Indian Institute of Technology Bhilai
Department of Computer Science
CSL301: Operating Systems
Scope: The Process
Difficulty Level: Beginner

Class Assignment - 2
August 13, 2025

Instructions

- You are provided with a Python simulator file named `process-run.py`, which models CPU and I/O scheduling.
- For each question, run the simulator with the specified command-line flags in terminal.
- Capture the terminal output as a screenshot and save it as: `<rollnumber>_Q<question-number>.png` Example: `12311001_Q1.png`.
- For the reasoning/explanation part of each question, create a plain text file and label it with the rollnumber and question number: Example: `12311001_Q<question-number>.txt`.
- Ensure that all images and text files are organized before submission.
- Place **all image and text files for Part 1 into a single folder**, then compress the folder into a ZIP file. Name the ZIP file as: `CA2_<rollnumber>_part1.zip`.

Part 1 - Process Scheduling Simulation

1. **First Run:** Execute the following in the terminal:

   ```
   ./process-run.py -l 2:0,5:100,3:50 -c -p -S SWITCH_ON_IO -I IO_RUN_LATER
   ```

   Before running, estimate:

   - The total time required for all processes to finish.
   - The CPU utilization percentage.

   Provide reasoning for your predictions, including when the CPU will be active, when it will be idle, and how I/O completion impacts process scheduling.

2. **Change the I/O Completion Policy:** Re-run the simulation using:

   ```
   ./process-run.py -l 2:0,5:100,3:50 -c -p -S SWITCH_ON_IO -I IO_RUN_IMMEDIATE
   ```

   Compare your results with Question 1. Discuss whether the `IO_RUN_IMMEDIATE` policy reduces total execution time, and explain why or why not.

3. **Change the Process-Switch Policy:** Now execute:

   ```
   ./process-run.py -l 2:0,5:100,3:50 -c -p -S SWITCH_ON_END -I IO_RUN_IMMEDIATE
   ```

   Predict the changes in CPU idle time compared to the first two runs. Describe real-world scenarios where using `SWITCH_ON_END` might lead to inefficient CPU usage.