What Designs for Coming Supercomputers?

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Abstract - The next grail sought by HPC community is the exascale, 100 times the current scale. This target will not be reached easily as many challenges are uprising. The first challenge, the Energy consumption, has become a strict constraint now with a limit set to 20MW (twice as the current top supercomputers). Multiplying the computing elements will imply to drastically reduce the power consumption of each of them. The second challenge will be to keep it cool as: first the overall power envelope, 20MW, include the energy for cooling and second, because 20MW will be turned into heat by joule effect. And the operating temperature of electronic must be bounded otherwise, the leakage (and thus the power consumption) increases and the reliability decreases. This brings us to a third challenge regarding the reliability of the machine, the number of components will be tremendous, thus, the probability of having failing ones will increase. It has to be managed in such a way that applications will not be impacted by the failures. Finally, The last challenge is related to the software stack of these supercomputers, how will we manage billions of threads, how will we debug it, … New paradigms are currently being studied, for instance Bag of tasks, that try to tackle these aspects. These are the challenges we have to solve!! **In this presentation, brightened up with insight into Bull roadmap, we present a possible future**.