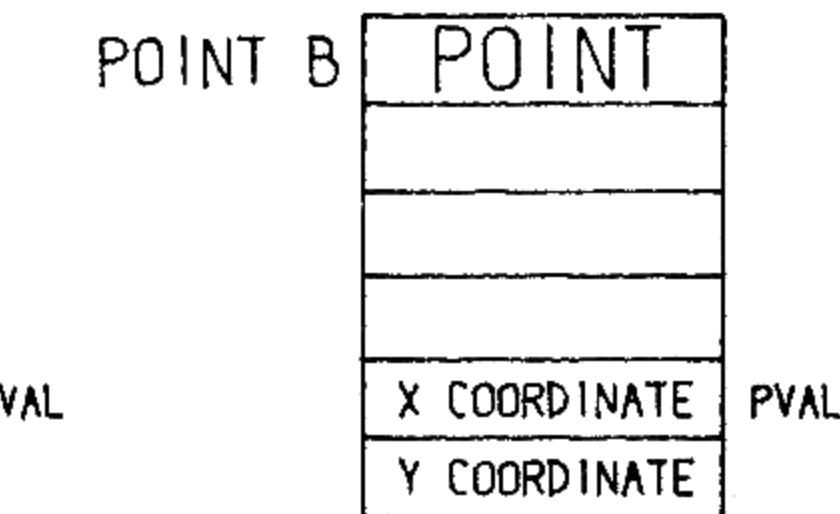
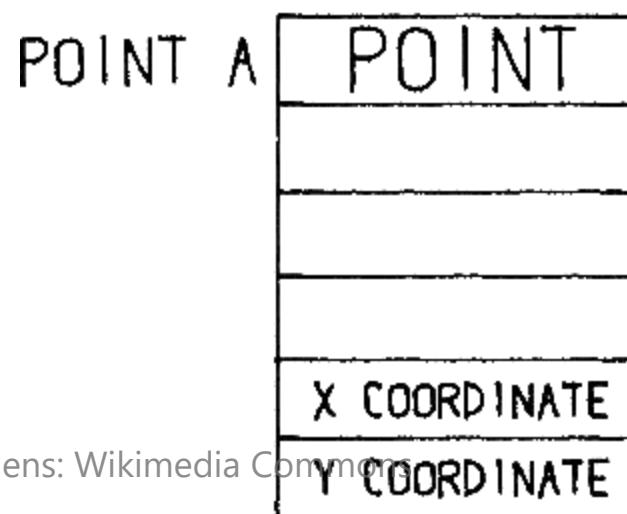
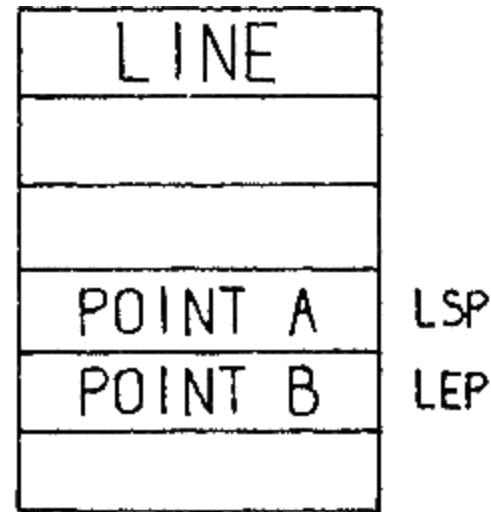


