RAPIDS

21.06 Release

@RAPIDSai

https://github.com/rapidsai

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RAPIDS

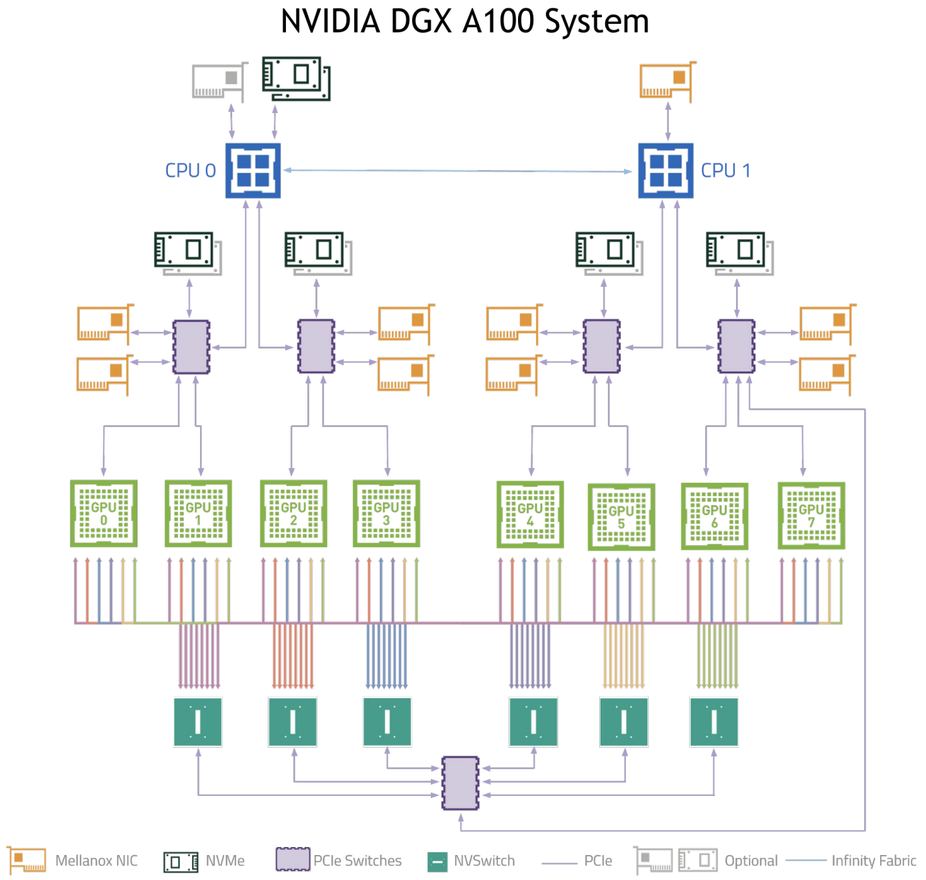
https://rapids.ai

Why GPUs for Data Science?

Numerous hardware advantages

- Thousands of cores with up to ~20 TeraFlops of general purpose compute performance
- Up to 1.5 TB/s of memory bandwidth
- Hardware interconnects for up to 600 GB/s bidirectional GPU <--> GPU bandwidth
- Can scale up to 16x GPUs in a single node

Almost never run out of compute relative to memory bandwidth!



What is RAPIDS?

End-to-End GPU Accelerated Data Science

cuDF

- GPU-accelerated ETL functions
- Tracks pandas and other common PyData APIs
- Dask + UCX integration for scaling

cuML

- GPU-native ML library, including XGBoost, FIL, HPO, and more

cuGraph

- GPU graph analytics, including TSP, PageRank, and more

cuxfilter

- GPU-accelerated cross-filtering

pyViz integration

- Plotly Dash, Bokeh, Datashader, HoloViews, hvPlot

Domain-Specific Libraries

CLX + Morpheus
Cyber log processing + anomaly detection

cuStreamz
Streaming analytics

cuSignal
Signals processing

cuCIM
Computer vision & image processing primitives

...and more!

