

# OS Assignment-3 Report

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The number of concurrent process is limited by multiple factors like how much memory is available to allocate to the new process, how many processes the cores can and are currently handling etc.

**Theoretical Limit:** There is a limit to number of processes for user. It is 4194303 on my machine. Also the limit on number of processes a given process can create(RLIMIT\_NPROC) value was given to be 21386 on my machine

**Memory Limiting:** If the total available memory is say A bytes and each process (parent and child) is allocated say B bytes of memory for address space, then the maximum number of child process possible will be at most  $A/B$ .

**Core Capacity limiting:** If the total number of cores is say 4 and each core can handle say C number of processes. Therefore, the total capacity to concurrently handle processes is  $4C$ . Let's assume the total number of processes already being handled is D. Then the maximum number of child process that can be run concurrently by the cores would be  $4C-D$ . Therefore the maximum size of matrix that can be accommodated is  $r1*c2 = 4C-D$ .

Having a matrix size larger may not be as fruitful as expected and all the calculations may not run concurrently because the cores are already fully scheduled and the new child processes will have to wait for the current processes to finish

**Practical Testing:** The file `/sys/fs/cgroup/pids/user.slice/user-1000.slice/pids.max` (has a value of 14115 on my machine) contains the maximum number of pids a certain group can contain. And as we are using fork in our assignment, and fork assigns pids in the same group, the number of maximum child processes is upper bounded by

We have tested the program for multiple values of  $r1*c2$ . The limit when new child process creation was failed was approximately 13835 number of children(which is pretty close to the upper bound we had before). That is the maximum value of  $r1*c2$  for my machine. Maximum value of  $r1*c2$  varies depending on the machine the program is run.