Efficiency: caching

COSC 208, Introduction to Computer Systems, 2021-11-01

Announcements

- Project 2 Part B due date extended to Tues, Nov 9

Outline

- Warm-up
- Instances of caching
- Cache replacement

Warm-up

Q1: *Cross-out unnecessary loads and stores from the assembly code.*

```
000000000000071c <multiply>:
    71c:    d10083ff    sub sp, sp, #0x20
    720:    b9000fe0    str w0, [sp, #12]
    724:    b9000be1    str w1, [sp, #8]
    728:    b9400fe1    ldr w0, [sp, #12]
    72c:    b9400be0    ldr w1, [sp, #8]
    730:    1b007c20    mul w0, w1, w0
    734:    b9001fe0    str w0, [sp, #28]
    738:    b9401fe0    ldr w0, [sp, #28]
    73c:    910083ff    add sp, sp, #0x20
    740:    d65f03c0    ret
```

Cache replacement

Assume a cache can hold 3 entries and the following 15 data accesses occur: 3, 4, 4, 5, 3, 2, 3, 4, 1, 4, 4, 2, 5, 2, 4. Assuming the cache is initially empty, what is the hit ratio for each of the following algorithms?

- *Optimal*

- Q2: *FIFO*

- Q3: *LRU*

- Q4: *LFU*