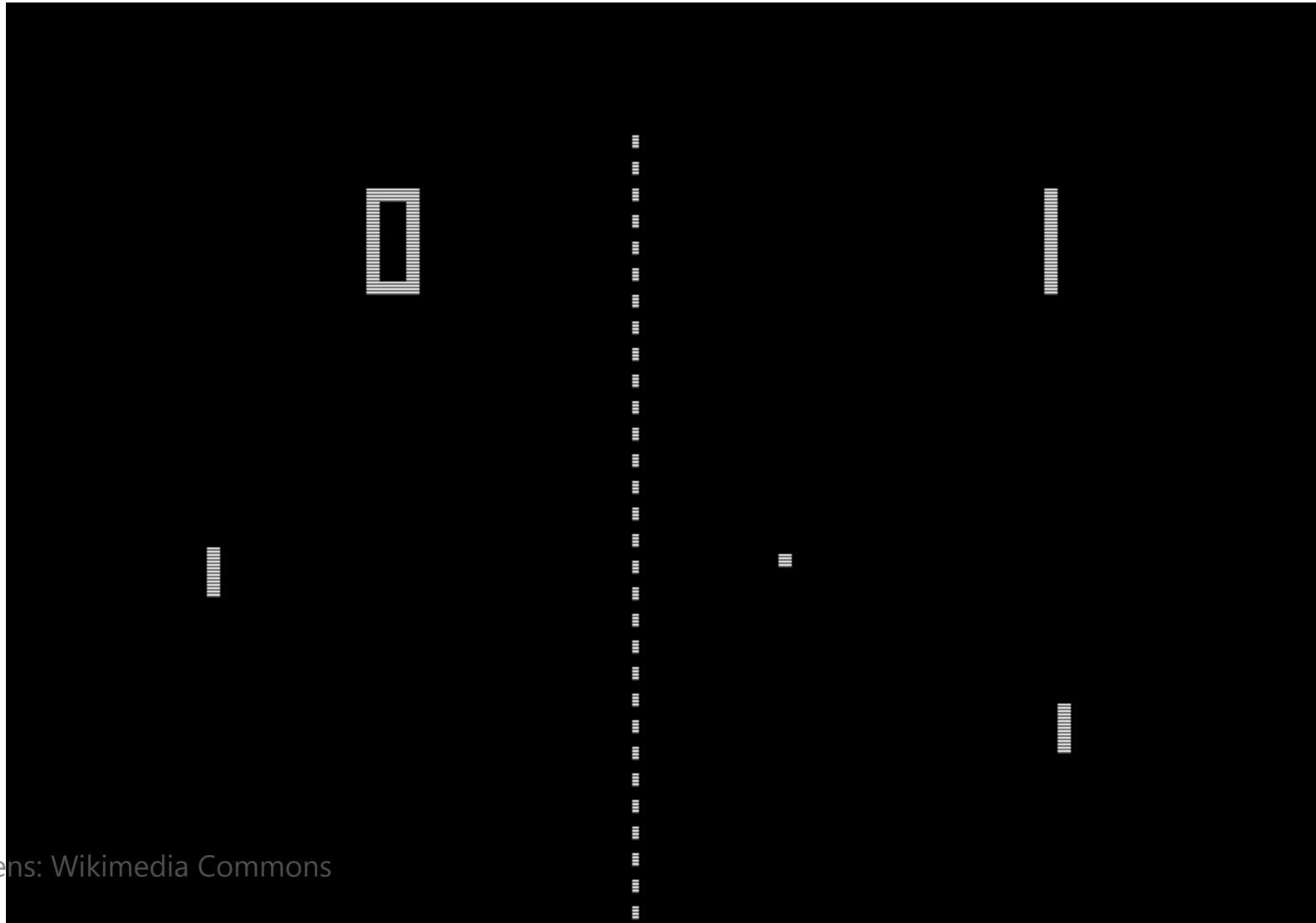
# Breve histórico da Computação Gráfica

Um resumo visual dos marcos principais.

