HPC Market Trends and Forecasts

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The 451 Group

- My background
- Why I'm here
- Why The 451 Group is interested

the 451 group
Analyzing the Business of Enterprise IT Innovation

INNOVATIONS IN HIGH-PERFORMANCE COMPUTING

How are companies, technology, products and users adapting to HPC evolution?

HPC is being hit by intersecting paradigm shifts: commodity clusters, multicores, GPUs, cloud computing, green IT and more. The price point of HPC systems is tumbling, bringing HPC techniques to the masses. But can the masses cope with writing parallel apps for massively multicore heterogeneous platforms in the cloud?

ICE INFRASTRUCTURE COMPUTING FOR THE ENTERPRISE

4 FINDINGS

- Most of the 'traditional' supercomputer vendors have fallen by the wayside or become small niche players. **PAGE 78**
- The price point and performance level of commodity clusters has changed the HPC landscape. **PAGE 4**
- Massively scalable HPC systems have several opportunities for adopting a green approach. **PAGE 6**
- The market shift toward commodity clusters has a profound effect on how supporting technologies such as storage must be implemented. **PAGE 44**

5 IMPLICATIONS

- The vast majority of future HPC systems will be based on x86 clusters. **PAGE 19**
- Where the price/performance benefit makes the programming pain worth it, accelerators will have an impact. **PAGE 13**
- The increased complexity of heterogeneous multicores must be matched with advances in programming paradigms, languages and tools. **PAGE 55**
- If applications lag too far behind software tool advances, there is a danger that new HPC architectures will leave legacy apps behind. **PAGE 40**
- There is still a requirement for global shared memory and symmetrical multiprocessing. Hybrid shared memory and clustered systems will emerge. **PAGE 40**

1 BOTTOM LINE

- If users are going to extract the maximum performance from emerging HPC platforms, applications must be re-architected. This process will rely on the next generation of software tools.

MARCH 2010

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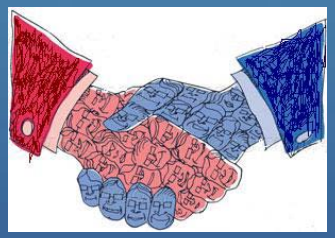
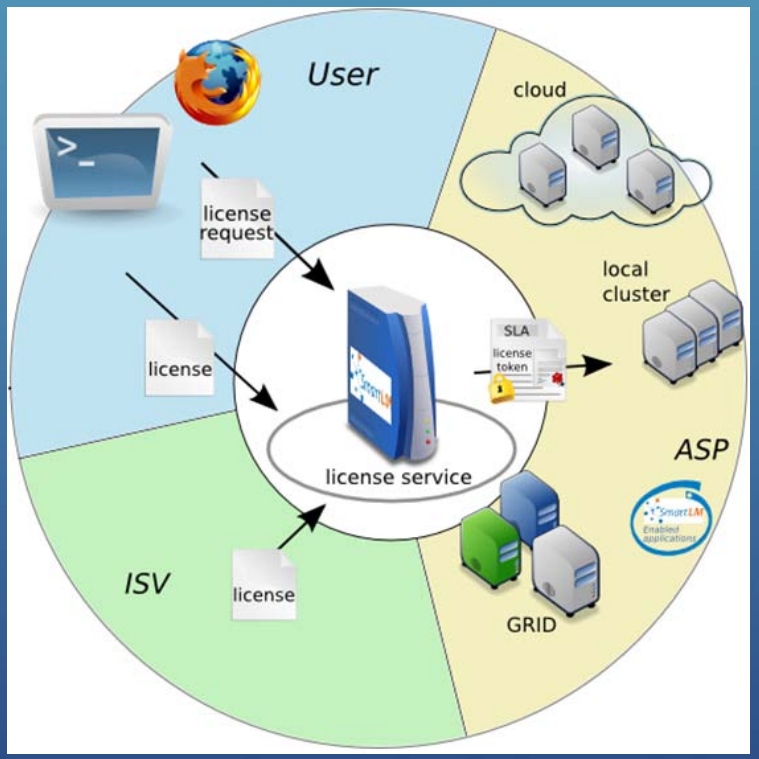
Software licensing in distributed environments

Traditional software licensing models are under pressure as they do not satisfy the changing business needs of today's enterprises.





