

Um pouco de história

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SketchPad - 1963

- Tese de Doutorado de Ivan Sutherland (MIT)
- Conceito de comunicação com o computador



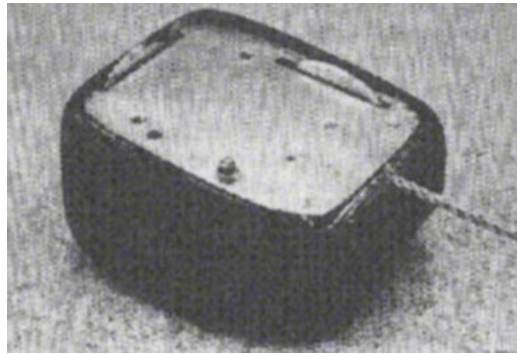
<http://www.youtube.com/watch?v=BKM3CmRqK2o>

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Tecnologia de input

- 1963 Mouse substitui o light pen (vector systems)



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1964

- Dispositivo de Entrada
Grafacon



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1972

- Computador ALTO da XEROX
- Processador de “Textos” (tela longa em comparação às atuais)

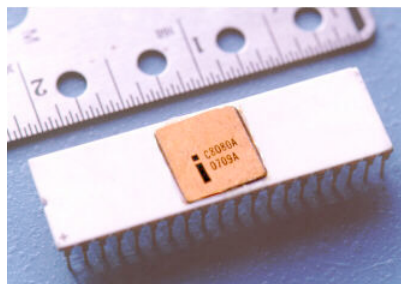


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1974

- Intel lança o 8080

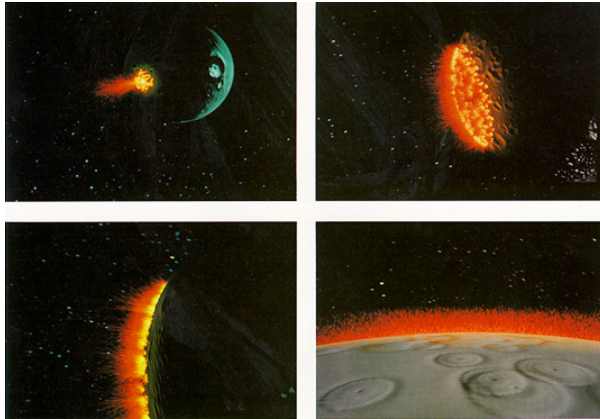


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1983

Jornada nas Estrelas Ira de Khan



Reeves 1983 -Sistemas de Partículas

http://www.youtube.com/watch?v=n6YvhhY_N5A

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Anos 80

- 1983 – SGI lança o IRIS 1000 e 1400
- 1983 – Alias fundada
- 1984 - Wavefront
- 1988 – Tin Toy da Pixar ganha um Oscar



US\$ 50.000
1.5MB RAM
72MB Disco
Compare com
o Primeiro PC....

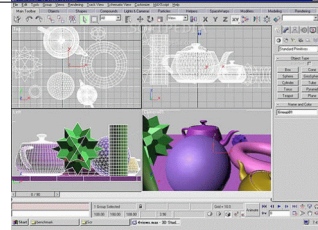


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Anos 90

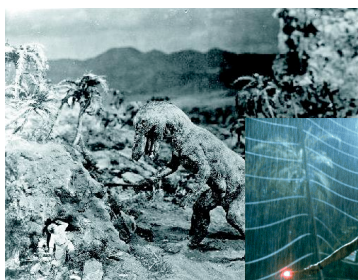
- 1990 – AutoDesk lança 3D Studio
- 1992 - OpenGL especificação
- 1993 - Jurassic Park



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Sofisticação Visual da Audiência...



