AI Inference Server with Dual Graphics Cards

Article Overview

A dual-GPU AI inference server allows you to run larger models by combining VRAM, but performance gains depend on model size, parallelism method, and software support.

Key Considerations for Dual-GPU AI Servers

VRAM and Model Size: Dual GPUs primarily increase total VRAM, not raw speed. For example, two RTX 3090 cards (24GB each) provide 48GB total, enough to run 70B parameter models at Q4 quantization, whereas a single card would be insufficient . This is crucial for large LLMs like Llama 70B or Qwen 72B. GPU Selection: Popular choices for dual-GPU setups include:

o NVIDIA RTX 3090/Ti (24GB)
o NVIDIA RTX 4090 (24GB)
o NVIDIA RTX 5090 (32GB)
o AMD Radeon 7900 XTX (24GB)
o Intel Arc A770 (16GB) Mixed GPU setups (e.g., 1x 3090 + 1x 4090) are possible but require careful pipeline parallelism configuration . Motherboard and PCIe Requirements: Ensure the motherboard has high-bandwidth PCIe slots with enough spacing for airflow. Dual GPUs typically run at x8 + x8 on PCIe 4.0 or 5.0. Some large cards like RTX 4090 may require vertical placement or riser cables . Power Supply and Cooling: A robust PSU is essential to handle both GPUs at full load. Adequate cooling and airflow are critical, especially for high-end cards that occupy multiple slots . Software Support: Multi-GPU inference requires frameworks that support model splitting:
o llama.cpp and Ollama handle multi-GPU automatically.
o vLLM offers fine-grained control for production serving.
o Pipeline parallelism is preferred for consumer PCIe setups, while tensor parallelism is better suited for NVLink configurations . Performance Expectations: Dual GPUs do not double inference speed due to communication overhead and PCIe bandwidth limits. Expect moderate speed improvements, but the main benefit is the ability to run larger models that exceed a single GPU's VRAM . Cost-Effectiveness: For personal or small-team experiments, dual consumer GPUs like RTX 4090 or 3090 provide a practical balance of VRAM, performance, and cost. Full-scale training of very large models still requires professional GPUs like A100 or H100 clusters .

Recommended Setup Example

o GPUs: 2x RTX 4090 (48GB total VRAM)
o CPU: Intel i9-13900K or AMD Ryzen 7950X
o Motherboard: Dual PCIe 4.0 x8 + x8 slots

o RAM: 128GB DDR5
o Storage: NVMe SSDs for fast model loading
o Software: llama.cpp or vLLM for inference, DeepSpeed for training offload This configuration can handle 70B-level models at 4-bit quantization and smaller models at near-lossless precision, making it suitable for local AI inference and small-scale fine-tuning . In summary, a dual-GPU AI inference server is ideal for running large LLMs locally, provided you carefully consider VRAM requirements, GPU compatibility, motherboard PCIe lanes, power, cooling, and software support. Properly configured, it enables efficient inference of models that would otherwise exceed a single GPU's capacity.

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