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* * *

Collective Communication Functions

The following NCCL APIs provide some commonly used collective operations.

ncclAllReduce

```
[ncclResult_t](types.html#c.ncclResult_t "ncclResult_t") `ncclAllReduce` (const  
void* _ sendbuff_, void* _ recvbuff_, size_t _ count_,  
[ncclDataType_t](types.html#c.ncclDataType_t "ncclDataType_t") _ datatype_,  
[ncclRedOp_t](types.html#c.ncclRedOp_t "ncclRedOp_t") _ op_,  
[ncclComm_t](types.html#c.ncclComm_t "ncclComm_t") _ comm_, cudaStream_t _  
stream_)
```

Reduces data arrays of length ``count`` in ``sendbuff`` using the ``op`` operation
and leaves identical copies of the result in each ``recvbuff``.

In-place operation will happen if ``sendbuff == recvbuff``.

Related links: [\[AllReduce\]\(../usage/collectives.html#allreduce\)](#).

ncclBroadcast

```
[ncclResult_t](types.html#c.ncclResult_t "ncclResult_t") `ncclBroadcast` (const
```

```
void*_ sendbuff_, void*_ recvbuff_, size_t _ count_,
[ncclDataType_t](types.html#c.ncclDataType_t "ncclDataType_t") _ datatype_,
int _ root_, [ncclComm_t](types.html#c.ncclComm_t "ncclComm_t") _ comm_,
cudaStream_t _ stream_)Â¶
```

Copies `count` elements from `sendbuff` on the `root` rank to all ranksâ€™™

`recvbuff`. `sendbuff` is only used on rank `root` and ignored for other ranks.

In-place operation will happen if `sendbuff == recvbuff`.

```
[ncclResult_t](types.html#c.ncclResult_t "ncclResult_t") `ncclBcast`(void*_
buff_, size_t _ count_, [ncclDataType_t](types.html#c.ncclDataType_t
"ncclDataType_t") _ datatype_, int _ root_,
[ncclComm_t](types.html#c.ncclComm_t "ncclComm_t") _ comm_, cudaStream_t _
stream_)Â¶
```

Legacy in-place version of `ncclBroadcast` in a similar fashion to MPI_Bcast.

A call to

```
ncclBcast(buff, count, datatype, root, comm, stream)
```

is equivalent to

```
ncclBroadcast(buff, buff, count, datatype, root, comm, stream)
```

Related links: [\[Broadcast\]\(../usage/collectives.html#broadcast\)](#)

```
## ncclReduce
```

```
[ncclResult_t](types.html#c.ncclResult_t "ncclResult_t") `ncclReduce` (const  
void* _ sendbuff_, void* _ recvbuff_, size_t _ count_,  
[ncclDataType_t](types.html#c.ncclDataType_t "ncclDataType_t") _ datatype_,  
[ncclRedOp_t](types.html#c.ncclRedOp_t "ncclRedOp_t") _ op_, int _ root_,  
[ncclComm_t](types.html#c.ncclComm_t "ncclComm_t") _ comm_, cudaStream_t _  
stream_)
```

Reduce data arrays of length ``count`` in ``sendbuff`` into ``recvbuff`` on the
``root`` rank using the ``op`` operation. ``recvbuff`` is only used on rank ``root``
and ignored for other ranks.

In-place operation will happen if ``sendbuff == recvbuff``.

Related links: [\[Reduce\]\(../usage/collectives.html#reduce\)](#).

```
## ncclAllGather¶
```

```
[ncclResult_t](types.html#c.ncclResult_t "ncclResult_t") `ncclAllGather` (const  
void* _ sendbuff_, void* _ recvbuff_, size_t _ sendcount_,  
[ncclDataType_t](types.html#c.ncclDataType_t "ncclDataType_t") _ datatype_,  
[ncclComm_t](types.html#c.ncclComm_t "ncclComm_t") _ comm_, cudaStream_t _  
stream_)¶
```

Gathers ``sendcount`` values from all GPUs and leaves identical copies of the result in each ``recvbuff``, receiving data from rank ``i`` at offset ``i*sendcount``.

Note: This assumes the receive count is equal to ``nranks*sendcount``, which means that ``recvbuff`` should have a size of at least ``nranks*sendcount`` elements.

In-place operation will happen if ``sendbuff == recvbuff + rank * sendcount``.

Related links: [\[AllGather\]\(../usage/collectives.html#allgather\)](#), [\[In-place Operations\]\(../usage/inplace.html#in-place-operations\)](#).

```
## ncclReduceScatter¶
```

```
[ncclResult_t](types.html#c.ncclResult_t "ncclResult_t")
`ncclReduceScatter` (const void* _ sendbuff_, void* _ recvbuff_, size_t _
recvcount_, [ncclDataType_t](types.html#c.ncclDataType_t "ncclDataType_t") _
datatype_, [ncclRedOp_t](types.html#c.ncclRedOp_t "ncclRedOp_t") _ op_,
[ncclComm_t](types.html#c.ncclComm_t "ncclComm_t") _ comm_, cudaStream_t _
stream_)Ä¶
```

Reduce data in `sendbuff` from all GPUs using the `op` operation and leave the reduced result scattered over the devices so that the `recvbuff` on rank `i` will contain the i-th block of the result.

Note: This assumes the send count is equal to `nranks*recvcount`, which means that `sendbuff` should have a size of at least `nranks*recvcount` elements.

In-place operation will happen if `recvbuff == sendbuff + rank * recvcount`.

Related links: [\[ReduceScatter\]\(../usage/collectives.html#reducescatter\)](#), [\[In-place Operations\]\(../usage/inplace.html#in-place-operations\)](#).

[\[Next \]\(group.html "Group Calls"\)](#) [\[Previous\]\(comms.html "Communicator Creation and Management Functions"\)](#)

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