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Open-Ended Questions day 4 :

- What happens step by step when you type a command in bash (e.g. ls) until you see the output?

- the shell is a type of program called an interpreter. An interpreter operates in a simple loop: It accept command, interprets the command, executes the command then waits For another command to be written

- Each Shell command comprises a command name, Followed by command option and command Argument

ls -l Documents

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and the command into words (ls) (-l) (Documents)

and also checks if it is a built in Function like (cd) or an external Program

- if it is built in → Bash runs it directly
  if not → Bash looks for it in your $Path
- Then Bash asks the Kernel to start the Program then the Program runs as a separate process

then you see the result then you see your shell prompt again

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Second Question:

1- "orphan child" → a child process whose parent has died (terminated)

→ it doesn't die it gets adopted by init (PID 1)

EX: Parent process crashes but its child sleep 100 keeps running

→ the sleep doesn't die gets adopted by PID 1

2- "Zombie process" → A process that has finished but its parent hasn't collected its exit status yet

→ it stays in the process table with status Z (Zombie)

3. "Daemon Process" ⇒ A background service that runs without direct user interaction often starts at boot

third Question:

IPC (Inter-Process Communication) is needed because processes are isolated but often must share data or coordinate work

Ex: Pipes, message queues, shared memory, semaphores, sockets, and signals