

[NCCL](../index.html)

[2.25](https://docs.nvidia.com/deeplearning/sdk/nccl-archived/index.html)

- * [Overview of NCCL](../overview.html)

- * [Setup](../setup.html)

- * [Using NCCL](../usage.html)

- * [Creating a Communicator](../usage/communicators.html)

- * [Creating a communicator with options](../usage/communicators.html#creating-a-communicator-with-options)

- * [Creating a communicator using multiple ncclUniqueIds](../usage/communicators.html#creating-a-communicator-using-multiple-nccluniqueids)

- * [Creating more communicators](../usage/communicators.html#creating-more-communicators)

- * [Using multiple NCCL communicators concurrently](../usage/communicators.html#using-multiple-nccl-communicators-concurrently)

- * [Finalizing a communicator](../usage/communicators.html#finalizing-a-communicator)

- * [Destroying a communicator](../usage/communicators.html#destroying-a-communicator)

- * [Error handling and communicator abort](../usage/communicators.html#error-handling-and-communicator-abort)

- * [Asynchronous errors and error handling](../usage/communicators.html#asynchronous-errors-and-error-handling)

- * [Fault Tolerance](../usage/communicators.html#fault-tolerance)

- * [Collective Operations](../usage/collectives.html)

- * [AllReduce](../usage/collectives.html#allreduce)

- * [Broadcast](../usage/collectives.html#broadcast)

- * [Reduce](../usage/collectives.html#reduce)

- * [\[AllGather\]\(../usage/collectives.html#allgather\)](#)
- * [\[ReduceScatter\]\(../usage/collectives.html#reducescatter\)](#)
- * [\[Data Pointers\]\(../usage/data.html\)](#)
- * [\[CUDA Stream Semantics\]\(../usage/streams.html\)](#)
 - * [\[Mixing Multiple Streams within the same ncclGroupStart/End\(\) group\]\(../usage/streams.html#mixing-multiple-streams-within-the-same-ncclgroupstart-end-group\)](#)
- * [\[Group Calls\]\(../usage/groups.html\)](#)
 - * [\[Management Of Multiple GPUs From One Thread\]\(../usage/groups.html#management-of-multiple-gpus-from-one-thread\)](#)
 - * [\[Aggregated Operations \(2.2 and later\)\]\(../usage/groups.html#aggregated-operations-2-2-and-later\)](#)
 - * [\[Nonblocking Group Operation\]\(../usage/groups.html#nonblocking-group-operation\)](#)
- * [\[Point-to-point communication\]\(../usage/p2p.html\)](#)
 - * [\[Sendrecv\]\(../usage/p2p.html#sendrecv\)](#)
 - * [\[One-to-all \(scatter\)\]\(../usage/p2p.html#one-to-all-scatter\)](#)
 - * [\[All-to-one \(gather\)\]\(../usage/p2p.html#all-to-one-gather\)](#)
 - * [\[All-to-all\]\(../usage/p2p.html#all-to-all\)](#)
 - * [\[Neighbor exchange\]\(../usage/p2p.html#neighbor-exchange\)](#)
- * [\[Thread Safety\]\(../usage/threadsafety.html\)](#)
- * [\[In-place Operations\]\(../usage/inplace.html\)](#)
- * [\[Using NCCL with CUDA Graphs\]\(../usage/cudagraph.html\)](#)
- * [\[User Buffer Registration\]\(../usage/bufferreg.html\)](#)
 - * [\[NVLink Sharp Buffer Registration\]\(../usage/bufferreg.html#nvlink-sharp-buffer-registration\)](#)
 - * [\[IB Sharp Buffer Registration\]\(../usage/bufferreg.html#ib-sharp-buffer-registration\)](#)
 - * [\[General Buffer Registration\]\(../usage/bufferreg.html#general-buffer-registration\)](#)
 - * [\[Memory Allocator\]\(../usage/bufferreg.html#memory-allocator\)](#)
- * [\[NCCL API\]\(../api.html\)](#)

