3D Graphics Standards and Product Development

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A different perspective...

- Work with product marketing and engineering
- Work with partners, systems integrators and software vendors
  - Help port, optimize, differentiate applications
- Caveats

Standards and certifications at SGI

- Some standards are a matter of course
  - X11R5/Motif 2.1, GNOME, IEEE, POSIX, PCI ...
- Other standards are special case
  - Customer driven
  - Business case
  - Larger effort (COE, CAPP, LSPP)
- Some standards created to solve business or technical problem: OpenGL™ 3D graphics standard

What is OpenGL™?

- Specification/API for low level (polygon) 3D data display
  - glDrawPixels(), glMultMatrix() …
  - Vendors are free to concentrate on price, performance
- Popular adoption by commercial/professional products
  - OpenGL also popular with gaming community
- Successful because:
  - Good technical spec
  - Open to anyone
  - Planned for change, openness and competition
  - Solved a business problem
- SGI open sourced the sample implementation for Linux

History of OpenGL™

- During mid-80's 3D graphics became popular and affordable
- Tower of Babel:
  - •Every vendor had their own API, spec, and style
  - •Vendor languages - IrisGL, PHIGS, PEX, etc. - were incompatible
- Graphics adoption slowed by lack of standard
- 1992: OpenGL standard developed by SGI
- Adopted by many vendors and controlled by Architecture Review Board (ARB)
  - •Consortium governed by ARB
  - •One vote for each member. Currently 12 voting members, many more non-voting members
  - •ARB defines conformance tests and approves new features
  - • SGI-licensed trademark protects integrity

Partner View

- Had to convince our partners to port to OpenGL
  - Standard allowed easier migration/port to our competitors; open to price/competition
- So, optimize in different ways
  - Run well everywhere, but especially on ours
  - Couldn't change behavior
  - Run on all platforms
  - Enable extensions for new features

Remember back when…?

- Computers were single processor?
- Now SSI computers are common
  - •512 CPU SSI IA64 Linux system at NASA
- Adding a CPU is becoming commodity decision
  - •Like adding storage - effectively low $ cost
  - •Problem shifts to good software and compilers
  - •Software and tools assume multiple CPU’s

But 3D visualization problems persist…

- Data is still too large, not local, or proprietary
- Graphics pipelines are never fast enough
- Solution: Many graphics processing units (GPU's)
- Dream: Adding another GPU will be like adding more disk space or CPUs

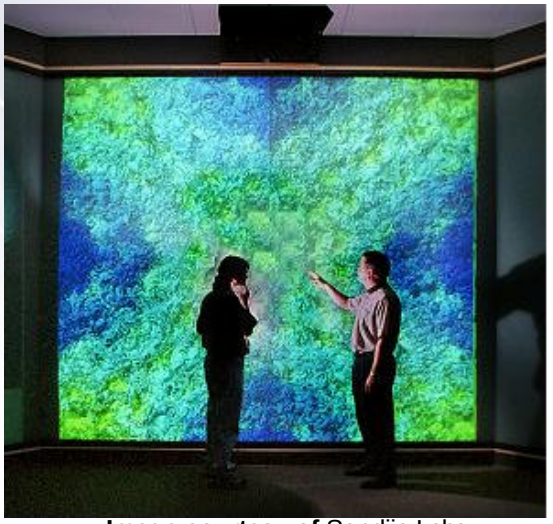

Image courtesy of Sandiia Labs

Graphics curve following CPU curve

- At first, just having a graphics board was interesting
- Then, features and speed made 3D graphics common place
- Now adding another graphics “pipe” is easier
  - •Problem shifts to good software
  - •Software assumes multiple GPU’s
    - – Lack of standards hurting adoption
    - – Proprietary SDK’s for SSI; clusters ??

Glimpse into the future?

- 3D data display is ubiquitous
- Cheap, pervasive
  - •Many pipes on single system
  - •Small pipes (PDA's, phones)?
- Adding display is easy
  - •Becomes "graphics compiler" problem


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