Lost World - 1922

Jurassic Park - 1997



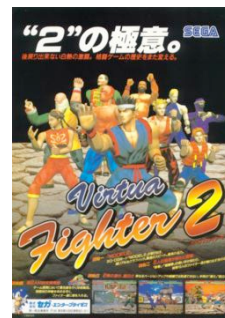
Transformers - 2007



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Anos 90

- 1994 – Sega Saturn
- 1995 – Toy Story

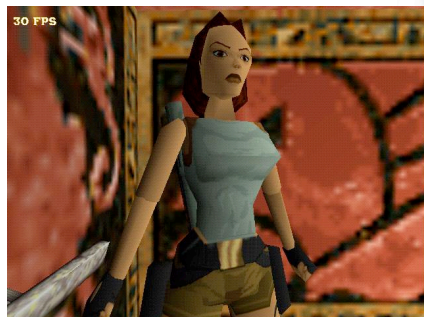
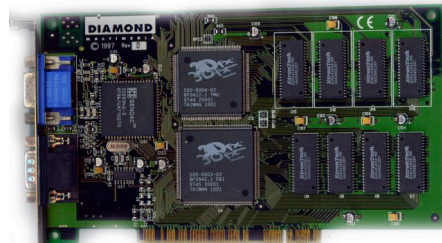


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1996/1997

- Voodoo board



2001

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Um exemplo



Em 11 anos os polígonos aumentaram aproximadamente **15 vezes!**

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Lara Croft 2011? 2013? 2020?

Quantos polígonos?



Qual modelo de iluminação?

Qual técnica de animação?

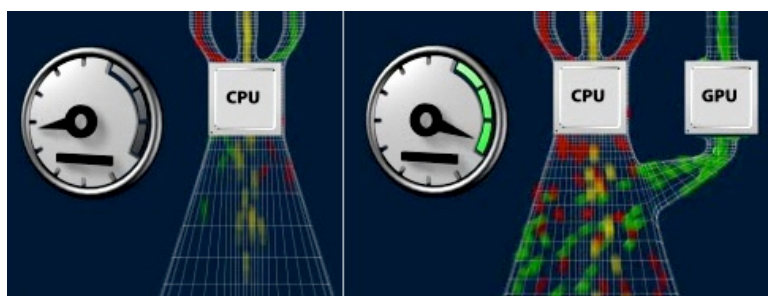
Como representar os materiais?

ETC, ETC, ETC...

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O que são GPUs?



