

CMSC 611: Advanced Computer Architecture

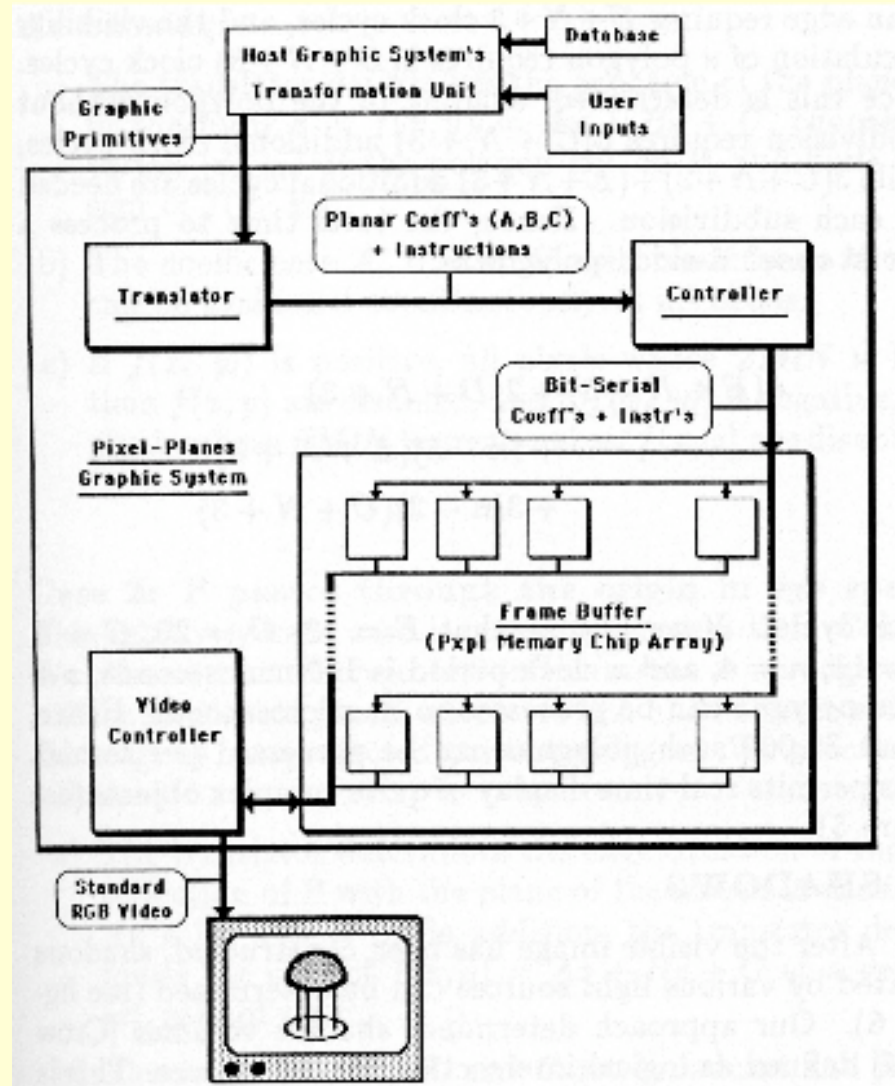
Complex Parallel Systems

Some Graphics Examples

- Pixel-Planes 4
- Pixel-Planes 5
- Pixel-Flow
- NVIDIA GeForce 6 series
- NVIDIA GeForce 8 series
- Intel Larrabee

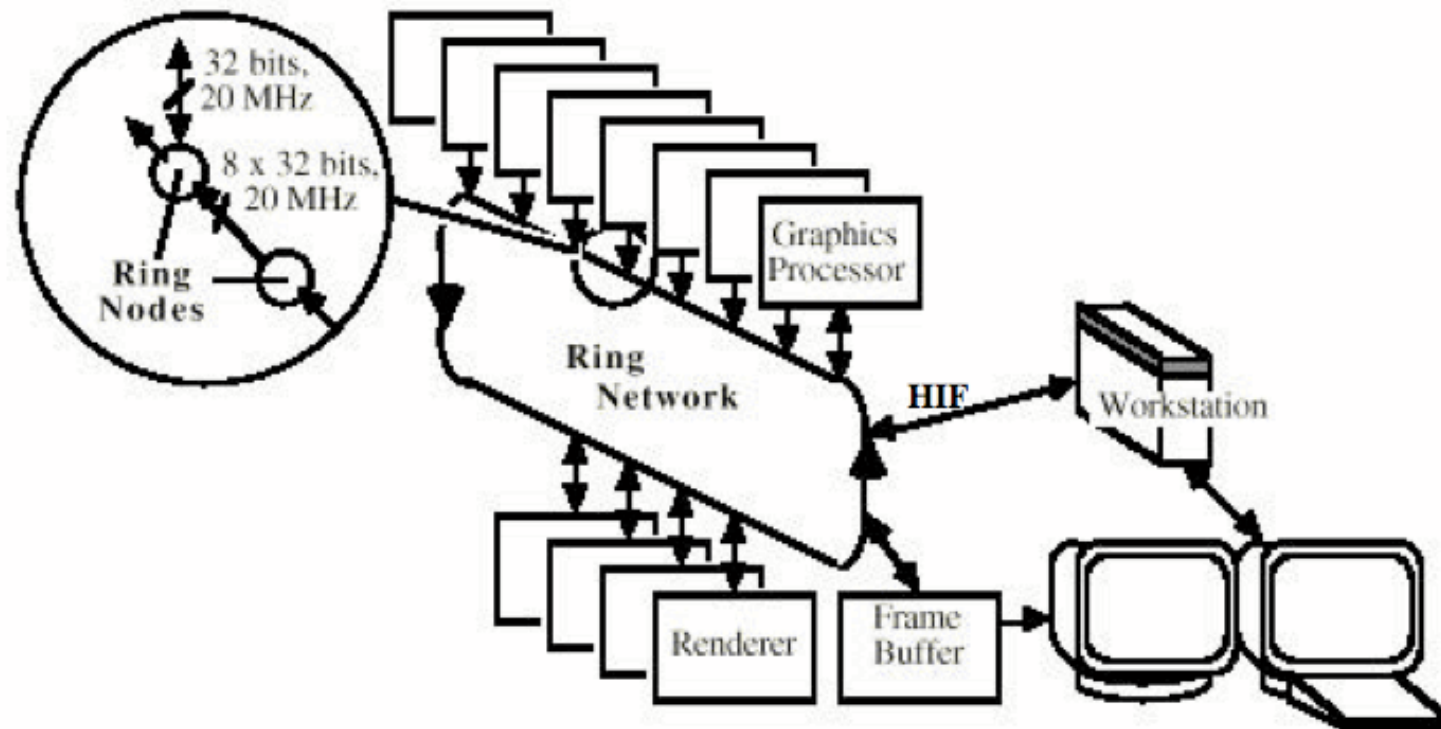
Pixel-Planes 4

- 512x512 SIMD array (full screen)