- * [Communicator Creation and Management Functions](comms.html)
- * [ncclGetLastError](comms.html#ncclgetlasterror)
- * [ncclGetErrorString](comms.html#ncclgeterrorstring)
- * [ncclGetVersion](comms.html#ncclgetversion)
- * [ncclGetUniqueId](comms.html#ncclgetuniqueid)
- * [ncclCommInitRank](comms.html#ncclcomminitrank)
- * [ncclCommInitAll](comms.html#ncclcomminitall)
- * [ncclCommInitRankConfig](comms.html#ncclcomminitrankconfig)
- * [ncclCommInitRankScalable](comms.html#ncclcomminitrankscalable)
- * [ncclCommSplit](comms.html#ncclcommsplit)
- * [ncclCommFinalize](comms.html#ncclcommfinalize)
- * [ncclCommDestroy](comms.html#ncclcommdestroy)
- * [ncclCommAbort](comms.html#ncclcommabort)
- * [ncclCommGetAsyncError](comms.html#ncclcommgetasynceerror)
- * [ncclCommCount](comms.html#ncclcommcount)
- * [ncclCommCuDevice](comms.html#ncclcommcudevice)
- * [ncclCommUserRank](comms.html#ncclcommuserrank)
- * [ncclCommRegister](comms.html#ncclcommregister)
- * [ncclCommDeregister](comms.html#ncclcommderegister)
- * [ncclMemAlloc](comms.html#ncclmemalloc)
- * [ncclMemFree](comms.html#ncclmemfree)
- * Collective Communication Functions
- * ncclAllReduce
- * ncclBroadcast
- * ncclReduce
- * ncclAllGather
- * ncclReduceScatter

- * [Group Calls](group.html)
- * [ncclGroupStart](group.html#ncclgroupstart)
- * [ncclGroupEnd](group.html#ncclgroupend)
- * [ncclGroupSimulateEnd](group.html#ncclgroupsimulateend)
- * [Point To Point Communication Functions](p2p.html)
- * [ncclSend](p2p.html#ncclsend)
- * [ncclRecv](p2p.html#ncclrecv)
- * [Types](types.html)
- * [ncclComm_t](types.html#ncclcomm-t)
- * [ncclResult_t](types.html#ncclresult-t)
- * [ncclDataType_t](types.html#nccldatatype-t)
- * [ncclRedOp_t](types.html#ncclredop-t)
- * [ncclScalarResidence_t](types.html#ncclscalarresidence-t)
- * [ncclConfig_t](types.html#ncclconfig-t)
- * [ncclSimInfo_t](types.html#ncclsiminfo-t)
- * [User Defined Reduction Operators](ops.html)
- * [ncclRedOpCreatePreMulSum](ops.html#ncclredopcreatepremulsum)
- * [ncclRedOpDestroy](ops.html#ncclredopdestroy)
- * [Migrating from NCCL 1 to NCCL 2](../nccl1.html)
- * [Initialization](../nccl1.html#initialization)
- * [Communication](../nccl1.html#communication)
- * [Counts](../nccl1.html#counts)
- * [In-place usage for AllGather and ReduceScatter](../nccl1.html#in-place-usage-for-allgather-and-reducescatter)
- * [AllGather arguments order](../nccl1.html#allgather-arguments-order)
- * [Datatypes](../nccl1.html#datatypes)
- * [Error codes](../nccl1.html#error-codes)

- * [Examples](../examples.html)
 - * [Communicator Creation and Destruction Examples](../examples.html#communicator-creation-and-destruction-examples)
 - * [Example 1: Single Process, Single Thread, Multiple Devices](../examples.html#example-1-single-process-single-thread-multiple-devices)
 - * [Example 2: One Device per Process or Thread](../examples.html#example-2-one-device-per-process-or-thread)
 - * [Example 3: Multiple Devices per Thread](../examples.html#example-3-multiple-devices-per-thread)
 - * [Example 4: Multiple communicators per device](../examples.html#example-4-multiple-communicators-per-device)
 - * [Communication Examples](../examples.html#communication-examples)
 - * [Example 1: One Device per Process or Thread](../examples.html#example-1-one-device-per-process-or-thread)
 - * [Example 2: Multiple Devices per Thread](../examples.html#example-2-multiple-devices-per-thread)
- * [NCCL and MPI](../mpi.html)
 - * [API](../mpi.html#api)
 - * [Using multiple devices per process](../mpi.html#using-multiple-devices-per-process)
 - * [ReduceScatter operation](../mpi.html#reducescatter-operation)
 - * [Send and Receive counts](../mpi.html#send-and-receive-counts)
 - * [Other collectives and point-to-point operations](../mpi.html#other-collectives-and-point-to-point-operations)
 - * [In-place operations](../mpi.html#in-place-operations)
 - * [Using NCCL within an MPI Program](../mpi.html#using-nccl-within-an-mpi-program)
 - * [MPI Progress](../mpi.html#mpi-progress)
 - * [Inter-GPU Communication with CUDA-aware

