# NVIDIA GPU Performance Optimization Analysis

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https://github.com/bradhaskell/nvidia-gpu-performance-optimization-analysis

# GPU comparative analysis for NVIDIA development

- Helping: NVIDIA product & performance team

- Advancing: GPU enthusiast knowledge on performances

- Solving: GPU pricing & performance decisions

- Solution: SQL analysis of extracted data for R&D insights

# Data Engineer for NVIDIA aligns with project goals

- Job: Data Engineer at NVIDIA

- Skills: ELT pipeline, SQL, Python, DBMS & Looker

- Data: GPU specs, pricing & FPS performance

- Visuals: Pipeline diagrams & dashboards

NVIDIA Diag Team is now seeking an extraordinary Data Engineer to build up a data platform enabling advanced and intelligent log data analysis to assist engineers in solving GPU server manufacturing challenges. We aim at delivering a platform to streamline the server manufacturing process. As a data engineer, you will partner with Data Scientists, engineers, and key stakeholders to design and implement the data architecture turning data into insights for opportunities of optimization and efficiency in the server manufacturing process.
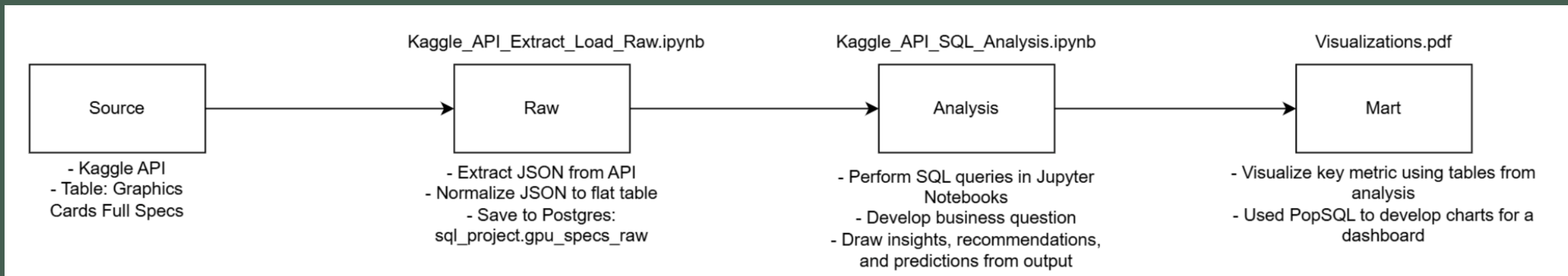
**What you'll be doing:**

- Build up robust, flexible, idempotent ELT data pipelines
- Ensure the data integrity and keep queries performant per database's indexing, partitioning, clustering, caching characteristics
- Adopt best practices to secure data access internally and externally and identify potential security leaks with proposed solutions
- Maintain and operate performant reporting system and interactive analytical dashboard given different business requirement
- Solve data-related bugs in a timely manner
- Enable the architecture and the use of off-the-shelf technologies for rolling update with minimal downtime

**What we need to see:**

- BS or MS degree in one of the areas of Electrical Engineering, Computer Engineering, Computer Science (or equivalent) with 5+ years of meaningful work experience
- Skillful in SQL and relational databases systems
- Demonstrable production experience in custom ELT design, implementation, maintenance, and performance tuning
- Familiar with workflow management engines (i.e. Airflow, Luigi, Prefect, Dagster, and etc)
- Extensive experience in Data Modeling for different database systems
- Solid hand-on experience in tuning database systems read/write performances

# GPU specs data was collected using Kaggle API

- Source: Kaggle, Graphics Cards Full Specs

- Relevant Fields: Product Details, Memory Details, Clock Details, Performance Specs, Chip Details

