



Balancing Performance and Cost: The Role of COTS GPUs in Medical Imaging

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Background/Problem Being Solved

Advanced imaging technologies in healthcare imaging imposes the use of high-performance graphics processing units (GPUs) that meet rigorous standards for reliability, precision, and regulatory compliance. However, medical-grade GPUs are often expensive. This financial burden can strain the budgets of healthcare institutions, potentially limiting access to imaging solutions. As healthcare systems worldwide struggle with increasing costs, finding cost-effective alternatives have become imperative. Commercial off-the-shelf (COTS) GPUs, primarily developed for gaming and general computing, present a potential solution to this problem. These GPUs are mass-produced, widely available, and less expensive than their medical-grade counterparts. However, adopting COTS GPUs in healthcare imaging raises concerns about their ability to meet performance standards and regulatory requirements.

Intervention(s)

The analysis focused on computational speed, accuracy, and compatibility with existing imaging applications. Testing was completed to simulate real-world scenarios, such as 3D rendering and real-time processing. Additionally, compatibility testing was prioritized to demonstrate how well COTS GPUs integrate with existing hardware and software in imaging healthcare settings. This included evaluating their interoperability with picture archiving and communication systems (PACS) and DICOM (Digital Imaging and Communications in Medicine) images.

Barriers/Challenges

A primary concern was the inability to meet the stringent regulatory requirements imposed on medical devices, which are critical for ensuring patient safety and data integrity. Another significant challenge was ensuring consistent performance and reliability. While COTS GPUs excel in gaming and general computing tasks, their performance can be inconsistent under the high computational loads typical of medical imaging applications. Furthermore, resistance from stakeholders also posed a barrier, as they were hesitant to deviate from established norms and adopt unproven solutions.

Outcome

The study revealed the importance of rigorous testing and strategic implementation. Healthcare organizations that adopted COTS GPUs reported positive outcomes, including enhanced operational efficiency and optimized budgets. However, the study also reinforced the need for ongoing monitoring and periodic re-evaluation to ensure that performance and reliability remain aligned with evolving medical standards.

Conclusion/Statement of Impact/Lessons Learned

The adoption of COTS GPUs in medical imaging can provide cost reduction and improved access to advanced technologies. This approach enables healthcare providers to allocate resources more efficiently, potentially broadening access to innovative imaging solutions. This study emphasizes the importance of balancing cost savings with performance and regulatory compliance. Rigorous testing, stakeholder engagement, and the development of standardized evaluation protocols are crucial for the successful integration of COTS GPUs into medical workflows.

Keywords

Administration & Operations; Standards & Interoperability