RAPIDS

21.10 Release

@RAPIDSai

https://github.com/rapidsai

https://rapids-goai.slack.com/join

RAPIDS

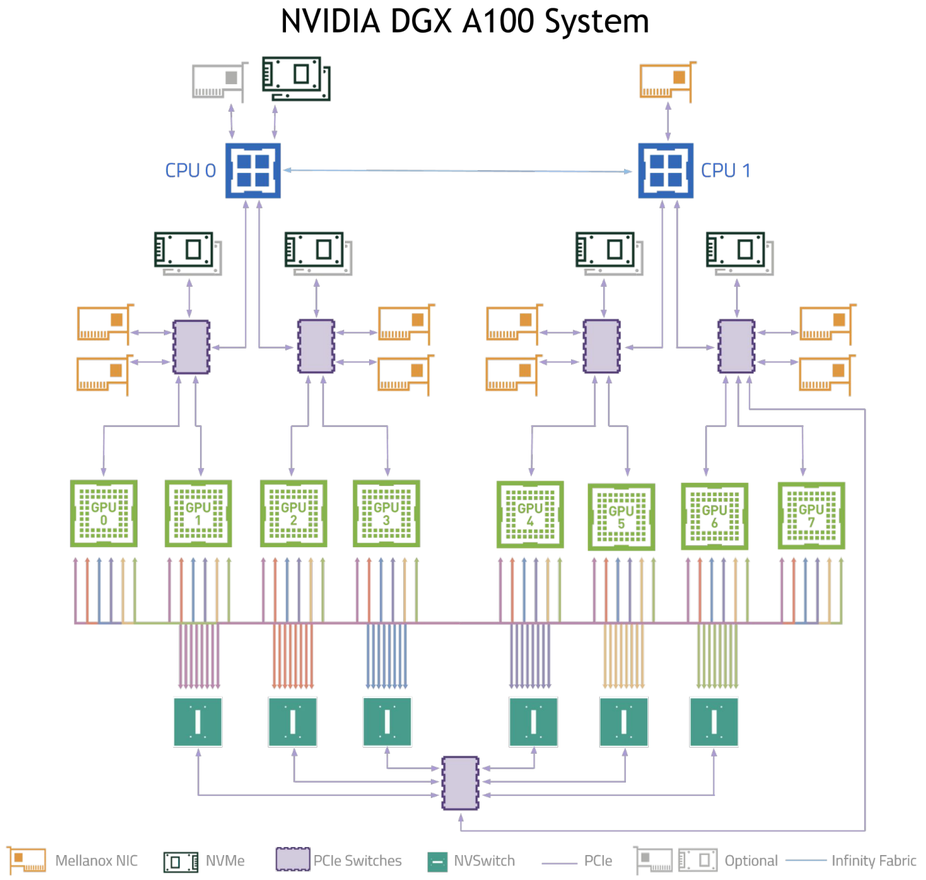
https://rapids.ai

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

RAPIDS ML

- GPU-native cuML library, plus 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 21.10 Release

- **RAPIDS** CUDA 11.4 now supported by RAPIDS
- **RAPIDS+Dask** Support for LocalCUDACluster with MIG; UCX 1.11.1 support
- **cuDF** Map support for ORC Reader; struct support for ORC write; Time series enhancements including support for rolling and grouped rolling variance and standard deviation, groupby first and last aggregations, and datetime manipulations like ceil and days_in_month;
- **cuML** New Categorical and Gaussian Naive Bayes models; categorical features support in FIL; improvements to ARIMA, Random Forest and HDBSCAN; new distances added to pairwise_distances; 2d kNN acceleration via RBC
- **cuGraph** New Sorensen coefficient and weighted Sorensen coefficient features; Biased Random Walks sampling for Graph Neural Networks support added to libcugraph; Improved graph primitives for better memory scaling and multi-node multi-GPU memory footprint improvements for low average vertex degree graphs; Multi-seed BFS, one seed per component, added.
- **CLX** Maintenance to existing code; DGA extended sequence handling; additional notebooks for new use cases
- **cuCIM** Support Runtime Context for CuFileDriver and CuImage; Support raw RGB tiled TIFF

cuDF Updates: Deep Dive

Release 21.10

Features added in 21.10

- Map support for ORC Reader and struct support for ORC writer
- Struct support for *drop_list_duplicates* in libcuDF
- LibcuDF added *interleave_columns* function for struct and lists
- Rolling and grouped rolling variance and standard deviation, and groupby first and last aggregations
- Linear interpolation for filling missing values
- Computing t-digests and approximate percentiles

Planned Upcoming Features

- Expanded support for additional decimal types
- Nested type support for JSON reader
- Enhanced GPUDirect Storage integration
- Map support for ORC writer
- Refactored hash join implementation

cuML Updates: Deep Dive
Release 21.10

Features added in 21.10

- Categorical features support in *FIL*
- Single-GPU implementation of *Categorical and Gaussian Naive Bayes* algorithm
- 2-Dimensional *Random Ball Cover* algorithm for speeding exact Nearest Neighbors
- Added support for hamming, jensen-shannon, kl-divergence, correlation and russellrao distances for *pairwise distance* calculations
- Support for missing observations, padding and exogenous variables for *ARIMA*
- Multiple improvements to *Random Forest* to improve accuracy and performance.

Planned Upcoming Features

- Support for exogenous variables in *ARIMA* and updates for confidence intervals and Kalman filter
- Exposing KL divergence in *TSNE*
- Optimized Linear SVM

cuGraph Updates: Deep Dive

Release 21.10

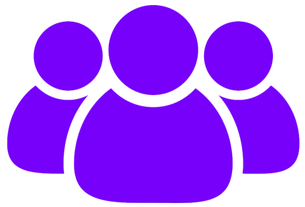
Features added in 21.10

- Single-GPU implementation of *Sorensen coefficient* and *weighted Sorensen similarity coefficient*.
- Added *Biased Random Walks* for Graph Neural Networks in libcuGraph
- Improved graph primitives to support better memory scaling, as well multi-node multi-GPU memory footprint improvements for low average vertex degree graphs
- New end-to-end benchmarking scripts
- Resolve tech debt and enhance the library
- Multi-seed BFS, allow one seed per connected component, add

Planned Upcoming Features

- *Multi-GPU graph primitives for Triangle Counting, Symmetrize, and Transpose*
- *Multi-GPU HITS*
- *SG node2vec graph sampling*

Join the Conversation



GOOGLE GROUPS

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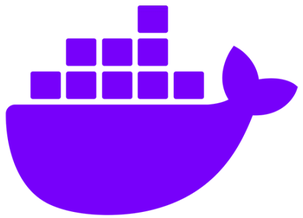
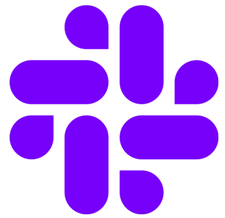


DOCKER HUB

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



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THANK YOU

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