Datasheets for MPI on

Rawtiming Routine

Timings made : Fri Jul 5 17:28:40 1996

Run time parameters

Iterations	3
Elements	from 1 to 8192
	with log multiplier 2
Data type	int (8 bytes)
Processes	128
Timer resolution	$0.0066\mu s$

Small messages (32 integers or less)

MPI Function	Time (μs)	Goodness of fit (Q)
send	$30 + 0 \times ndata$	0.94
ssend	$80 + 0.5 \times ndata$	1
rsend	$30 + 0.1 \times ndata$	1
isend1	$30 + 0.2 \times ndata$	1
isend2	$10 + 0 \times ndata$	0.9
isendoverlap	$3 + 0 \times ndata$	0.74
recv	$60 + 0.7 \times ndata$	0.97
recvmin	$30 + 0.9 \times ndata$	0.77
irecv1	$30 + 0 \times ndata$	1
irecv2	$40 + 0 \times ndata$	0.065
irecvoverlap	$0.6 + 0.02 \times ndata$	1
sendrecv	$90 + 1 \times ndata$	0.97
pingpong	$100 + 1 \times ndata$	0.99
alltoall	$40 + 50 \times nprocs + 2 \times ndata$	1
allsend	$40 + 0.05 \times nprocs + 0.09 \times ndata$	1
gather	$70 + 10 \times nprocs + 0.7 \times ndata$	1
allgather	$40 + 40 \times nprocs + 1 \times ndata$	1
reduce	$300 + 3 \times nprocs + 2 \times ndata$	1
allreduce	$300 + 6 \times nprocs + 2 \times log(nprocs) \times ndata$	1
bcast	$200 + 2 \times nprocs + 0.6 \times ndata$	1

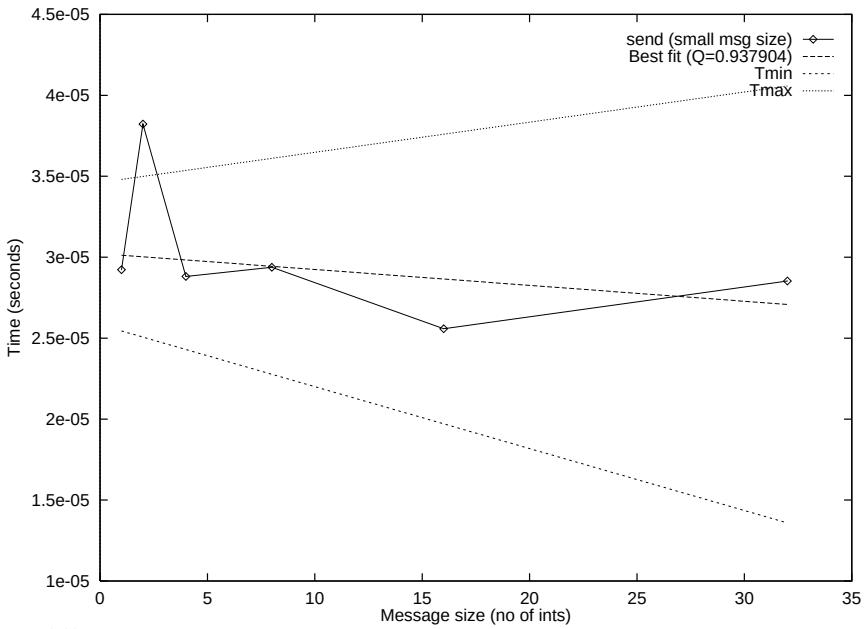
Large messages (32 integers or more)

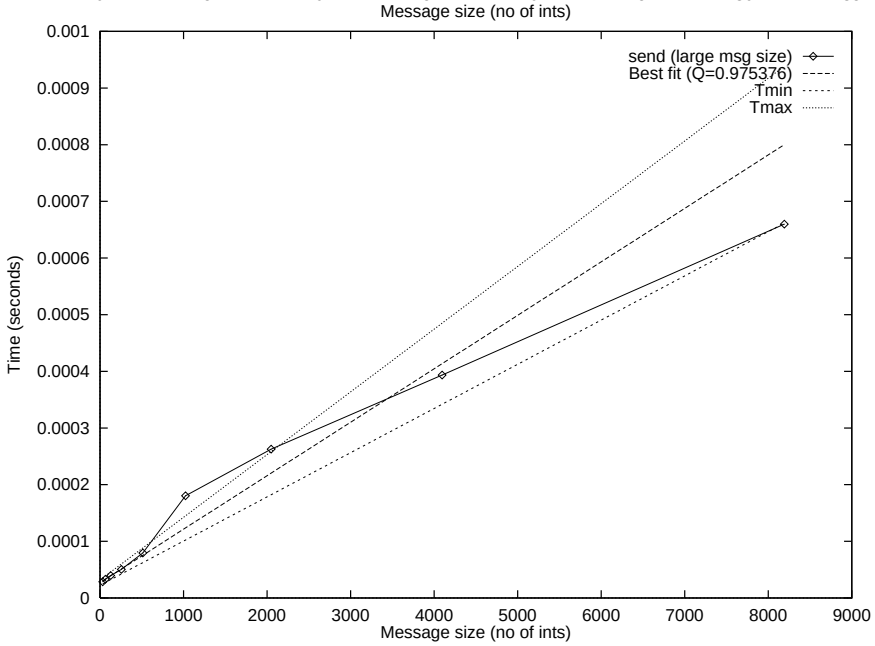
MPI Function	Time (μs)			Goodness of fit (Q)
send	$30 +$	$0.09 \times ndata$		0.98
ssend	$100 +$	$0.1 \times ndata$		0.98
rsend	$30 +$	$0.09 \times ndata$		0.98
isend1	$30 +$	$0.09 \times ndata$		0.98
isend2	$10 +$	$0.001 \times ndata$		0.78
isendoverlap	$3 +$	$0.0002 \times ndata$		0.93
recv	$60 +$	$0.5 \times ndata$		1
recvmin	$30 +$	$0.4 \times ndata$		1
irecv1	$40 +$	$0 \times ndata$		0.44
irecv2	$5 +$	$0.5 \times ndata$		0.87
irecvoverlap	$0.5 +$	$0.005 \times ndata$		$3e-05$
sendrecv	$90 +$	$0.6 \times ndata$		1
pingpong	$100 +$	$1 \times ndata$		1
alltoall	$0 +$	$40 \times nprocs +$	$0.3 \times nprocs \times ndata$	1
allsend	$40 +$	$0.1 \times nprocs +$	$0.1 \times ndata$	1
gather	$0 +$	$200 \times log(nprocs) +$	$0.0009 \times nprocs^2 \times ndata$	2
allgather	$0 +$	$40 \times nprocs +$	$0.3 \times nprocs \times ndata$	1
reduce	$300 +$	$2 \times nprocs +$	$0.6 \times log(nprocs) \times ndata$	1
allreduce	$300 +$	$6 \times nprocs +$	$1 \times log(nprocs) \times ndata$	1
bcast	$100 +$	$2 \times nprocs +$	$0.2 \times log(nprocs) \times ndata$	1

Barrier type routines

MPI Function	Time (μs)	Goodness of fit (Q)
barrier	$10 + \quad 8 \times log(nprocs)$	1

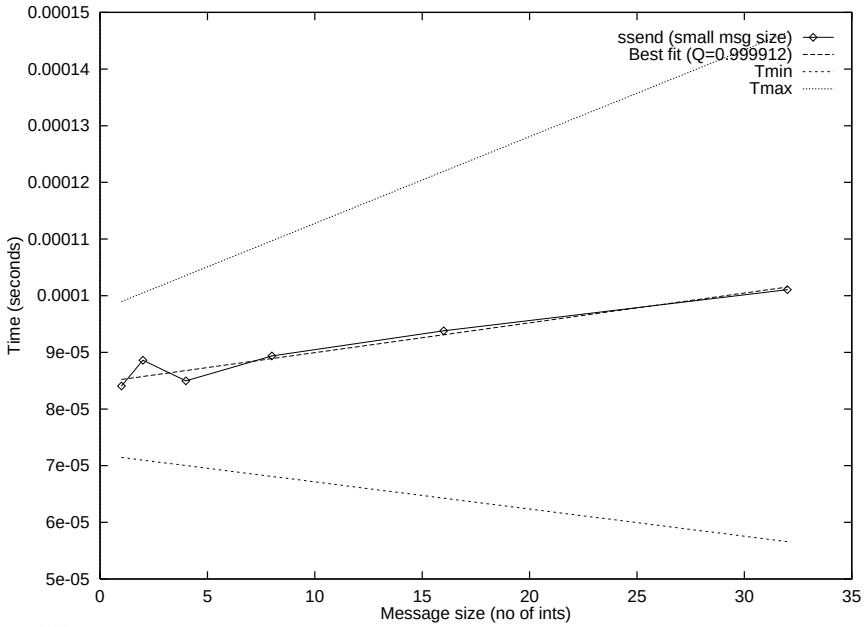
send

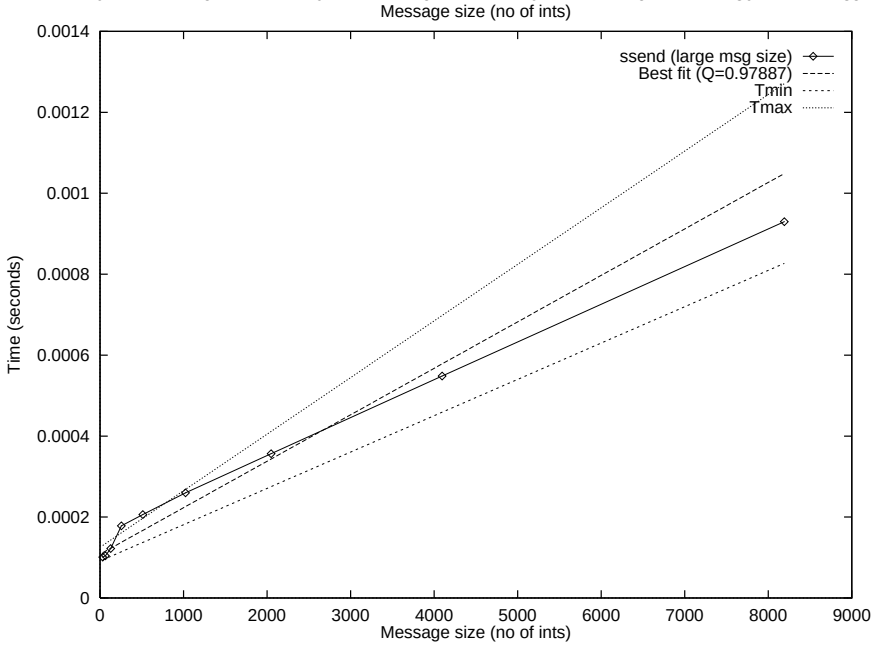




$$T_{send}(\mu s) = \begin{cases} (30 \pm 4) + (0 \pm 0.3) \times ndata & \text{if } ndata <= 32 \\ (30 \pm 5) + (0.09 \pm 0.02) \times ndata & \text{if } ndata > 32 \end{cases}$$