cuSpatial
Spatial analytics

node-RAPIDS
Bindings for node.js

Overview of Changes: RAPIDS 21.06 Release

- **RAPIDS+Dask** Updated memory spilling (JIT_UNSPILL) to use compatibility mode; added capability to benchmarks; added support for CUDA Async Memory Resource; UCX usability improvements including clean endpoint shutdown and documentation;
- **cuDF** Additional support for fixed-point decimal types in Python; more groupby and join aggregations; more functionalities for list and string type operations in Python; expanded dictionary type operations in C++;
- **cuML** New HDBSCAN model; major improvements to Random Forest; single-linkage hierarchical clustering; sample weights for logistic regression; major improvements to build system;
- **XGBoost** 1.4.2 ships with 21.06, including improvements to Dask integration and prediction functions;
- **cuGraph** Single and Multi GPU Weakly Connected Components; graph batching for C++; multi-column support; Bipartite graph structures; continued improving graph primitives for performance
- **CLX** URL processing for DGA detection; added Multiclass Sequence Classifier; enhanced Lightweight Online Detector of Anomalies
- **cuCIM** Multiple GPU accelerated computer vision and image processing primitives for N dimensional images
- **Morpheus** using RAPIDS libraries; early access available on June 15th 2021

cuDF Updates: Deep Dive

Release 21.06

Features added in 21.06

- Decimal data type is now supported for *csv* and *orc writer* functions in Python
- *Shift* and multiple cumulative operations for *groupby* aggregation are now available
- Add *join_list_elements*, *getitem*, *concatenate_list_elements* functions to List
- Updates and enhancements of multiple string functionalities

Planned Upcoming Features

- Conditional Joins
- Decimal support for additional cuIO functions
- ORC GDS and struct support
- Update to Arrow 4.0.1
- Support multiple inputs in json reader

cuML Updates: Deep Dive
Release 21.06

Features added in 21.06

- New *Hierarchical Density-Based Spatial Clustering of Applications with Noise (HDBSCAN)* algorithm
- *Fast Fourier Transform accelerated t-Stochastic Neighborhood Embedding (FIt-SNE)*
- New backend to use cuML's *Forest Inference Library (FIL)* in the NVIDIA Triton Inference Server.
- Added *ColumnTransformer* and *FunctionTransformer* functions to cuML's preprocessing module
- New *Random Forest* backend is the default both classification and regression models - provides better performance and accuracy
- Many model-specific improvements! *ARIMA* memory improvements, deterministic mode for UMAP, sample weights for logistic regression, ...

Planned Upcoming Features

- Further enhancements for *Random Forest*, *Forest Inference Library* and *HDBSCAN*
- Sparse *Logistic Regression*
- Weighted multi-node multi-gpu *KMeans*

cuGraph Updates: Deep Dive

Release 21.06

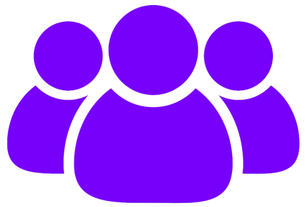
Features added in 21.06

- New Multi GPU implementation of *Weakly Connected Components*
- *Graph Batching* functionality added to libcugraph
- Multi-column support for all cuGraph algorithms
- Bipartite graph structures are now supported in cuGraph
- New padded result set for Random Walk

Planned Upcoming Features

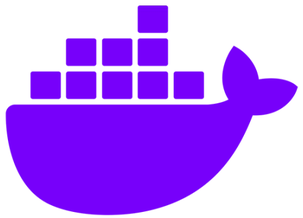
- Depth limit functionality on traversal algorithms
- Batch *Random Walk*
- *Multi-Seed Breadth First Search*
- *Aggregated Traversal Graph Prim*

Join the Conversation



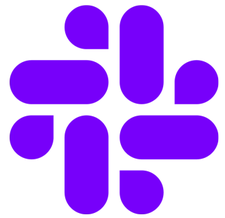
GOOGLE GROUPS

https://groups.google.com/forum/#!forum/rapidsai



DOCKER HUB

https://hub.docker.com/r/rapidsai/rapidsai



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THANK YOU

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