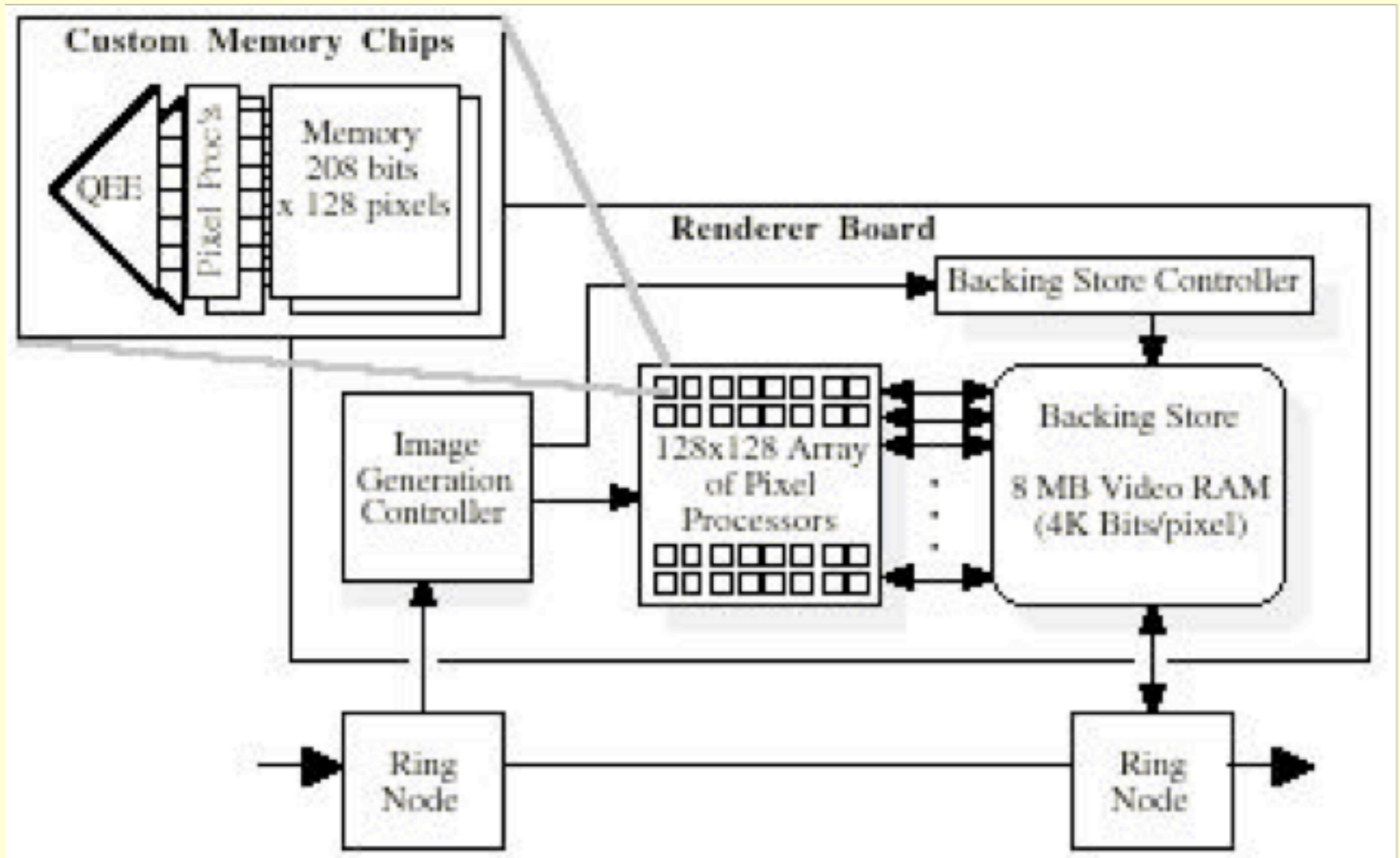


Pixel-Planes 5

- Message-passing
- ~40 i860 CPUs
- ~20 128x128 SIMD arrays (~80 tiles/screen)