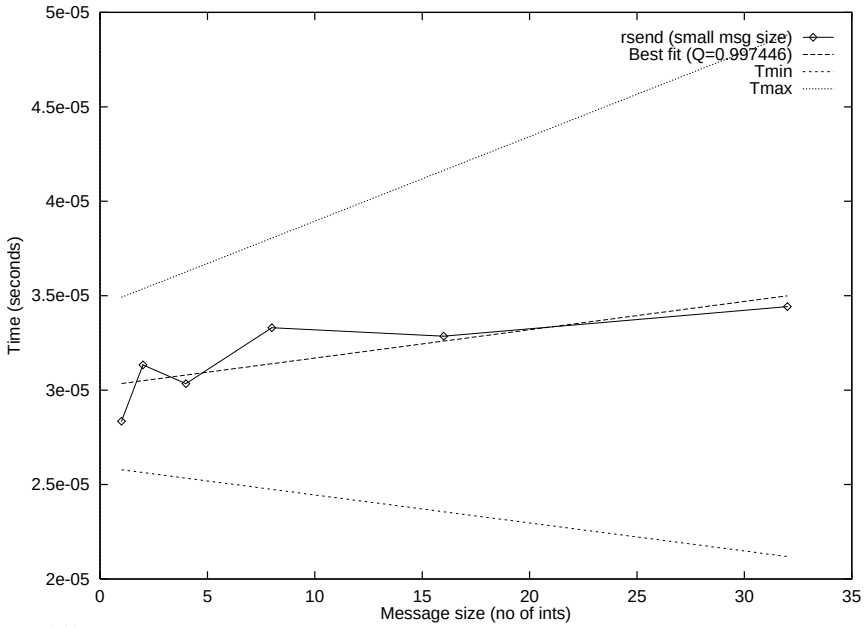
ssend

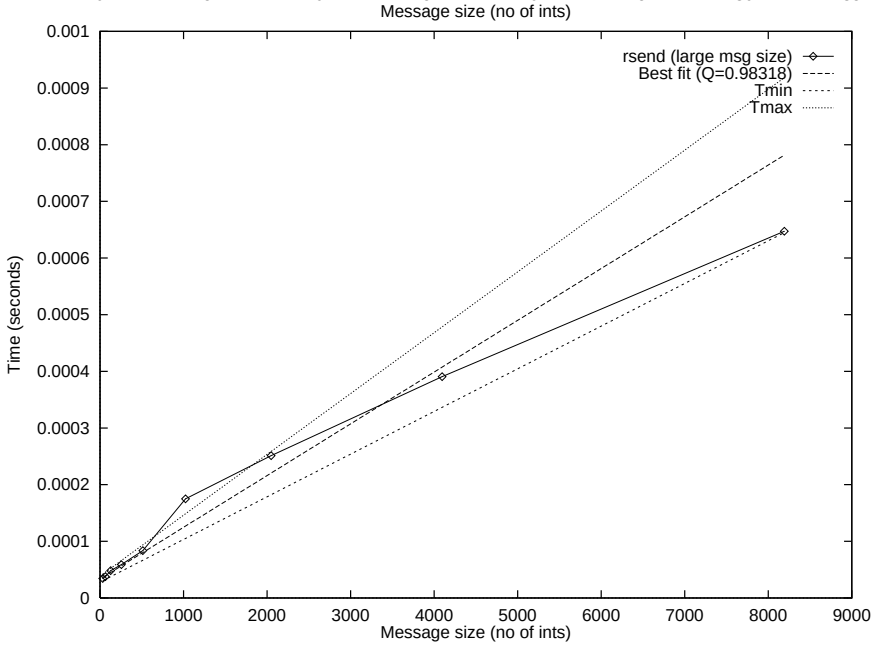




$$T_{ssend}(\mu s) = \begin{cases} (80 \pm 10) + (0.5 \pm 1) \times ndata & \text{if } ndata <= 32 \\ (100 \pm 20) + (0.1 \pm 0.03) \times ndata & \text{if } ndata > 32 \end{cases}$$

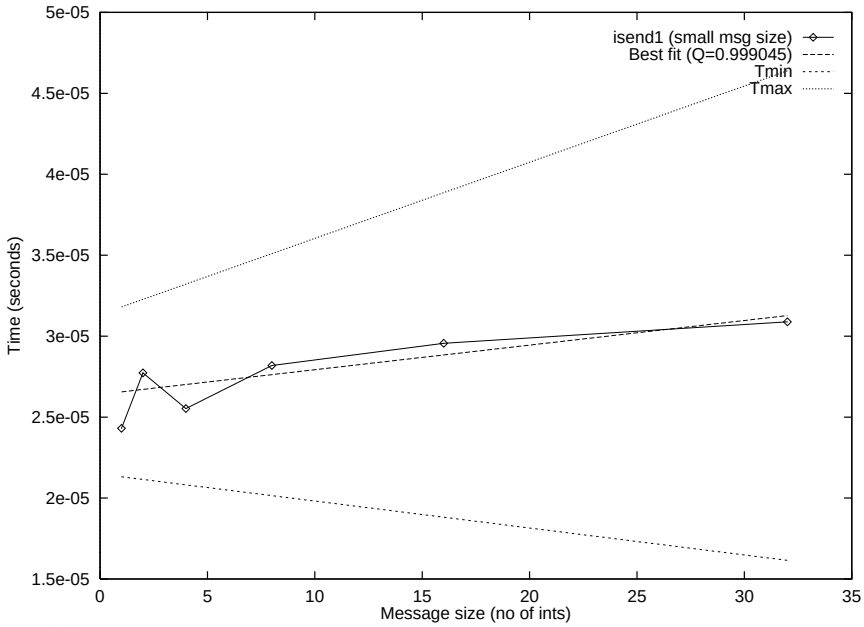
rsend

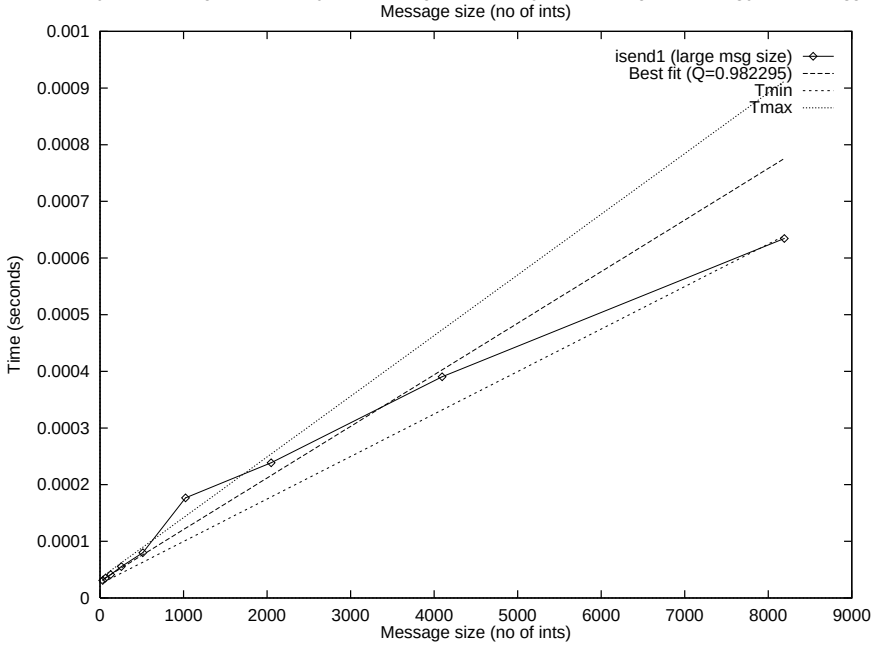




$$T_{rsend}(\mu s) = \begin{cases} (30 \pm 4) + (0.1 \pm 0.3) \times ndata & \text{if } ndata <= 32 \\ (30 \pm 5) + (0.09 \pm 0.02) \times ndata & \text{if } ndata > 32 \end{cases}$$

