INTRODUCING HPC TO YOUNG STUDENTS

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GOALS

- Create a contextual introduction to the field of HPC for young students
- Develop an easy to use activity using the Scratch programming environment from MIT (http://scratch.mit.edu)
- Explain real-world situations where HPC can be used to solve large scale problems that have a tangible outcome
- Design a coordinated instructional approach that introduces the field of HPC using a variety of examples and experiences

ACTIVITY

Students enter a number of threads and the resolution for the simulation

Students run the simulation and observe the results

Students can move the pressure centers

Once the simulation is complete, it will report the elapsed time back to the student

Each advancing row of wind vectors shows the progress of a single thread

RESULTS

- Students record the number of threads, resolution and time elapsed
- The data is collected and plotted
- The resulting graph is analyzed and discussed to learn more about HPC
- We observe how the hardware affects the results of the tests

OUTCOMES

- We successfully developed an introduction to HPC using Scratch that can be easily adapted to simulate a wide variety of real-world problems
- This activity will be incorporated into our “Introduction to Computing Science” course to help introduce students to HPC concepts
- Based on student surveys, after our presentation:
  - 22 of 41 students showed interest in a job using HPC to solve problems
  - 27 of 37 students felt they can learn how to write computer programs

INSTRUCTION

- We had a limited amount of time (40 minutes) to work with students so we had to prioritize our goals to maximize student learning
- We began with a brief overview of ways that HPC is used in society to solve complex problems
- Students then toured the “Beocat” HPC cluster housed at K-State to understand the scale and size of real HPC systems
- Finally, students performed a hands-on experiment using a multi-threaded wind forecast simulator to further understand HPC concepts

FUTURE WORK

- Increase the amount of time we spend with students in order to give them a fuller introduction to HPC concepts
- Expand this teaching method to include more real-world problems that can be solved by HPC to reach more diverse audiences
- Modify the simulation to allow students more opportunity to learn programming concepts by implementing the calculations themselves
- Focus on collecting more data from students to analyze the effectiveness of this approach