

The GPU Game: Who Performs, Who Pays, and Who Wins?"

As AI, gaming, and design applications surge, consumers and developers face a crucial question: Which GPU delivers the best power for the price? This dashboard unpacks the evolving world of GPU hardware — identifying market leaders, spotlighting top performers, and tracking how value-for-money has changed over time.

To build a story that balances performance, pricing, and technical capability, I relied on two key datasets sourced from Kaggle and PassMark. The first contained overall benchmark performance metrics such as G3Dmark and G2Dmark, representing a GPU's general computational strength. The second offered API-specific performance data for CUDA, OpenCL, Vulkan, and Metal — which allowed for nuanced comparisons between how different GPUs perform under different programming environments.

However, these datasets weren't immediately ready for comparison. They required thoughtful cleaning and transformation:

I removed rows with null or irrelevant values to ensure integrity.

I created a new field `gpu_clean` by standardizing GPU names (e.g., removing "GeForce" or "RTX"), enabling us to relate models across datasets.

Transformed text fields into numerical types for analysis in Tableau.

I also calculated a field called `gpuValue_calc`, defined as:

```
IF [Price] > 0 THEN [G3Dmark] / [Price]
```

```
ELSE NULL
```

```
END
```

This field represents the performance-to-cost ratio — giving us a normalized metric to assess whether a GPU is "worth it" beyond just raw power. A GPU with a high `gpuValue_calc` may not top the benchmark charts, but it could be the smartest buy for consumers or developers seeking value. The cleaned and enriched dataset was then exported as a unified Excel workbook, serving as the foundation for all five visual narratives in Tableau.

Act 1: Who Are the Major Players?

Sheet 1: GPU Brand Share

This begins by mapping the market landscape. Understanding which brands dominates the GPU space sets the stage for every following insight. With a simple count of GPU models per brand, we quickly see that NVIDIA holds the lion's share, followed by AMD. Intel and other emerging players make up a much smaller portion.

Chart Used: Bar chart showing number of GPU entries by brand.

Insight: This distribution reflects both market maturity and brand strategy. NVIDIA's broad GPU lineup spans from entry-level consumer cards to enterprise and AI-focused solutions, explaining its dominance in raw count. AMD's share, though smaller, is highly competitive in the gaming segment, often targeting mid-tier and upper-mid-tier price points. Intel's emerging presence marks its attempt to disrupt the duopoly with its ARC series — a narrative worth watching in future GPU generations. This opening visualization anchors the story in the industry's competitive dynamics.

Act 2: The Heavy Hitters

Sheet 2: Top 10 GPUs by Performance

I zoomed in to see who's leading the benchmark race. The G3Dmark metric offers a unified score for general computational performance, making it an excellent yardstick for power users. Top contenders include NVIDIA's RTX 3090 Ti and 3080 Ti, with AMD's Radeon RX 6900 XT holding strong.

Chart Used: Horizontal bar chart showing G3Dmark scores of the top 10 GPUs.

Insight: High G3Dmark scores correlate with recent architectures like NVIDIA's Ampere and AMD's RDNA2. These GPUs are designed for high-end gaming, 3D rendering, and AI workloads. However, this sheet also reveals a crucial trade-off — most of these top-tier performers come at a premium, highlighting the distinction between power and value.

This sets up the next part of our narrative: not just how much performance you get, but how much you're paying for it.

Act 3: Performance vs Price — The Trade-Off

Sheet 3: Performance vs Price Scatter Plot

A GPU can be powerful, but is it worth the price? This visualization addresses that core trade-off. By plotting each GPU's benchmark score against its market price, we expose pricing strategies and efficiency tiers.

Chart Used: Scatter plot with brand-specific trend lines.

Insight: Trend lines reveal brand philosophies: NVIDIA's upward-sloping trend line reflects a market strategy that equates higher performance with premium pricing — typical of its flagship products. AMD's flatter curve suggests a focus on accessibility and maximizing value, making it a go-to for users who want strong performance at reasonable prices. Outliers, like Quadro and Tesla GPUs, tell their own story: these are built for specialized use cases like deep learning or visualization, and their high costs make them less attractive for general consumers. This visual helps decode the business strategies embedded in GPU pricing.

Act 4: Performance by Software API

Sheet 4: API-Specific Performance

Not all GPUs excel in the same environments. CUDA, Vulkan, Metal, and OpenCL represent different ecosystems — each relevant depending on whether you're developing AI, gaming, or using creative tools.

Chart Used: Grouped bar chart comparing average performance across APIs.

Insight: NVIDIA leads in CUDA performance — not surprising, as CUDA is their proprietary framework and the standard for machine learning, scientific computing, and professional AI research. AMD's dominance in Vulkan shows its alignment with open, cross-platform gaming standards. OpenCL levels the playing field, offering a glimpse of how each manufacturer fares in open-compute contexts. Metal, exclusive to Apple ecosystems, remains limited in adoption but highlights the growing specialization of GPUs. This visualization is key for developers choosing hardware based on software compatibility, not just raw speed.

Act 5: The Value Story — Is It Getting Better?

Sheet 5: Value-for-Money Over Time (with Forecast)

Are GPUs becoming a better deal? A look at value-per-dollar over time shows progress — especially from AMD. NVIDIA improves too, but the price tag tells its own story.

Chart: Line chart of AVG(gpuValue_calc) by release year, with forecast lines and confidence bands.

Insight: The trend line clearly shows that GPUs are delivering more performance per dollar over time. The upward trajectory indicates that both AMD and NVIDIA are optimizing their designs — but AMD's slope is steeper, implying more aggressive pricing or performance gains. The forecast (enabled via Tableau's exponential smoothing model) projects this trajectory forward, suggesting that GPU affordability may continue to improve. This is a key takeaway for value-conscious buyers and policy makers monitoring hardware accessibility.