Assignment 3 - Implementation of Slim Chance Page Replacement Algorithm for FreeBSD Memory Management System

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General Overview:

This assignment aims to change the behavior of the pageout daemon in FreeBSD, which is responsible for deciding which pages to make available for replacement and which pages to flush back to disk. The changes are slightly variant from the Second Chance Clock Algorithm but with slight modifications.

Steps to achieve Slim Chance Algorithm:

- Change the way that inactive and invalid pages are put in the free list, so instead of them being placed in the front, we will place them in the rear of the list.

- When you move a page to the inactive list, it goes on the front instead of the rear.

- Instead of subtracting from the activity count, you will divide it by two and move it to the front of the active list instead of to the rear.

Change the way that inactive and invalid pages are put in the free list:

1. By modifying the **file(vm_pageout.c)** -> vm_page_deactivate() function's athead parameter from 0 to 1, we revert the behavior of _vm_page_deactivate() function. And instead of them being added to the front, they will be added to the rear.

2. Also modifying the **file(vm_phys.c)** -> vm_phys_free_pages() -> vm_freelist_add(int argument) from 1 to 0, this will revert the default from adding pages to the front to being added to the rear.

Moving a page to the inactive list, it goes to the front instead of the rear:

1. Change TAILQ_INSERT_TAIL -> TAILQ_INSERT_HEAD In the ***vm_page_requeue()***
2. Change TAILQ_INSERT_TAIL -> TAILQ_INSERT_HEAD In the ***vm_page_requeue_locked()***

Instead of subtracting from the activity count, you will divide it by two:

1. By modifying the **file(vm_pageout.c)** -> vm_pageout_scan() -> m->act_count to divide by 2 instead of subtracting from the activity count.

To see the true effect of paging out:

Increase the amount of paging out to happen every 10 seconds instead of 600 seconds or 10 minutes, Modifying the **file(vm_pageout.c)** -> vm_pageout_update_period = 10 instead of 600.

Stress Testing:

1. Clear the message file in /var/log before stress testing: `cp /dev/null /var/log/messages`
2. Define a clear start before the stress testing by writing this to the log: `START_LOG`
3. Using 15 workers, initiate the stress testing: `stress --vm 15 --timeout 60s --vm-keep`
4. Define a clear end to the stress testing by writing this to the log: `END_LOG`