

### REVIEW - PARALLEL ALGORITHMS

- Give the correct definition of the execution time!
- Give a simple model of the communication time!
- Give the definitions of the speedup (S) and efficiency (E), let  $T_1$  and  $T_p$  be the execution time on one and  $p$  processors, respectively!
- Select the correct list of Single Computer Model (Von Neuman) components!

### REVIEW - PARALLEL ALGORITHMS (cont.)

- Suppose that for finishing a complex repetitive task, e.g., car production, time  $T$  is needed for one person. Let this task be divided into  $k$  equally time-demanding subtasks, and for each of them a specialised worker be assigned. When the first and the second car will come from the production line?
- Suppose that the current computer performance is  $10^{13}$ . According to the Moore's law that states that the computer performance doubles each one and half year, when the performance would be 10 times greater?

### REVIEW - PARALLEL ALGORITHMS (cont.)

- Let a program  $P_r$  be composed of sequential part  $S_q$  and a parallel part  $P_p$  that can be ideally parallelized:  $P_r = S_q + P_p$ . On a single processor  $S_q$  takes 5% of the total CPU time,  $P_p$  can be implemented in 95% of the total execution time. What is the maximal speedup that can be reached with an arbitrary large number of processors? What is the name of this law?
- Why the load in a parallel program has to be distributed evenly among processors? Because the slowest processor dictates the execution time.
- Methodology for Designing Parallel Algorithms is composed of four stages, list they!

### REVIEW - PARALLEL ALGORITHMS (cont.)

- Give the expression for the step execution time on  $P$  processors for an implementation of finite differences on 3-D domain with  $N_x N_y N_z$  points, 6 points stencil, calculation time  $T_c$  for a single floating point operation and communication time model  $T_s + T_w$ . Suppose that the domain is decomposed in 2-D.
- How many interactions must be computed in pairwise interactions problem with  $N$  particles, supposing that interactions are symmetric?