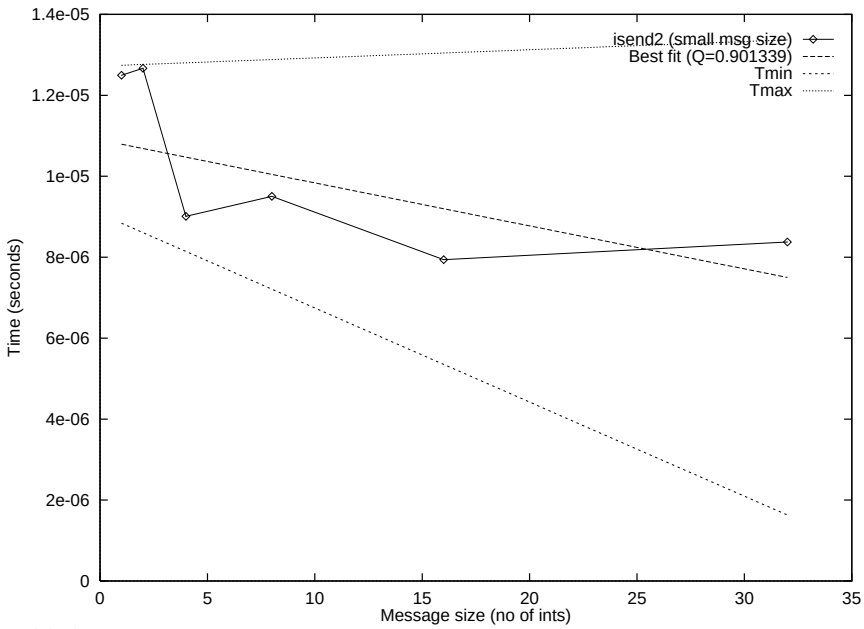
isend1

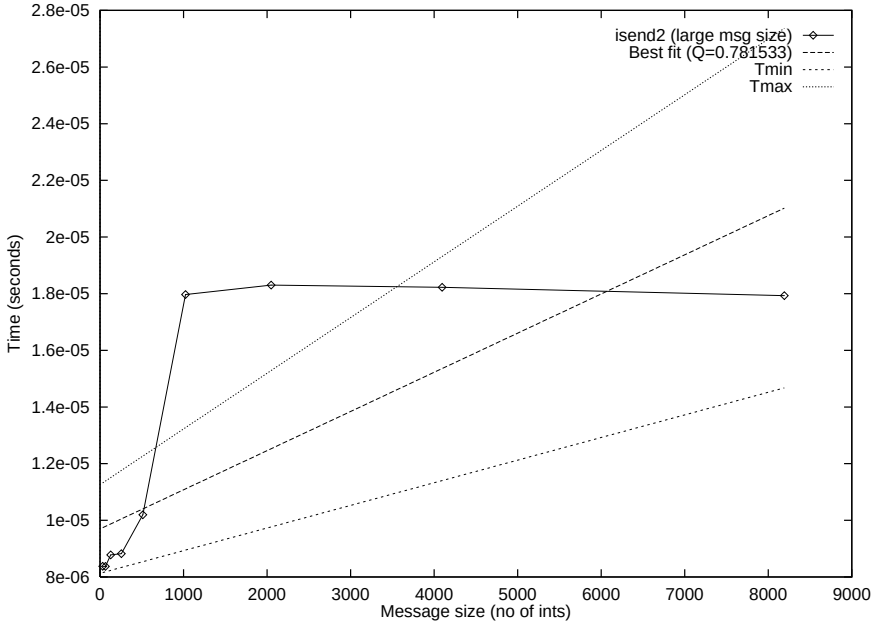




$$T_{isend1}(\mu s) = \begin{cases} (30 \pm 5) + (0.2 \pm 0.3) \times ndata & \text{if } ndata <= 32 \\ (30 \pm 5) + (0.09 \pm 0.02) \times ndata & \text{if } ndata > 32 \end{cases}$$

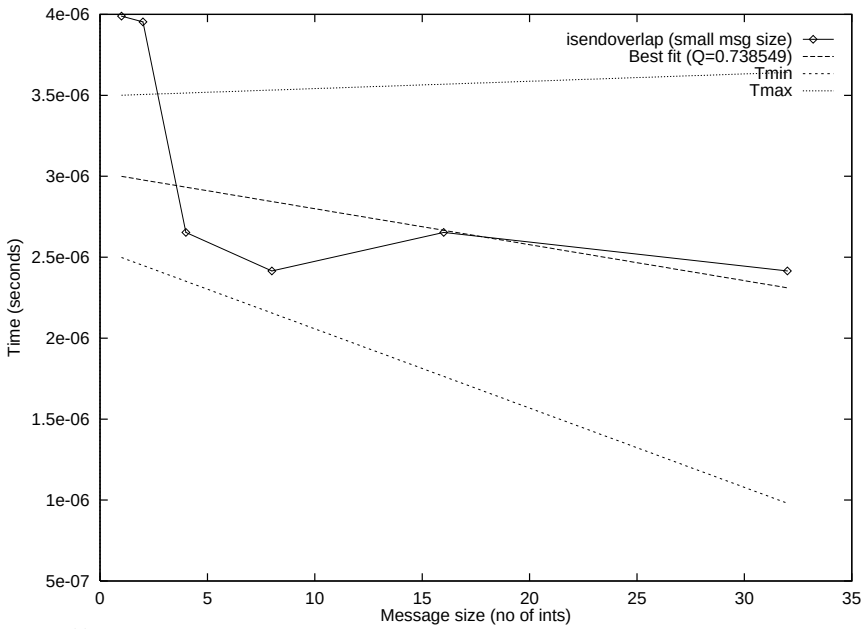
isend2

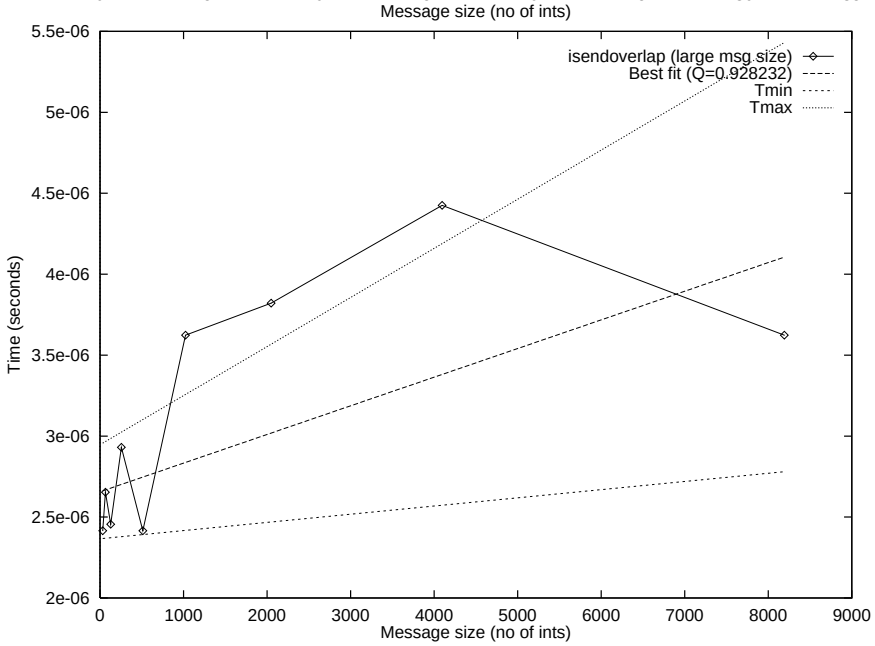




$$T_{isend2}(\mu s) = \begin{cases} (10 \pm 2) + (0 \pm 0.1) \times ndata & \text{if } ndata <= 32 \\ (10 \pm 2) + (0.001 \pm 0.0006) \times ndata & \text{if } ndata > 32 \end{cases}$$

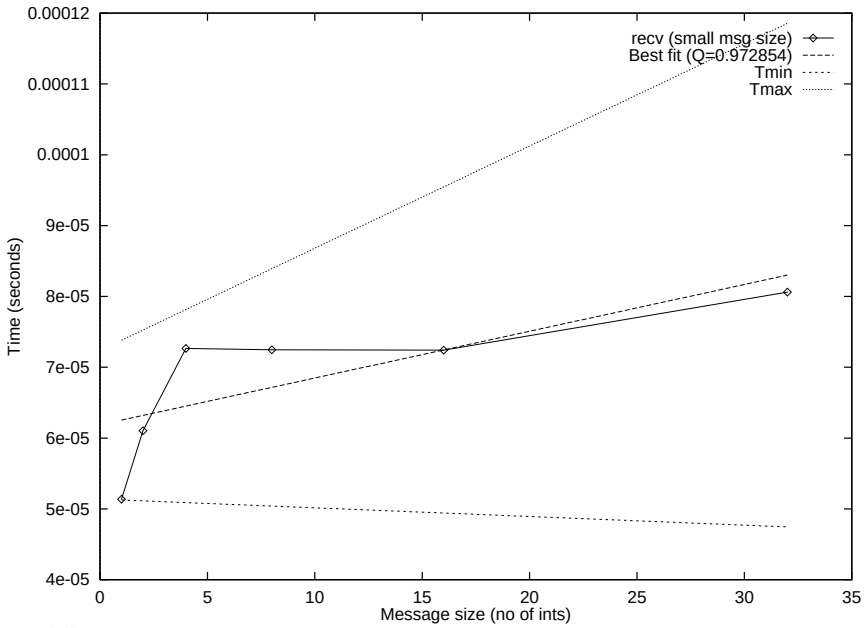
isendoverlap

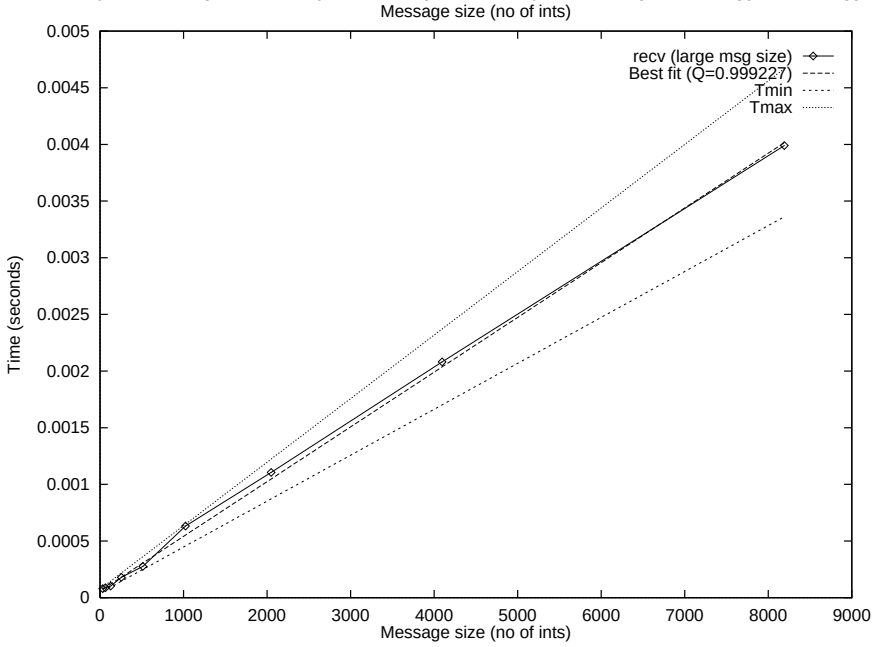




$$T_{isendoverlap}(\mu s) = \begin{cases} (3 \pm 0.5) + (0 \pm 0.03) \times ndata & \text{if } ndata <= 32 \\ (3 \pm 0.3) + (0.0002 \pm 0.0001) \times ndata & \text{if } ndata > 32 \end{cases}$$

