



13-14 October 2009

“NSC DURING 20 YEARS”

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Today we take it all for granted...

Prehistoric? It is not that long ago
- depending on your outlook

Internet and www were not around

Workstations appeared when NSC started up

Underpinning technologies:

Semiconductor fabrication, integrated circuits

Jack S Kilby, Nobel prize 2000

Optical fibers, Charles K. Kao, Nobel prize
2009

.....

Swedish supercomputing started in Linköping with Cray 1 (no. 09)



- European Weather Forecasting Center in Reading, UK. First time forecasting by solving equations! Today Climate Modeling



- Acquired 1983 by Saab, Linköping (2nd hand, 33 million SwCr) for development of JAS jet fighter (aerodynamics solid mechanics)



Cray 1 (no. 09)

- Owned by Saab, available to academic user via the Swedish Research Council.
- Served between 1983-89.
- Now at the National Museum of Science and Technology in Stockholm. (cf an airplane museum must have a Spitfire)

National Supercomputer Centre (NSC) at Linköping University

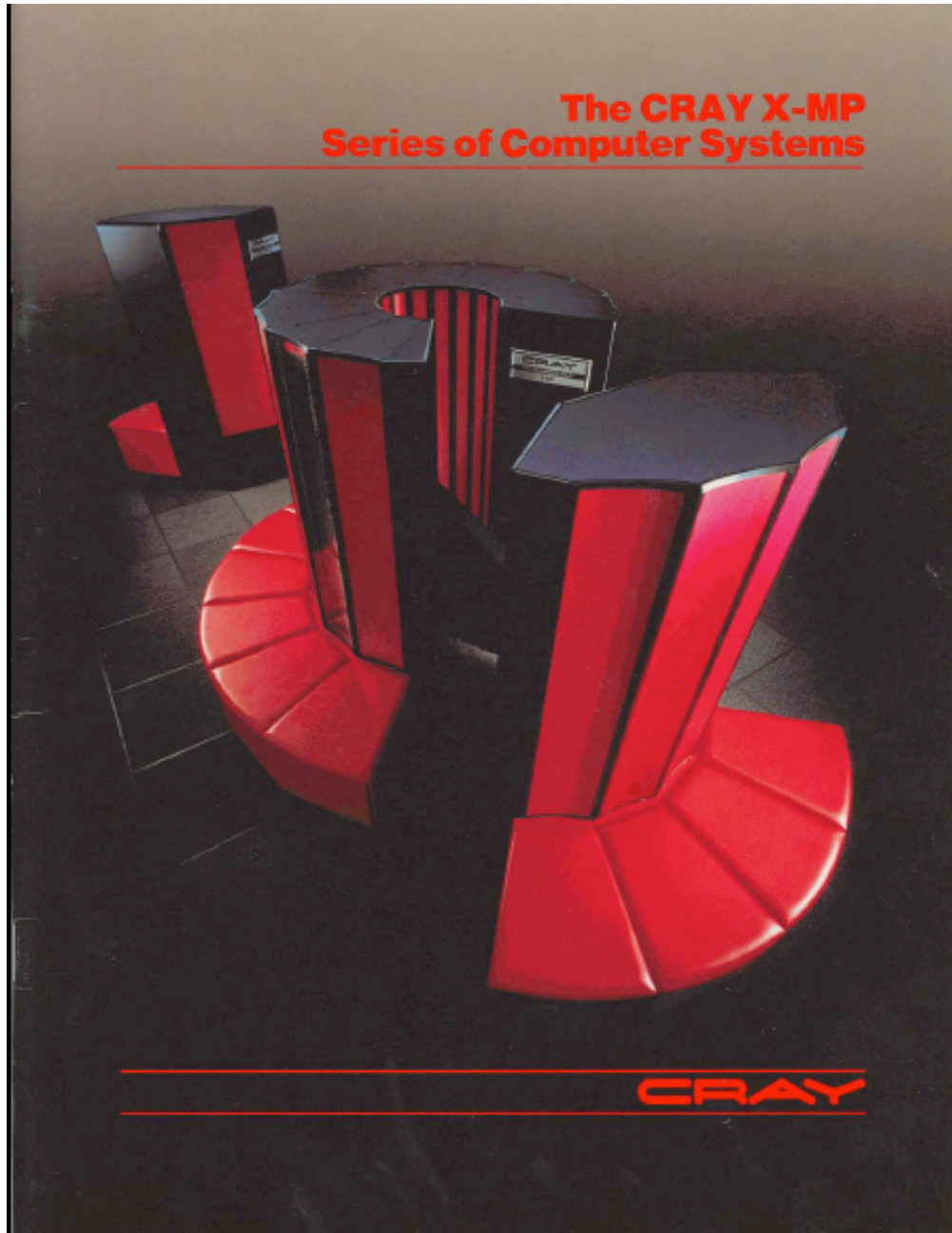
- NSC was created 88/89, first academic super-computer centre with Saab as partner.
- SMHI joined later.
- A Cray XMP, also 2nd hand was aquired for 55 million SwCr. Vector, 4 processors (KAW-SEB)
- New feature: The SSD (Solid State Storage Device)
- Availble via Sunet (64 kbit/s), smart card login. The begining of remote computing.
- (Too) strict security.