- Job Relevance: Mirrors product-level spec analysis
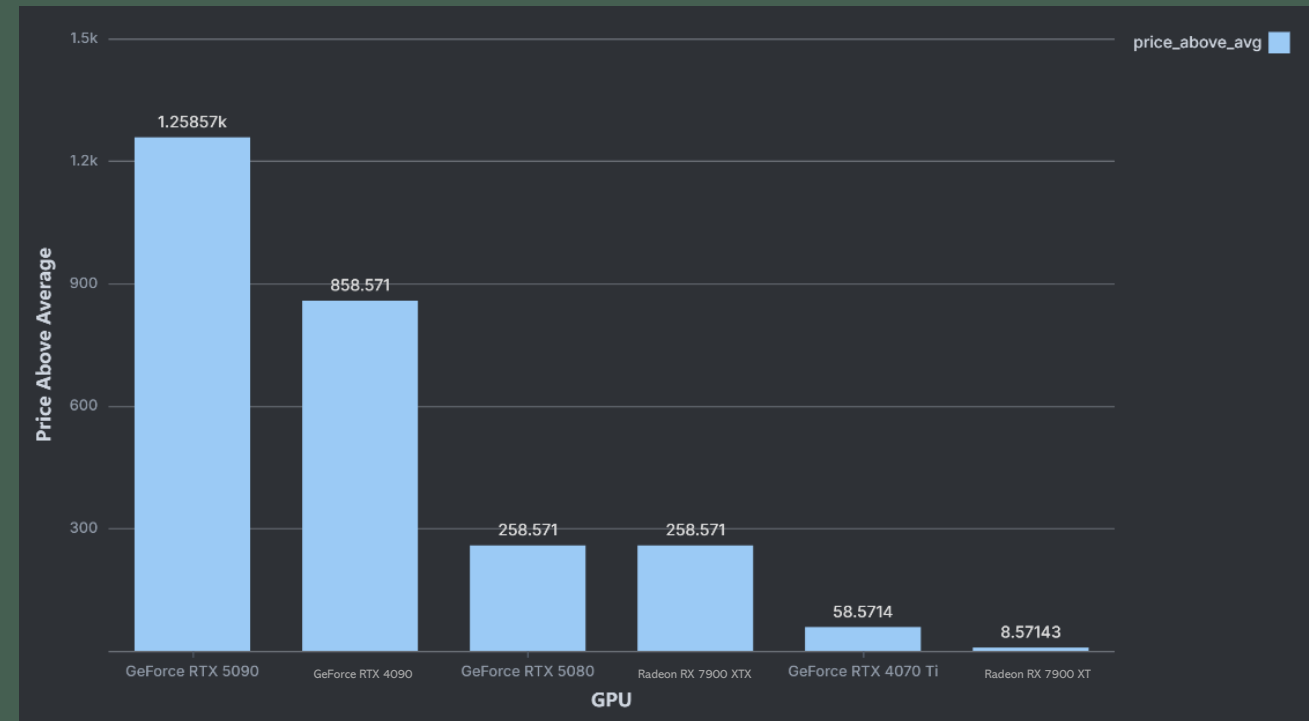
- Pipeline Diagram:

# GPU memory correlates with sales price increases

- Business question: Is MSRP affected by memory size and clock speed?

- Recommendation: Market high-memory GPUs at a premium price

- Prediction: NVIDIA can earn more in sales with high-memory cards priced accordingly
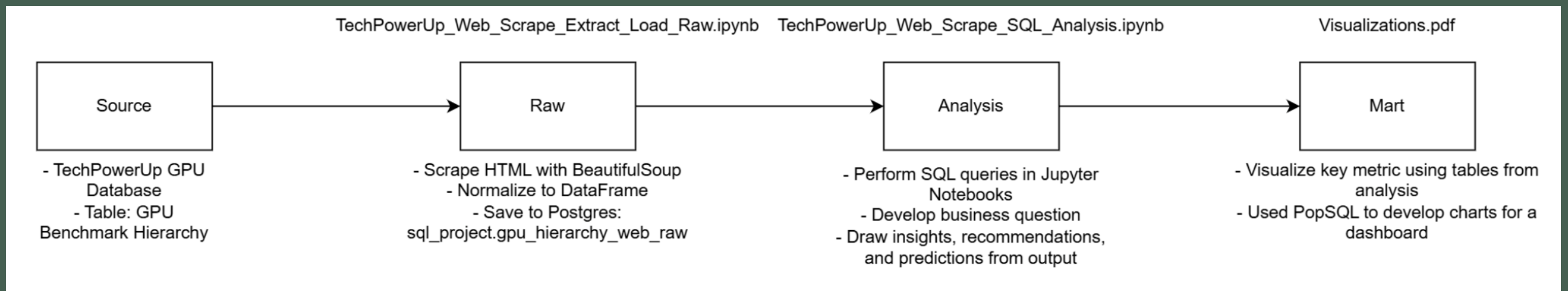
# GeForce RTX 5090 & 4090 priced well above average

- Business Question: Do top-tier models justify higher pricing?

