International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 8 Aug 2021, pp: 1563-1566 www.ijaem.net ISSN: 2395-5252

# APPLICATION OF SIMULATION USING OPERATING SYSTEM

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Submitted: 10-08-2021 Revised: 25-08-2021 Accepted: 28-08-2021

## Abstract:

Simulation, an analyst can introduction the constants and variables related to the problem-solving, set-up the possible courses of human activity and launch criteria which official document as measures of effective need.Simulation techniques allow experiment with a models of the reality –life system rather than the actual operating system.Sometimes experimenting with the actualization system it's self could prove to be too expensive and in several cases too disrupt live . Similarly, the operation of a large computer center under a number of different operating alternative might be too costly to be feasible.

**Keyword:Simulation,Operating System,Measures.**

**TYPES OF SIMULATIONS**

Simulation is mainly of two types:

(i)Analogue simulation (or Environmental simulation). The simple example cited are of simulating the reality in physical forms, which we may refer as analogue (or environmental simulation )

(ii) Computer Simulation (or system simulation).

Under these situations, the complex system is formulated into a mathematical model for which a computer programme is developed a such type of simulation is called a computer system or system simulation.

- **Simulation of Deterministic Models**

In the case of these models, the input and output changeable are not legal document to be nonrandom variables and models are delineated by exact useful relation.

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❖ **Simulation of Probabilistic Models**

In such cases, method acting of random distribution is used. .

❖ **Simulation of Static Models**

These models do not take uncertain instance into circumstance.

❖ **Simulation of Dynamic Models**

Hypothese models deal with time-varying fundamental interaction.

| ***Inter Arrivo Time (Minu*** | ***Probab*** | ***RN Allott*** | ***Servic Time (Minu*** | ***Probab*** | ***RN Allott*** |
|---|---|---|---|---|---|
| 1 – 2 | 0.05 | 00 – 04 | 1 – 2 | 0.10 | 00 – 09 |
| 2 – 3 | 0.20 | 05 – 24 | 2 – 3 | 0.20 | 10 – 29 |
| 3 – 4 | 0.35 | 25 – 59 | 3 – 4 | 0.40 | 30 – 69 |
| 4 – 5 | 0.10 | 60 – 84 | 4 – 5 | 0.20 | 70 – 89 |
| 5 – 6 | 0.10 | 85 – 94 | 5 – 6 | 0.10 | 90 – 99 |
| 6 – 7 | 0.05 | 95 – 99 | 6 – 7 | – | – |

**A simulation work sheet has been industrial in the favorable property**

The first arrival comes in 4 minutes after the starting time. This means that the clerk waited for 4 minutes initially. The simulated service for the first arrival is 3 minutes which results in the service being completed by 11.07 *am*. The next arrival comes at 11.08 *am*. Which indicates that no one has waited in the queue.

The second arrival comes at 11.05 *am*. But the services will begin only at 11.07 *am*. Since the service of first arrival ends at 11.07 *am*. This means that the second arrival has waited for 2 minutes before the start of its service one customer waiting in the queue is shown in the last column of the simulation table. The procedure has been followed throughout the preparation of the simulation work sheet.