CRAY X-MP/416 supercomputer in C building at Linköping University, Linköping, Sweden. This computer was in service at the university from 1989 to 1993, replacing the earlier CRAY-1.



The C in the NSC logo is a remnant of the typical “coach” of the first multiprocessor Cray computers at NSC.



Served from 1989...
replaced by other
Cray vector, T3E,...
more and more
parallel machines,
grids and storage for
LHC to find Higg's...

SUNET upgraded

"Webinterfaced"
Computing

Start up with very few support persons

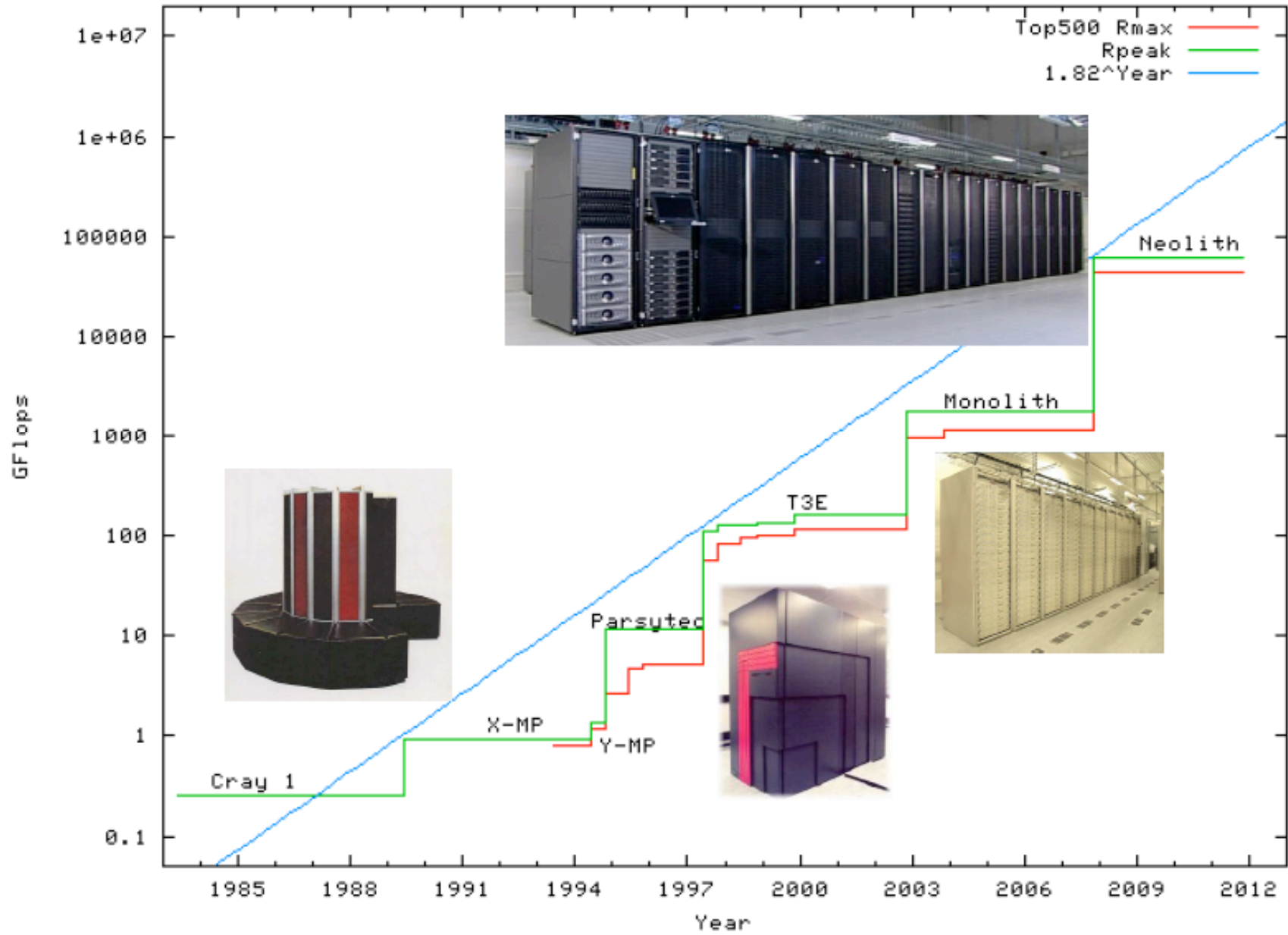
National supercomputer committee

HPD Council (Vector? Parallel?)

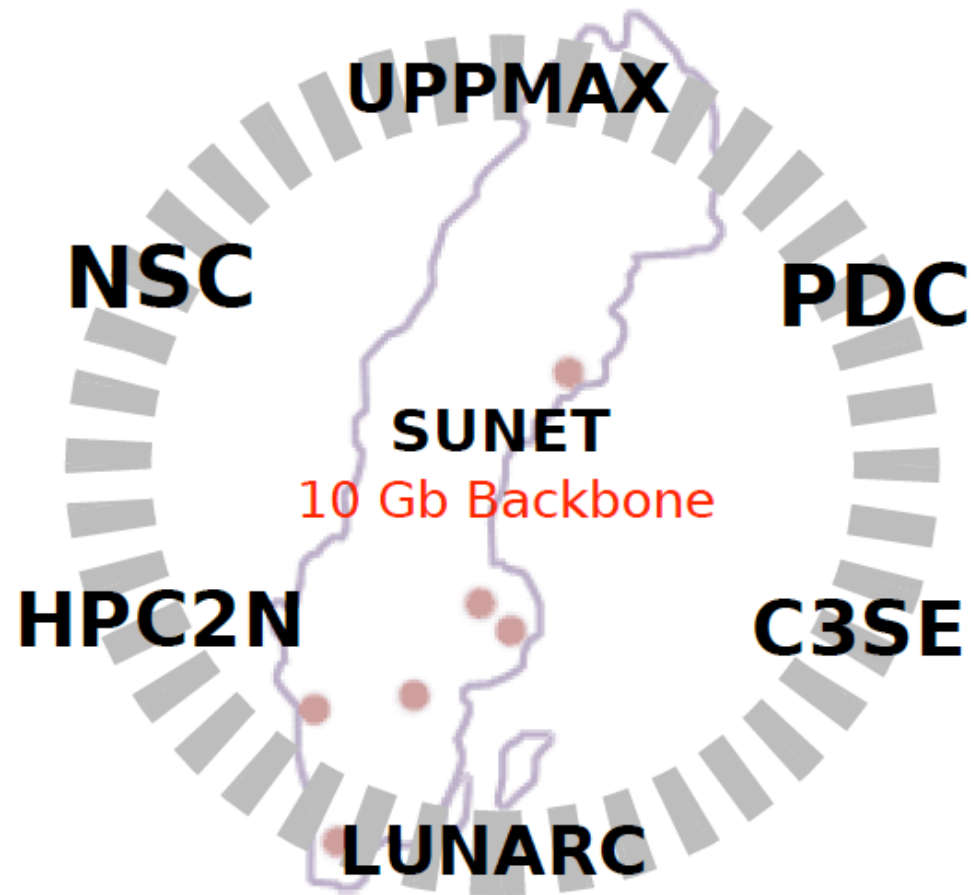
SNIC (National facility)