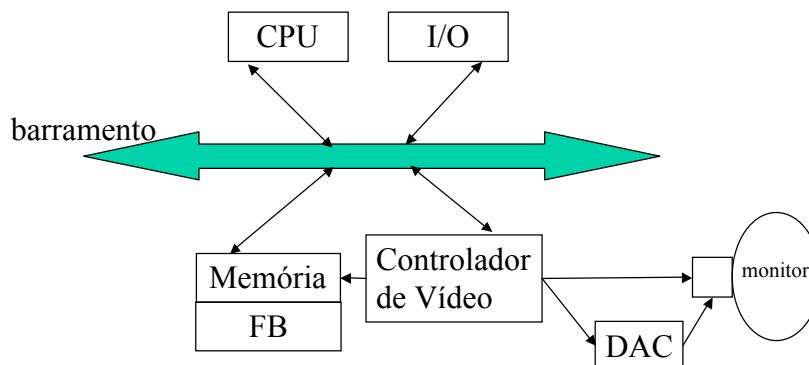
Graphics Processing Units

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Arquiteturas Típicas

1) SIMPLES

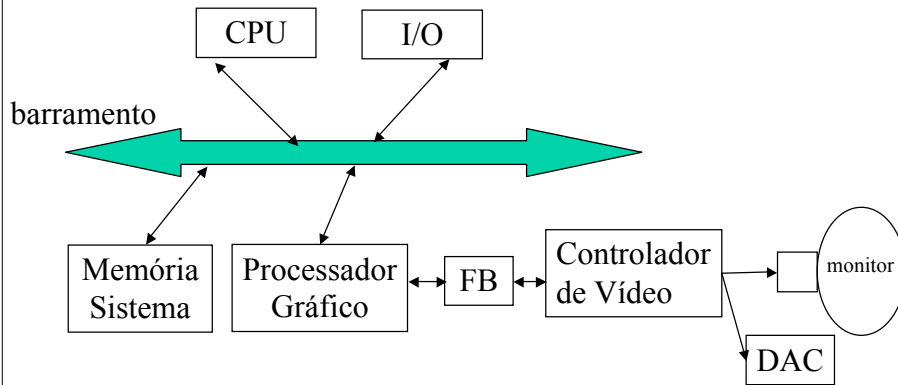


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Arquiteturas Típicas

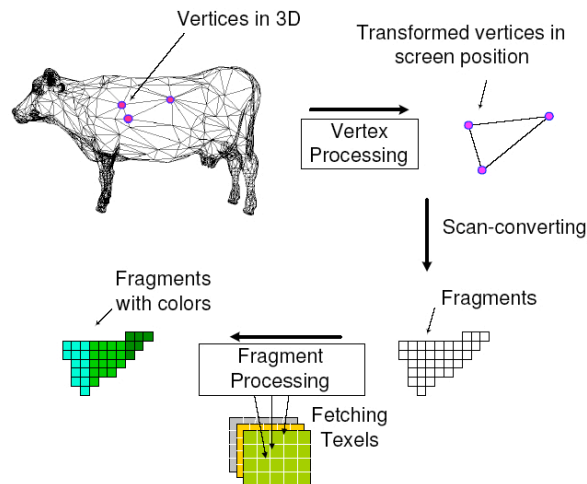
2) Com Processador Gráfico



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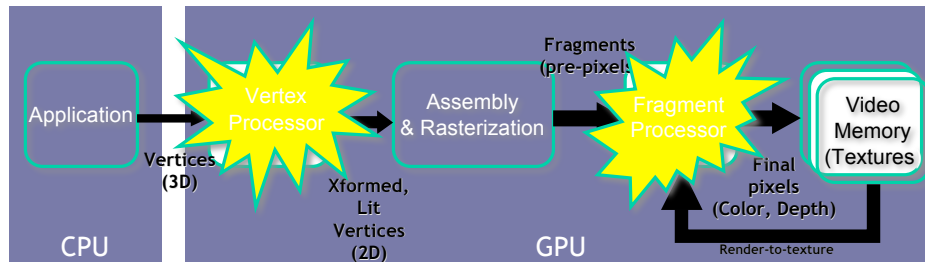
Graphics Pipeline



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Graphics Pipeline: The Big Picture



GPU is a stream processor

- *Multiple programmable processing units*
- *Connected by data flows*

Breve Histórico GPUs Nvidia

Ano	Modelo	Processo	#Trans	Mpixels/s	pipes	
1998	RivaZX	0.25	5M	250		
1999	TNT2	0.22	9M	480		
2000	GeForce2 GTS	0.18	25M	800		
2001	GeForce3	0.15	57M	800		**
2002	GeForce4 Ti	0.15	63M	1000	4	
2003	GeForce 5900	0.13	125M	1600	4/8	
2005	GeForce 6800	0.13	222M	3900	16	
2006	GeForce 7800	0.09	302M	6400	24	\$599

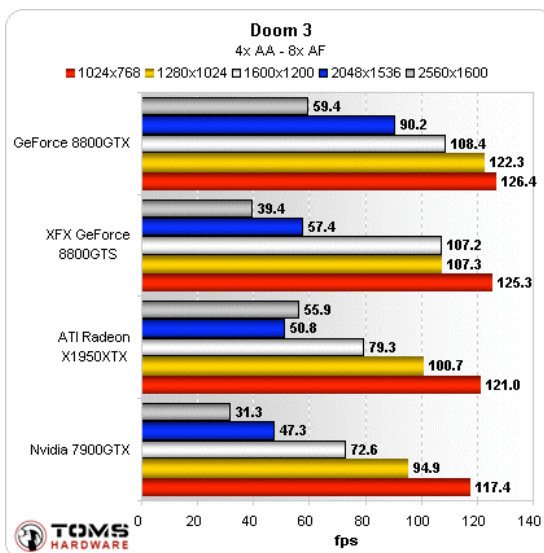
Placas Gráficas



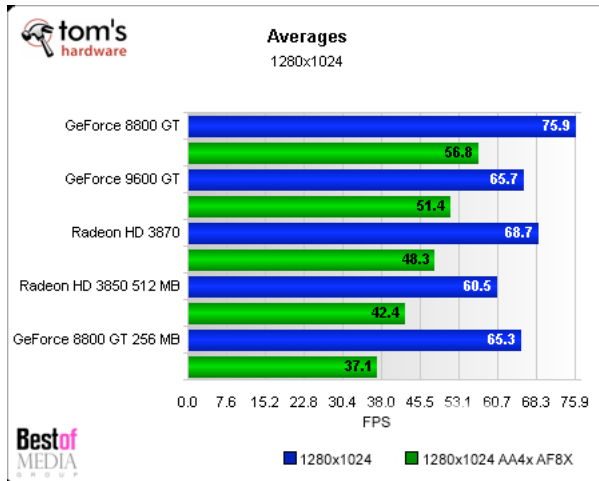
- GeForce 8800GTX
 - Nov. 2006 - US\$599
 - 128 processadores
 - 768MB memória
 - 681 milhões de transistores
 - 10.800 milhões vértices por segundo