- Recommendation: Continue focusing high-end pricing with higher memory models

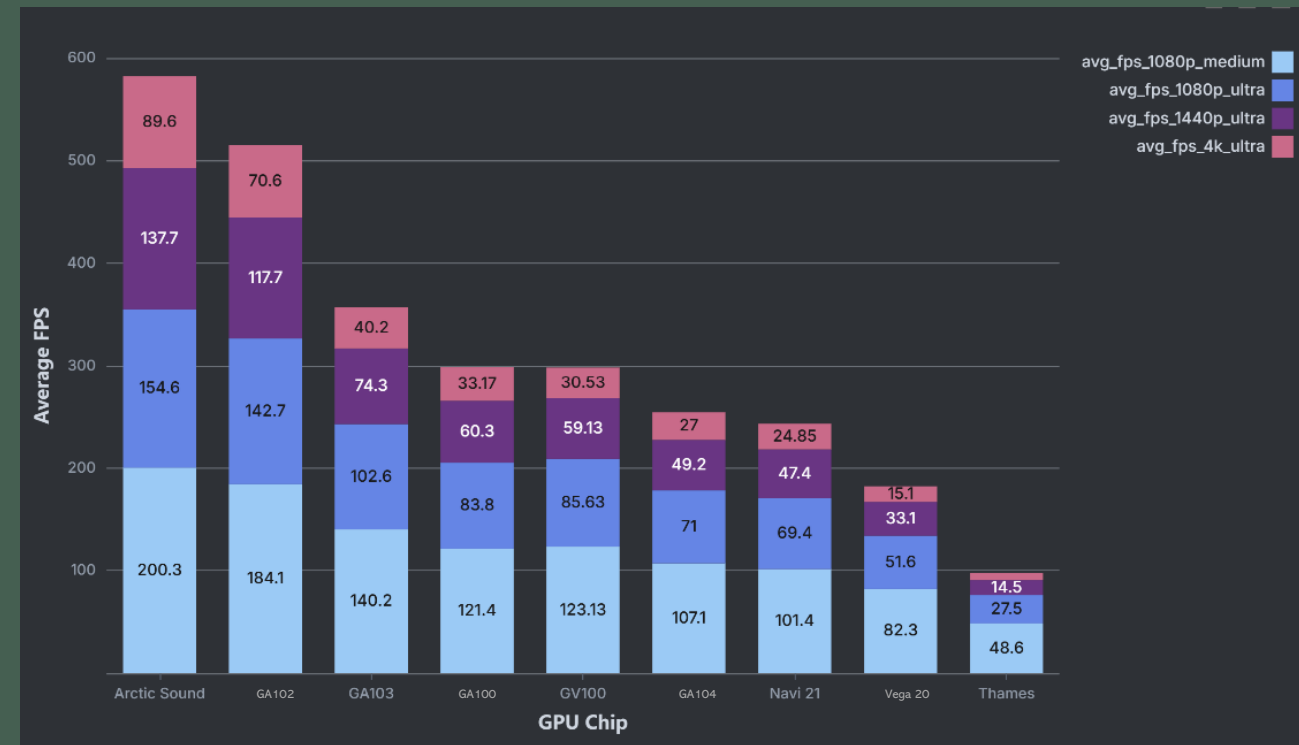- Prediction: GPU enthusiasts will prioritize buying high memory models

# GPU price and FPS data scraped with BeautifulSoup

- Source: Tom's Hardware, GPU Benchmark Hierarchy

- Relevant Fields: Product Details, Pricing Details, FPS Resolutions

- Job Relevance: GPU chip analysis for real-world performances

- Pipeline Diagram:



TechPowerUp_Web_Scrape_Extract_Load_Raw.ipynb    TechPowerUp_Web_Scrape_SQL_Analysis.ipynb    Visualizations.pdf

**Source**
- TechPowerUp GPU Database
- Table: GPU Benchmark Hierarchy

**Raw**
- Scrape HTML with BeautifulSoup
- Normalize to DataFrame
- Save to Postgres: sql_project.gpu_hierarchy_web_raw

**Analysis**
- Perform SQL queries in Jupyter Notebooks
- Develop business question
- Draw insights, recommendations, and predictions from output