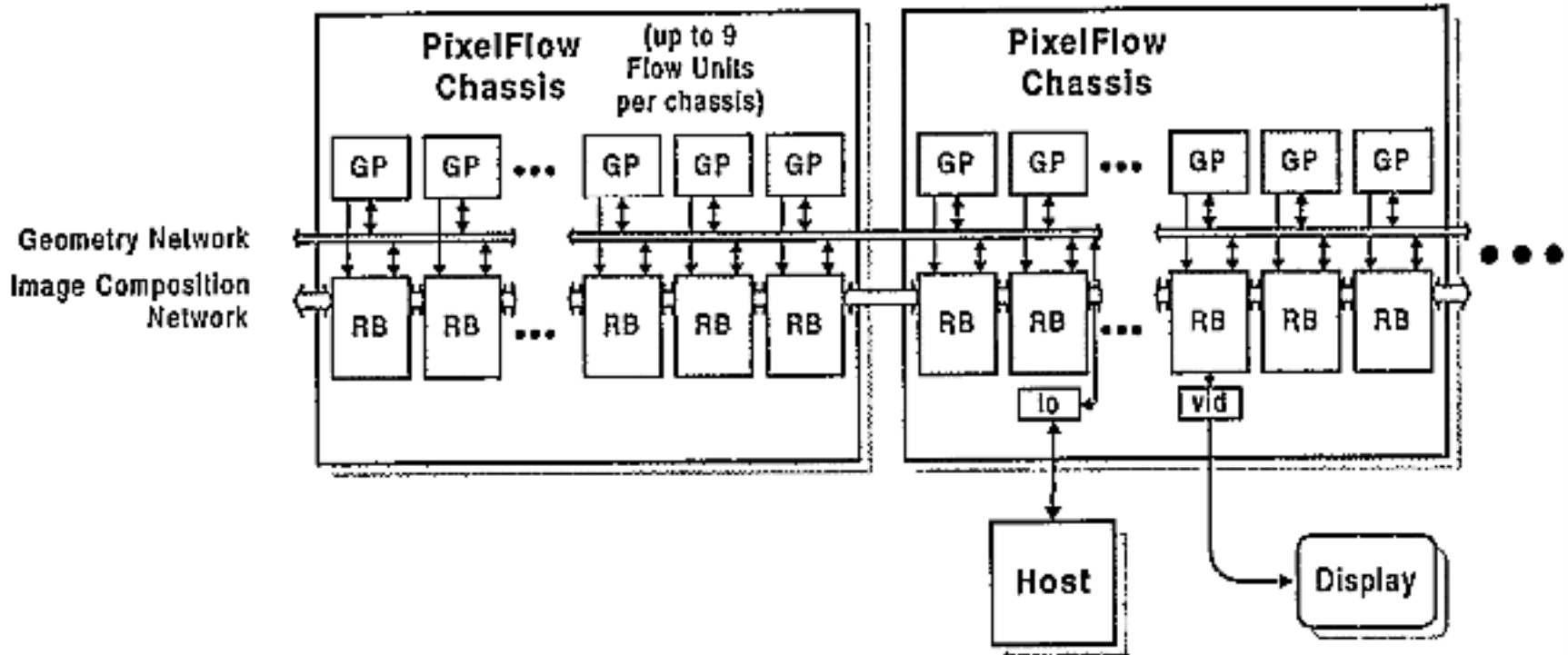


Pixel-Planes 5

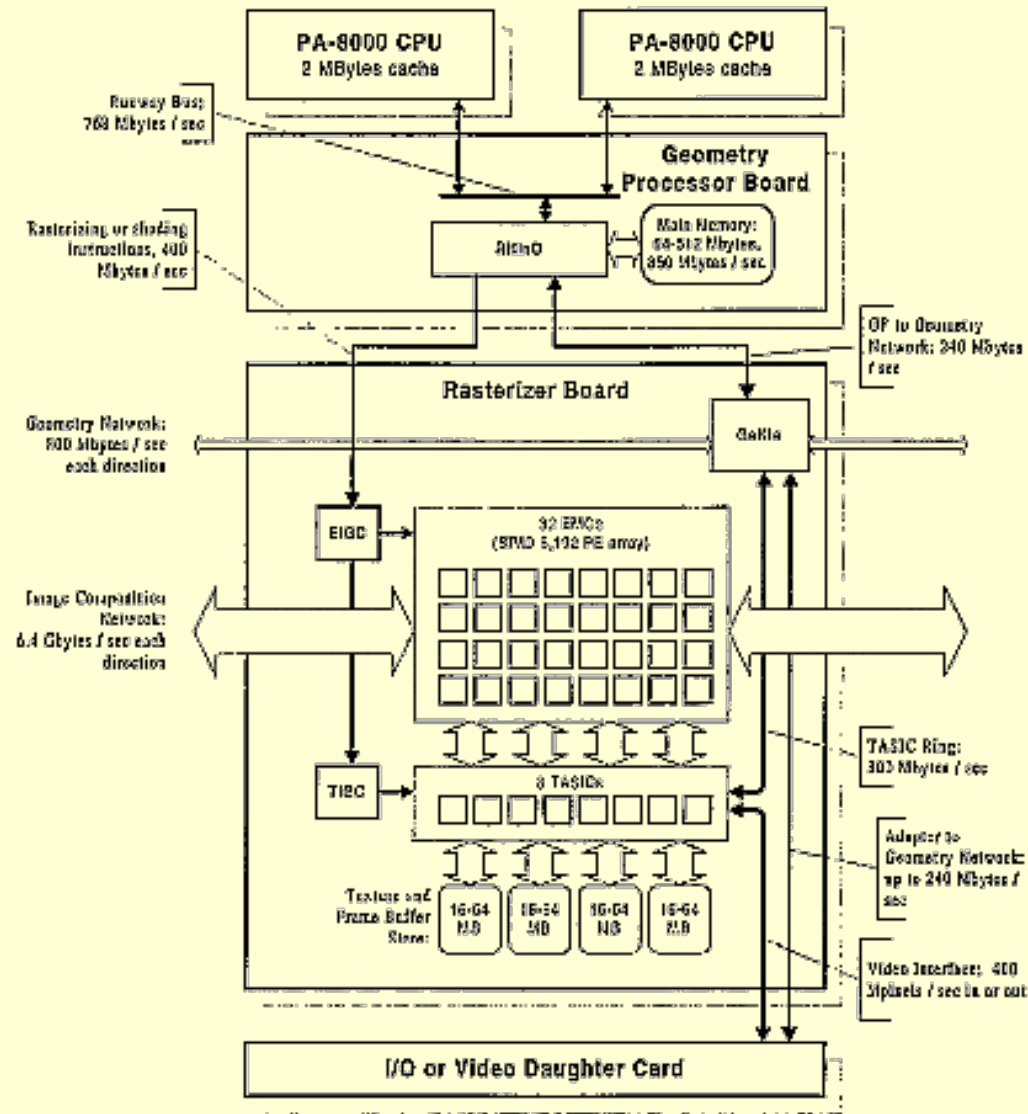


Pixel-Flow

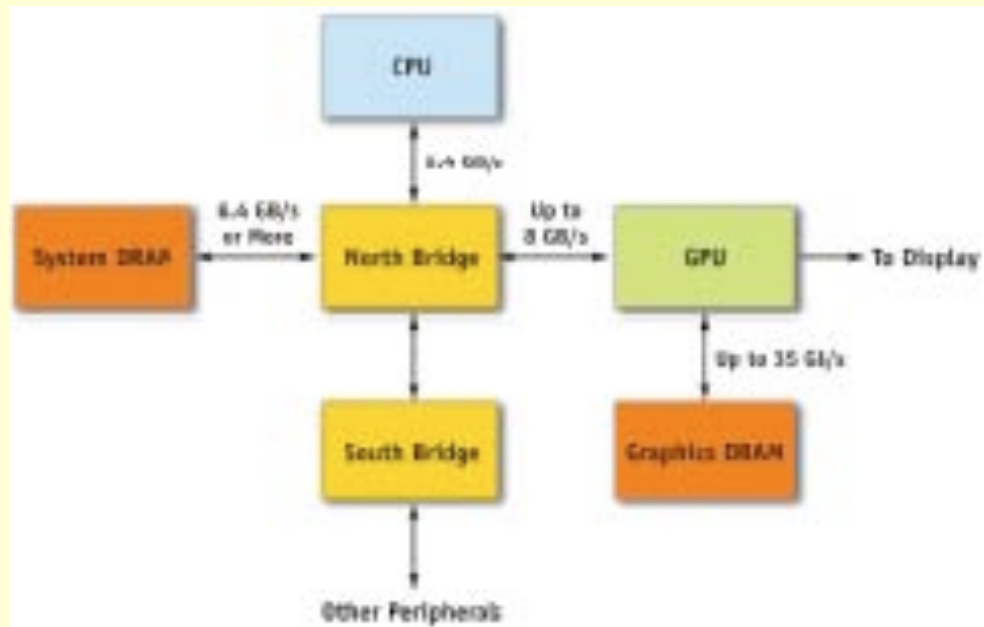
- Message-passing
- ~35 nodes, each with
