

Cairo University

Faculty of Computers and Artificial Intelligence

BCS241 Operating Systems

2nd Semester – 2020 - Project Description



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Objectives :

Select ONE of the following two projects:

- Project (A) It is required to implement different techniques of contiguous memory allocation.
- Project (B) It is required to implement three different techniques of page replacement.

Report Instructions

- 1- This project is to be solved by teams of at most FIVE students.
- 2- Each team of students will submit one combined solution and must contribute equally to the solution.
- 3- **Students have collective ownership and responsibility of their project. Any violation of academic honesty will have severe consequences and punishment for ALL team members.**
- 4- **Please submit only work that you did yourself. If you copy work from your friend or book or the internet, you will fail the course.**
- 5- Please read the rest of this document very carefully.
- 6- Use the cover page in Appendix A.

Project 1: Memory Management (Contiguous Memory Allocation)

- 1- **Read carefully** the given system specifications.
- 2- **Develop program(s')** as required in the System Description.
- 3- **Write a report** that contains the following parts:
 - a. Describe how implement each part of the system
 - b. Describe how different test cases are used to test the system (input, output, screen shots of each run).
 - c. Write/describe the role of each team member work in the project.
 - d. Source code text must be added at the end of the report.
- 4- **Create** one zip file with your report (in pdf format) and code directory.

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System Description:

Develop a memory allocation simulator to allocate variable-sized partitions of the memory to given sequence of processes requests. Apply different allocation policies:

1. First-Fit policy.
2. Best-Fit policy.
3. Worst-Fit policy.

Input will be as follows:

- Number of partition
- Size of each partition.
- Number of process requests.
- Size of each process.
- Selected policy by the user.

Output will be as follows:

- Pairs of Partition and process (Partition allocated, to which process).
- The remaining free space from each partition.

Sample input:

Enter number of partition: 4

Partition1 size: 50

Partition2 size: 70

Partition3 size: 15

Partition4 size: 30

Enter number of processes: 3

Process1 size: 40

Process2 size: 30

Process3 size: 20

Select the policy you want to apply:

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1. First fit
2. Worst fit
3. Best fit

Sample output:

If selected policy = 1:

Partition 1 (50 KB) = Process 1 (40 KB), Rest of Partition 1 = (10 KB).
Partition 2 (70 KB) = Process 2 (30 KB), Rest of Partition 2 = (40 KB).
Partition 2 (70 KB) = Process 3 (20 KB), Rest of Partition 2 = (20 KB).
Partition 3 (15 KB) = Empty.
Partition 4 (30 KB) = Empty.

If selected policy = 2:

Partition 1 (50 KB) = Process 2 (30 KB), Rest of Partition 1 = (20 KB).
Partition 2 (70 KB) = Process 1 (40 KB), Rest of Partition 2 = (30 KB).
Partition 2 (70 KB) = Process 3 (20 KB), Rest of Partition 2 = (10 KB).
Partition 3 (15 KB) = Empty.
Partition 4 (30 KB) = Empty.

If selected policy = 3:

Partition 1 (50 KB) = Process 1 (40 KB), Rest of Partition 1 = (10 KB).
Partition 2 (70 KB) = Process 3 (20 KB), Rest of Partition 2 = (50 KB).
Partition 3 (15 KB) = Empty.
Partition 4 (30 KB) = Process 2 (30 KB), Rest of Partition 4 = (0 KB).

Project 2: Virtual Memory Management (Page Replacement)

- 1- **Read carefully** the given system specifications.
- 2- **Develop program(s')** as required in the System Description.
- 3- **Write a report** that contains the following parts:

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- Describe how implement each part of the system
- Describe how different test cases are used to test the system (input, output, screen shots of each run).
- Write/describe the role of each team member work in the project.
- Source code text must be added at the end of the report.

4- **Create** one zip file with your report (in pdf format) and code directory.

System Description:

Develop a page replacement simulator to allocate free frames of physical memory to a given page requests. Apply replacement algorithms:

- First-in First-out (FIFO).
- Optimal replacement.
- Least recently used.

Input will be as follows:

- Size of reference string (# of page requests).
- Page number for each request.
- Number of frames
- Selected replacement algorithm

Output will be as follows:

- Record of page number assigned to each frame.
- Number of page replacements.
- Number of page faults.

Sample input:

Enter size of reference string: 20

Enter the reference string:

7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

Enter number of frames: 3

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Enter selected replacement algorithm:

1. FIFO
2. Optimal Replacement
3. LRU

Selected replacement: 3.

Sample output:

[7, --,--]

[7, 0, --]

[7, 0, 1]

[2, 0, 1]

...

Number of page faults = 15

Number of page replacements = 12

reference string

7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1

7	7	7	2														7	7	7
	0	0	0		2	2	4	4	4	0			0	0			1	0	0
			1	1	3	3	3	2	2	2			1	1			2	2	1
					1	0	0	0	0	3	3		3	2					

page frames

* Same is applied for any selected replacement algorithm.

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Appendix A

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Operating Systems

2nd Semester 2020 Project

XXX Title XXX

ID	Name	Email