Lab Requirement 3 - Process Management

Requirement

Write a C program that implements a simple web server capable of handling multiple client requests simultaneously by forking child processes.

Server (Parent) Process

1. The server should start by reading a value n from the user, which specifies the number of simultaneous client connections it will handle **(Read**s a value *n* from the user).
2. The server should fork n child processes, each representing a client connection **(Fork**s *n* children.)
3. After forking, the parent process should wait to receive exit codes from all n children and print them (**Wait**s to receive exit codes from the *n* children and **print**s them).
4. The server should terminate after all child processes have completed **(Terminate**s).

Important Note that points 2 and 3 are non-overlapping! That is, the parent should fork *n* children THEN wait for *n* exit codes. It should NOT just fork one child and wait for its exit code and repeat that *n* times.

Each Child Process

1. **Print**s the following message for the user,
   `I am the child number` *X* `and my pid is` *P* `and my parent pid is` *PP*
   where *X* is its order of creation among the *n* children, *P* is its pid and *PP* is its parent pid.
2. Each child process should simulate handling a client request by creating one grandchild process (**Create**s 1 grandchild).
3. **Wait**s to receive exit code from its own grandchild and **print**s them.
4. **Send**s *X* (its order of creation) as its exit code to its parent.

Each Grandchild Process

1. **Print**s the following message for the user,
   `I am the grandchild with pid` *P* `and my parent pid is` *PP*
   where *P* is its pid and *PP* is its parent pid
2. **Send**s *X* (its parent's order of creation) as its exit code to its own direct parent (the child).

Example Output:

For n = 3, the expected output could look like this:

```
I am child number 1, my PID is 12345, and my parent's PID is 12344
I am grandchild with PID 12346 and my parent's PID is 12345
Grandchild exit code: 1

I am child number 2, my PID is 12347, and my parent's PID is 12344
I am grandchild with PID 12348 and my parent's PID is 12347
Grandchild exit code: 2

I am child number 3, my PID is 12349, and my parent's PID is 12344
I am grandchild with PID 12350 and my parent's PID is 12349
Grandchild exit code: 3

Child exit code: 1
Child exit code: 2
Child exit code: 3
```

HINT: The order of the messages may not be in the same order or as the example in each run since the output to the console is often buffered. This means that messages may not be printed immediately as they are generated. The OS may decide to output the messages at different times, especially if multiple processes are trying to print to the console simultaneously.