Trends in Graphics Architecture

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graphics business

- ~$20M to develop a graphics chip
- Lucky to net ~$10 a chip
- Only game platforms have enough volume
  - Novelty supercedes fidelity
- PC's offer many design win opportunities
  - But model and API velocity limit lifecycle
- Consoles live long and prosper
  - But only 2.5 design wins per cycle

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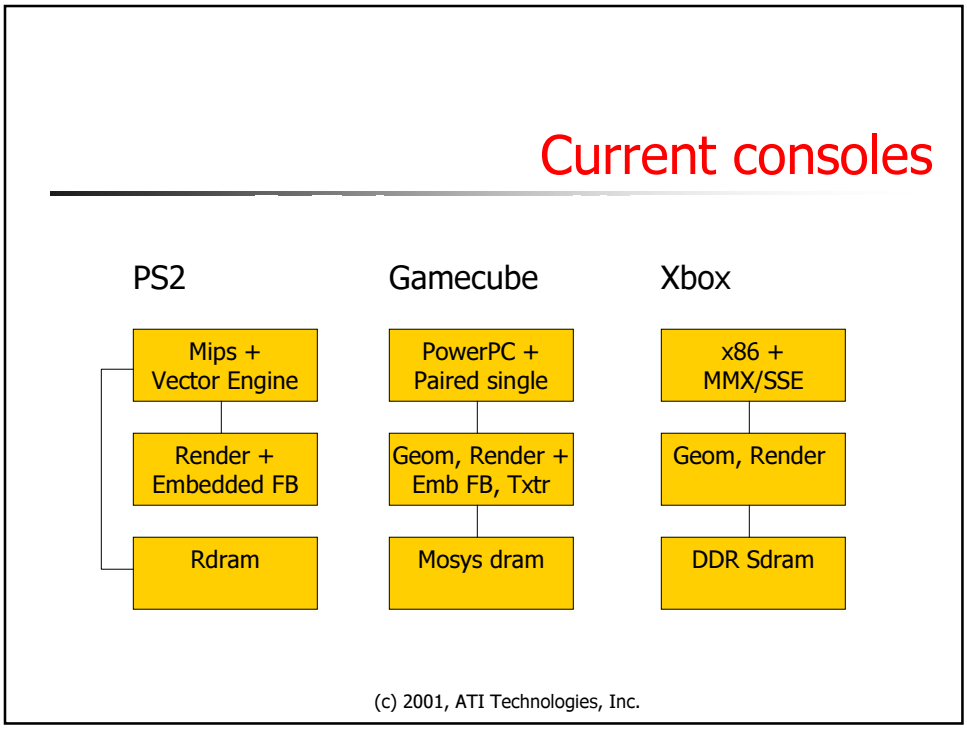
Current consoles
PS2
Gamecube
Xbox
Mips + Vector Engine
Render + Embedded FB
Rdram
PowerPC + Paired single
Geom, Render + Emb FB, Txtr
Mosys dram
x86 + MMX/SSE
Geom, Render
DDR Sdram
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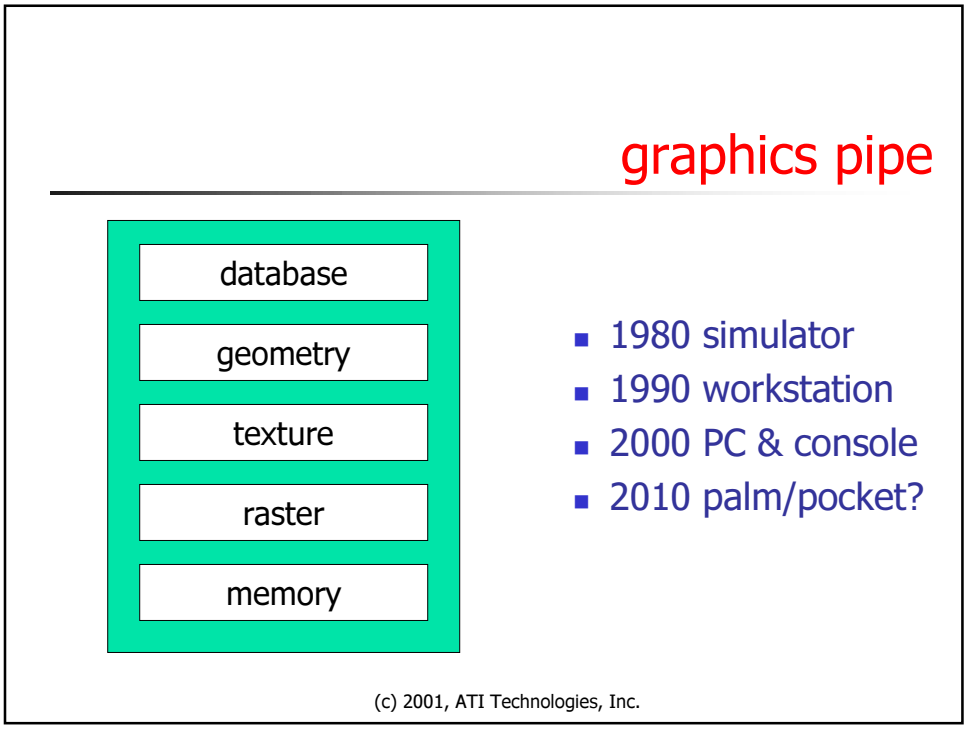
graphics pipe
database
geometry
texture
raster
memory
1980 simulator
1990 workstation
2000 PC & console
2010 palm/pocket?
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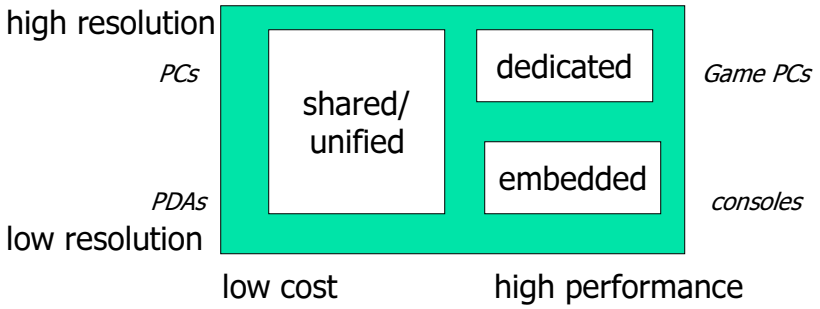
graphics memory



