Production System

The second assignment focuses on a production system similar to those covered in the lectures. The production system consists of six machines, each considered unbreakable (no maintenance required).

This production system is responsible for producing three different families of products. The product family determines the shop floor routing and the processing times for each machine.

First, students must implement a simulation of the environment managed using the "PUSH" policy: whenever a new customer order is received, it is immediately released onto the shop floor. The PUSH policy serves as the benchmark for comparison with the RL-based solution.

Secondly, students must implement an alternative environment where, upon receiving a customer order, the order is placed into a "pre-shop pool" (PSP). At regular intervals, a reinforcement learning (RL) agent will decide whether to release the most urgent order from the PSP into the shopfloor.

The objective is to achieve the same throughput as the PUSH system, while minimizing the WIP and with a comparable job tardiness and earliness.

The simulation parameters are as follows:

- 6 machines
- 3 product families
- Job arrival rate (exponential): lambda 0.65
- Families' weights:
    - F1: 10%
    - F2: 52%
    - F3: 38%
- Routings (probabilistic):

	WC1	**WC2**	**WC3**	**WC4**	**WC5**	**WC6**
F1	1	1	0	1	1	1
F2	0.8	0.8	1	0.8	0.8	0.75
F3	0	0	1	0	0	0.75

- Processing Times:
    - F1: gamma distribution, alpha=2, beta=2
    - F2: gamma distribution, alpha=4, beta=0.5
    - F2: gamma distribution, alpha=6, beta=1/6
- Due Dates:
    - Uniform: U(30, 50)