- Licenses
  - are web services
  - are managed as agreements
  - support dynamic negotiation
- The access to license protected software is secure
- 100% trustworthy accounting & billing
- Software licensing based on business objectives

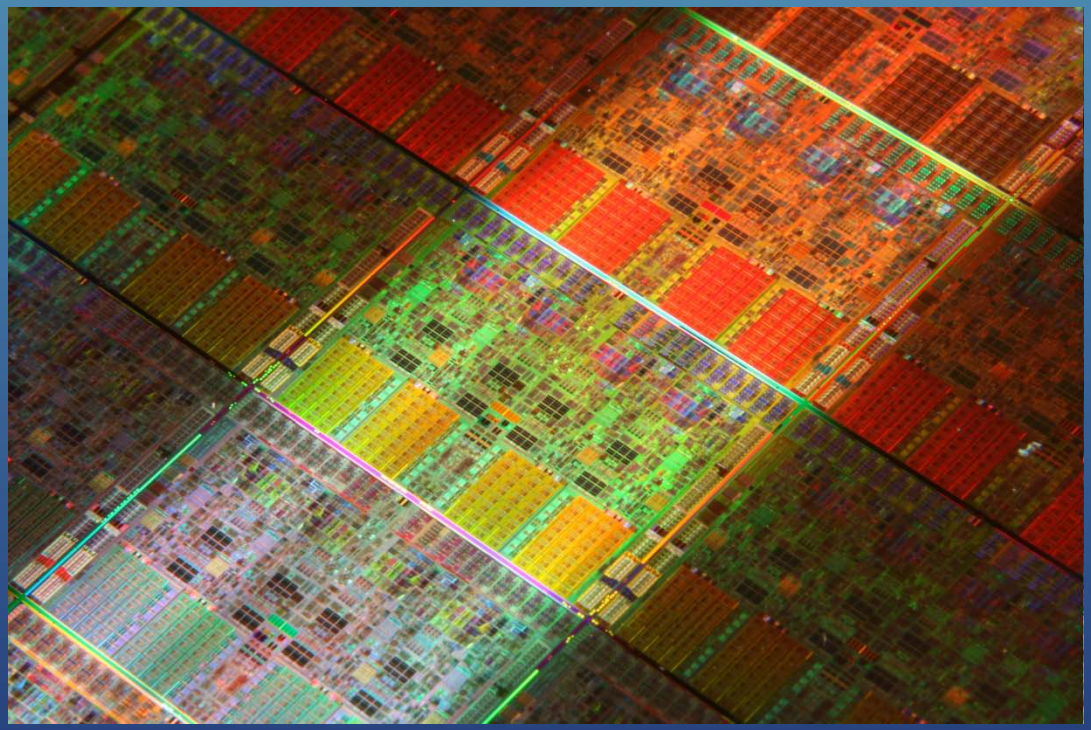
SmartLM is about a win-win set-up, which matches user needs with vendor strategies…

