Programming Assignment #3

Due Jul 1 by 11:30pm **Points** 50 **Submitting** a file upload
Available after Jun 22 at 8pm

Design and implement a program to simulate memory allocation/deallocation.
You shall create a program that simulates the main memory allocation in an operating system.
You will use
this to simulate and evaluate *first fit* and *best fit* memory allocation/deallocation technique
s when using
a linked list to keep track of memory usage.

Implementation:
Assume the following:
- Memory is 256 KB and is divided into units of 2 KB each.
- A process may request between 3 and 10 units of memory.

Your simulation consists of three components: (1) Memory component that implements a specific
allocation/deallocation technique; (2) a request generation component that generates allocati
on/deallocation
requests; and (3) a statistics reporting component that prints out the relevant statistics.

The Memory component exports the following functions:

1. *int allocate_mem (int process_id, int num_units)*: allocates num_units units of memory to
a process whose
id is process_id. If successful, it returns the number of nodes traversed in the linked l
ist. Otherwise,
it returns -1.

2. *int deallocate_mem (int process_id)*: deallocates the memory allocated to the process whos
e id is
process_id. It returns 1, if successful, otherwise –1.

3. *int fragment_count( )*: returns the number of holes (fragments of sizes 1 or 2 units).

You will implement a separate Memory component for each memory allocation/deallocation techni
que. The
request generation component generates allocation and deallocation requests. For allocation r
equests, the
component specifies the process id of the process for which memory is requested as well as th
e number of
memory units being requested. For this simulation, assume that memory is requested for each p
rocess only
once. For deallocation requests, the component specifies the process id of the process whose
memory has to
be deallocated. For this simulation, assume that the entire memory allocated to a process is
deallocated on
a deallocation request. You may generate these requests based on some specific criteria, e.g.
a random
sequence or hard coded sequence. There are three performance parameters that your simulation
should
calculate for both techniques: average number of external fragments, average allocation time
in terms of the
average number of nodes traversed in allocation, and the percentage of times an allocation re
quest is denied.

Run your simulation generating 10,000 requests using the request generation component, and fo
r each request,
invoke the appropriate function of the Memory component for each of the memory allocation/dea
llocation
technique. After every request, update the three performance parameters for each of the techn
iques.

The statistics reporting component prints the value of the three parameters for both techniqu
es at the end.

Your project shall include a README file using the same conventions/requirements specified in
the course
README instructions file.

Your program will be tested by compiling and executing on edoras. Your program shall be writt
en such that it
compiles and executes cleanly when using gcc/g++. Note - you must use a Makefile. You shall c
reate a
sub-directory named "a3" in your home directory. In it, you shall place all of your project f
iles, including
your Makefile. Your source files shall contain sufficient comments for making the source easy
to read. Name
the executable "sim". Also, create an archive file (tarball or zip) and upload to edoras (on
e student per
project) as your turn-in for assignment #3.

- Create ~/a3 by hand.
- Create all necessary project files. Put them into ~/a3.
- The Makefile shall create an executable named "mot" in this same directory (~/a3).
- The system call "system()" will NOT be allowed
- You must work individually or in pairs (individually or a team of 2 students)

You may use gcc, or g++ compiler on this assignment

Submission

× **Not Submitted!**

Submission Details

Grade: 50 (50 pts possible)
Graded Anonymously: no

Comments:

cssc4206 redid: 827228799
a3.zip
Dong Lin, Jul 3 at 9:27am
Outstanding! Really well done! I liked your licensing comment as well
Guy Leonard, Jul 5 at 12:15pm