 - 2 HP-PA 8000 CPUs
 - 128x64 SIMD array (~160 tiles/screen)



Pixel-Flow



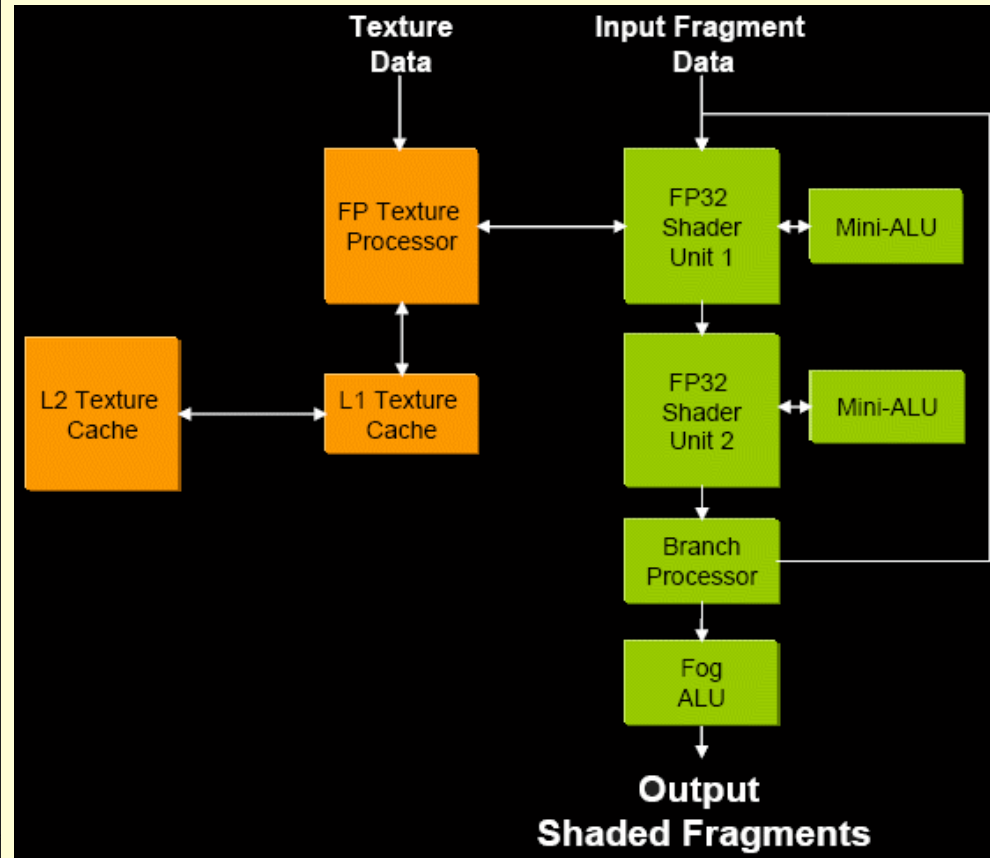
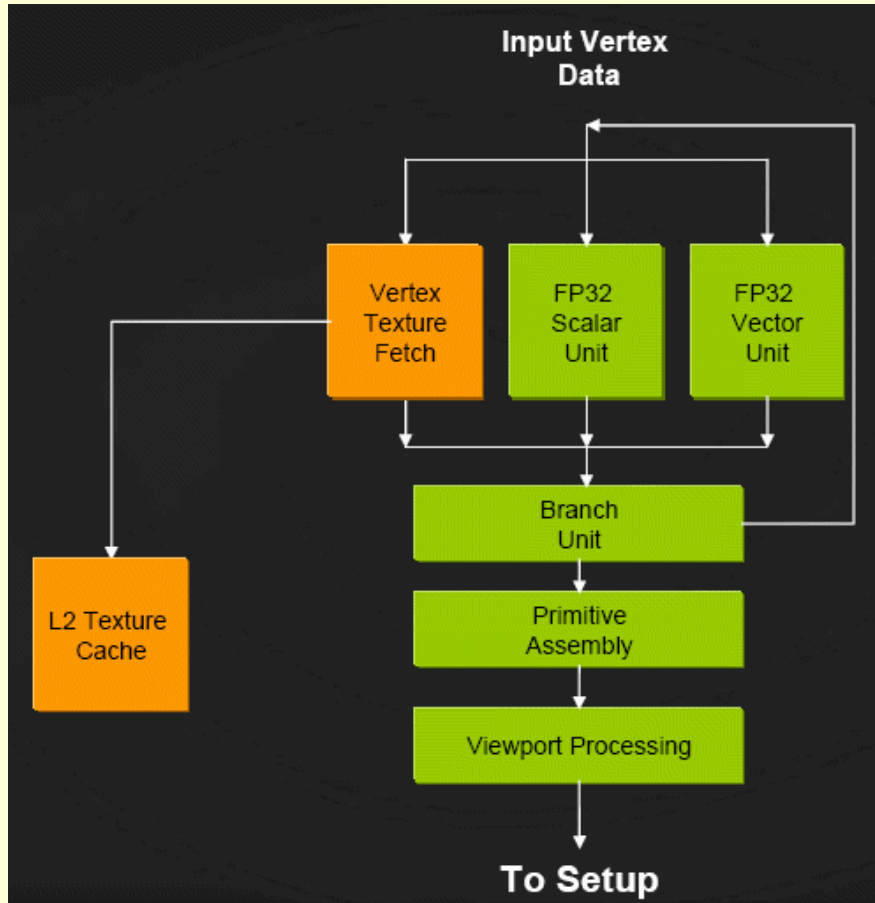
PC Graphics Cards