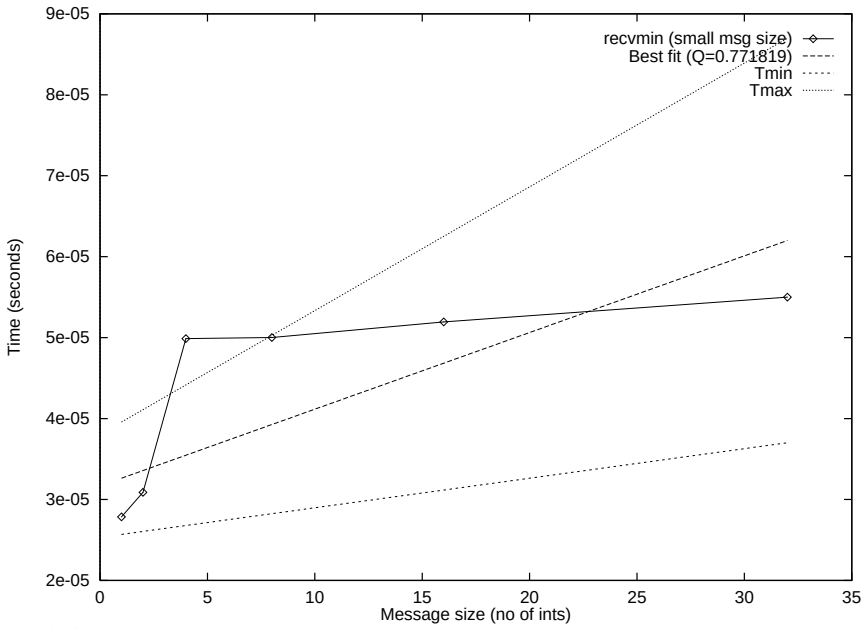
recv

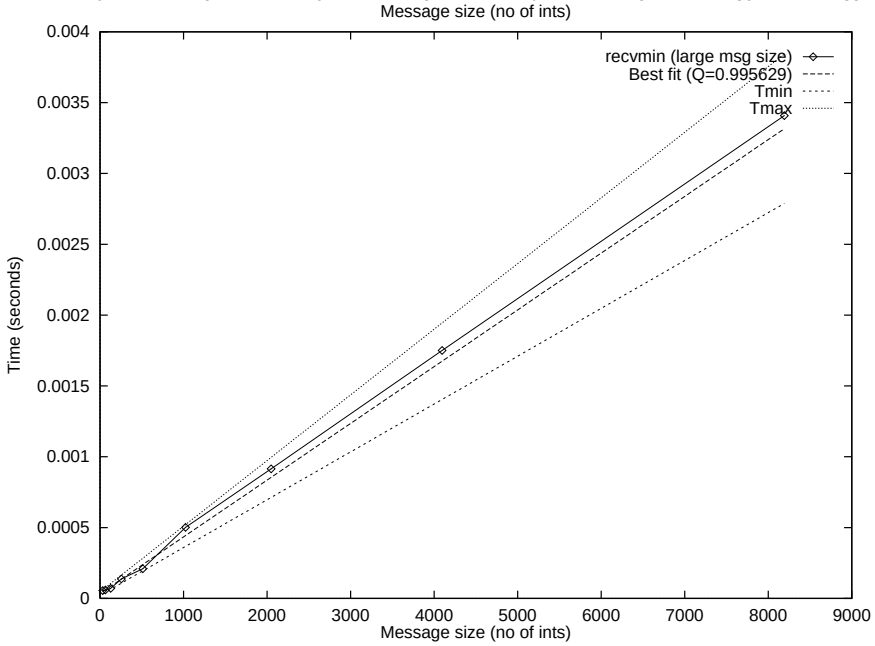




$$T_{recv}(\mu s) = \begin{cases} (60 \pm 10) + (0.7 \pm 0.8) \times ndata & \text{if } ndata <= 32 \\ (60 \pm 20) + (0.5 \pm 0.08) \times ndata & \text{if } ndata > 32 \end{cases}$$

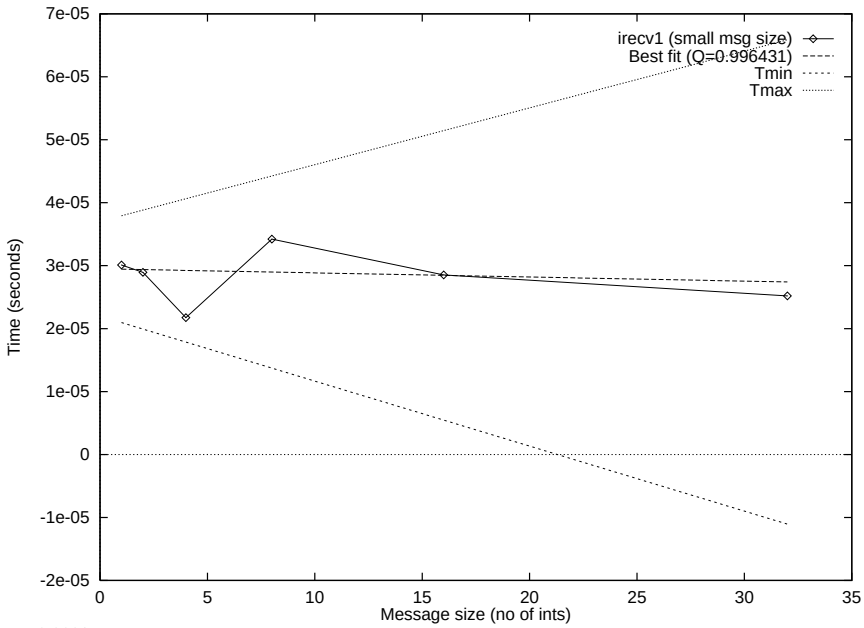
recvmin

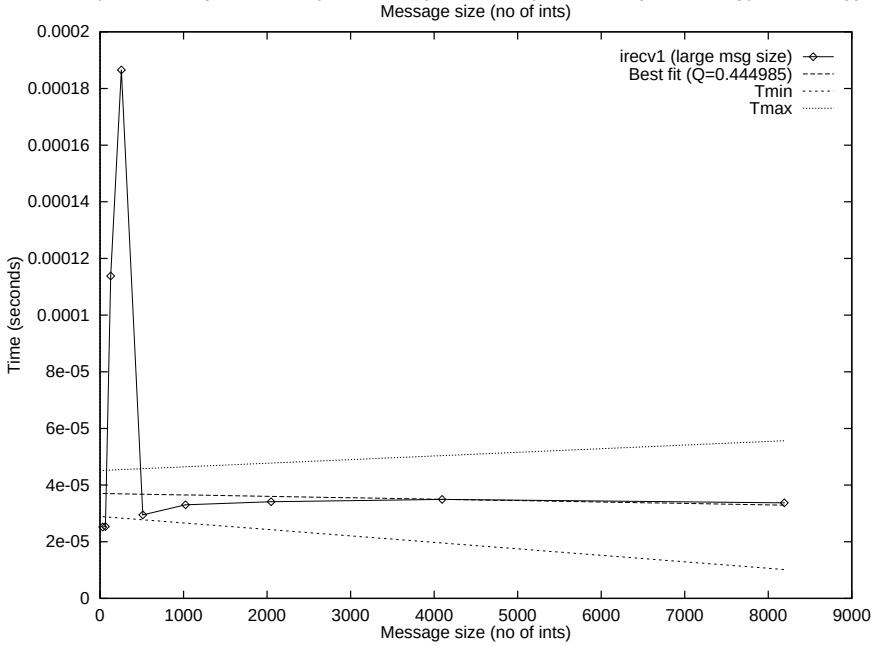




$$T_{recvmin}(\mu s) = \begin{cases} (30 \pm 6) + (0.9 \pm 0.6) \times ndata & \text{if } ndata <= 32 \\ (30 \pm 10) + (0.4 \pm 0.06) \times ndata & \text{if } ndata > 32 \end{cases}$$

