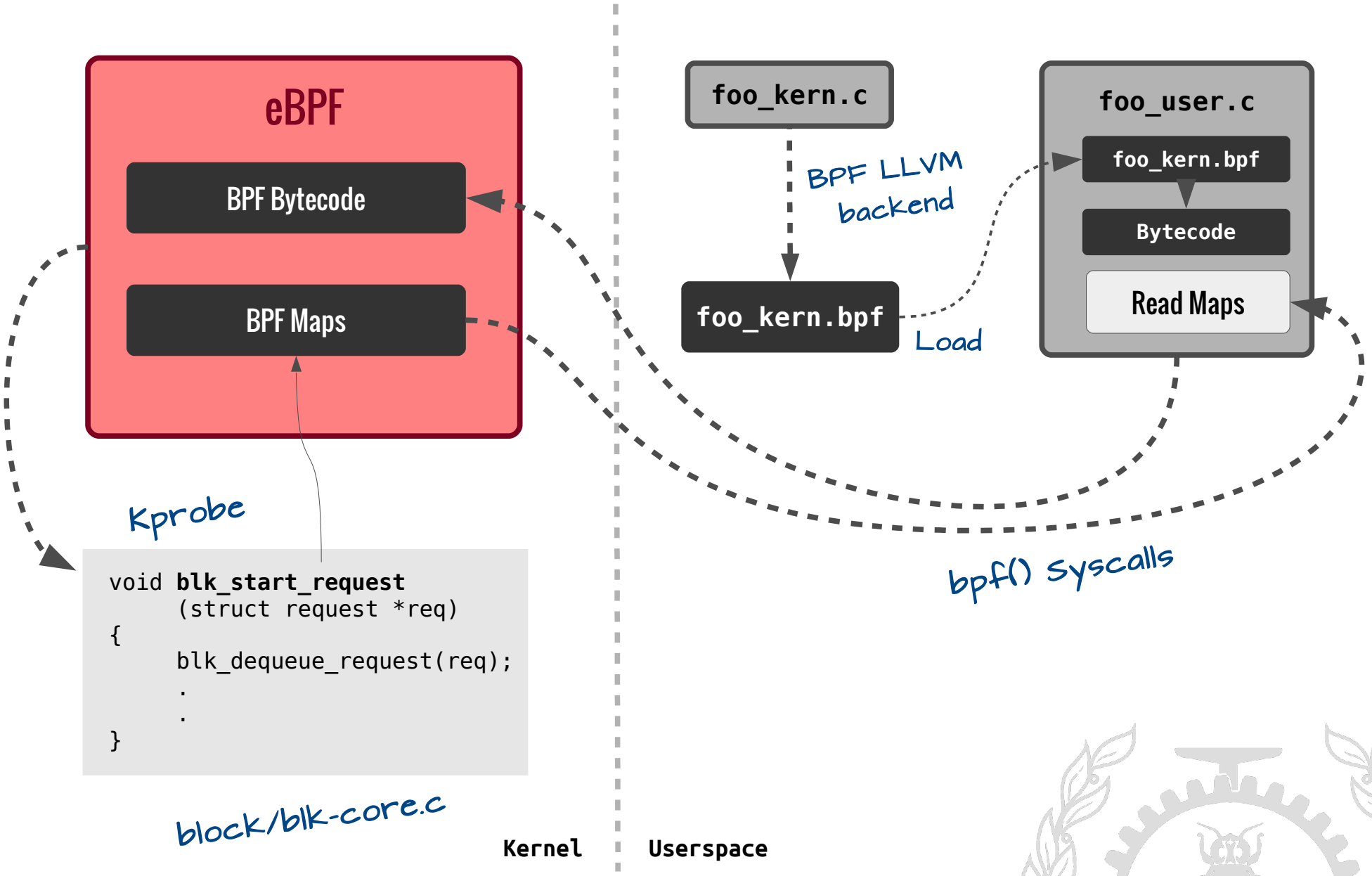
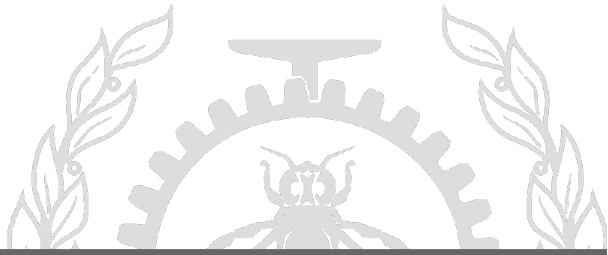


