NVIDIA CUDA-X REPORT

INTRODUCTION

NVIDIA CUDA-X which is built on top NVIDIA CUDA is a large collection of libraries, tools and technologies that deliver dramatically higher performance compared to CPU-based alternatives- across multiple application domains from artificial intelligence (AI) to high performance computing (HPC).

MATH LIBRARIES

GPU-accelerated math libraries lay the foundation for the involvement of intense-computing applications like molecular dynamics, computational fluid dynamics, computational chemistry, medical imaging, etc. These libraries include cuBLAS, cuFFT, CUDA Math Library, cuRAND, cuSOLVER, cuSPARSE, cuTensor, AmgX.

DEEP LEARNING LIBRARIES

These are the gpu-accelerated libraries for deep learning applications that leverage CUDA and specialized hardware components of GPUs. Some of the libraries include NVIDIA cuDNN, NVIDIA TensorRT, NVIDIA Jarvis, NVIDIA Deepstream SDK, NVIDIA DALI.

PARALLEL ALGORITHM LIBRARIES

GPU-accelerated libraries of highly efficient parallel algorithms for several operations in C++ and for use with graphs when studying relationships in natural sciences, logistics, travel planning, and more. Thrust is a library of data structures and parallel algorithms, it provides a flexible and high-level interface for GPU programming that enhances developer productivity.

IMAGE-VIDEO LIBRARIES

GPU-accelerated libraries for image and video decoding, encoding, and processing that leverage CUDA and specialized hardware components of GPUs. Some libraries include nvJPEG, NVIDIA Performance Primitives, NVIDIA Video Codec SDK, NVIDIA Optical FLow SDK.

COMMUNICATION LIBRARIES

Performance-optimized multi-GPU and multi-node communication primitives. The provided libraries include NVSHMEM and NCCL.