

Card Sorting

Course Level:

CS0

PDC Concepts Covered:

PDC Concept	Bloom Level
Concurrency	K/C
Synchronization	K
Parallel Overhead	K

Prerequisites:

None

Tools Required:

1. 2-4 Decks of regular playing cards

Introduction:

Two teams compete to sort decks of cards. One team is made up of a single student, while the other is comprised of 2-4 students.

Activity Description:

Have random students shuffle 2 decks of cards together, then select new students to be part of the teams. The first team, consisting of a single student, represents sequential programming with a single core. The second team, made up of multiple students, represents parallel programming across multiple cores. Both teams are told to sort the cards but no further instructions are provided.

Note: Make sure a “sorted” deck is unambiguous. Order by suit (club, diamond, heart, spade) and then by rank (ace, 2, ..., 10, J, Q, K).

Important Points:

As the teams work through the completion of the task, they demonstrate the concept of speedup, as the team with more members should be able to work at a faster speed than the individual. In addition, the students show that while the team may sort the cards quicker, they are still constrained by sequential dependency and the speed of the lead of the team in assigning tasks to the other members.

Extensions:

You can make the task more difficult for the larger group by adding more decks to the cards they must sort. In this way you can demonstrate that, in certain cases, the parallel solution can accomplish more work in the same amount of time

This activity can be expanded to talk about the limits of parallelism. By adding more members to the “parallel group” you can show increased speedup, but as the number of members grows you can also show how many of the members are not being utilized.