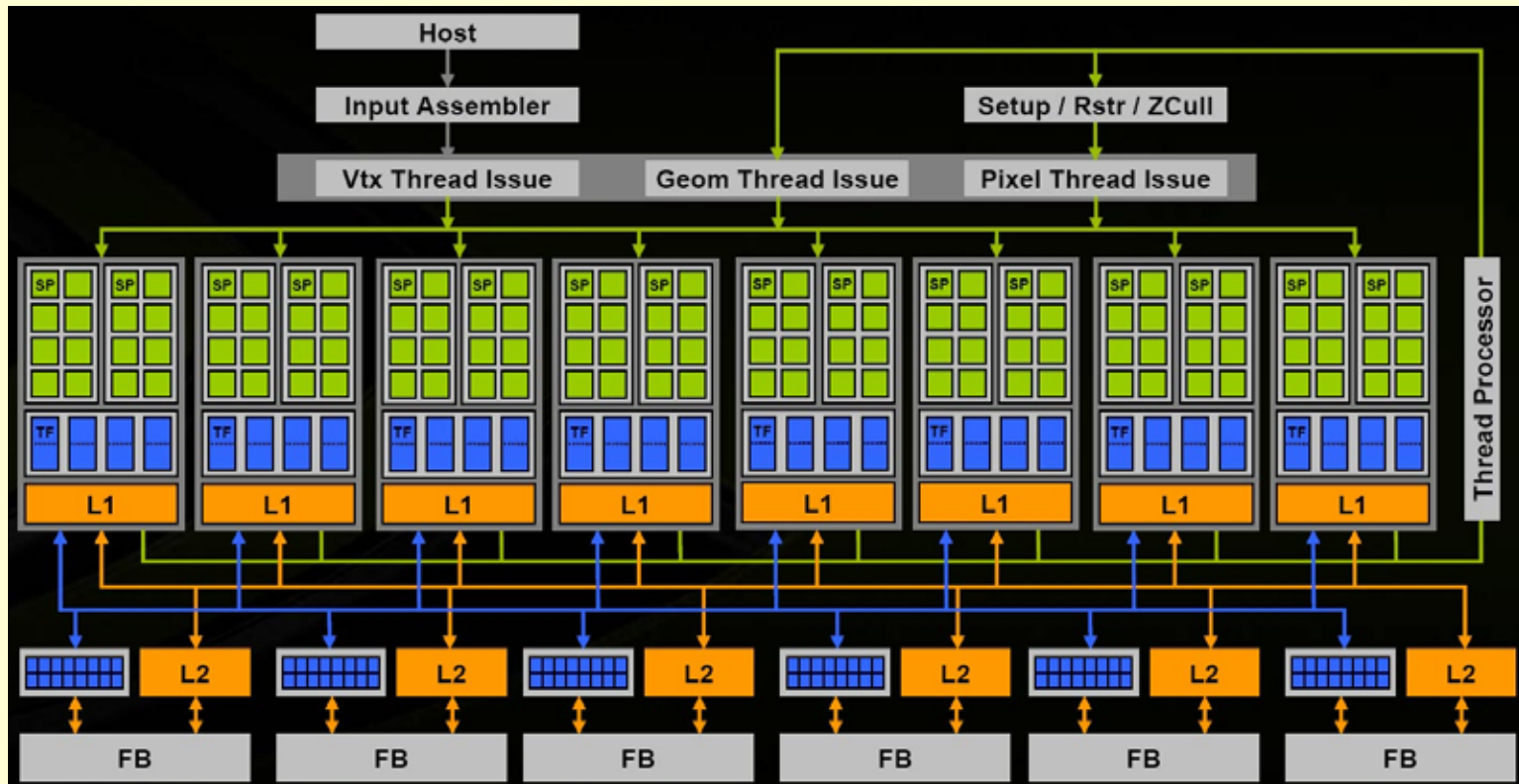
NVIDIA 7800 / G70



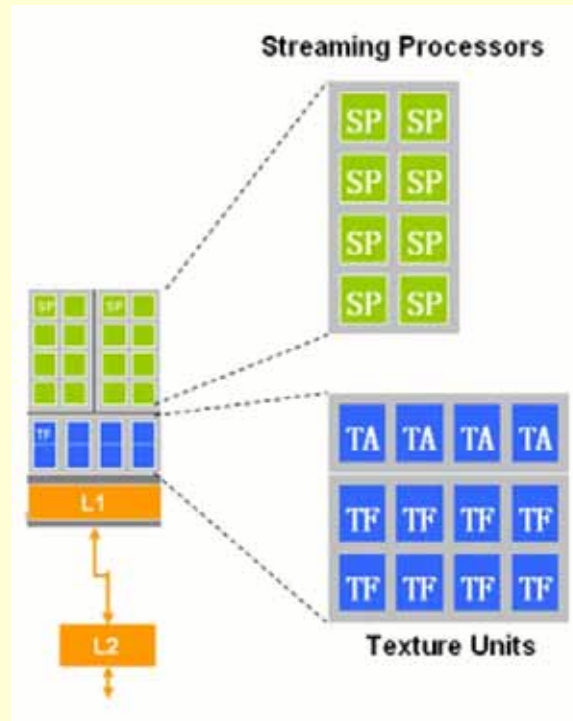
NVIDIA 7800 / G70



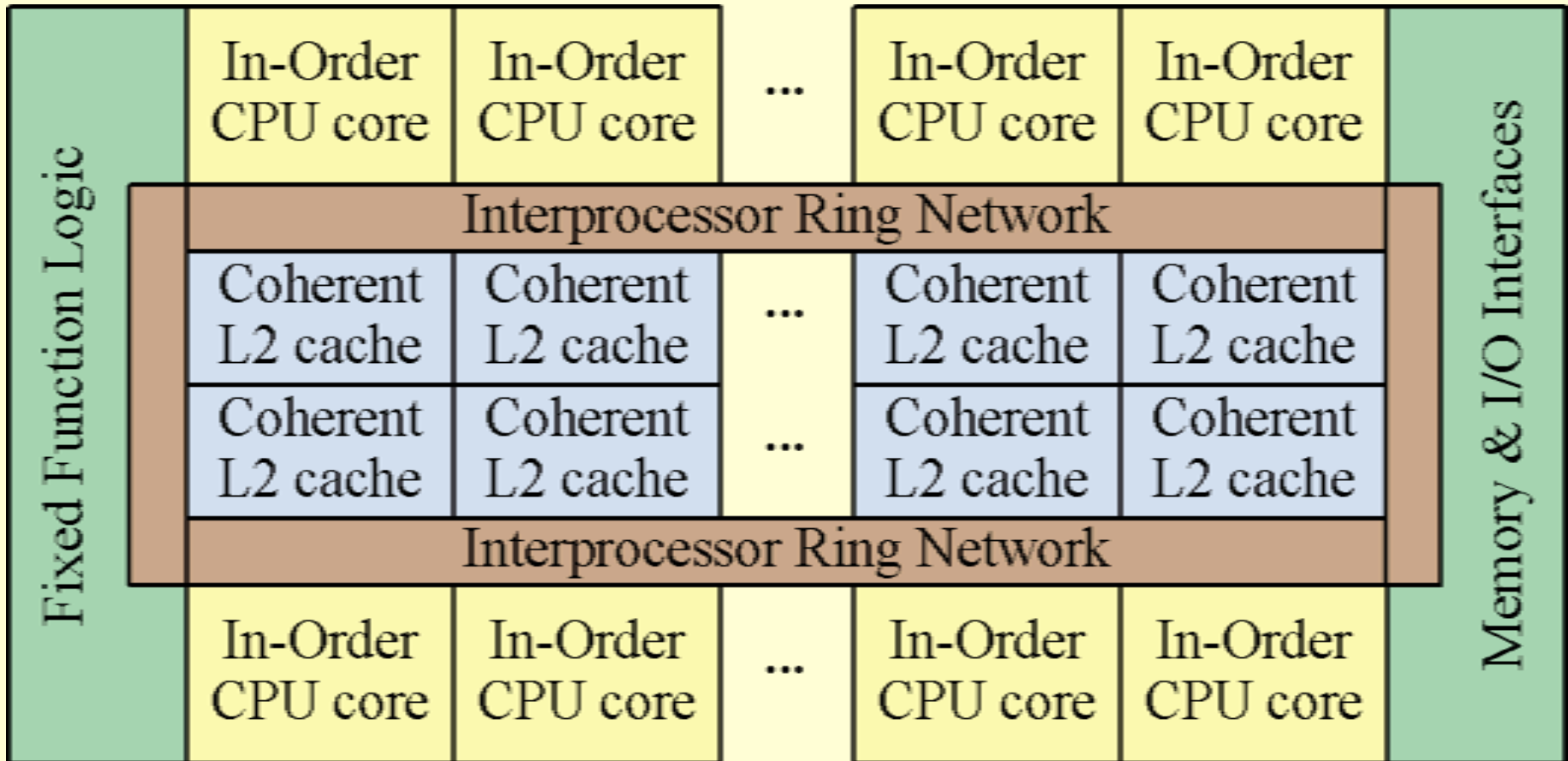
NVIDIA G80



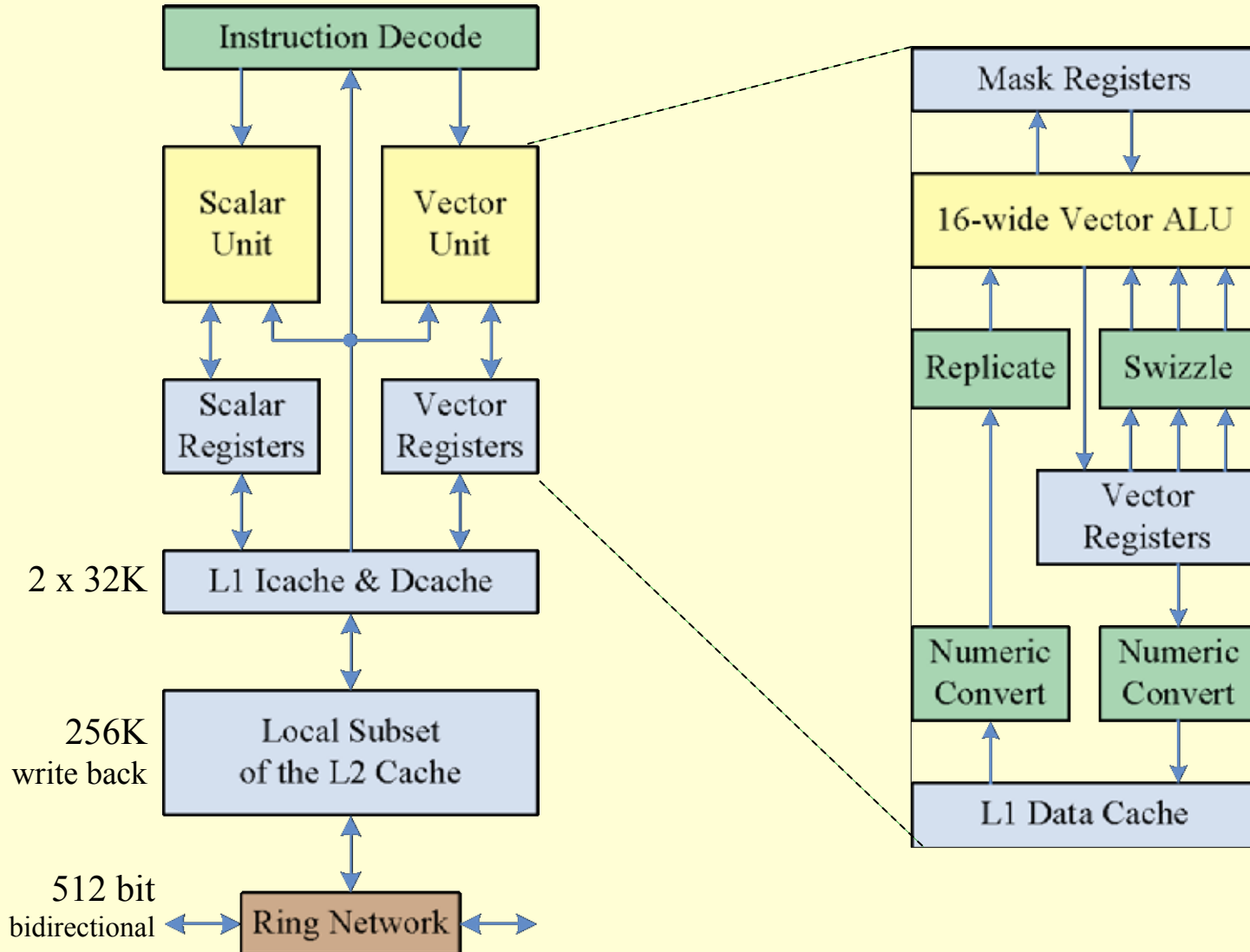
Streaming Processors



Intel Larrabee



Larrabee Core



