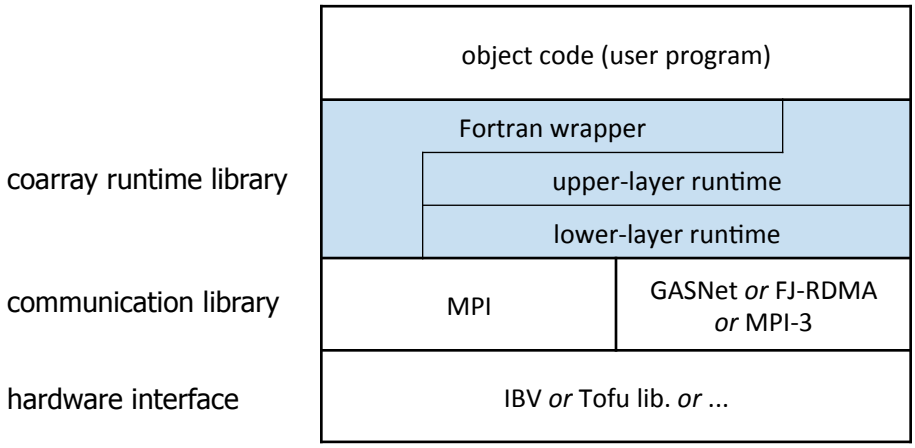
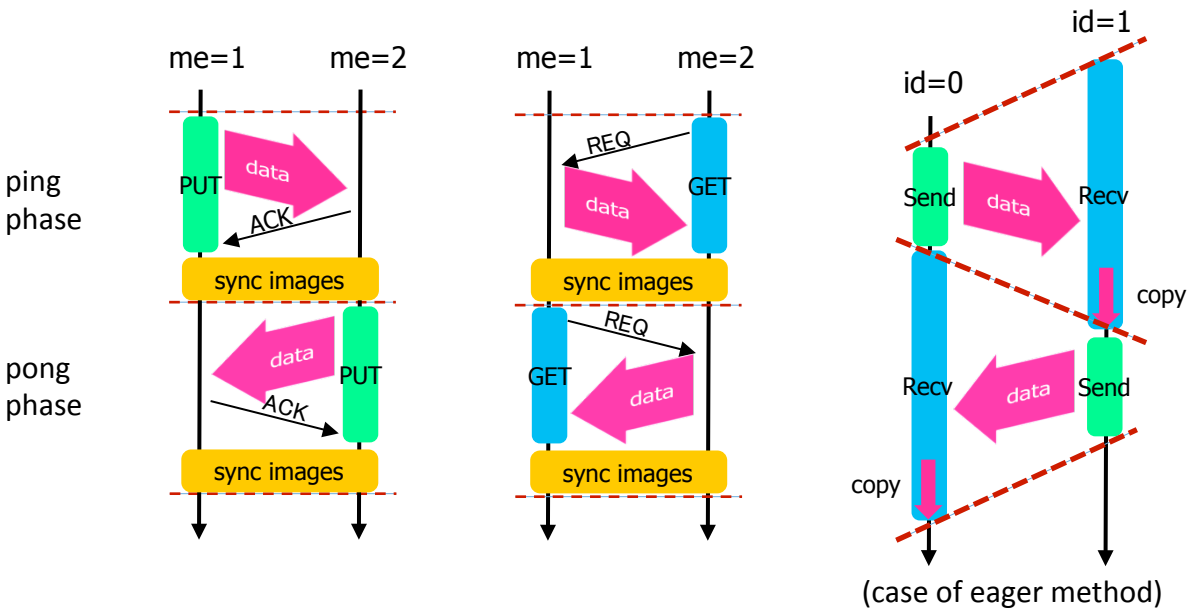
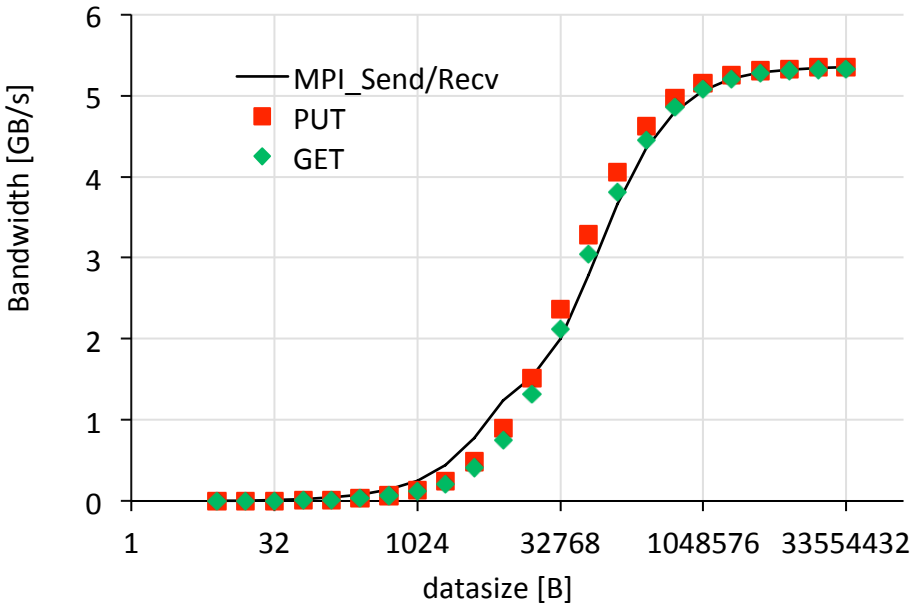