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graphics programmability

- CPU
  - Less than compelling 3D
- 80's bitslice, DSP, sundry
  - Lag in clock speed, software
- 90's CPU plus simd coprocessor
  - Lag in memory throughput, addressing
- 00's standalone simd coprocessor ('shader')
  - TBD

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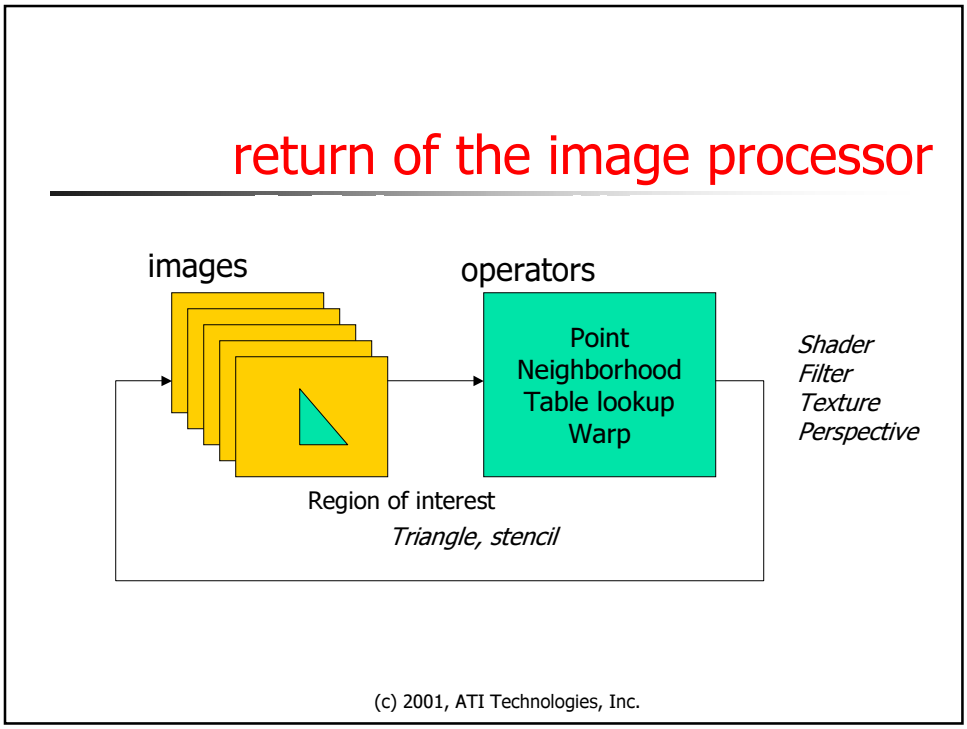
return of the image processor
images
operators
Point
Neighborhood
Table lookup
Warp
Shader
Filter
Texture
Perspective
Region of interest
Triangle, stencil
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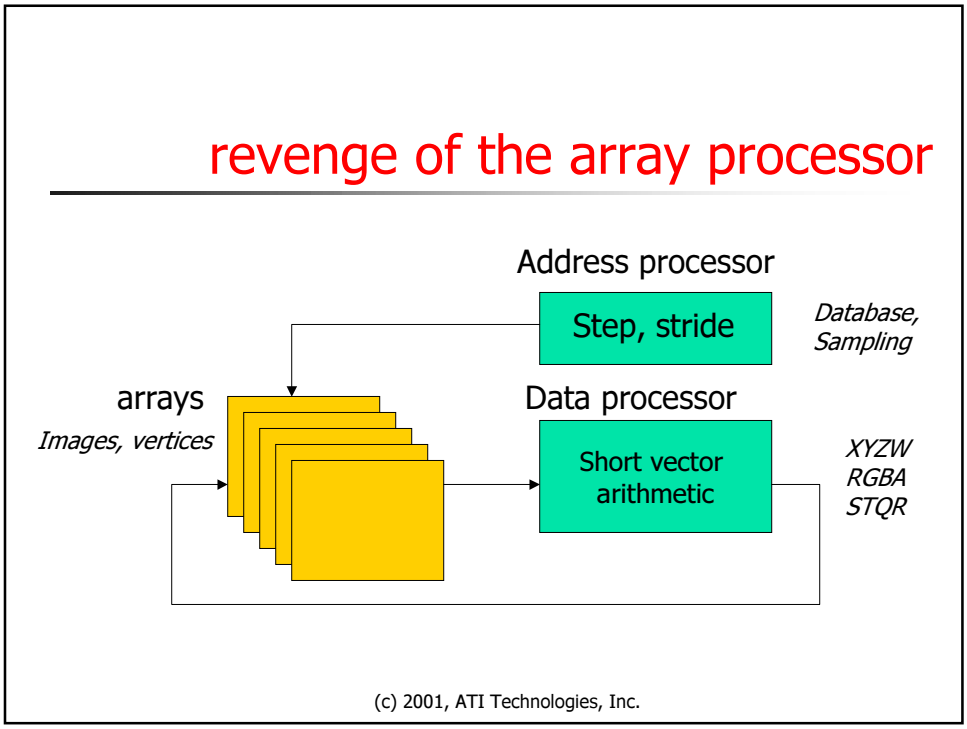
revenge of the array processor
Address processor
Step, stride
Database,
Sampling
arrays
Images, vertices
Data processor
Short vector
arithmetic
XYZW
RGBA
STQR
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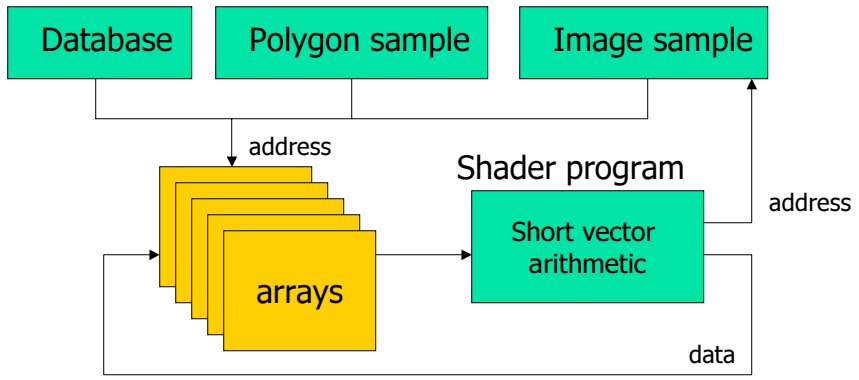
graphics image array processor