Benchmark



Series 9000 9600 GT



The raw processing power of this G94 is still a full 38% lower than that of the 8800 GT.

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Series 9000 9600 GT

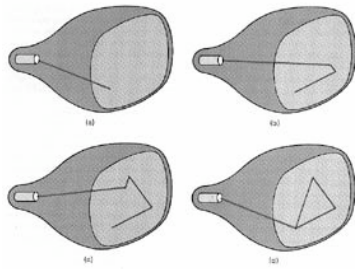
Stream Processors	64
Core Clock (MHz)	650 MHz
Shader Clock (MHz)	1625 MHz
Memory Clock (MHz)	900 MHz
Memory Amount	512MB
Memory Interface	256-bit
Memory Bandwidth (GB/sec)	57.6
Texture Fill Rate (billion/sec)	20.8



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Tecnologia de output



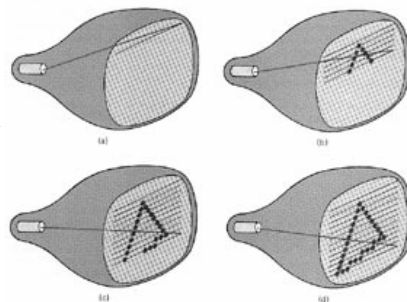
- (Anos 60) Vector systems
 - Processador de display (I/O) conectado na CPU
 - Especificação em alto-nível (início linha, final linha)

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Tecnologia de output

- (Anos 70) Raster systems
 - Tecnologia baseada em TV (tecnologia raster onde linhas são traçadas horizontalmente)



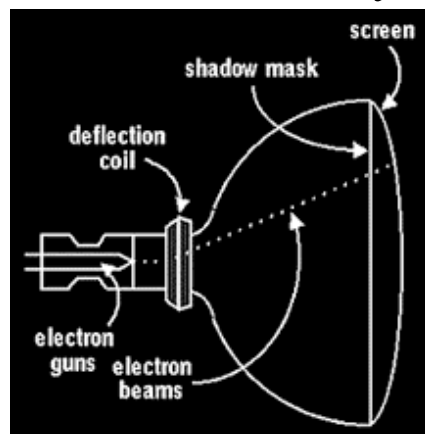
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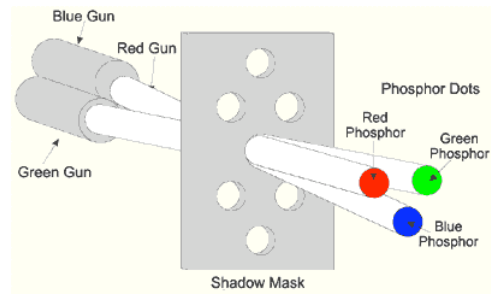
Componentes

- Frame-Buffer
- Conversor DAC
- Monitor de Vídeo
 - CRT
 - Controlador de Vídeo

Tubo de Raios Catódicos (CRT - Cathode Ray Tube)