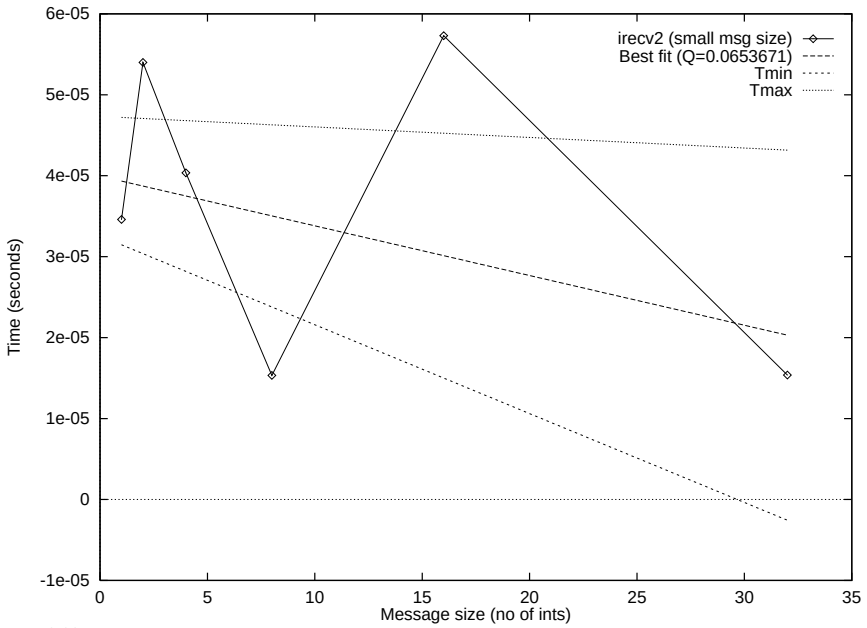
irecv1

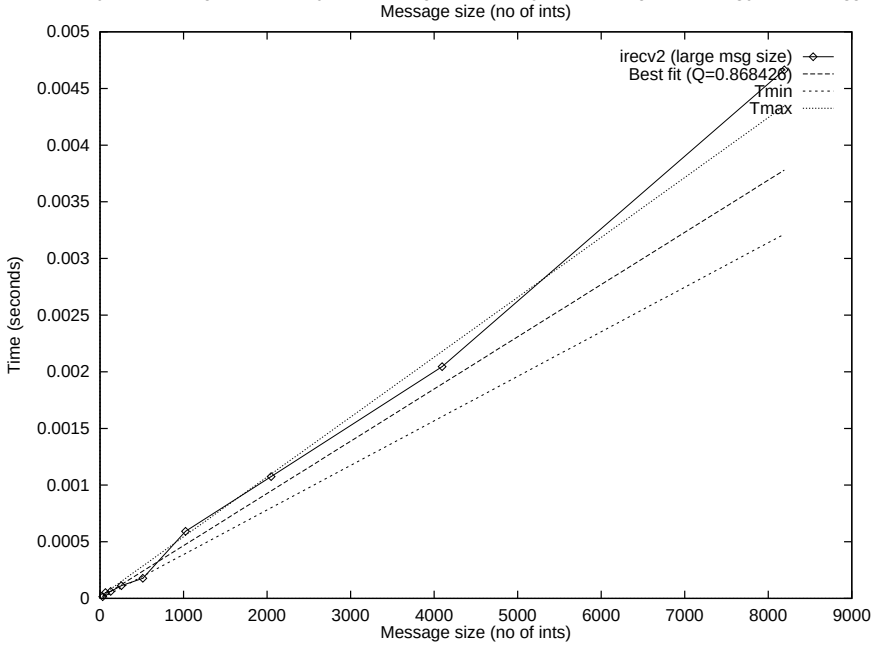




$$T_{irecv1}(\mu s) = \begin{cases} (30 \pm 8) + (0 \pm 1) \times ndata & \text{if } ndata <= 32 \\ (40 \pm 8) + (0 \pm 0.002) \times ndata & \text{if } ndata > 32 \end{cases}$$

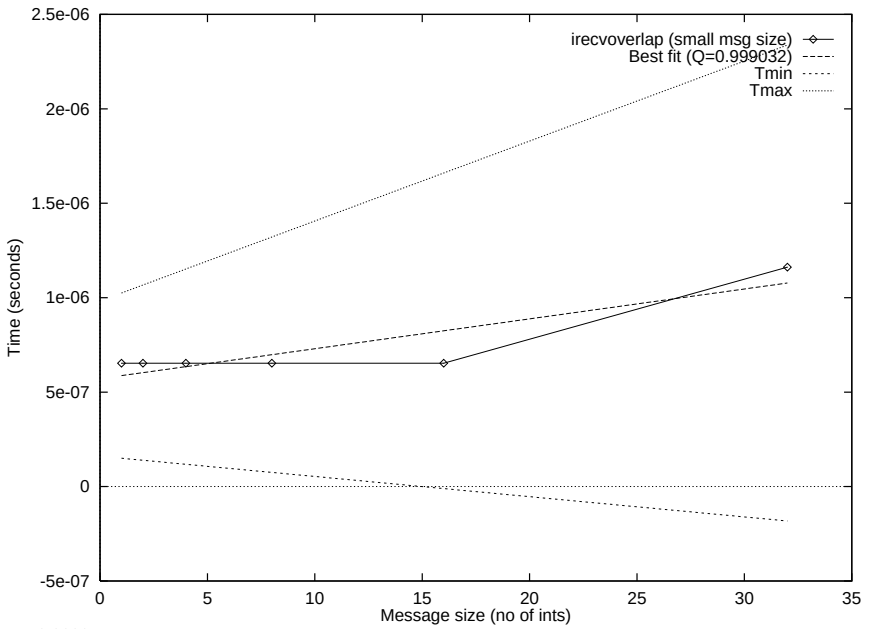
irecv2

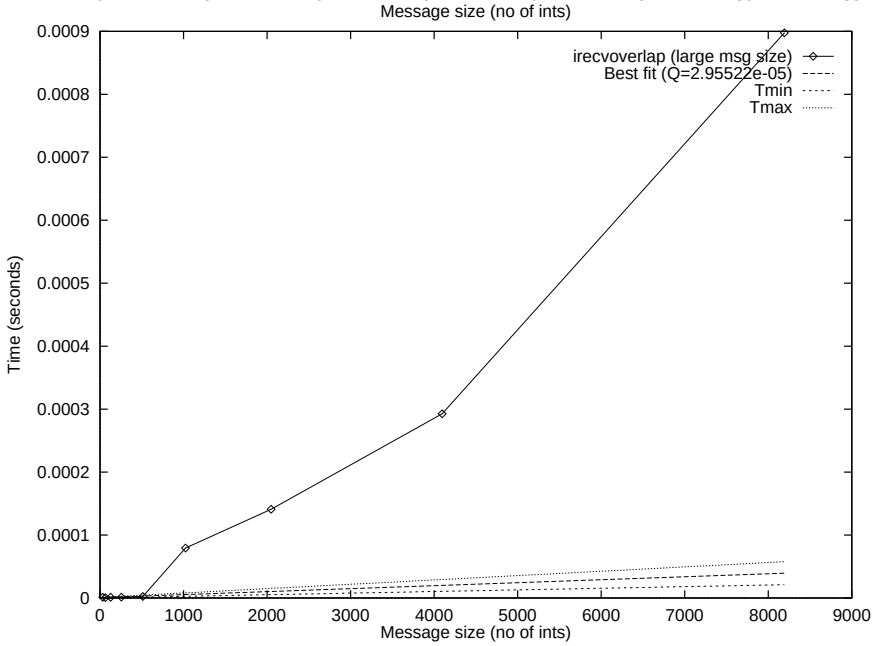




$$T_{irecv2}(\mu s) = \begin{cases} (40 \pm 7) + (0 \pm 0.5) \times ndata & \text{if } ndata <= 32 \\ (5 \pm 10) + (0.5 \pm 0.07) \times ndata & \text{if } ndata > 32 \end{cases}$$

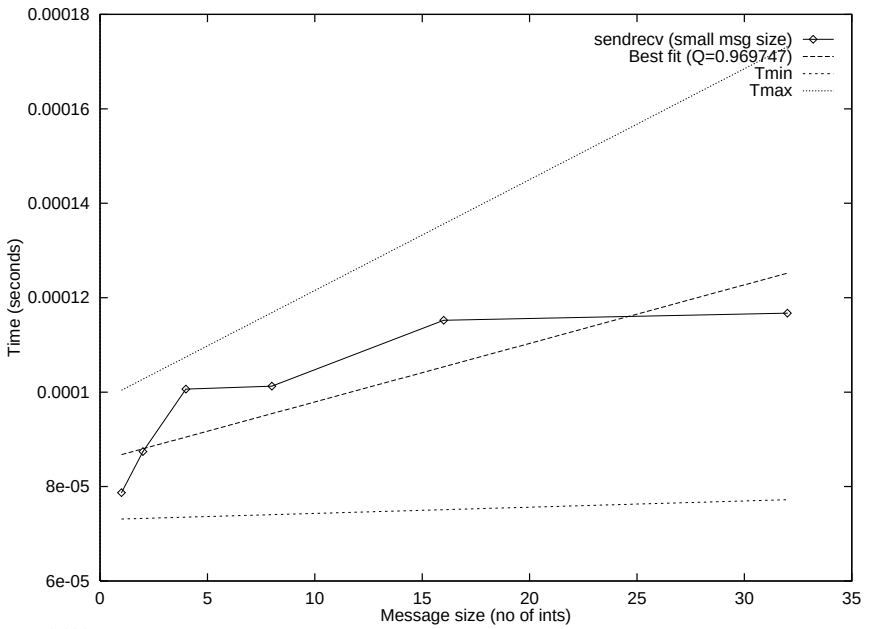
irecvoverlap

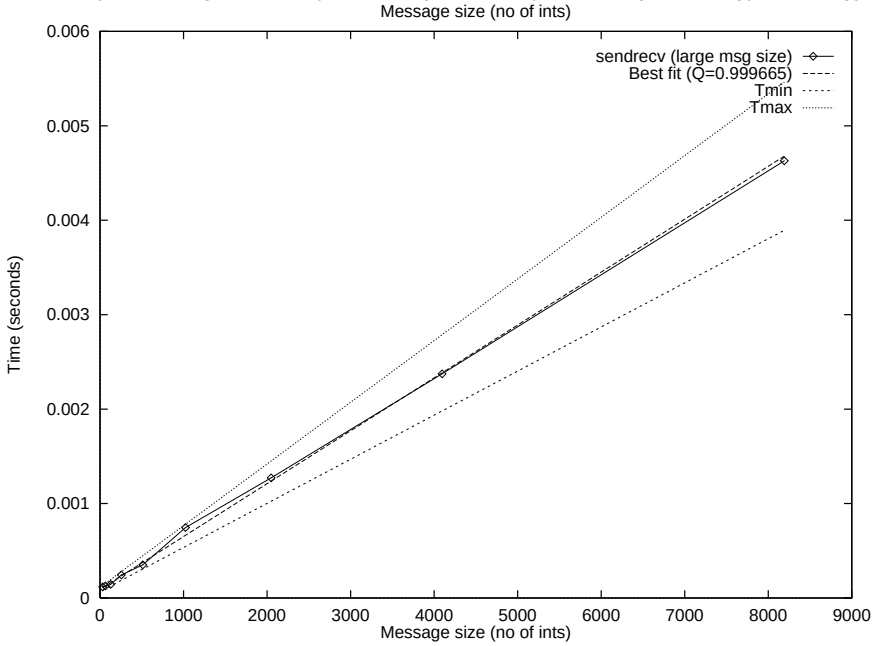




$$T_{irecvoverlap}(\mu s) = \begin{cases} (0.6 \pm 0.4) + (0.02 \pm 0.03) \times ndata & \text{if } ndata <= 32 \\ (0.5 \pm 0.5) + (0.005 \pm 0.002) \times ndata & \text{if } ndata > 32 \end{cases}$$