**Simulation Work Sheet**

| ***Ran Nur*** | ***Int Arr Tim*** | ***Arr Tim (an*** | ***Ser Beg (an*** | ***Ran Nur*** | ***Servic*** | | ***Waiting*** | | ***Lin Len*** |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | ***Tir (m*** | ***En (ar*** | ***Cle*** | ***Cust*** | |
| 64 | 4 | 11.0 | 11.0 | 30 | 3 | 11. | 4 | – | – |
| 04 | 1 | 11.0 | 11.0 | 75 | 4 | 11. | – | 2 | 1 |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 02 | 1 | 11.0 | 11.1 | 38 | 3 | 11. | – | 5 | 1 |
| 70 | 4 | 11.1 | 11.1 | 24 | 2 | 11. | – | 4 | 1 |
| 03 | 1 | 11.1 | 11.1 | 57 | 3 | 11. | – | 5 | 1 |
| 60 | 4 | 11.1 | 11.1 | 09 | 1 | 11. | – | 4 | 1 |
| 16 | 2 | 11.1 | 11.2 | 12 | 2 | 11. | – | 3 | 1 |
| 08 | 2 | 11.1 | 11.2 | 18 | 2 | 11. | – | 3 | 1 |
| 36 | 3 | 11.2 | 11.2 | 65 | 3 | 11. | – | 2 | 1 |
| 38 | 3 | 11.2 | 11.2 | 25 | 2 | 11. | – | 2 | 1 |
| 07 | 2 | 11.2 | 11.2 | 11 | 2 | 11. | – | 2 | 1 |
| 08 | 2 | 11.2 | 11.3 | 79 | 4 | 11. | – | 2 | 1 |
| 59 | 3 | 11.3 | 11.3 | 61 | 3 | 11. | – | 3 | 1 |
| 53 | 3 | 11.3 | 11.3 | 77 | 4 | 11. | – | 3 | 1 |
| 03 | 1 | 11.3 | 11.4 | 10 | 2 | 11. | – | 6 | 1 |
| 62 | 4 | 11.4 | 11.4 | 16 | 2 | 11. | – | 4 | 1 |
| 36 | 3 | 11.4 | 11.4 | 55 | 3 | 11. | – | 3 | 1 |
| 27 | 3 | 11.4 | 11.4 | 52 | 3 | 11. | – | 3 | 1 |
| 97 | 6 | 11.5 | 11.5 | 59 | 3 | 11. | – | – | – |
| 86 | 5 | 11.5 | 11.5 | 63 | 3 | 12. | 2 | – | – |
| **20** | **57** | | | | **54** | | **6** | **56** | **17** |

The following information can be obtained from the simulation work sheet based on the period of one hour only;

$(a)$ *Average queue length*

$$= \frac{Number\ of\ Customers\ in\ the\ Waiting\ line}{Number}$$

$$= \frac{17}{20} = 0.85$$

$(b)$ *Average Waiting time of Customer before service*

$$= \frac{Customer\ Waiting\ time}{Number\ of\ Arrivals}$$

$$= \frac{56}{20} = 2.80\ minutes$$

$(c)$ *Average Service time*

$$= \frac{Total\ Service\ time}{Number\ of\ Arrivals}$$

$$= \frac{54}{20} = 2.70\ minutes$$

$(d)$ *Time a Customer Spends in the System*

$$= Average\ Service\ time +$$

$$Average\ Waiting\ time\ before\ service$$

$$= 2.70 + 2.80 = 5.50\ minutes$$

Simulation work sheet developed in the problem also states that if one or more clerk is added, there is no need for a customer to wait in the queue. But before effecting any decision, the cost of having an additional clerk has to be compared with the cost due to customer waiting time.

| ***One Hour Period*** | ***Cost with One Cleri*** | ***Cost with Two Clerk*** |
|---|---|---|
| *Customer waiting ti* (56 *minutes* × *Rs.*5 *per Hour*) | *Rs.*4.50 | *Nil* |

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| | | |
|---|---|---|
| $Clerk's Cost$ | $Rs.6.00$ | $Rs.12.00$ |
| $Total\ cost\ of$ $One\ Hour\ Period$ | $Rs.10.50$ | $Rs.12.00$ |

If the above analysis based on simulation for a period of one hour only is representative of the actual situation, then it may be concluded that the cost with one clerk is lower than what it is with two clerks. Hence, it would not be an economical proposition to engage an additional clerk.

**CONCLUSION**

Computer simulation is indeed a versatile tool. It provides one statistical estimates rather than exact results and it only compares the alternatives rather than generating an optimal one. It is a slow and dear thanks to study a drag . Despite limitations, it is an priceless tool in Operations Research.

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