Amdhal's Law

Speedup:
If one processor take t1 time on One processor then how much take time on **N** processor.

Lets n =2 ; number of processor
t1 = 1 sec (Tn = 1/n : n is number of processor)
t2 = ½ = 0.5
speedup = 1/0.5 =2

Here **t1** is for one processor and **t2** is for 2 processor.

Then **Speedup** that time take on one processor over time take on **N** processor.
Speedup = t1/t2 = 1/0.5 = 2

in this way we will get the linear relation in the term of Speedup. Number of processor is directly proporational to speedup but its not right in the real time Case.
In the real we have **Amdhal's Law**
Amdale's law say: That
There are other factor which effect the speedup that is the part of **parallel** and and part of **series** and **number of the processor**. They Data structure is used whether in series or parallel .
For example if the data structure used linked list then there never using parallel processing if the data structure used graph or tree then must be used parallel processing then we will do concurrent processing.
Notation
series(s) , parallel(p) , (number of processor n)
if we have one single processor
$T1 = S + P$ if $n = 1$
if we have **N** number of processor
$Tn = S + P / n$ for n processor $\rightarrow$ 1.1
if we have 1 processor
$1 = S + p \rightarrow 1.2$
$S = 1 - P \rightarrow 1.3$
putting 1.3 into 1.1
$Tn = (1 - P) + P/n$
This is called **Amdale's law**
in this case what is speedup?
Speedup = $1 / ((1 - P) + P/n)$

Numericals :
The number of processor is = n = *10*
The part of the parallel is = P = *60%*
the part of the series is = S = *40%*

Solution:
Speedup = 1 / ((1 – P) + P /n)
Speedup = 1/(1-0.6) + 0.6/10
speedup = 2.17

Another example :
What would happen if we keep same number of processor and increase the part of parallel
The number of processor is = n = *10*
The part of the parallel is = P = 80*%*
the part of the series is = S = 20*%*

Solution:
Speedup = 1 / ((1 – P) + P /n)
Speedup = 1/(1-0.8) + 0.8/10
speedup = 3.57

Another example :
What would happen if we keep same number of processor and more increase the part of parallel
The number of processor is = n = *10*
The part of the parallel is = P = 90*%*
the part of the series is = S = 10*%*

Solution:
Speedup = 1 / ((1 – P) + P /n)
Speedup = 1/(1-0.9) + 0.9/10
speedup = 5.26