MPI Cheat Sheet

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Arguments from the main function
Called at the start of any MPI program

int MPI_Init(↕ int *, ↕ char *)**

&argc	&argv
NULL	NULL

Called at the end of any MPI program

int MPI_Finalize()

Gives the number of tasks

int MPI_Comm_size (↓ MPI_Comm, ↑ int *)

MPI_COMM_WORLD	&num_tasks

Gives the id (rank) of the current (calling) task

int MPI_Comm_rank (↓ MPI_Comm, ↑ int *)

MPI_COMM_WORLD	&rank

Synchronizez all tasks at the call of the barrier

int MPI_Barrier (↓ MPI_Comm comm)

MPI_COMM_WORLD

Send from buffer **b**, **c** elements of data type d to rank r. The communication is marked with tag **t**.
The function is blocking, b can safely be used after it but data may not have yet been delivered.

int MPI_Send(↓ void *b, ↓ int c, ↓ MPI_Datatype d, ↓ int reiceiver, ↓ int t, ↓ MPI_Comm)

v	num_el(v)	MPI_INT	[0, **num_tasks**)	[0, ..)	MPI_COMM_WORLD
&v[3]	[0,..)	MPI_CHAR			
&a		MPI_FLOAT			
v+5		MPI_LONG			

Receive in buffer **b**, **c** elements of data type d from rank r. The communication is marked with tag **t**.
The function is bloking, b can be safely used and the data was delivered.

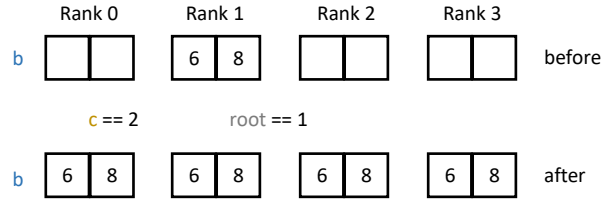
int MPI_Recv(↑ void *b, ↓ int c, ↓ MPI_Datatype d, ↓ int sender, ↓ int t, ↓ MPI_Comm, ↑ MPI_Status *)

v	num_el(v)	MPI_INT	[0, **num_tasks**)	MPI_COMM_WORLD	
&v[3]	[0,..)	MPI_CHAR	MPI_ANY_SOURCE		
&a		MPI_FLOAT		&Stat	
v+5		MPI_LONG	[0, ..)	MPI_STATUS_IGNORE	
			MPI_ANY_TAG	***Stat.MPI_SOURCE, Stat.MPI_TAG***	

Sends (Broadcasts) **c** elements of data type d from buffer **b** from rank r to all other tasks in buffer **b**.
All tasks have to call this function with the same value for root.

int MPI_Bcast (↕ void *b, ↓ int c, ↓ MPI_Datatype d, ↓ int root, ↓ MPI_Comm)

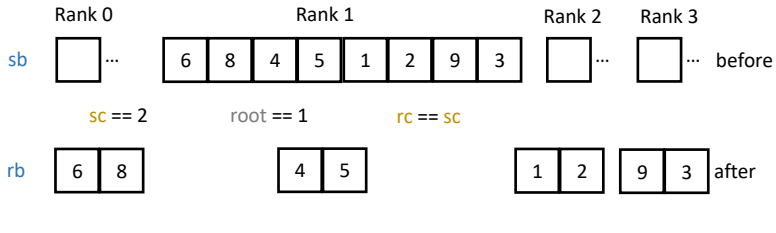
v	num_el(v)	MPI_INT	MPI_COMM_WORLD
&v[3]	[0,..)	MPI_CHAR	[0, **num_tasks**)
&a		MPI_FLOAT	
v+5		MPI_LONG	



Splits the elements from **sb** of datatype sd on rank root in num_tasks chunks of size **sc**.
Every task receives its appropriate chunk in **rb**. For simplicity **sc** == **rc**, sd == rd.
All tasks have to call this function with the same value for root.

int MPI_Scatter (↓ void *sb, ↓ int sc, ↓ MPI_Datatype sd, ↑ void *rb, ↓ int rc, ↓ MPI_Datatype rd, ↓ int root, ↓ MPI_Comm)

v	num_el(v)/**num_tasks**	MPI_INT	v	num_el(v)/**num_tasks**	MPI_INT	MPI_COMM_WORLD
&v[3]	[0,..)	MPI_CHAR	&v[3]	[0,..)	MPI_CHAR	[0, **num_tasks**)
&a		MPI_FLOAT	&a		MPI_FLOAT	
v+5		MPI_LONG	v+5		MPI_LONG	



Gathers **sc** elements from all **sb** of datatype sd on all tasks and places the **num_tasks** chunks of size **rc** in **rb** on task of rank root.
Every task sends its appropriate chunk in **rb**. For simplicity **sc** == **rc**, sd == rd.
All tasks have to call this function with the same value for root.

int MPI_Gather (↓ void *sb, ↓ int sc, ↓ MPI_Datatype sd, ↑ void *rb, ↓ int rc, ↓ MPI_Datatype rd, ↓ int root, ↓ MPI_Comm)

v	num_el(v)/**num_tasks**	MPI_INT	v	num_el(v)/**num_tasks**	MPI_INT	MPI_COMM_WORLD
&v[3]	[0,..)	MPI_CHAR	&v[3]	[0,..)	MPI_CHAR	[0, **num_tasks**)
&a		MPI_FLOAT	&a		MPI_FLOAT	
v+5		MPI_LONG	v+5		MPI_LONG