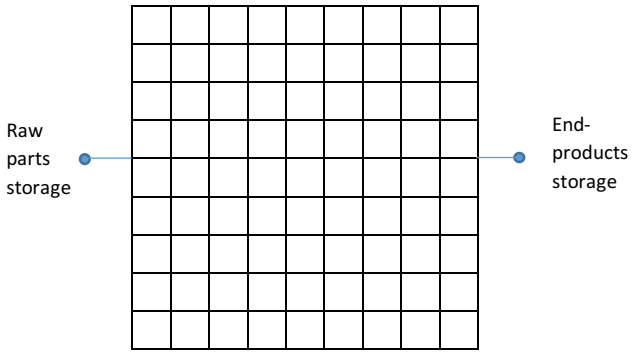
Scenario of Factory Operations



- There are 100 machines (located in the vertexes of the grid) and each machine is capable of processing all 10 types of operations. Each machine has a speed factor and if the speed factor is v and processing time is p in standard machine with speed factor 1, the processing time by the machine is p/v.
- A machine requires a setup time if it switches to a different type of operation. The setup time is a constant value across all machines.
- There are 5 types of customer orders and they are arriving according to an exponential distribution. Each type of orders has to be processed in a sequence of 10 operations (the sequence is different from type to type). The processing time for each operation required by a type of order is deterministic and given with respect to speed factor 1.
- Raw parts storage contains the parts used to fulfill orders and we assume that there is only one type of parts. Every order uses a raw part that is transported to and processed in machines. The raw parts are replenished from a supplier and the lead time to receive the ordered parts is normally distributed regardless of the order quantity.
- There are four types of storages: raw parts storage, end-products storage, input storage of each machine, and output storage of each machine. All storages are assumed infinite in capacity.
- There are 20 transporters that move the parts among machines and storages, and their carrying capacity is one. Assume that they are homogeneous and they move rectilinearly through the edges in the grid. The time length of each edge is constant and deterministic. Please ignore any conflicts and safety issues.
- Assume that once the end-product is transported to the end-product storage, the end-product is immediately delivered to customer and the order is completed.

Smart Factory Design Project

Objective of the factory: Make smart decisions to minimize average customer waiting time and average number of parts in system

Decisions involved: layout, inventory replenishment (raw parts), transporter routing, and queue prioritizing

General procedure:

- Understand the template simulation model
- Determine the scope of project in terms of decisions
- Design alternative ways of realizing smart decisions
- Develop alternative smart factory models in computer simulation
- Experiment and analyze
- Recommend a factory model with implementation requirements and limitations