[MPI\]\(../mpi.html#inter-gpu-communication-with-cuda-aware-mpi\)](#)

* [\[Environment Variables\]\(../env.html\)](#)

* [\[System configuration\]\(../env.html#system-configuration\)](#)

* [\[NCCL_SOCKET_IFNAME\]\(../env.html#nccl-socket-ifname\)](#)

* [\[Values accepted\]\(../env.html#values-accepted\)](#)

* [\[NCCL_SOCKET_FAMILY\]\(../env.html#nccl-socket-family\)](#)

* [\[Values accepted\]\(../env.html#id2\)](#)

* [\[NCCL_SOCKET_RETRY_CNT\]\(../env.html#nccl-socket-retry-cnt\)](#)

* [\[Values accepted\]\(../env.html#id3\)](#)

* [\[NCCL_SOCKET_RETRY_SLEEP_MSEC\]\(../env.html#nccl-socket-retry-sleep-msec\)](#)

* [\[Values accepted\]\(../env.html#id4\)](#)

* [\[NCCL_SOCKET_NTHREADS\]\(../env.html#nccl-socket-nthreads\)](#)

* [\[Values accepted\]\(../env.html#id5\)](#)

* [\[NCCL_NSOCKS_PERTHREAD\]\(../env.html#nccl-nsocks-perthread\)](#)

* [\[Values accepted\]\(../env.html#id6\)](#)

* [\[NCCL_CROSS_NIC\]\(../env.html#nccl-cross-nic\)](#)

* [\[Values accepted\]\(../env.html#id7\)](#)

* [\[NCCL_IB_HCA\]\(../env.html#nccl-ib-hca\)](#)

* [\[Values accepted\]\(../env.html#id8\)](#)

* [\[NCCL_IB_TIMEOUT\]\(../env.html#nccl-ib-timeout\)](#)

* [\[Values accepted\]\(../env.html#id9\)](#)

* [\[NCCL_IB_RETRY_CNT\]\(../env.html#nccl-ib-retry-cnt\)](#)

* [\[Values accepted\]\(../env.html#id10\)](#)

* [\[NCCL_IB_GID_INDEX\]\(../env.html#nccl-ib-gid-index\)](#)

* [\[Values accepted\]\(../env.html#id11\)](#)

* [\[NCCL_IB_ADDR_FAMILY\]\(../env.html#nccl-ib-addr-family\)](#)

* [\[Values accepted\]\(../env.html#id12\)](#)

* [NCCL_IB_ADDR_RANGE](../env.html#nccl-ib-addr-range)

* [Values accepted](../env.html#id13)

* [NCCL_IB_ROCE_VERSION_NUM](../env.html#nccl-ib-roce-version-num)

* [Values accepted](../env.html#id14)

* [NCCL_IB_SL](../env.html#nccl-ib-sl)

* [Values accepted](../env.html#id15)

* [NCCL_IB_TC](../env.html#nccl-ib-tc)

* [Values accepted](../env.html#id16)

* [NCCL_IB_FIFO_TC](../env.html#nccl-ib-fifo-tc)

* [Values accepted](../env.html#id17)

* [NCCL_IB_RETURN_ASYNC_EVENTS](../env.html#nccl-ib-return-async-events)

* [Values accepted](../env.html#id18)

* [NCCL_OOB_NET_ENABLE](../env.html#nccl-oob-net-enable)

* [Values accepted](../env.html#id19)

* [NCCL_OOB_NET_IFNAME](../env.html#nccl-oob-net-ifname)

* [Values accepted](../env.html#id20)

* [NCCL_UID_STAGGER_THRESHOLD](../env.html#nccl-uid-stagger-threshold)

* [Values accepted](../env.html#id21)

* [NCCL_UID_STAGGER_RATE](../env.html#nccl-uid-stagger-rate)

* [Values accepted](../env.html#id22)

