Course COMP-8567
Assignment 02
Summer 2023
Due Date: Jun/27/2023 (Revised to Jun/29/2023)
50 Marks
PART A: 25 Marks
PART B: 25 Marks

Note: The assignment consists of two parts. Read the instructions thoroughly.

Part A

Write a C program that searches for processes in the process tree (rooted at a specified process) and outputs the requested information based on the input parameters.

Synopsis :

prcinfo [*root_process]* [*process_id1*] [*process_id2*]… [*process_id(n)*] [*OPTION*]

- 1 >=n <= 5
- Lists the PID and PPID of each *process_id(n)* if *process_id(n)* belongs to the process tree rooted at *root_process*
    - *root_process* is the PID of a process that is a descendant of the current bash process.
    - *process_id(n)* is the PID of a process that is a descendant of the current bash process.

OPTION

-nd additionally lists the PIDs of <u>all</u> the **non-direct** descendants of *process_id1 (only)*

-dd additionally lists the PIDs of all the **immediate** descendants of *process_id1*

-sb additionally lists the PIDs of all the **sibling processes** of *process_id1*

- sz additionally Lists the PIDs of all **sibling** processes of *process_id1* that are **defunct**

- gc additionally lists the PIDs of all the **grandchildren** of *process_id1*

- zz additionally prints the status of *process_id1* (Defunct/ Not Defunct)

- zc additionally lists the PIDs of all the direct descendants of *process_id1* that are currently in the defunct state

Part B

Write a C program that searches for defunct processes in a process tree(rooted at a specified process) and forcefully terminates their parent processes based on the input parameters

Synopsis:

deftreeminus [*root_process*] [*OPTION1*] [*OPTION2*] [*-processid*]

- Forcefully terminates all the parent processes (as long as it is not the current BASH process) of all the defunct processes that belongs to the process tree rooted at *root_process*.
- *root_process* is the PID of a process that is a descendant of the current bash process.
- *-processid*: **if specified**, the process with *PID= processid* will **not be terminated** even if it happens to be the parent of a defunct process that that belongs to the process tree rooted at root_process.
    - *-processid* can be specified **without** the options:
      $ deftreeminus 1004 -1010 (Terminates 1005 only in the process tree shown in sample runs below) whereas,
      $ deftreeminus 1004 (Terminates both 1005 and 1010)

OPTION1

- **- t** forcefully terminates parent processes (whose elapsed time is greater than ***PROC_ELTIME***) of all the defunct processes in the process tree rooted at *root_process*

- **- b** forcefully terminates all the processes in the process tree rooted at root_process that have >= ***NO_OF_DFCS*** defunct child processes.

