



What is High Performance Computing?
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● **Summary-**

This lesson will cover a basic description of high performance computing for kindergarten students. We will explain what the technology is, why we use it, and then have an interactive example using suggestions from the audience

● **Engineering Connection-**

High performance computing is becoming increasingly prevalent in all facets of engineering, being used for simulation, modeling, data analysis, and more

● **Audience-**

K-2 grade

● **Lesson Objectives-**

Introduce students to high performance computing, have kids understand why we use HPCs and how they can be used to solve problems

● **Educational Standards-**

K-2-ETS1-1 Engineering Design - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.

● **Material List-**

One computer with internet access, projector or screen to connect to

● **Introduction-**

Begin by asking kids if they know what a computer is and what it does; if they have one at home A computer can do those things, but it can also be used to do math and solve problems. In order to solve harder problems, we need more powerful computers to do more math. That's why we use supercomputers. *Ask audience if they can guess what a supercomputer is/does* Supercomputers are a bunch of powerful computers working together. When used together, they become much more powerful and can do all kinds of tasks that one computer alone can't do.

- **Procedure-**

- **Background knowledge**
 - Follow introduction
- **Before the activity**
 - Follow introduction
- **During the activity**
 - Explain to students that the example we're going to do is going to create a bunch of copies of something
 - Ask students what they'd like to see (favorite animal, food, etc.)
 - Demonstrate comparing a normal computer and the supercomputer
 - Open up a VNC session on Lonestar6 so we can see what's going on for comparison
 - Load a custom program on local computer and Lonestar6, which lets you upload an image and then has options to duplicate it on the screen while it bounces around the window
 - Start by making one copy of the image on both computers
 - Show that it runs well on both
 - Make many duplicates
 - Show that the local computer is starting to struggle while Lonestar is still doing well
 - Finish by making millions of duplicates
 - The local computer may freeze completely while Lonestar is still able to handle the load

- **Assessment-**

- Can someone explain what a supercomputer is
 - How it's different to a normal computer?
- Which computer did better on the activity?
 - Ask kids why they think Lonestar is so much better.
- What's another situation where we can use a supercomputer

- **Wrap-up-**

- Come up with other ideas for activities using the supercomputer with audience input
 - If it's simple maybe implement it on the spot
- Go over the core ideas one final time
- Have a small discussion
 - Have the kids ask any questions they may still have and answer them to the best of your ability