* [NCCL_NET](../env.html#nccl-net)

* [Values accepted](../env.html#id23)

* [NCCL_NET_PLUGIN](../env.html#nccl-net-plugin)

* [Values accepted](../env.html#id24)

* [NCCL_TUNER_PLUGIN](../env.html#nccl-tuner-plugin)

* [Values accepted](../env.html#id25)

* [NCCL_PROFILER_PLUGIN](../env.html#nccl-profiler-plugin)

- * [Values accepted](../env.html#id26)
- * [NCCL_IGNORE_CPU_AFFINITY](../env.html#nccl-ignore-cpu-affinity)
 - * [Values accepted](../env.html#id27)
- * [NCCL_CONF_FILE](../env.html#nccl-conf-file)
 - * [Values accepted](../env.html#id28)
- * [NCCL_DEBUG](../env.html#nccl-debug)
 - * [Values accepted](../env.html#id30)
- * [NCCL_DEBUG_FILE](../env.html#nccl-debug-file)
 - * [Values accepted](../env.html#id31)
- * [NCCL_DEBUG_SUBSYS](../env.html#nccl-debug-subsys)
 - * [Values accepted](../env.html#id32)
- * [NCCL_COLLNET_ENABLE](../env.html#nccl-collnet-enable)
 - * [Value accepted](../env.html#value-accepted)
- * [NCCL_COLLNET_NODE_THRESHOLD](../env.html#nccl-collnet-node-threshold)
 - * [Value accepted](../env.html#id33)
- * [NCCL_TOPO_FILE](../env.html#nccl-topo-file)
 - * [Value accepted](../env.html#id34)
- * [NCCL_TOPO_DUMP_FILE](../env.html#nccl-topo-dump-file)
 - * [Value accepted](../env.html#id35)
- * [NCCL_SET_THREAD_NAME](../env.html#nccl-set-thread-name)
 - * [Value accepted](../env.html#id36)
- * [Debugging](../env.html#debugging)
- * [NCCL_P2P_DISABLE](../env.html#nccl-p2p-disable)
 - * [Values accepted](../env.html#id37)
- * [NCCL_P2P_LEVEL](../env.html#nccl-p2p-level)
 - * [Values accepted](../env.html#id38)
- * [Integer Values (Legacy)](../env.html#integer-values-legacy)

* [NCCL_P2P_DIRECT_DISABLE](../env.html#nccl-p2p-direct-disable)

* [Values accepted](../env.html#id39)

* [NCCL_SHM_DISABLE](../env.html#nccl-shm-disable)

* [Values accepted](../env.html#id40)

* [NCCL_BUFFSIZE](../env.html#nccl-buffersize)

* [Values accepted](../env.html#id41)

* [NCCL_NTHREADS](../env.html#nccl-nthreads)

* [Values accepted](../env.html#id42)

* [NCCL_MAX_NCHANNELS](../env.html#nccl-max-nchannels)

* [Values accepted](../env.html#id43)

* [NCCL_MIN_NCHANNELS](../env.html#nccl-min-nchannels)

* [Values accepted](../env.html#id44)

* [NCCL_CHECKS_DISABLE](../env.html#nccl-checks-disable)

* [Values accepted](../env.html#id45)

* [NCCL_CHECK_POINTERS](../env.html#nccl-check-pointers)

* [Values accepted](../env.html#id46)

* [NCCL_LAUNCH_MODE](../env.html#nccl-launch-mode)

* [Values accepted](../env.html#id47)

* [NCCL_IB_DISABLE](../env.html#nccl-ib-disable)

* [Values accepted](../env.html#id48)

* [NCCL_IB_AR_THRESHOLD](../env.html#nccl-ib-ar-threshold)

* [Values accepted](../env.html#id49)

* [NCCL_IB_QPS_PER_CONNECTION](../env.html#nccl-ib-qps-per-connection)

* [Values accepted](../env.html#id50)

* [NCCL_IB_SPLIT_DATA_ON_QPS](../env.html#nccl-ib-split-data-on-qps)

* [Values accepted](../env.html#id51)

* [NCCL_IB_CUDA_SUPPORT](../env.html#nccl-ib-cuda-support)

* [Values accepted](../env.html#id52)

