Consider an Auto Repair shop with three workers A, B, and C, where each worker has its own queue. When a job arrives to the shop,

* If worker A is free, then worker A starts the service.
* If A is not free and worker B is free, then worker B starts the service.
* If both workers are busy, then the job enters the queue (Queue A or Queue B) with the shortest queue length.
* If both queues have the same length, then the job enters queue A.
* After workers A or B finish servicing their jobs, worker C inspects the service quality for approval.
* Then the job would leave the auto shop.

Inter-arrival Time Distribution

|  |  |  |
| --- | --- | --- |
| Time between arrivals | Probability | Cumulative |
| 1 | 0.15 |  |
| 2 | 0.10 |  |
| 3 | 0.25 |  |
| 4 | 0.30 |  |
| 5 | 0.15 |  |
| 6 | 0.05 |  |

Table 1

Service Time Distribution

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Server A | | Cum |  | Server B | | Cum |  | Server C | | Cum |
| Service Time | Probability |  |  | Service Time | Probability |  |  | Service Time | Probability |  |
| 1.5 | 0.30 |  |  | 2 | 0.35 |  |  | 1 | 0.10 |  |
| 2.5 | 0.15 |  |  | 2.5 | 0.15 |  |  | 1.5 | 0,20 |  |
| 3 | 0.40 |  |  | 3.5 | 0.20 |  |  | 2 | 0.40 |  |
| 3.5 | 0.05 |  |  | 4 | 0.10 |  |  | 2.5 | 0.20 |  |
| 4 | 0.10 |  |  | 4.5 | 0.20 |  |  | 3 | 0.10 |  |

Table 2

The values generated for the inter-arrival time distribution

|  |  |
| --- | --- |
| Serial | Probability |
| 1 | 0.40 |
| 2 | 0.25 |
| 3 | 0.20 |
| 4 | 0.70 |
| 5 | 0.45 |
| 6 | 0.85 |
| 7 | 0.25 |
| 8 | 0.55 |

Table 3

The values generated for Service time distribution

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Server A | |  | Server B | | |  | Server C | |
| Serial | Probability |  | Serial | Probability |  | | Serial | Probability |
| 1 | 0.30 |  | 1 | 0.20 |  | | 1 | 0.75 |
| 2 | 0.25 |  | 2 | 0.35 |  | | 2 | 0.90 |
| 3 | 0.70 |  | 3 | 0.60 |  | | 3 | 0.25 |
| 4 | 0.15 |  | 4 | 0.35 |  | | 4 | 0.80 |
| 5 | 0.50 |  | 5 | 0.40 |  | | 5 | 0.25 |
| 6 | 0.30 |  | 6 | 0.85 |  | | 6 | 0.45 |
| 7 | 0.20 |  | 7 | 0.25 |  | | 7 | 0.20 |
| 8 | 0.10 |  | 8 | 0.15 |  | | 8 | 0.10 |

Table 4

Given the simulation system in described above, where the memory used has 10 records. Assume there are 5 linked lists, with the following initial setup:

Starting time = 0

* Empty List – has all 10 records, starting at record 1.
* Events List – Pointer to head is null.
* Queue A List - Pointer to head is null.
* Queue B List Pointer to head is null.
* Queue C List Pointer to head is null.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Memory**  **Location** | **ID** | **Event notice (event type)** | **Event time** | **Next Event** |
| **1** | **--** | **--** | **--** | **2** |
| **2** | **--** | **--** | **--** | **3** |
| **3** | **--** | **--** | **--** | **4** |
| **4** | **--** | **--** | **--** | **5** |
| **5** | **--** | **--** | **--** | **6** |
| **6** | **--** | **--** | **--** | **7** |
| **7** | **--** | **--** | **--** | **8** |
| **8** | **--** | **--** | **--** | **9** |
| **9** | **--** | **--** | **--** | **10** |
| **10** | **--** | **--** | **--** | **0** |

The simulation ends when job 4 enters the system