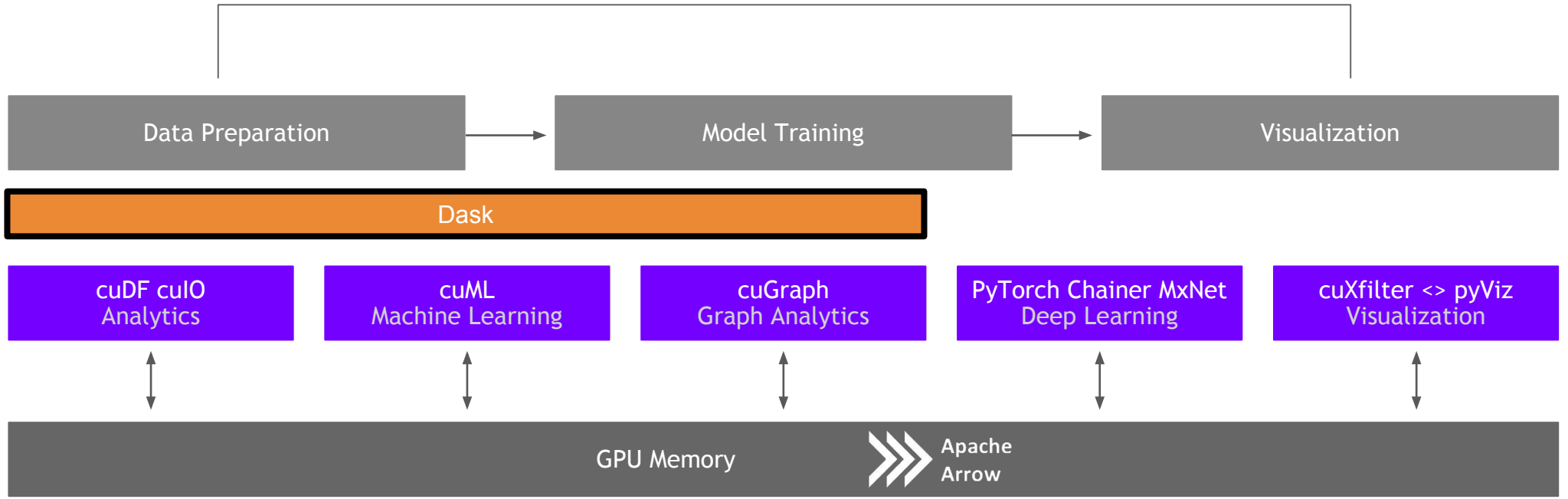
Dask

RAPIDS

Scaling RAPIDS with Dask



Why Dask?

PyData Native

- **Easy Migration:** Built on top of NumPy, Pandas Scikit-Learn, etc.
- **Easy Training:** With the same APIs
- **Trusted:** With the same developer community

Deployable

- **HPC:** SLURM, PBS, LSF, SGE
- **Cloud:** Kubernetes
- **Hadoop/Spark:** Yarn

Easy Scalability

- Easy to install and use on a laptop
- Scales out to thousand-node clusters

Popular

- Most common parallelism framework today in the PyData and SciPy community

Why OpenUCX?

Bringing hardware accelerated communications to Dask

- TCP sockets are slow!
- UCX provides uniform access to transports (TCP, InfiniBand, shared memory, NVLink)
- Python bindings for UCX (ucx-py) in the works
- Will provide best communication performance, to Dask based on available hardware on nodes/cluster

Scale out with RAPIDS + Dask with OpenUCX

Scale Up / Accelerate

RAPIDS and Others

Accelerated on single GPU

NumPy -> CuPy/PyTorch/..
Pandas -> cuDF
Scikit-Learn -> cuML
Numba -> Numba

RAPIDS

RAPIDS + Dask with OpenUCX

Multi-GPU
On single Node (DGX)
Or across a cluster

RAPIDS

DASK

PyData

NumPy, Pandas, Scikit-Learn, Numba and many more

Single CPU core
In-memory data

NumPy

Numba

PyData

pandas

$y_i t = \beta' x_{it} + \mu_i + \epsilon_{it}$

scikit learn

Dask

Multi-core and Distributed PyData

NumPy -> Dask Array
Pandas -> Dask DataFrame
Scikit-Learn -> Dask-ML
… -> Dask Futures

DASK

Scale out / Parallelize

Building on top of RAPIDS

A bigger, better, stronger ecosystem for all

Streamz

High-Performance Serverless event and data processing that utilizes RAPIDS for GPU Acceleration

GPU accelerated SQL engine built on top of RAPIDS

Distributed stream processing using RAPIDS and Dask