Free of charge for users?

Performance of NSC's fastest supercomputers



Swedish National Infrastructure for Computing



The New York Times (Global Edition)
October 12, 2009

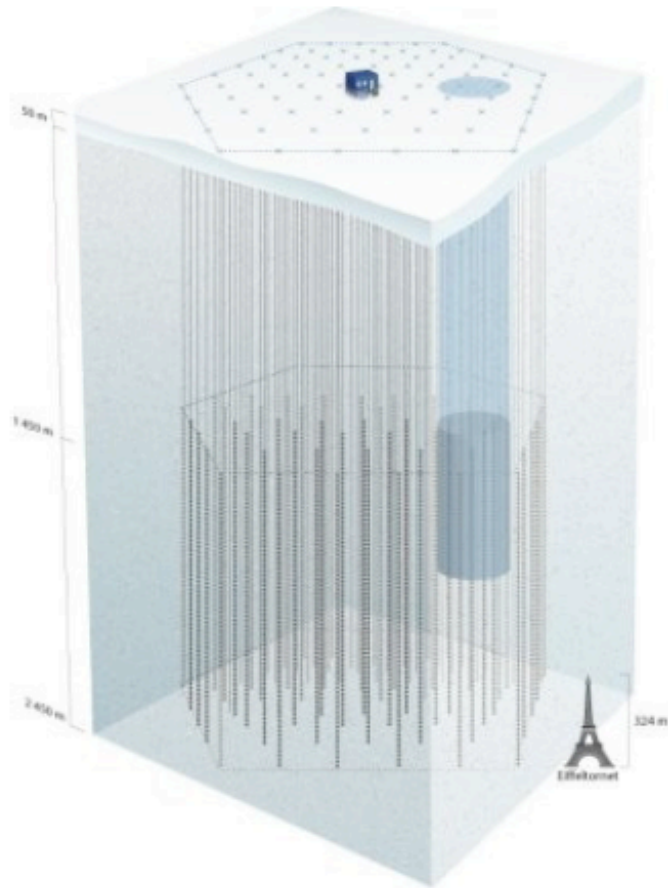
“Science these days has basically
turned into a data management
problem”

Grand Challenge: Large Hadron Collider (LHC)



Remote experimentation

IceCube



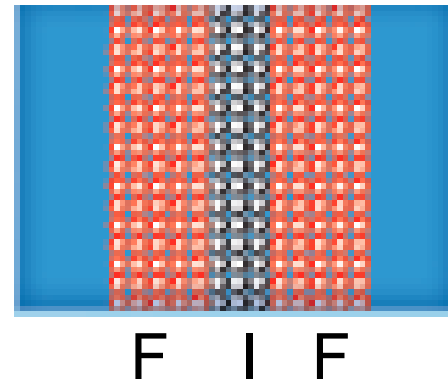
- Detector at south pole
- 4800 photomultipliers in 1 km²
- Detect Čerenkov radiation from neutrinos- \rightarrow muons

ESS and Max in Lund



New hardware ideas?