**Mart**
- Visualize key metric using tables from analysis
- Used PopSQL to develop charts for a dashboard

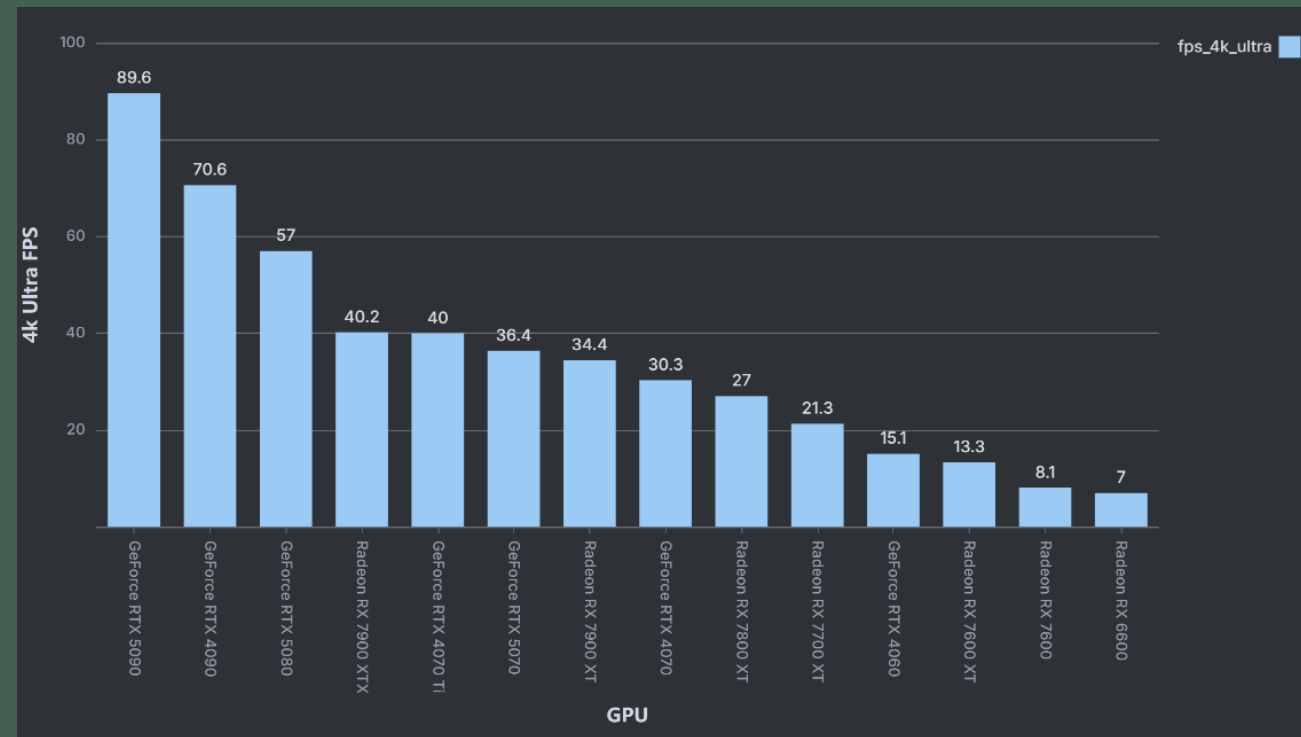# Arctic Sound and GA102 GPU chips show high FPS

- Business Question: Which chips produce the top FPS?

- Recommendation: Prioritize Arctic Sound and GA102 for best performance

- Prediction: FPS benchmarks will drive consumer demands leading to more sales

# NVIDIA has impressive FPS using quality GPU chips

- Business Question: Where does NVIDIA rank among competitors in FPS?

- Recommendation: Continue developing GPUs with good chip quality

- Prediction: Continuous high FPS performances will increase sales

# NVIDIA specs and FPS drives high sales and quality

- Combined API & benchmark data sources

- Analyzed NVIDIA GPUs from specs to FPS

- Found strong links between memory & MSRP / chips & performance

- Demonstrated real world SQL analysis & pipeline skills

- Showed value through data driven product insights