Hardwired pipeline



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whither

- Generalization is likely
  - Addressing, branching, threading, virtual memory
- Cheap fast things devour big complex ones
  - Unit growth in pocket/palm entertainment
- But programmability can be scalable
  - Perhaps SOC CPU + simd + database/samplers
- And business overpowers technologies

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denial

- Global illumination is very useful
  - Simply enable shadows, reflection, refraction
- Global illumination is very hard
  - Sort violates the pipe
- So circulate lots of images, arrays
  - Novelty supercedes fidelity

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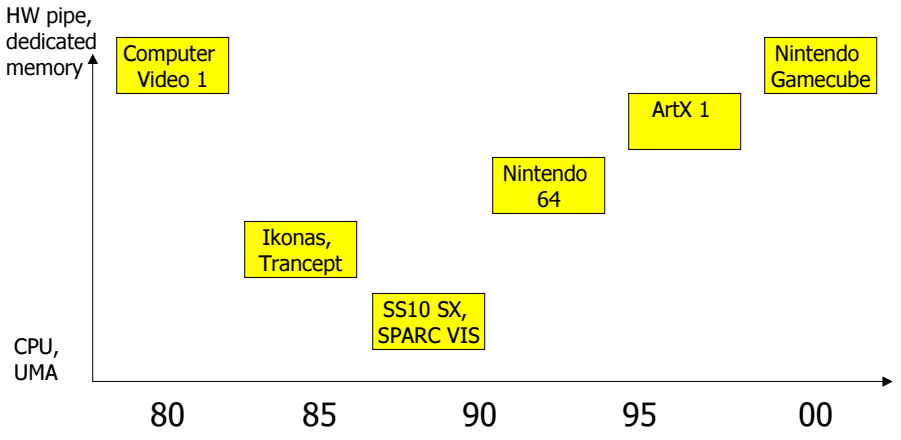
whence



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why

- De-evolutionary optimization
  - Direct to icon to symbol and back
- Evolutionary light prosthesis
  - Compensation for our visual asymmetry
- An instrument
  - Enable the top of the pyramid

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