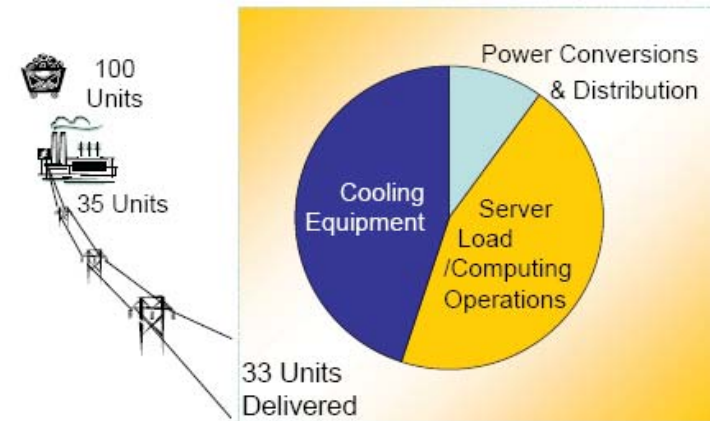


The Rise of the Machine

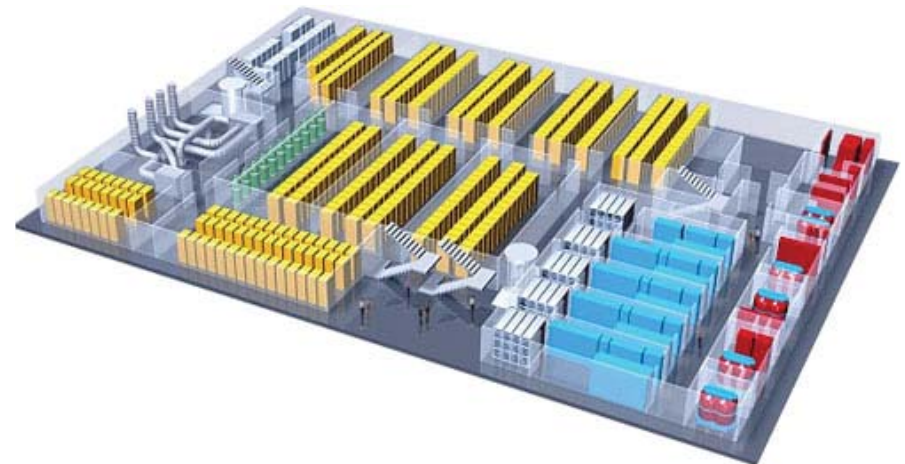
As supercomputing moves into the petaflop era (10¹⁵ flops, or Floating point Operations Per Second), improved energy efficiency and renewable energy sources provide the key to increasing computing power without exacting and undue cost on the environment or curtailing computing power. Where the early Jacquard looms were powered by water, the newest generations of data centers will have to be cooled by water. For each watt of energy given to the computer processors they give off close to a watt of heat energy. This energy then has to be displaced to keep the machines within their optimal operating temperature (55-90 F.)

This thesis will apply the following industry best practices:

- Improved air management
- "Free cooling" from either air-side or water-side economizers
- Alternative humidity control
- On-site generation combined with special chillers for cooling using the waste heat
- Direct liquid cooling of racks or computers



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