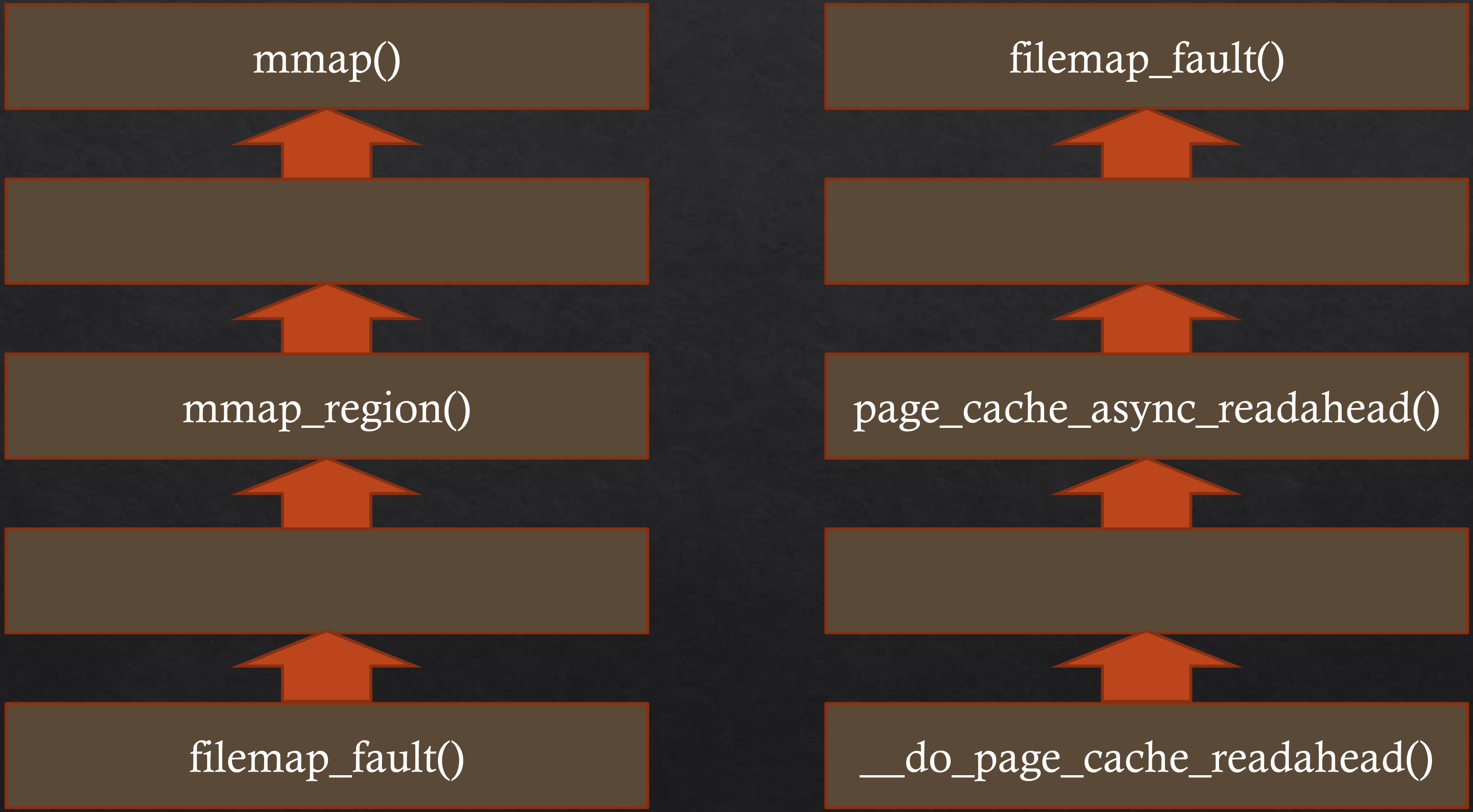
Tracing codes

- Steps
  - Google for a function name
  - Bottom-up backtracking
  - Top-down analyzing
- Tools
  - `grep -nr`: generic text search
  - ctags: semantic-aware search
  - LXR – Linux Cross Reference

    http://lxr.linux.no/

Readahead flow



How much to read?

- On memory efficiency perspective
  - Page contents that will not be accessed should not be loaded into memory
  - Thus, it favors small page loading on page fault
    - An extreme case: **pure demand paging**
- On runtime performance perspective
  - Disk I/O access is very time-consuming
  - Thus, it favors large page loading on page fault

Memory efficiency v.s. runtime performance

Readahead algorithm

- How many pages are read?

```
/* mm/filemap.c */
page_cache_async_readahead(mapping, ra, file,page,
                                        offset, ra->ra_pages);
/* mm/readahead.c */
ra->ra_pages = mapping->backing_dev_info->ra_pages;

/* mm/backing-dev.c */
struct backing_dev_info default_backing_dev_info = {
    .ra_pages = VM_MAX_READAHEAD * 1024 / PAGE_CACHE_SIZE,
};
```

Project Goals

- Code reading (40%)
  - Part I: How filemap_fault() is set as the page fault handler when mmap() is called
  - Part II: How and when the readahead algorithm takes place when filemap_fault() is invoked
- Revise readahead algorithm (40%)
  - Any change that reduces the time between “page fault test program starts !” and “page fault test program ends !”
  - Percentage of reduction varies from machine to machine. Any number larger than 0 is fine. As a reference: 6% on SSD and > 10% on HDD
- Report (20%)
  - Up to 4 pages, with experiments and discussions

Bonus of Project 3

- Any change that reduces latency or improve throughput in disk I/O (10%)
- Report (10%)
  - Additional 2 pages at most
  - Implementation, discussion and experiments

Submission Rules

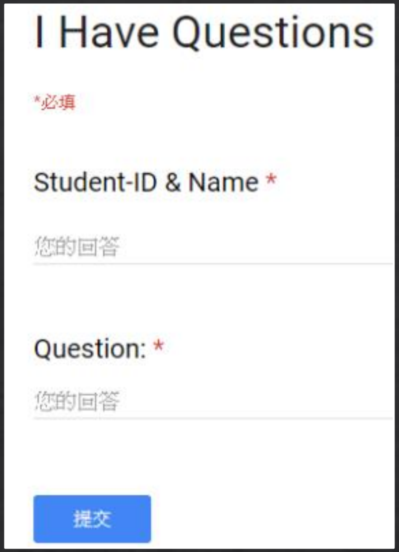
- Project deadline: **2018/06/20 (Wed.) 23:59**
  - Delayed submissions yield severe point deduction
- Upload your team project to the FTP site.
  - FTP server: 140.112.28.143:21
  - Account/password: os2018/ktw2018os
- The team project should contain
  - Any modified files
  - Baseline and bonus in a single report (PDF, within 6 pages)
- Packed as “OSPJ3_Team##_v#.zip”

```
OSPJ3_Team##_v#.zip/
    Report.pdf
    Baseline/
        xxx.c
    Bonus/
        yyy.c
```

Contact TAs

- If you have any problem about the projects, please feel free to contact TAs.
- I have questions:

  https://goo.gl/forms/39eB4ex4w3EX7I4K2



I Have Questions

*必填

Student-ID & Name *

您的回答

Question: *

您的回答

- Video:

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