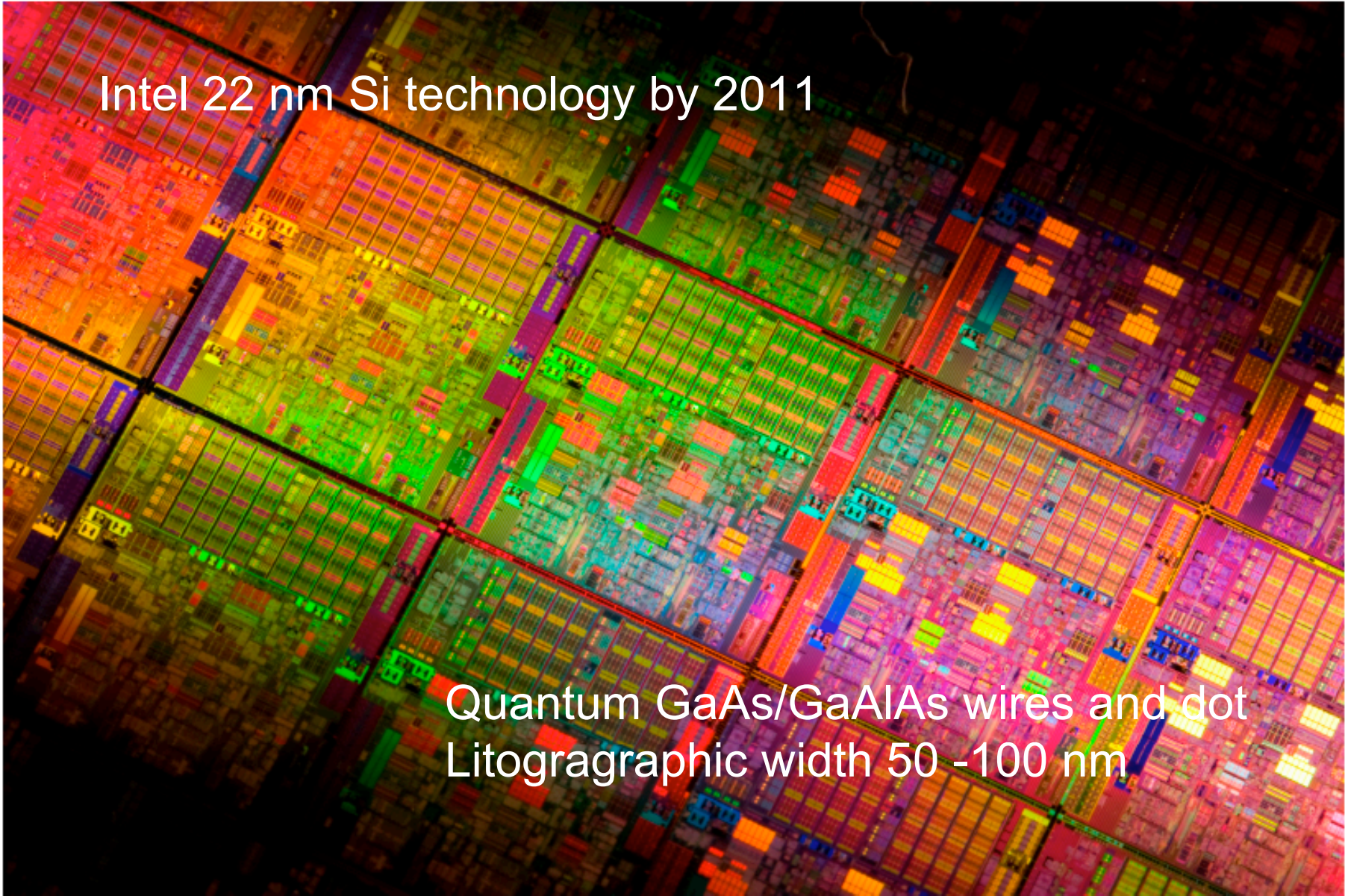
- Optical computers
- New materials like GaAs, Organic, Graphene, etc . Silicon remains.
- Quantum computers
- Spintronics (Thin Film Physics), nanopatterned materials (quantum dots)



Quantum?

Intel 22 nm Si technology by 2011

Quantum GaAs/GaAlAs wires and dot
Litographic width 50 -100 nm



ENERGY?

The energy consumption for large-scale computing is becoming increasingly cumbersome.