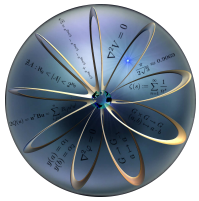

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proof of Amdahl's Law

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Suppose an algorithm needs n operations to compute the result. With 1 processor, the algorithm will take n time units. With N processors, the $(1-f)n$ parallelizable operations will take $\frac{(1-f)n}{N}$ time units and the remaining fn non parallelizable operations will take fn time units for a total running time of $fn + \frac{(1-f)n}{N}$ time units. So the speedup S is $\frac{n}{fn+\frac{(1-f)n}{N}} = \frac{1}{f+\frac{1-f}{N}}$.