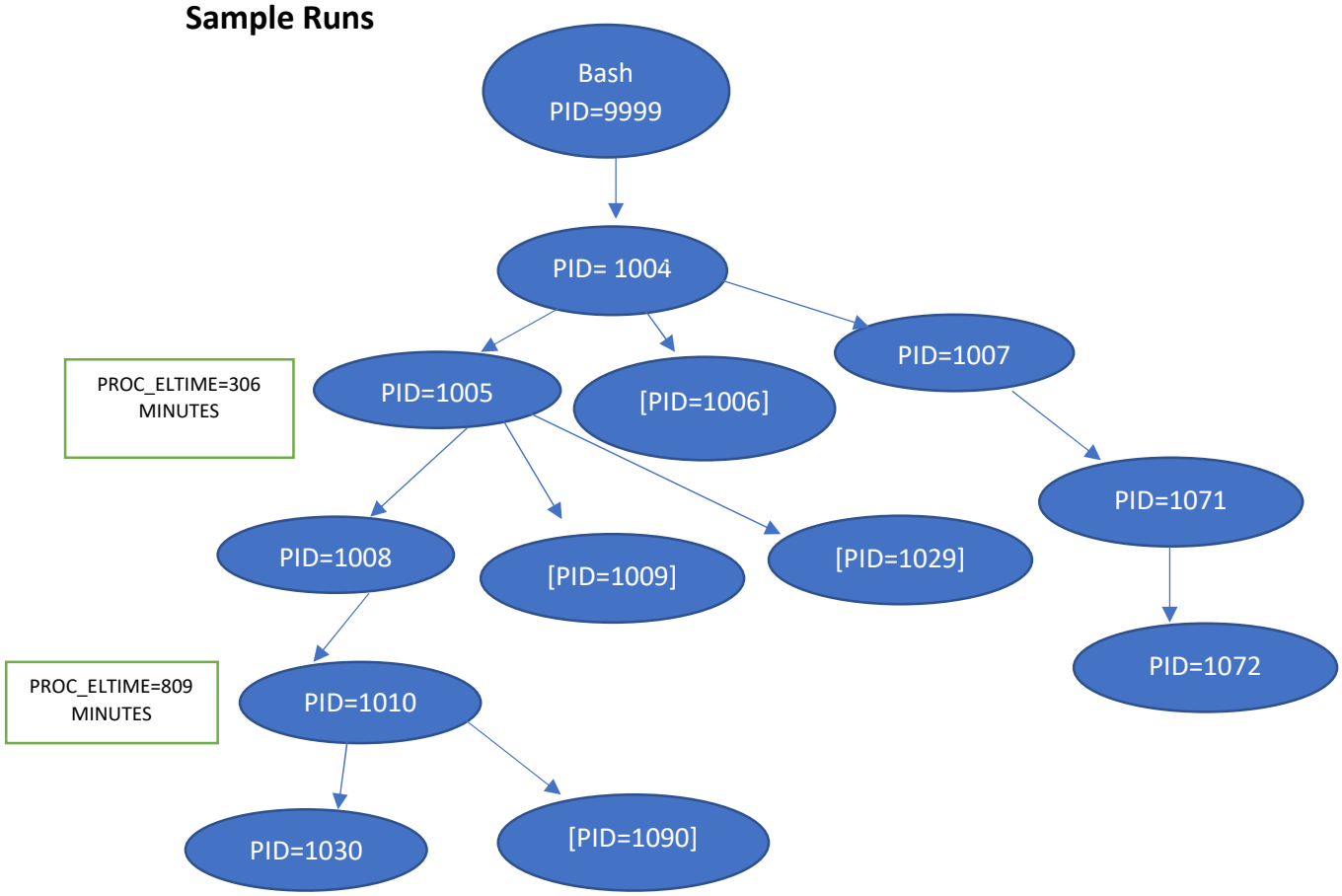
OPTION2

- **PROC_ELTIME** The elapsed time of the process in minutes since it was created (>=1)

- **NO_OF_DFCS** The number of default child processes (>=1)

(Continued on Page 4)

Sample Runs



Note: In the above example, [PID=1006], [PID=1009], [PID=1029] and [PID=1090] are defunct (zombie) processes at the time of execution of the following programs

$ prcinfo 1004 1009
1009 1005
 	
$ prcinfo 1004 1008 1007
1008 1005
1007 1004
 	
$ prcinfo 1005 1062 1010 1090
1010 1008
1090 1010
 	
$ prcinfo 1005 1020 //no output
 	
$ prcinfo 1005 1010 -zz
1010 1008
NOT DEFUNCT
	$ prcinfo 1004 1005 1071 -zc
	1005 1004
	1071 1007
	1009
	1029
	
	$ prcinfo 1004 1008 1071 -sz
	1008 1005
	1071 1007
	1009
	1029
	
	$ prcinfo 1004 1030 -sb
	1030 1010
	1090
		$ deftreeminus 1007
		//No processes are forcefully terminated
		
		$ deftreeminus 1005 -b 2
		//1005 is forcefully terminated, 1010 is not
		
		$ deftreeminus 1004 -t 400
		// 1010 is forcefully terminated, 1005 is not
		
		$ deftreeminus 1004 -b 1 -1005
		// 1010 is forcefully terminated, 1005 is not

$ prcinfo 1004 1005 1007 -nd
1005 1004
1007 1004
1010
1030
1090
 	
$ prcinfo 1004 1005 1007 -dd
1005 1004
1007 1004
1008
1009
1029
	$ prcinfo 1005 1008 -gc
	1008 1005
	1030
	1090
	
	$ prcinfo 1004 1005 -zc
	1005 1004
	1009
	1029
		$ deftreeminus 1005
		//Forcefully terminates 1005 and 1010
		
		$ deftreeminus 1005
		//Forcefully terminates 1005 and 1010

Comments and explanation of the program

-You are required to include adequate and appropriate comments to explain the working of the program.
-Please see the assignment rubrics for more information

Submission Instructions:

You need to submit the following:

1. **prcinfo.c**
2. **deftreeminus.c**
3. **prcinfo.txt** //note: prcinfo.txt must be an identical copy of prcinfo.c with a .txt extension
4. **deftreeminus.txt** //note: deftreeminus.txt must be an identical copy of deftreeminus.c with a .txt extension.
5. **Zoom recording link** explaining the following (not more than 15 minutes)
    - Overall working of the code and various modules (around 8-9 minutes)
    - Execution of the code under various inputs/conditions as per the requirements of the assignment (around 6-7 minutes)
        - **Note:** Other form of links/MP4 files will **NOT** be acceptable.
        - **Include the link in the COMMENTS section.**

Note:

- You are required to follow the **Submission Instructions** carefully and email the instructor reasonably ahead of the submission deadline in case of any questions.
    a. Incorrect submission of files/purported inadvertent submission of empty files, or absence of any file/link/requirement as outlined in the **Submission Instructions** will be deemed as a **missed assignment** and will be assigned a mark of zero.
- **After your submission**, you will be able to view the **Turnitin** similarity report that compares your submission with all the remaining submissions in the section/all the sections of the course.