* [NCCL_IB_PCI_RELAXED_ORDERING](../env.html#nccl-ib-pci-relaxed-ordering)

* [Values accepted](../env.html#id53)

* [NCCL_IB_ADAPTIVE_ROUTING](../env.html#nccl-ib-adaptive-routing)

* [Values accepted](../env.html#id54)

* [NCCL_IB_ECE_ENABLE](../env.html#nccl-ib-ece-enable)

* [Values accepted](../env.html#id55)

* [NCCL_MEM_SYNC_DOMAIN](../env.html#nccl-mem-sync-domain)

* [Values accepted](../env.html#id56)

* [NCCL_CUMEM_ENABLE](../env.html#nccl-cumem-enable)

* [Values accepted](../env.html#id57)

* [NCCL_CUMEM_HOST_ENABLE](../env.html#nccl-cumem-host-enable)

* [Values accepted](../env.html#id58)

* [NCCL_NET_GDR_LEVEL (formerly

NCCL_IB_GDR_LEVEL)](../env.html#nccl-net-gdr-level-formerly-nccl-ib-gdr-level)

* [Values accepted](../env.html#id59)

* [Integer Values (Legacy)](../env.html#id60)

* [NCCL_NET_GDR_READ](../env.html#nccl-net-gdr-read)

* [Values accepted](../env.html#id61)

* [NCCL_NET_SHARED_BUFFERS](../env.html#nccl-net-shared-buffers)

* [Value accepted](../env.html#id62)

* [NCCL_NET_SHARED_COMMS](../env.html#nccl-net-shared-comms)

* [Value accepted](../env.html#id63)

* [NCCL_SINGLE_RING_THRESHOLD](../env.html#nccl-single-ring-threshold)

* [Values accepted](../env.html#id64)

* [NCCL_LL_THRESHOLD](../env.html#nccl-ll-threshold)

* [Values accepted](../env.html#id65)

* [NCCL_TREE_THRESHOLD](../env.html#nccl-tree-threshold)

* [Values accepted](../env.html#id66)

* [NCCL_ALGO](../env.html#nccl-algo)

* [Values accepted](../env.html#id67)

* [NCCL_PROTO](../env.html#nccl-proto)

* [Values accepted](../env.html#id68)

* [NCCL_NVX_DISABLE](../env.html#nccl-nvx-disable)

* [Value accepted](../env.html#id69)

* [NCCL_P2P_DISABLE](../env.html#nccl-p2p-disable)

* [Value accepted](../env.html#id70)

* [NCCL_P2P_P2P_LEVEL](../env.html#nccl-p2p-p2p-level)

* [Value accepted](../env.html#id71)

* [NCCL_RUNTIME_CONNECT](../env.html#nccl-runtime-connect)

* [Value accepted](../env.html#id72)

* [NCCL_GRAPH_REGISTER](../env.html#nccl-graph-register)

* [Value accepted](../env.html#id74)

* [NCCL_LOCAL_REGISTER](../env.html#nccl-local-register)

* [Value accepted](../env.html#id75)

* [NCCL_LEGACY_CUDA_REGISTER](../env.html#nccl-legacy-cuda-register)

* [Value accepted](../env.html#id76)

* [NCCL_SET_STACK_SIZE](../env.html#nccl-set-stack-size)

* [Value accepted](../env.html#id77)

* [NCCL_GRAPH_MIXING_SUPPORT](../env.html#nccl-graph-mixing-support)

* [Value accepted](../env.html#id79)

* [NCCL_DMABUF_ENABLE](../env.html#nccl-dmabuf-enable)

* [Value accepted](../env.html#id80)

* [NCCL_P2P_NET_CHUNKSIZE](../env.html#nccl-p2p-net-chunksize)

