

Machine Problem 4 Report

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Your report should include two parts:

1. Briefly answer each problem. If your solutions are reasonable and correct, you can get points.

Note that you can get points even if you fail to solve the problems. (10 points)

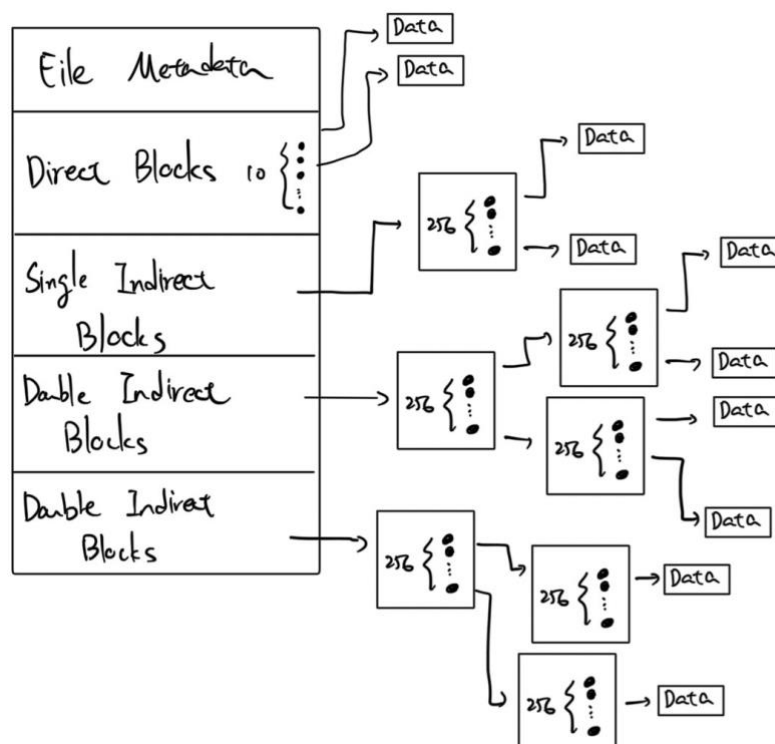
(a) Problem 1: Large Files (4 points)

Please draw your inode block structure and explain how to access 66666th block in your implementation.

Ans:

Inode block structure 如下圖所示，除了 file metadata 外，有 10 個 direct blocks、1 個 single indirect block 以及兩個 double indirect block。

因為 1 個 direct blocks 包含 1 個 data blocks，1 個 single indirect block 包含 256 個 data blocks，1 個 double indirect blocks 包含 256×256 個 data blocks。因此可以計算出，若要 access 66666th block，會在下圖的第二個 double indirect block 中，且由第一層第 4 個 address，第二層第 96 個 address，access 66666th block。



(b) Problem 2: Symbolic Links to Files (3 points)

Function `symlink("/b", "/a")` creates a symbolic link `/a` links to file `/b`, explain how to open symbolic link `/a`.

Ans:

在 `sys_open` 實作中，若要開啟的檔案是 `symlink` (`ip->type == T_SYMLINK`)，則會執行一個 `while` 迴圈。每次回圈會把存在 `symlink` 的內容讀出來，即 `symlink` 連結到的檔案名稱，並把該檔案的 `inode` 獨進來，並更新 `ip`。若 `type` 仍是 `symlink`，就繼續迴圈。除此之外會記錄一個 `counter`，代表 `while` 執行了幾次，若超過 20 則代表出現迴圈，`return -1`。

(c) Problem 3: Symbolic Link to Directories (3 points)

Function `symlink("/y/", "/x/a/")` creates a symbolic link `/x/a` links to directory `/y/`, explain how to write to `/x/a/b`.

Ans:

要寫對 `/x/a/b` 執行寫入的動作，首先要先開啟或創建該檔案。用 `sys_open` 開啟，執行 `namei` 或 `nameparenti` 時都會呼叫 `namex`。而因為 `/x/a/` 為 `symlink` 因此需要先將 `/x/a` 轉換為 `/y/`。在 `namex` 中的 `while((path = skipelem(path, name)) != 0)` 迴圈裡，若檢查當前讀取到的 `directory` 是否為 `symlink`，若是的話會更新 `path` 以及 `ip`，`path` 就替換成該 `symlink` 指到的目標檔案加上後面的子路徑，例如 `/x/a/ -> /y/`，當我在讀 `/x/a/b` 的時候，走到 `/x/a/` 時發現它是 `symlink`，我就更新 `path` 成 `/y/b/` 並且將 `ip` 重新指到根目錄。讀到檔案之後再 `access` 相對應的 `data blocks` 進行寫入。

2. We encouraged you to help other students. Please describe how you helped other students here. You should make the descriptions as short as possible, but you should also make them as concrete as possible (e.g., you can screenshot how you answered other students' questions on NTU COOL). Please note that you will not get any penalty if you leave it empty here. Please also note that this bonus is not for you to do optimization, so we will not release the grading criteria and the grades. Regarding the final letter grades, it is very likely that this does not help — you will get promoted to the next level only if you are near the boundary of levels and you have significant contributions. (0 points)

Ans:

幫同學找出錯誤，以及解決寫作時遇到想法卡住的問題。