HPC Market Trends and Forecasts

- Multicore
- GPU
- Scalability
- Cloud
- Software

Multicore Trends

- 2 or 4 core
- 8 or 12 core
- Hyper threading



GPU Trends

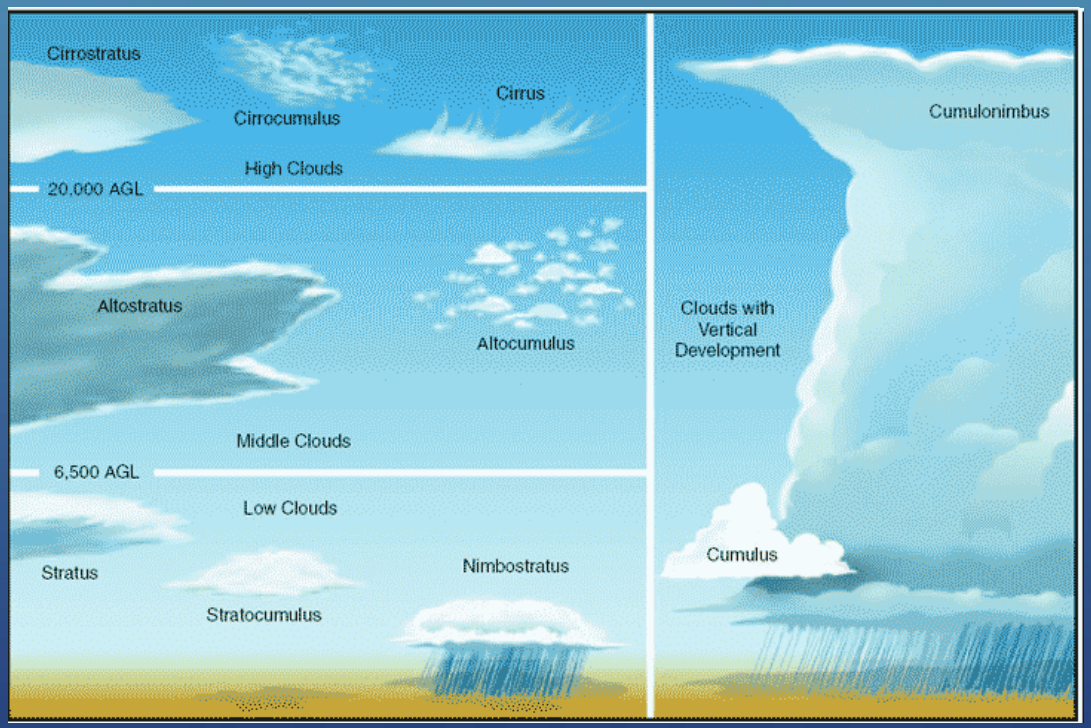
- NVIDIA
- AMD/ATI
- FPGA

Scalability Trends

- Core
- Sockets
- Clusters
- Systems
- Grids

Cloud Trends

- Amazon
- Google
- Microsoft
- Telco
- ISP
- etc…

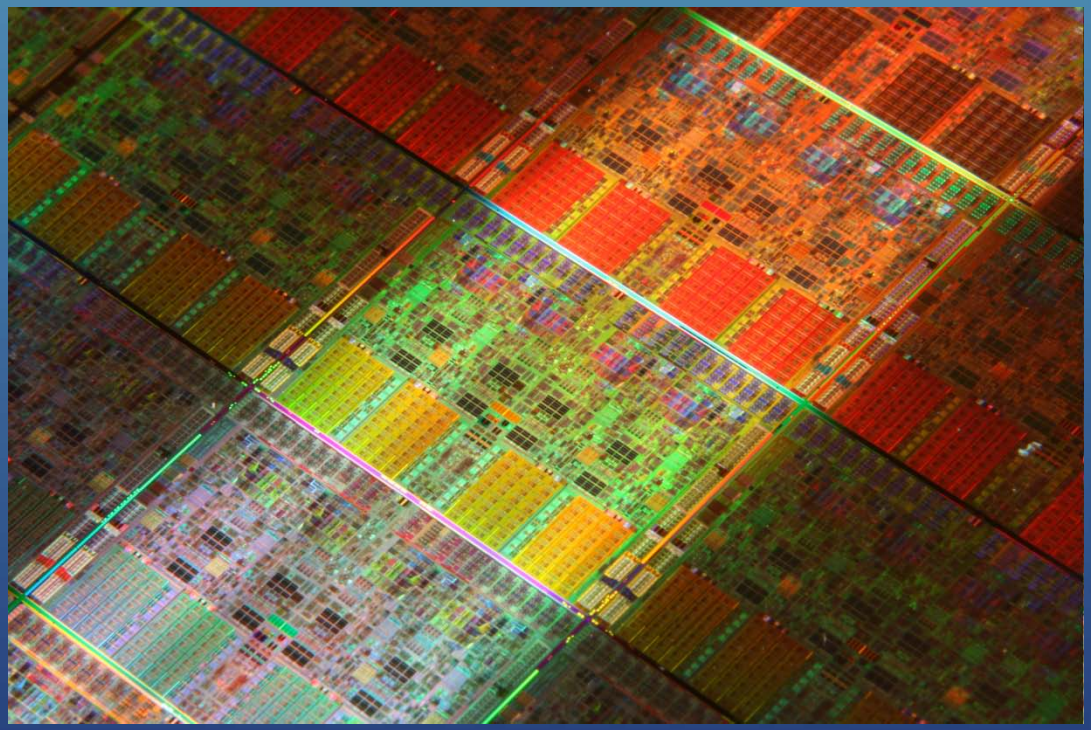


Software Trends

- Existing
  - OpenMP
  - MPI
- Emerging
  - CUDA
  - Ct
  - OpenCL
  - PGAS

Multicore Forecasts

- Future Processors
  - IBM Cyclops
  - Intel Polaris, “Cloud on a chip”
  - 50+ cores
  - Memory bandwidth?
    - Shared memory?