- * [Values accepted](../env.html#id81)
- * [NCCL_P2P_LL_THRESHOLD](../env.html#nccl-p2p-ll-threshold)
- * [Values accepted](../env.html#id82)
- * [NCCL_ALLOC_P2P_NET_LL_BUFFERS](../env.html#nccl-alloc-p2p-net-ll-buffers)
- * [Values accepted](../env.html#id83)
- * [NCCL_COMM_BLOCKING](../env.html#nccl-comm-blocking)
- * [Values accepted](../env.html#id84)
- * [NCCL_CGA_CLUSTER_SIZE](../env.html#nccl-cga-cluster-size)
- * [Values accepted](../env.html#id85)
- * [NCCL_MAX_CTAS](../env.html#nccl-max-ctas)
- * [Values accepted](../env.html#id86)
- * [NCCL_MIN_CTAS](../env.html#nccl-min-ctas)
- * [Values accepted](../env.html#id87)
- * [NCCL_NVLS_ENABLE](../env.html#nccl-nvls-enable)
- * [Values accepted](../env.html#id88)
- * [NCCL_IB_MERGE_NICS](../env.html#nccl-ib-merge-nics)
- * [Values accepted](../env.html#id89)
- * [NCCL_MNNVL_ENABLE](../env.html#nccl-mnnvl-enable)
- * [Values accepted](../env.html#id90)
- * [NCCL_RAS_ENABLE](../env.html#nccl-ras-enable)
- * [Values accepted](../env.html#id91)
- * [NCCL_RAS_ADDR](../env.html#nccl-ras-addr)
- * [Values accepted](../env.html#id92)
- * [NCCL_RAS_TIMEOUT_FACTOR](../env.html#nccl-ras-timeout-factor)
- * [Values accepted](../env.html#id93)
- * [Troubleshooting](../troubleshooting.html)
- * [Errors](../troubleshooting.html#errors)

- * [\[RAS\]\(../troubleshooting.html#ras\)](#)
- * [\[RAS\]\(../troubleshooting/ras.html\)](#)
- * [\[Principle of Operation\]\(../troubleshooting/ras.html#principle-of-operation\)](#)
- * [\[RAS Queries\]\(../troubleshooting/ras.html#ras-queries\)](#)
- * [\[Sample Output\]\(../troubleshooting/ras.html#sample-output\)](#)
- * [\[GPU Direct\]\(../troubleshooting.html#gpu-direct\)](#)
- * [\[GPU-to-GPU communication\]\(../troubleshooting.html#gpu-to-gpu-communication\)](#)
- * [\[GPU-to-NIC communication\]\(../troubleshooting.html#gpu-to-nic-communication\)](#)
- * [\[PCI Access Control Services \(ACS\)\]\(../troubleshooting.html#pci-access-control-services-ac\)](#)
- * [\[Topology detection\]\(../troubleshooting.html#topology-detection\)](#)
- * [\[Shared memory\]\(../troubleshooting.html#shared-memory\)](#)
- * [\[Docker\]\(../troubleshooting.html#docker\)](#)
- * [\[Systemd\]\(../troubleshooting.html#systemd\)](#)
- * [\[Networking issues\]\(../troubleshooting.html#networking-issues\)](#)
- * [\[IP Network Interfaces\]\(../troubleshooting.html#ip-network-interfaces\)](#)
- * [\[IP Ports\]\(../troubleshooting.html#ip-ports\)](#)
- * [\[InfiniBand\]\(../troubleshooting.html#infiniband\)](#)

* [\[RDMA over Converged Ethernet](#)

[\(RoCE\)\]\(../troubleshooting.html#rdma-over-converged-ethernet-roce\)](#)

[__\[NCCL\]\(../index.html\)](#)

* [\[Docs\]\(../index.html\)](#) »

* [\[NCCL API\]\(../api.html\)](#) »

* [Collective Communication Functions](#)

* [\[View page source\]\(../_sources/api/colls.rst.txt\)](#)

* * *

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_,
[nccclDataType_t](types.html#c.nccclDataType_t "nccclDataType_t") _ datatype_,
int _ root_, [nccclComm_t](types.html#c.nccclComm_t "nccclComm_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`.

```
[nccclResult_t](types.html#c.nccclResult_t "nccclResult_t") `nccclBcast`(void*_
buff_, size_t _ count_, [nccclDataType_t](types.html#c.nccclDataType_t
"nccclDataType_t") _ datatype_, int _ root_,
[nccclComm_t](types.html#c.nccclComm_t "nccclComm_t") _ comm_, cudaStream_t _
stream_)Â¶
```

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

A call to

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

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

* * *

(C) Copyright 2020, NVIDIA Corporation

Built with [Sphinx](http://sphinx-doc.org/) using a

[theme](https://github.com/rtfd/sphinx_rtd_theme) provided by [Read the

Docs](https://readthedocs.org).