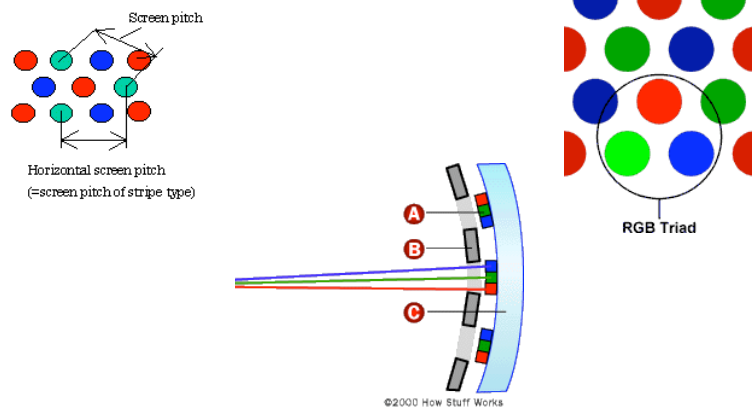
Shadow Mask



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Pitch/Triad



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Monitores



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Conversão FB/Monitor

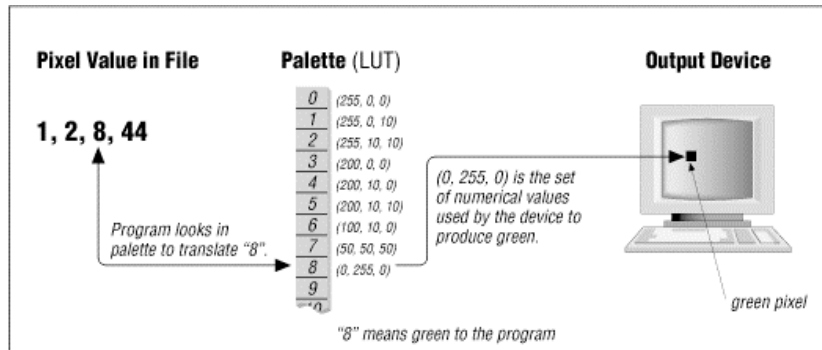
- Diretamente
 - Cada informação de cor do pixel é utilizada diretamente para ativar os fósforos no monitor
 - Por exemplo: $r=0.5$, $g=0.9$, $b=0.05$
 - Canhão Red com 50% da capacidade, Green com 90% e Blue com 5%

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Conversão FB/Monitor

- Indiretamente



Exemplo de LUT:
216 Entradas
24 bits por entrada

FFFFF	FF99FF	CCFFFF	CC99FF	99FFFF	9999FF	66FFFF	6699FF	33FFFF	3399FF	00FFFF	0099FF
FF99CC	FF99CC	CCFFCC	CC99CC	99FFCC	9999CC	66FFCC	6699CC	33FFCC	3399CC	00FFCC	0099CC
FF9999	FF9999	CCFF99	CC9999	99FF99	999999	66FF99	669999	33FF99	339999	00FF99	009999
FF9966	FF9966	CCFF66	CC9966	99FF66	999966	66FF66	669966	33FF66	339966	00FF66	009966
FF9933	FF9933	CCFF33	CC9933	99FF33	999933	66FF33	669933	33FF33	339933	00FF33	009933
FF9900	FF9900	CCFF00	CC9900	99FF00	999900	66FF00	669900	33FF00	339900	00FF00	009900
FFCCFF	FF99FF	CC99FF	CC99FF	99CCFF	9999FF	66CCFF	6699FF	33CCFF	3399FF	00CCFF	0099FF
FFCCCC	FF33CC	CC99CC	CC99CC	99CC99	9999CC	66CC99	6699CC	33CC99	3399CC	00CC99	0099CC
FFCC99	FF3399	CC9999	CC9999	99CC99	999999	66CC99	669999	33CC99	339999	00CC99	009999
FFCC66	FF3366	CC9966	CC9966	99CC66	999966	66CC66	669966	33CC66	339966	00CC66	009966
FFCC33	FF3333	CC9933	CC9933	99CC33	999933	66CC33	669933	33CC33	339933	00CC33	009933
FFCC00	FF3300	CC9900	CC9900	99CC00	999900	66CC00	669900	33CC00	339900	00CC00	009900
FF99FF	FF99FF	CC99FF	CC99FF	9999FF	9999FF	6699FF	6699FF	3399FF	3399FF	0099FF	0099FF
FF99CC	FF99CC	CC99CC	CC99CC	9999CC	9999CC	6699CC	6699CC	3399CC	3399CC	0099CC	0099CC
FF9999	FF9999	CC9999	CC9999	999999	999999	669999	669999	339999	339999	009999	009999
FF9966	FF9966	CC9966	CC9966	999966	999966	669966	669966	339966	339966	009966	009966
FF9933	FF9933	CC9933	CC9933	999933	999933	669933	669933	339933	339933	009933	009933
FF9900	FF9900	CC9900	CC9900	999900	999900	669900	669900	339900	339900	009900	009900