

## Supercomputing on a Chip Has Arrived



### Cray 1 Supercomputer

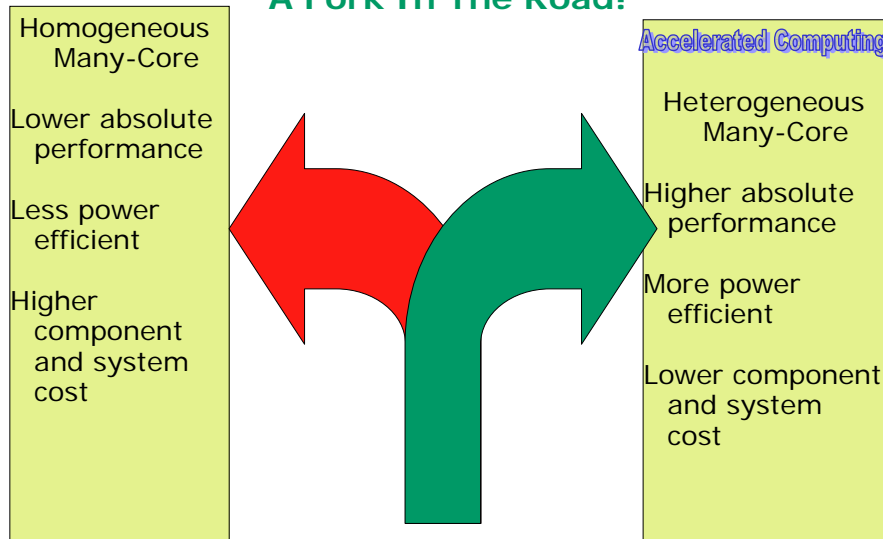
- ~9 million dollars
- 1 large room
- 0.0008 TeraFLOPS
- 150 Kilowatts under load

### ATI Radeon 4870 GPU

- ~300 dollars
- 1 dime
- 1.2 TeraFLOPS
- 160 ~~K~~Watts under load

Sources:  
<http://blog.modernmechanix.com/2006/07/16/1979-review-of-the-cray-1-supercomputer/>  
<http://ed-thelen.org/comp-hist/CRAY-1-HardRefMan/CRAY-1-HRM.html#p2-7>  
<http://en.wikipedia.org/wiki/Cray-1>

## A Fork In The Road!



## The Challenge: Programmer Productivity



### Software developers will soon face systems with

- > 5 TFLOPs of compute power
- 20+ of cores, 1000's of hardware threads
- Heterogeneous cores (CPU+GPUs), app-specific accelerators
- Deep memory hierarchies

### Challenge: harness these devices productively

- Gap exists between the capabilities of today's programming environments, the requirements of parallel applications, and the challenges of future parallel architectures
- Developers need powerful tools and industry standard APIs
- It is time to move past proprietary interfaces
  - Developers want open, industry standards (Brook+, OpenCL)
- Powerful productivity tools are needed
  - Auto-tuners, profilers, debuggers, emulator



12/11/2008

Accelerated Computing Panel - Converts and Skeptics

SEG 2008