Activity Name:	**Sorting in Parallel**		
Concepts:	Parallelism, sorting, supercomputers		
Audience:	Age Group: Any Size: Groups of 1, 2, 4+	Time	Duration of activity: 3-5 mins Preparation time: 5 mins
Staff Effort:	Number of instructors per number of participants: 2 per sorting group. Experience level: Basic parallel/supercomputing concepts		
Short Description:	In this activity, participants are timed to sort objects into different categories. The number of objects sorted by one person in the given time is recorded and then the experiment is repeated with two people and again with more. At the end of the activity you should be able to see that by adding more people you have been able to sort more objects within the given time. The results are recorded on a chart, demonstrating a “parallel speed-up”.		
Learning objectives:	Understanding of how supercomputers work in parallel to solve problems: ● Multiple people sorting will do more than one person in the same given time. ● Modern parallel computers operate on the same principle. ● Bottlenecks and challenges exist that can slow things down.		
Prerequisites:	Assumes that participants have discussed the basics of a computer and what it is used for. Assumes an understanding that a supercomputer is made up of many many computers connected together.		
Materials:	● A set of objects to sort e.g. different colours, shapes or sizes (be careful to accommodate for colourblind). ● A box or bag to contain the sorting objects. ● Smaller boxes to sort the objects into. ● A timer. ● Labels for each sorting box to indicate which object goes where. ● Sheet of A3 with a pen/sticky dots to record the results.		
Guide for instructor:	**Set-up:** Place the sorting objects into the larger box and then place the smaller empty boxes nearby. This could be very close, to allow participants to place the objects, or further away to turn the activity into throwing target practice (can be more fun!). **Introduce the activity:** Start by explaining that we are demonstrating the benefit of doing things in parallel and discuss how this is relevant to supercomputers. It could be useful to establish some rules 1. Sort the objects into the matching box 2. You must only use one hand and process one object at a time.		

	3. There is a (30s) time limit - helps to give more people a chance to participate. 4. Don't worry if you make a mistake - keep going! **Activity:** ● Get one person to sort as many objects as they can in a given time frame (30s). ● Monitor the time. ● Count the objects they have sorted. ● Note down the score and/or add a sticky dot to the chart. ● Reset the activity, remembering to reschuffle the objects. ● Get more than one person to carry out the same task. ● Now discuss your results with the group. **Discussion points:** ● It is likely the number of objects sorted increases with the number of people sorting. This is similar to a simple case of running a code on a supercomputer. ● However, this likely does not increase perfectly linearly. Ask them why this is and introduce the concept of bottlenecks (i.e. getting hands into the sorting box) which can be analogous to memory contention. **Further considerations:** Depending on the time available and the group size you could repeat either with group sizes of 2\4\6 or, at events with a high throughput of people, you could record the timings of different sized groups to plot the results over an entire day.
Related activities:	Activity discussing sorting algorithms? Communication between processes i.e. telephone MPI model?
Contact:	Eleanor Broadway (e.broadway@epcc.ed.ac.uk)
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