    - Cache architecture?
    - Interconnect on a chip?



GPU Forecasts

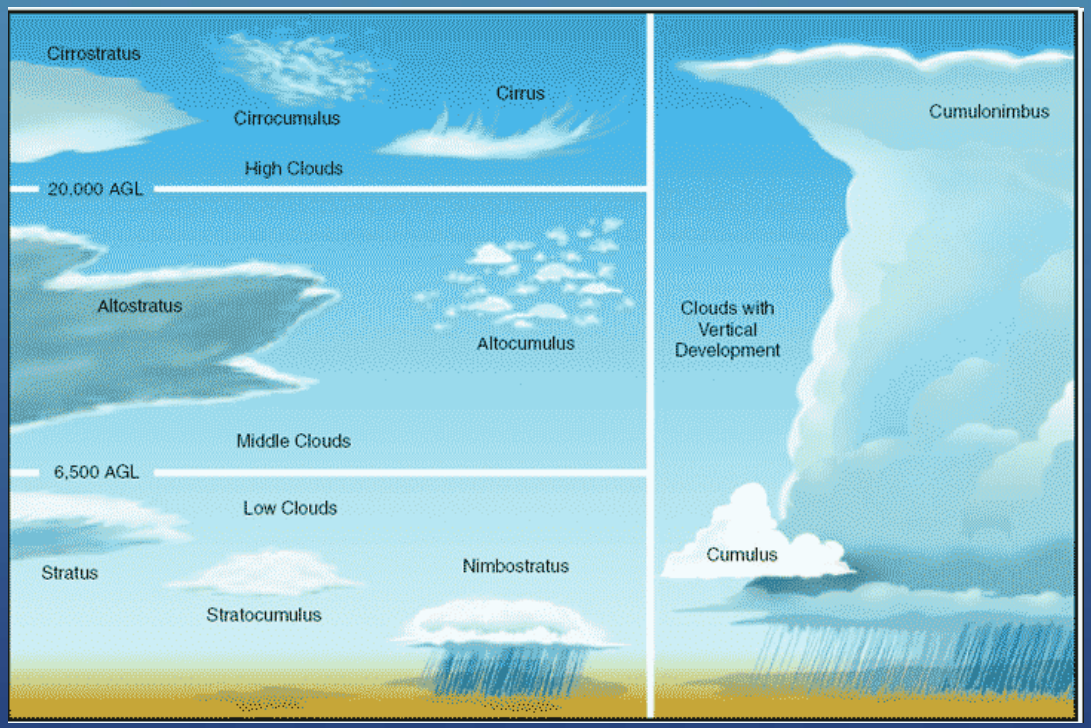
- Heterogeneous processors
- GPU and CPU will share the same die

Scalability Forecasts

- Commodity SMP systems > 100 cores
- ScaleMP, Numaflex → 100+ systems
- High end Exascale systems

Cloud Forecasts

- HPC is all about Optimization
- Cloud is all about Abstraction and Virtualization



Software Forecasts

- Many hardware options
- Write once, deploy anywhere?
- HPC for the masses
- Evolution or revolution?
- Target emerging hardware platforms
  - And the Cloud

Thank You

"May you live in interesting times."

Confucius