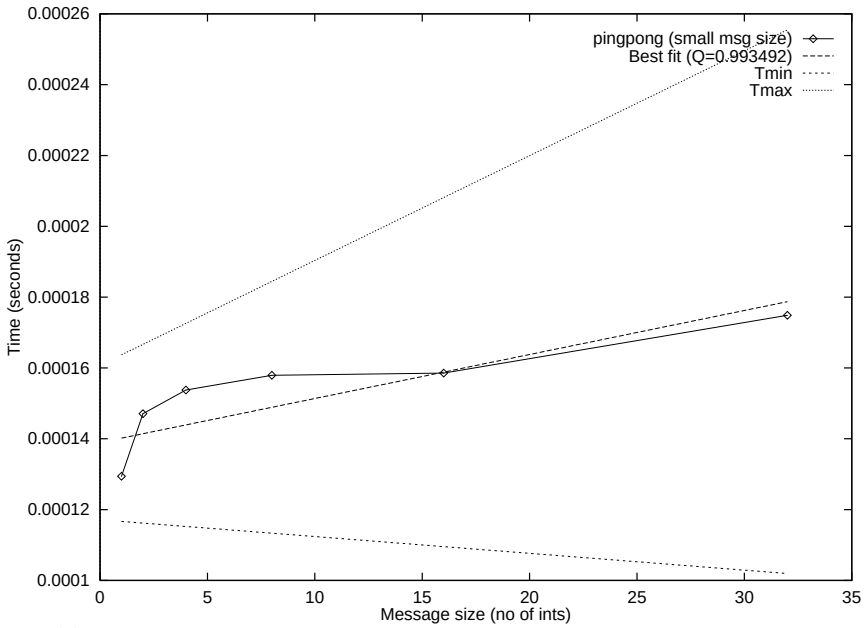
sendrecv

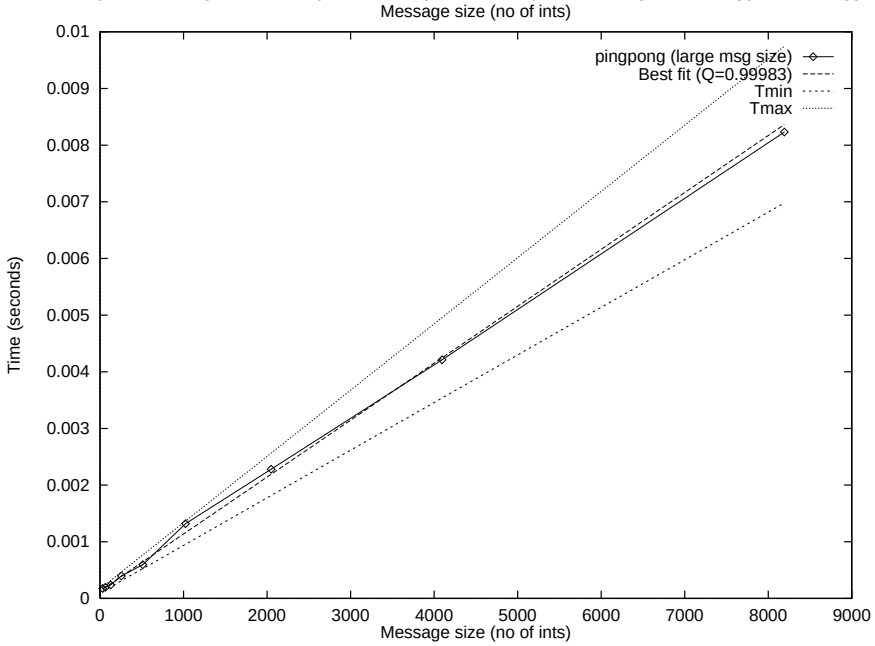




$$T_{sendrecv}(\mu s) = \begin{cases} (90 \pm 10) + (1 \pm 1) \times ndata & \text{if } ndata <= 32 \\ (90 \pm 20) + (0.6 \pm 0.09) \times ndata & \text{if } ndata > 32 \end{cases}$$

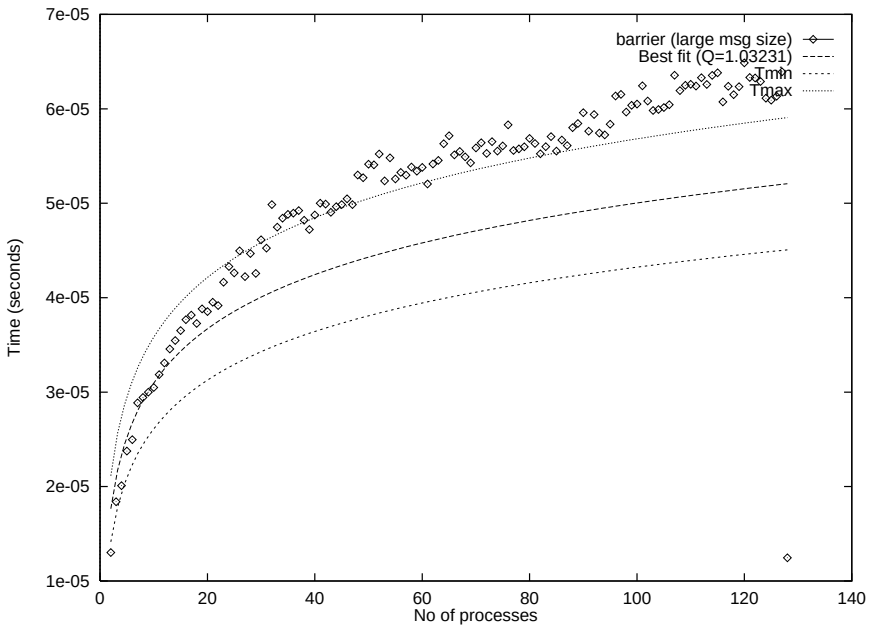
pingpong





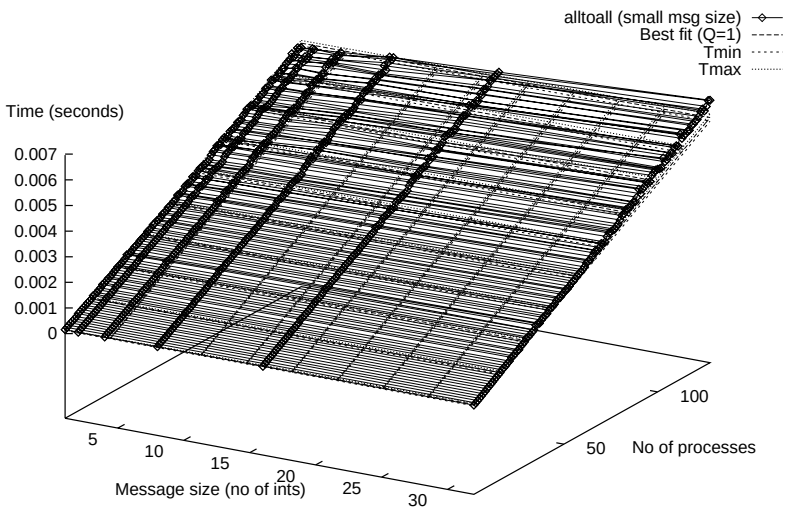
$$T_{pingpong}(\mu s) = \begin{cases} (100 \pm 20) + (1 \pm 2) \times ndata & \text{if } ndata <= 32 \\ (100 \pm 40) + (1 \pm 0.2) \times ndata & \text{if } ndata > 32 \end{cases}$$

