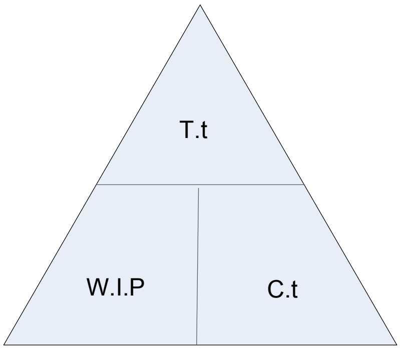
Little's Law

Mathematical relationship between:

1. Throughput time	T.t	The time for a unit to move through a process
2. Work-in-process	W.I.P	The number of units within a process waiting to be processed further
3. Cycle time	C.t	The average time between units of output merging from a process



Example 1:

Suppose it is decided when a new process is being introduced, that the average number of customers in the process should be limited to around ten and the maximum time a customer is in the process should be on average 4 minutes. The time to assemble and sell a sandwich (from customer request to the customer leaving the process) in the new process has reduced to 1.2 minutes. How many staff should be serving?

Tt = 4 minutes

WIP = 10 customers

$$Ct = \frac{TT}{W.I.P}$$

$$= \frac{4 \text{ minutes}}{10 \text{ customers}}$$

$$= 0.4 \text{ minutes}$$

A customer should emerge from the process every 4 minutes, on average.

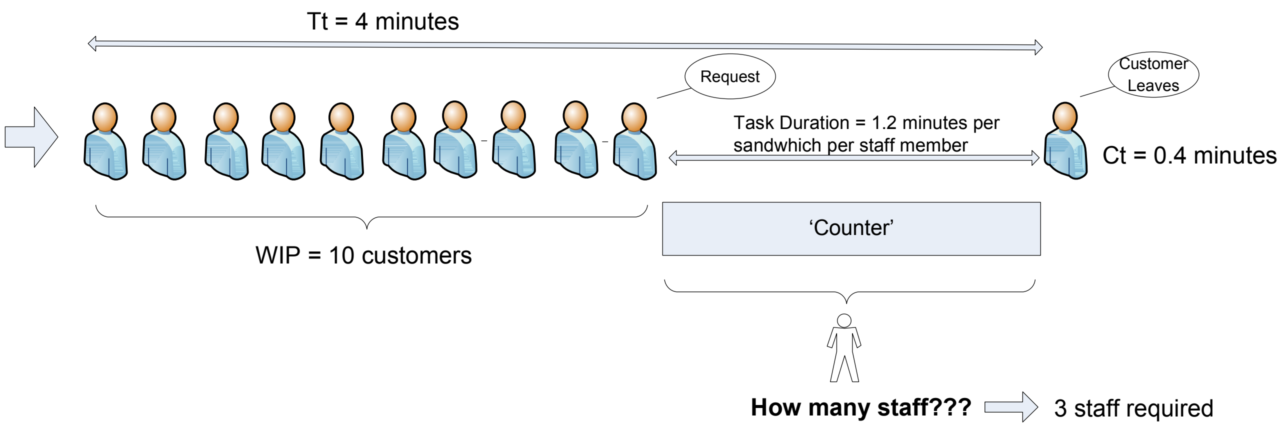
Given that an individual can be served in 1.2 minutes

How many staff???

The number of servers required = $\frac{1.2 \text{ (Task duration)}}{0.4 \text{ (C.t)}}$

= 3

In other words, three servers would serve three customers in 1.2 minutes or one customer in 0.4 minutes



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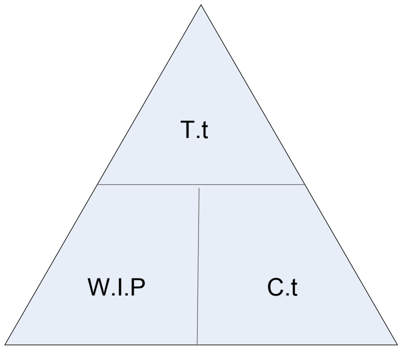


Example 2:

Every year it was the same. All workstations in the building had to be renovated (tested, new software installed, etc.) and there was only one week in which to do it. The one week fell in the middle of the August vacation period when the renovation process would cause minimum disruption to normal working. Last year the company's 500 work-stations had all been renovated within one working week (40 hours). Each renovation last year took on average two hours and 25 technicians had completed the process within the week. This year there would be 530 workstations to renovate but the company's IT support unit has devised a faster testing and renovation routine that would only take on average 1.5 hours instead of 2 hours. How many technicians will be needed this year to complete the renovation processes within one week?

LAST YEAR

Tt = 40 Hours

WIP = 500 workstations

$$Ct = \frac{Tt}{W.I.P}$$

$$= \frac{40 \text{ Hours}}{500 \text{ workstations}}$$

$$= 0.08 \text{ Hours}$$

A workstation should be completed every 0.08 hours on average.

Given that one work stations lead time is 2 hours per technician

$$\text{The number of servers required} = \frac{2 \text{ (Task duration)}}{0.08 \text{ (C.t)}}$$

$$= 25$$

In other words, 25 technicians would upgrade 25 workstations in 2 hours or 1 workstation in 0.08 hours (4.8 minutes)

THIS YEAR

Tt = 40 Hours

WIP = 530 workstations

$$Ct = \frac{Tt}{W.I.P}$$

$$= \frac{40 \text{ Hours}}{530 \text{ workstations}}$$

$$= 0.07547 \text{ Hours}$$

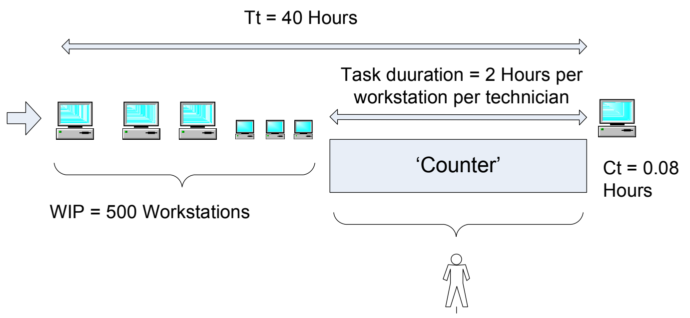
A W/S should be completed every 0.07547 hours on average.

Given that one work stations lead time is 1.5 hours per technician

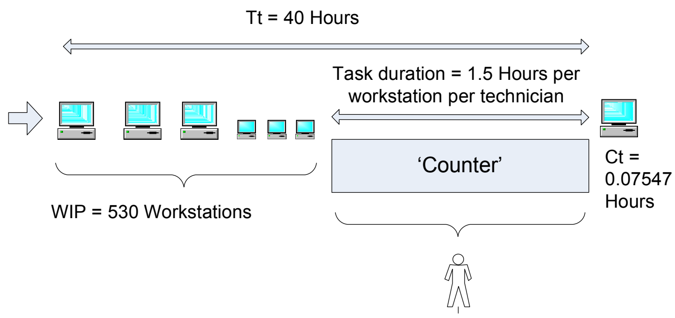
$$\text{The number of servers required} = \frac{1.5 \text{ (Task duration)}}{0.07547 \text{ (C.t)}}$$

$$= 19.8754 \text{ workers}$$

In other words, 20 technicians would upgrade 20 workstations in 1.5 hours or 1 workstation in 0.007547 hours (4.53 minutes)



25 Technicians



How many technicians??? → 20

The question has been answered and illustrated in a similar fashion to Example 1 to clarify how examples may differ, but the principles and methodologies remain similar