Larrabee: In Order Core

#CPU Cores	2 out-of-order	10 in-order
Instruction issue	4 per clock	2 per clock
VPU per core	4-wide SSE	16-wide vector
Single stream	4 per clock	2 per clock
Vector	8 per clock	160 per clock

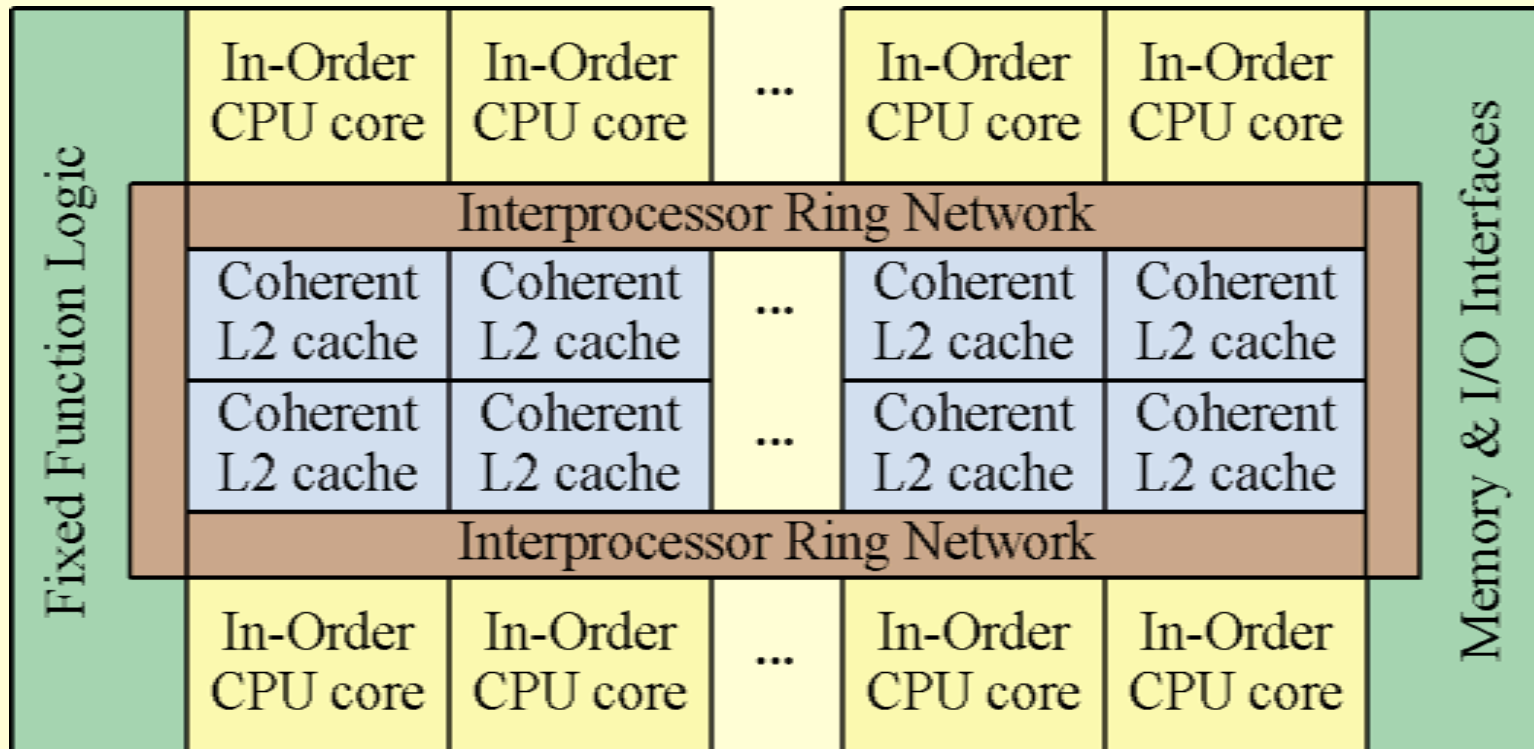
- Small, so fit more on chip

Larrabee ISA

- x86 base
- Cache (instructions & modes)
 - prefetch
 - early eviction
 - Direct from L1 as fast as registers
- Exposed dual issue
 - 2nd restricted set for second instruction
- 4 threads w/ independent registers
- Vector instructions

