Riley Wilburn
Zoya Bharmal
Henry Gao

Decentralized Servers

During the winter, space heating consumes over 189 billion kilowatt hours in the US alone. This energy is not being used to do anything other than heat cold air. Servers produce a lot of heat too, and around 15 billion kilowatt hours of electricity is used to cool these servers annually. Why not combine the two? If servers, primarily ones high density servers, with many CPUs or GPUs, which produce a lot of heat were placed inside homes, it would cut down on cooling bills for server owners, as well as heating bills for homeowners.

Logistically, the server owner would end up paying more than the homeowner. The server owner and homeowner would negotiate a price arrangement so that they split the electrical bill for the house. This would encourage both server owners and homeowners to participate in this program.

In the best case scenario, the heating and cooling would exactly match, effectively halving the total energy consumption of the server cooling and home heating. However, this solution would not be optimal for data servers. Data servers often contain sensitive or personal information that would be immoral to store in someone else's house. Data servers also contain numerous hard drives which are rather fragile and require fairly frequent replacement. Luckily, data servers usually require less cooling per server, being generally lower powered than other types of servers.

Most homes do not have particularly fast internet connections, so it would be impractical to have web hosting or cloud servers in residences. Instead, it would be more practical to have distributed compute servers in homes. These servers would be high power density servers intended for hash cracking, rendering, or protein folding. They typically do not require real time connections to other servers, instead only communicating to receive jobs.

Although it is impractical to host web servers from a residence, larger office buildings usually have much more substantial networks. Server owners could place web servers to supplement an office building's heating system. This would further reduce total energy consumption for server cooling.

As a result of this use of server to heat spaces, up to 15 billion kilowatt hours per year could be saved. This would result in about 10 million fewer metric tons of CO_2 released yearly. That is the equivalent of 2 million passenger vehicles or the energy consumed by 950 thousand homes. While a 100% adoption rate for this program is highly unlikely, even a 1% adoption rate would make a difference, and help save both money and the planet.