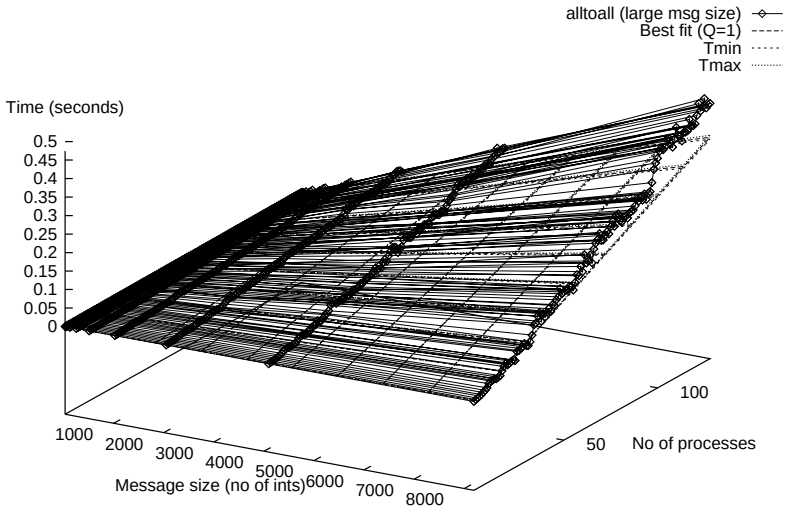
barrier



$$T_{barrier}(\mu s) = (10 \pm 3) + (8 \pm 0.8) \times log(nprocs)$$

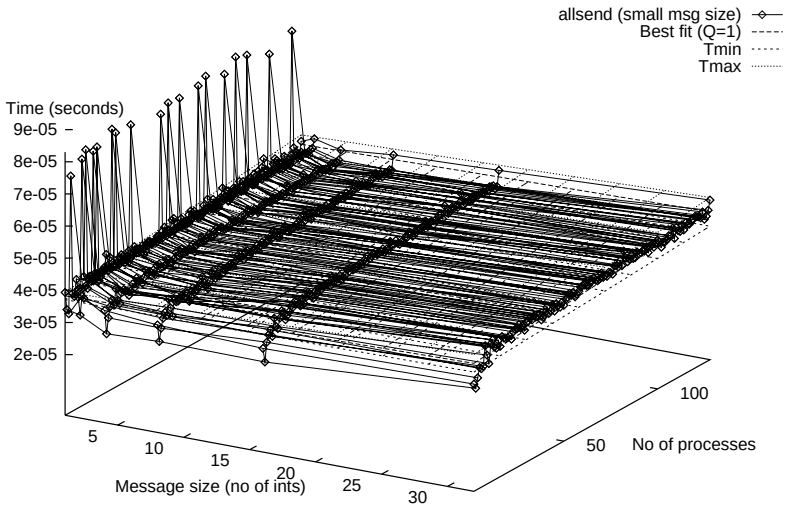
alltoall

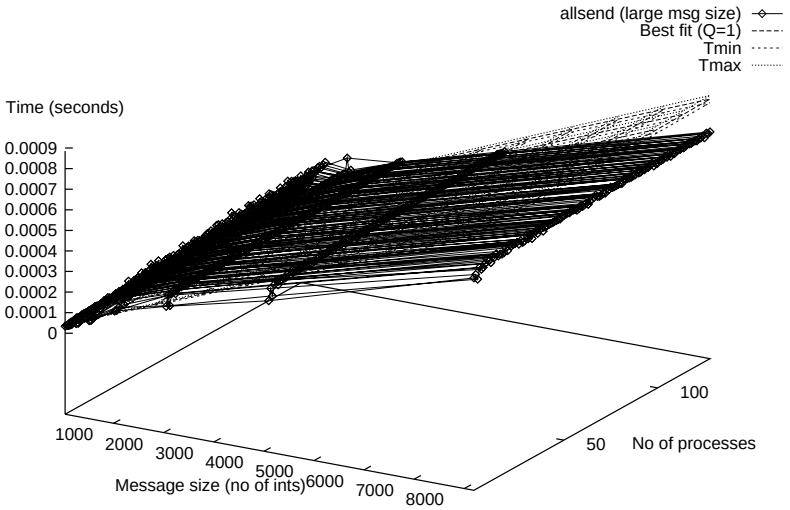




$$T_{alltoall}(\mu s) = \begin{cases} (40 \pm 20) + (50 \pm 0.7) \times nprocs + (2 \pm 1) \times ndata & \text{if } ndata <= 32 \\ (0 \pm 20) + (40 \pm 1) \times nprocs + (0.3 \pm 0.005) \times nprocs \times ndata & \text{if } ndata > 32 \end{cases}$$

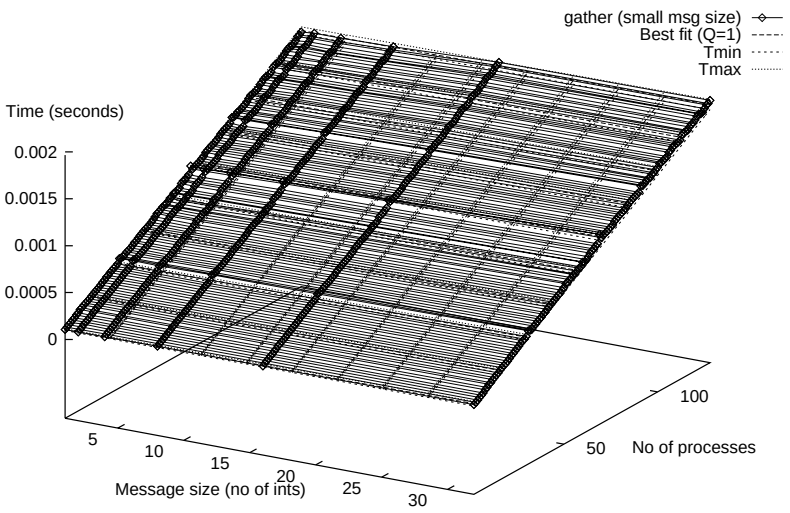
allsend

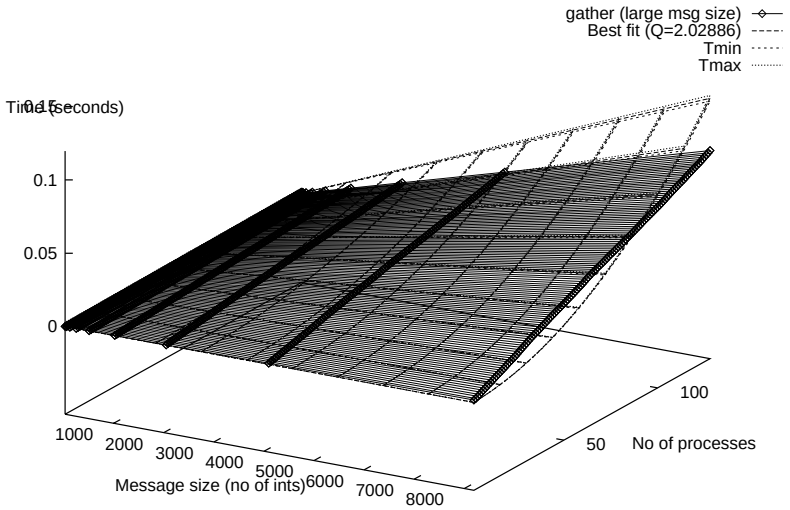




$$T_{allsend}(\mu s) = \begin{cases} (40 \pm 1) + (0.05 \pm 0.01) \times nprocs + (0.09 \pm 0.05) \times ndata & \text{if } ndata <= 32 \\ (40 \pm 1) + (0.1 \pm 0.02) \times nprocs + (0.1 \pm 0.002) \times ndata & \text{if } ndata > 32 \end{cases}$$

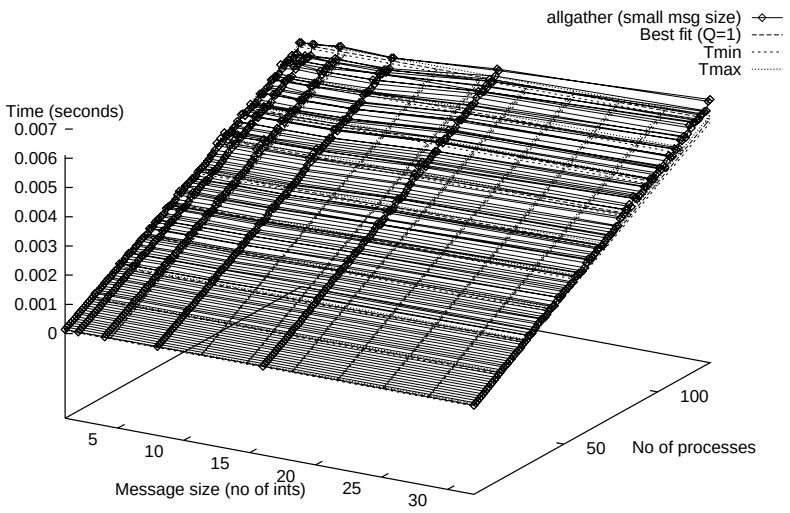
gather

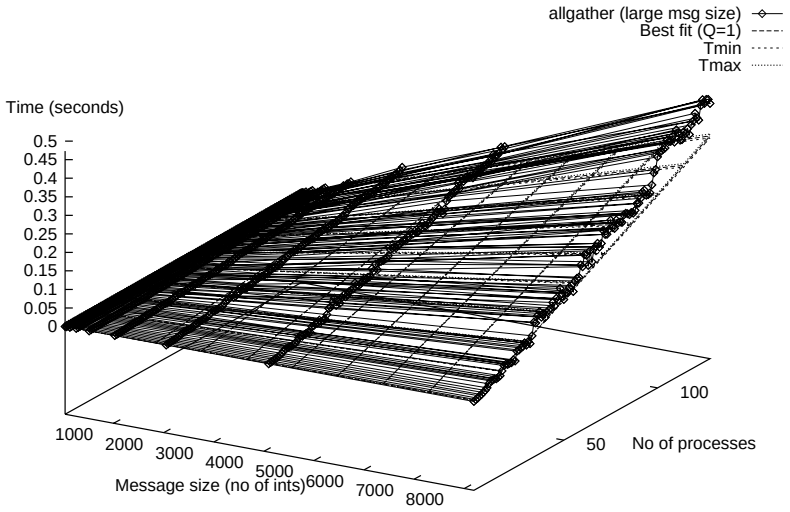




$$T_{gather}(\mu s) = \begin{cases} (70 \pm 8) + (10 \pm 0.2) \times nprocs + (0.7 \pm 0.5) \times ndata & \text{if } ndata <= 32 \\ (0 \pm 20) + (200 \pm 7) \times log(nprocs) + (0.0009 \pm 1e-05) \times nprocs^2 \times ndata & \text{if } ndata > 32 \end{cases}$$