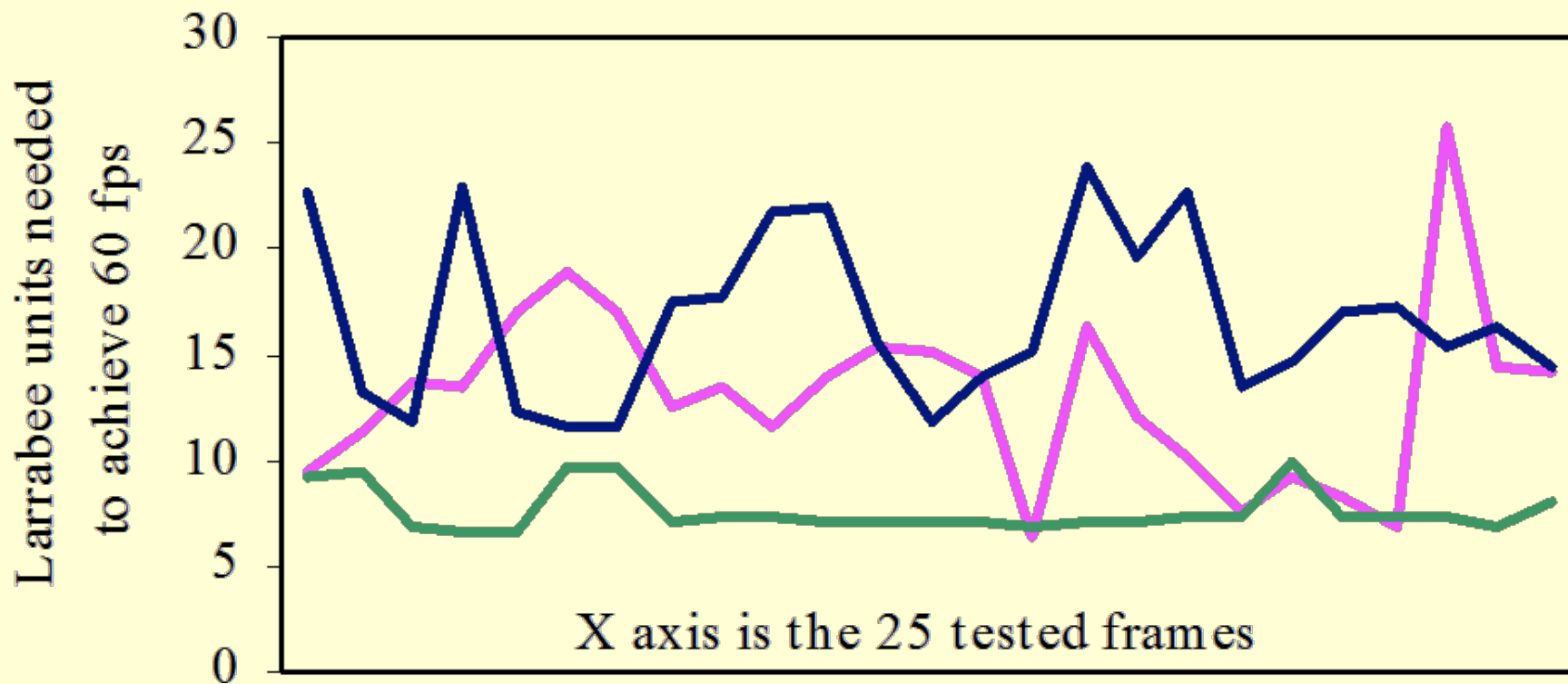
Larrabee Fixed Function

- Extra application-specific units
- Texture filtering
 - 12-40x faster than software

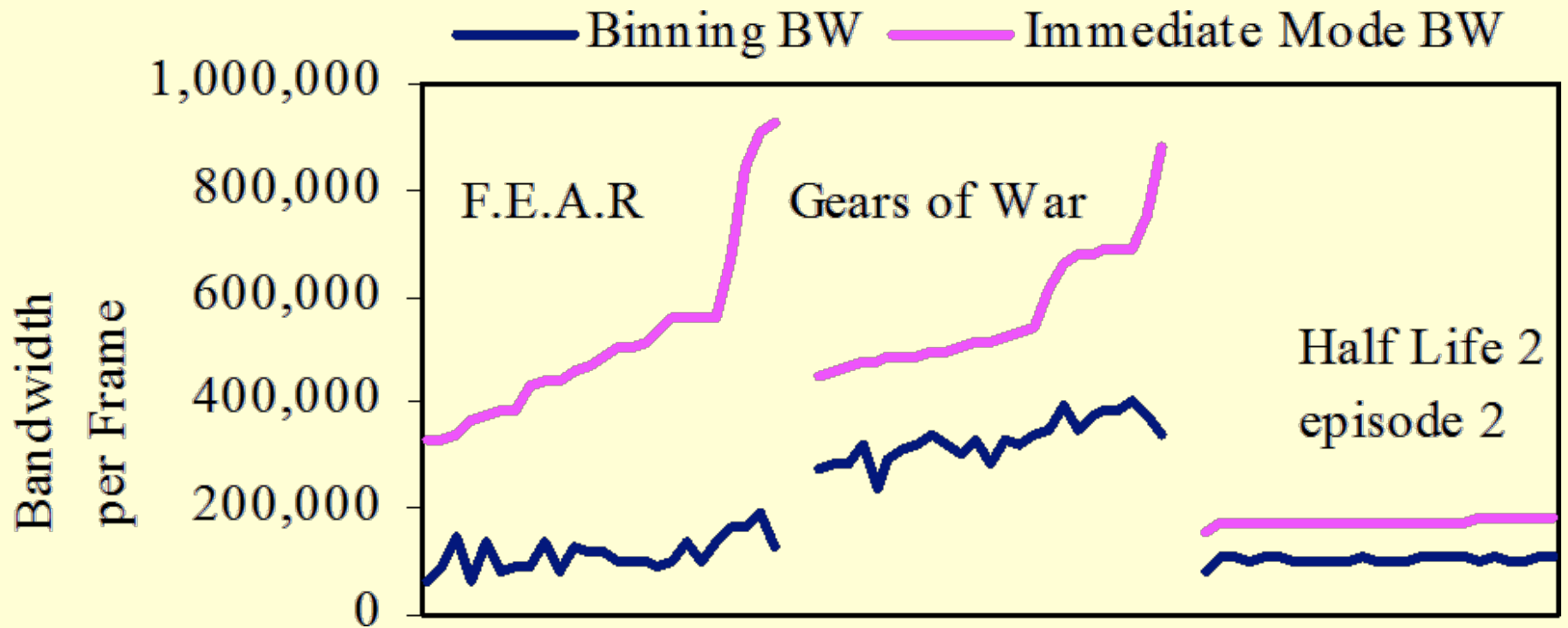


Larrabee Size

F.E.A.R. Gears of War Half-Life 2 Ep. 2



Larrabee Bandwidth



Larrabee Processing