# 1963 — Sketchpad (Ivan Sutherland)



# 1972 — Pong (primeiros jogos gráficos)



# 1984 — Apple Macintosh (GUI no desktop)



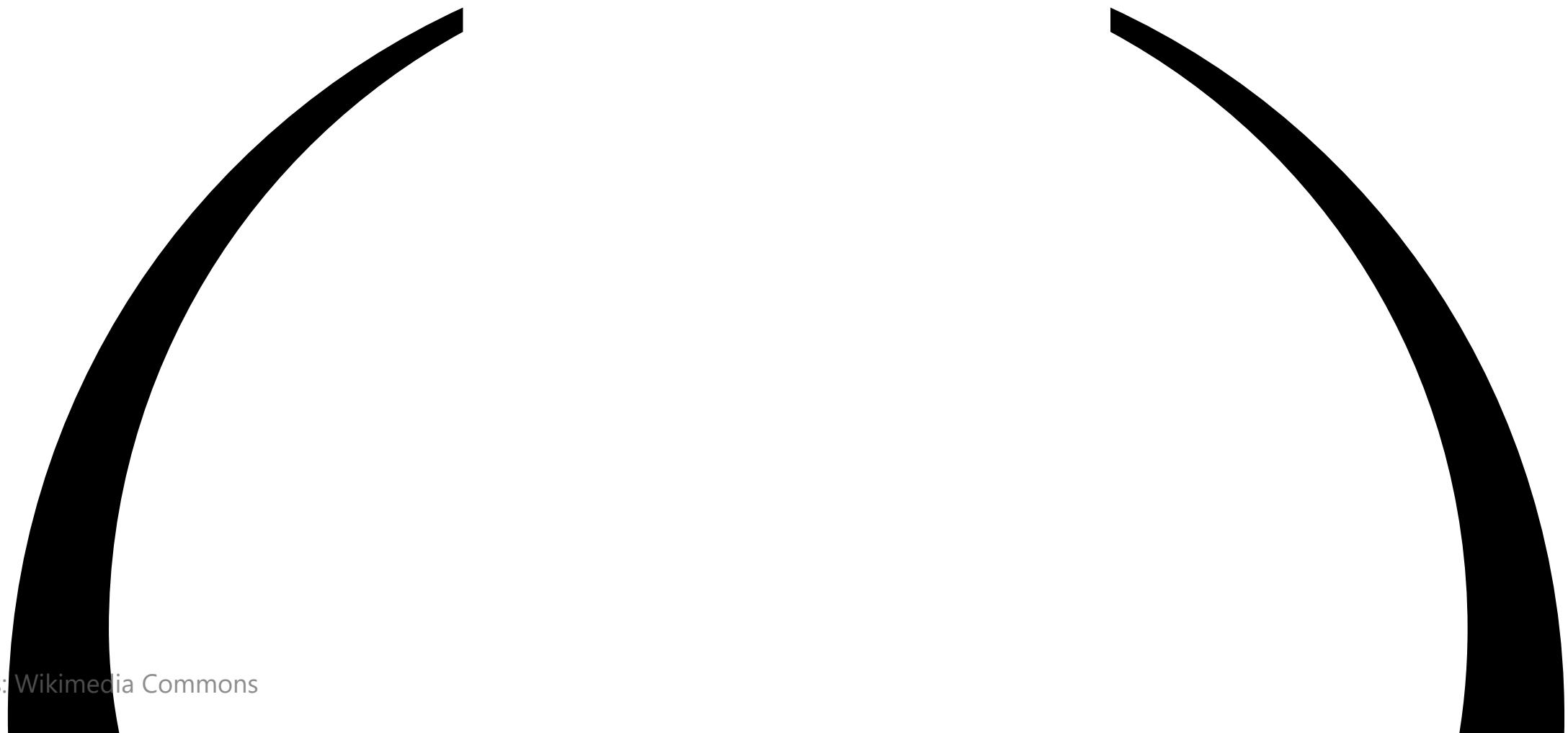
Imagens: Wikimedia Commons

## 1990s — APIs gráficas (OpenGL) e 3D em tempo real



\*\*Importância:\*\* padronização (OpenGL/DirectX), aceleração por hardware e gráficos 3D.

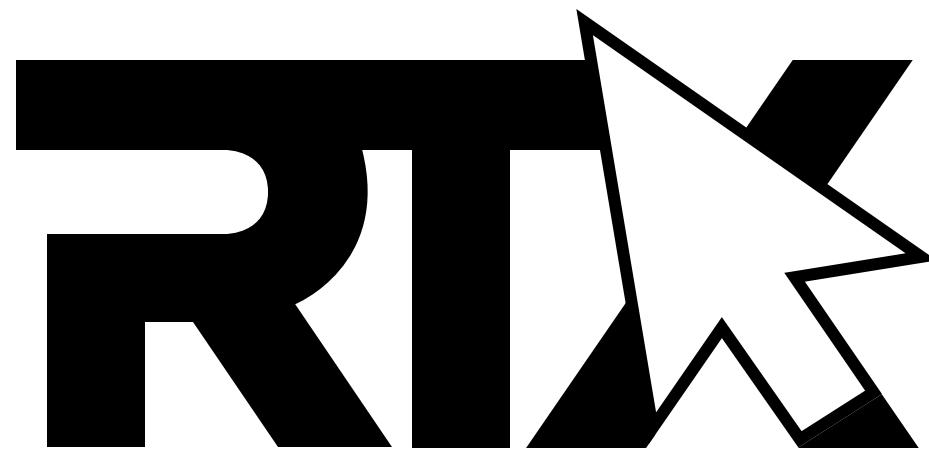
# 1996 — Quake (motores 3D em tempo real)



## ~2016 — Realidade Virtual (HTC Vive)



# Ray tracing em tempo real — NVIDIA RTX (hardware)



## Fotorealismo em tempo real — Unreal Engine (UE)



\*\*Importância:\*\* tecnologias (Nanite, Lumen) aproximando o fotorealismo em tempo real.

# Conclusão

- A computação gráfica evoluiu de interfaces vetoriais experimentais para renderização fotorealista em tempo real.
- Marcos: Sketchpad → GUI (Mac) → APIs 3D (OpenGL/DirectX) → motores 3D (Quake) → GPUs programáveis → VR/RT/UE5.

# Fontes (imagens)

- Sketchpad — Wikimedia Commons. :contentReference[oaicite:0]{index=0} ([https://upload.wikimedia.org/wikipedia/commons/3/33/Sketchpad\\_N-Component\\_Element.png](https://upload.wikimedia.org/wikipedia/commons/3/33/Sketchpad_N-Component_Element.png))
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