

Contribution:

Both contributed equally

Github Repository:

[Sanchay117/OS-Scheduler: Assignment 3 Of Operating Systems Course](#)

1.Functions

a. enqueue(pid_t pid)

- Purpose: Adds a process to the end of the `ready_queue`.
- Parameters: `pid` - Process ID to enqueue.
- Behavior: If the queue is full, the function kills the process and exits.

b. dequeue()

- Purpose: Removes a process from the front of the `ready_queue`.
- Return: Returns `pid` if a process is dequeued, or `-1` if the queue is empty.

c. handle_sigint(int sig)

- Purpose: Handles `SIGINT` signal for terminating SimpleScheduler.
- Operation: Iterates through `ready_queue` and terminates each active process using `SIGKILL`.

d. handle_sigusr(int signo)

- Purpose: Handles user-defined signal to enqueue a new process from a temporary file.
- Behavior: Reads the `pid` from `TEMP_FILE`, enqueues it, and updates the `Process` structure.

e. check_process_status(pid_t pid)

- Purpose: Checks if a process has finished by communicating with `SimpleShell`.
- Return: Returns 0 if the process needs to be re-queued or 1 if it has finished execution.
- Process:
 1. Writes the process ID (`pid`) and turns to `TEMP_PID_FILE`.
 2. Sends a `SIGUSR1` to `SimpleShell`.
 3. Waits for `SimpleShell` to write a status response in `TEMP_RESPONSE_FILE`.

f. `start_scheduler()`

- Purpose: Core scheduler loop that manages processes according to the round-robin policy.
- Operation:
 - Fetches up to `NCPU` processes from `ready_queue`.
 - Starts each process using `SIGCONT` and waits for `TSLICE`.
 - Stops each active process using `SIGSTOP` and re-enqueues if unfinished.
 - Increments the `turns` counter after each `TSLICE`.

2. Signal Handling

- `SIGINT`: Caught by `handle_sigint`, which kills all managed processes and exits.
- `SIGUSR1`: Caught by `handle_sigusr`, which allows new processes to be enqueued from `TEMP_FILE`.

3. Error Handling

- Queue Overflow: If `ready_queue` is full, the enqueued process is killed.
- File Operations: Handles potential errors when accessing or removing temporary files like `TEMP_FILE`, `TEMP_RESPONSE_FILE`, etc.
- Invalid Input: `NCPU` and `TSLICE` should be validated at runtime.