

Why Supercomputer?

- Q.** If supercomputers use the same processors as laptops & cell phones, could we just use cloud-computing resources to do the same?
- A.** No. Emergent properties arising from many interacting entities (*e.g.*, life) could only be studied as a whole [**“More is different,”** P. W. Anderson, *Science* **177**, 393 ('72) <https://aiichironakano.github.io/cs596/Anderson-MoreIsDifferent-Science72.pdf>]. This would require innovative hardware & software solutions to tightly couple massive computations:
- Hardware:** Ultrafast network interconnect among billions of processing elements, *cf.* human brain has 10^3 synapses per neuron.
- Software:** Communication-minimizing divide-conquer-recombine algorithms that accurately describe many-body interaction.