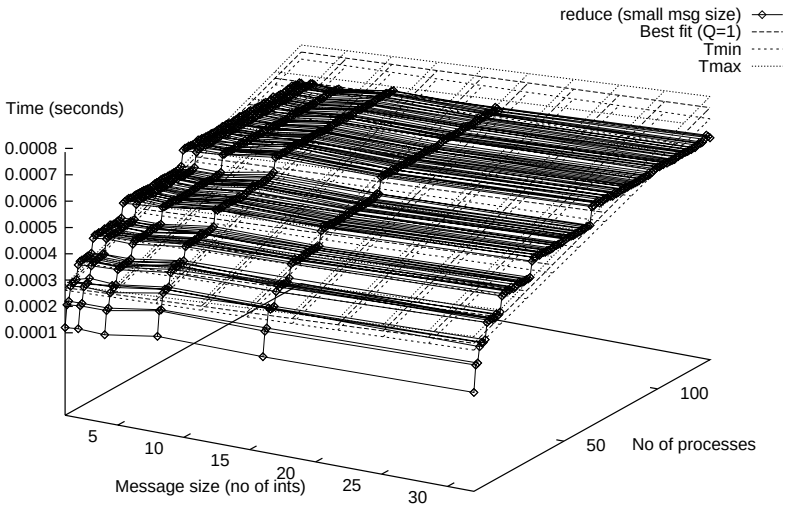
allgather

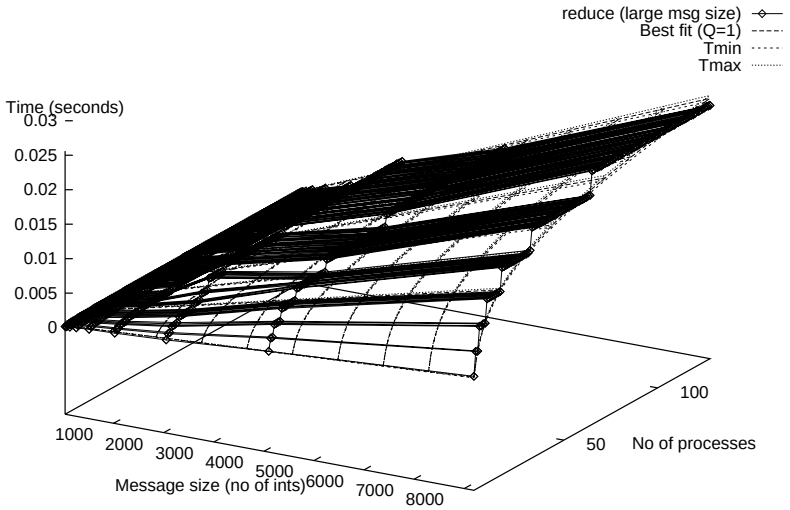




$$T_{allgather}(\mu s) = \begin{cases} (40 \pm 10) + (40 \pm 0.6) \times nprocs + (1 \pm 0.9) \times ndata & \text{if } ndata <= 32 \\ (0 \pm 20) + (40 \pm 1) \times nprocs + (0.3 \pm 0.005) \times nprocs \times ndata & \text{if } ndata > 32 \end{cases}$$

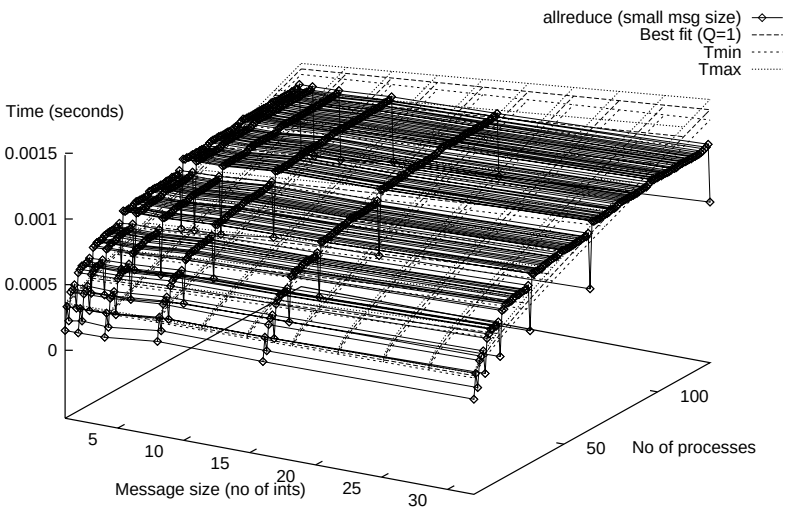
reduce

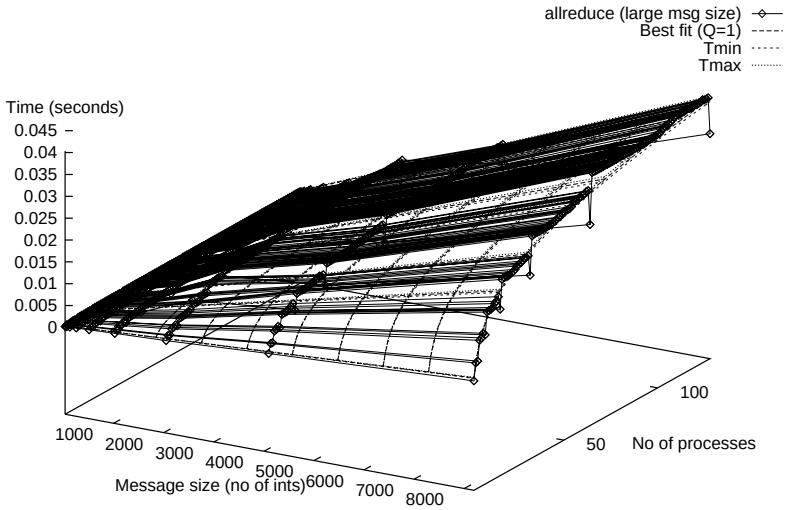




$$T_{reduce}(\mu s) = \begin{cases} (300 \pm 9) + (3 \pm 0.1) \times nprocs + (2 \pm 0.5) \times ndata & \text{if } ndata <= 32 \\ (300 \pm 10) + (2 \pm 0.2) \times nprocs + (0.6 \pm 0.01) \times log(nprocs) \times ndata & \text{if } ndata > 32 \end{cases}$$

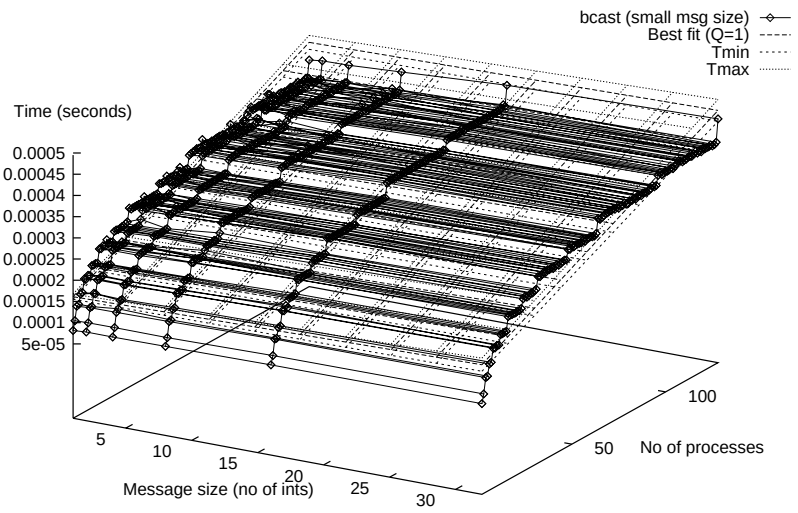
allreduce

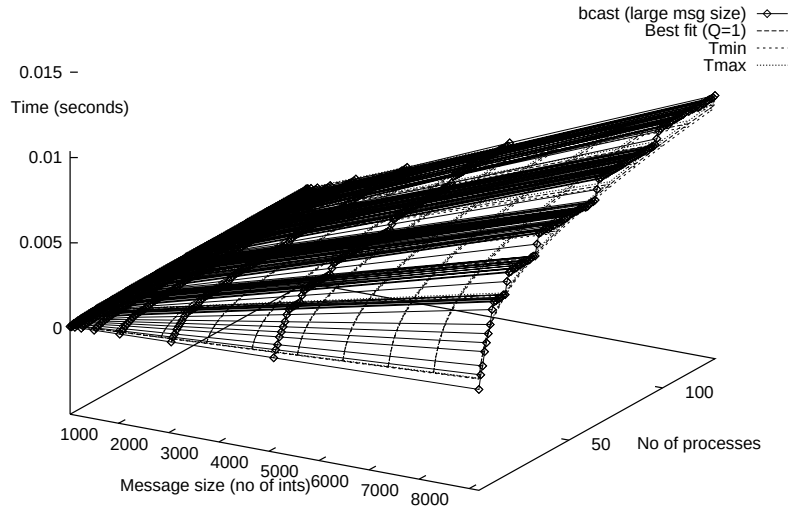




$$T_{allreduce}(\mu s) = \begin{cases} (300 \pm 10) + (6 \pm 0.2) \times nprocs + (2 \pm 0.2) \times log(nprocs) \times ndata & \text{if } ndata <= 32 \\ (300 \pm 20) + (6 \pm 0.3) \times nprocs + (1 \pm 0.01) \times log(nprocs) \times ndata & \text{if } ndata > 32 \end{cases}$$

bcast





$$T_{bcast}(\mu s) = \begin{cases} (200 \pm 6) + (2 \pm 0.08) \times nprocs + (0.6 \pm 0.3) \times ndata & \text{if } ndata <= 32 \\ (100 \pm 7) + (2 \pm 0.1) \times nprocs + (0.2 \pm 0.004) \times log(nprocs) \times ndata & \text{if } ndata > 32 \end{cases}$$