Example eBPF Session



Example BPF session with

https://github.com/iovisor/bcc



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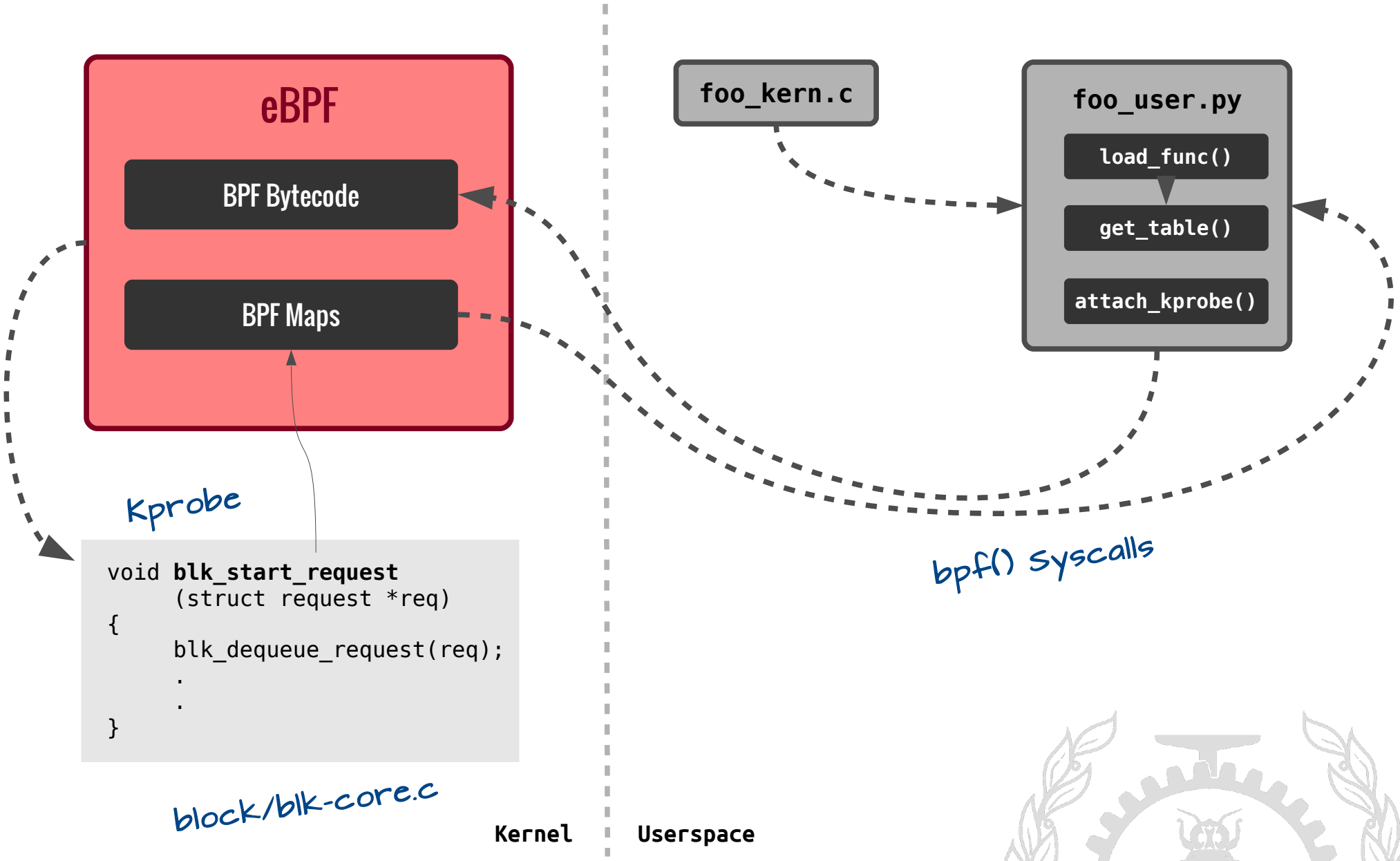


Example eBPF Session with bcc

task_switch.c

```
#include <uapi/linux/ptrace.h>
#include <linux/sched.h>

struct key_t {
  u32 prev_pid;
  u32 curr_pid;
};

BPF_TABLE("hash", struct key_t, u64, stats, 1024);

int count_sched(struct pt_regs *ctx, struct
task_struct *prev) {
  struct key_t key = {};
  u64 zero = 0, *val;

  key.curr_pid = bpf_get_current_pid_tgid();
  key.prev_pid = prev->pid;

  val = stats.lookup_or_init(&key, &zero);
  (*val)++;
  return 0;
}
```

Kernel side BPF program

task_switch.py

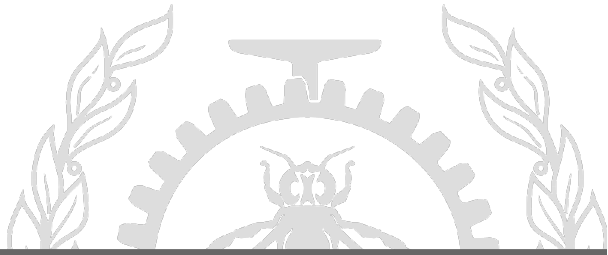
```
from bpf import BPF
from time import sleep

b = BPF(src_file="task_switch.c")
fn = b.load_func("count_sched", BPF.KPROBE)
stats = b.get_table("stats")
BPF.attach_kprobe(fn, "finish_task_switch")

# generate many schedule events
for i in range(0, 100): sleep(0.01)

for k, v in stats.items():
    print("task_switch[%5d->%5d]=%u" %
(k.prev_pid, k.curr_pid, v.value))
```

Userspace side Python program



Questions?

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