object code (user program)
Fortran wrapper
upper-layer runtime
lower-layer runtime
coarray runtime library
MPI
GASNet *or* FJ-RDMA *or* MPI-3
communication library
IBV *or* Tofu lib. *or* ...
hardware interface

	PUT version	GET version	MPI version

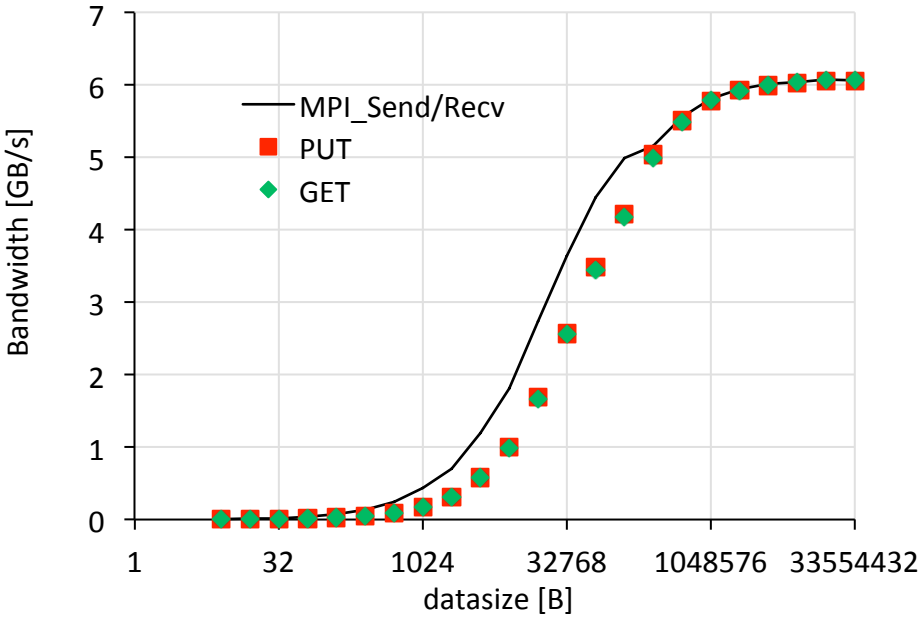
ping phase	if (me == 1) then
	  x(1:n)[2] = x(1:n)
	  sync images(2)
	else if (me == 2) then
	  sync images(1)
	end if
		if (me == 1) then
		  sync images(1)
		else if (me == 2) then
		  x(1:n) = x(1:n)[1]
		  sync images(1)
		end if
			if (id == 0) then
			  call MPI_Send(x, n, … 1, …)
			else if (id == 1) then
			  call MPI_Recv(x, n, … 0, …)
			end if

pong phase	if (me == 1) then
	  sync images(2)
	else if (me == 2) then
	  x(1:n)[1] = x(1:n)
	  sync images(1)
	end if
		if (me == 1) then
		  x(1:n) = x(1:n)[2]
		  sync images(2)
		else if (me == 2) then
		  sync images(1)
		end if
			if (id == 0) then
			  call MPI_Recv(x, n, … 1, …)
			else if (id == 1) then
			  call MPI_Send(x, n, … 0, …)
			end if

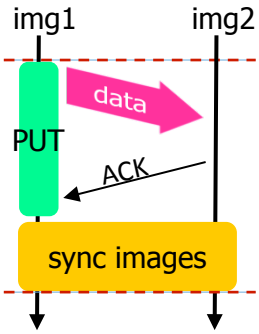




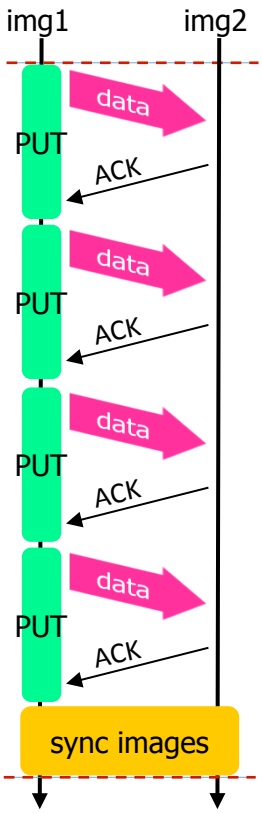
(a) PRIMEHPC FX100
(FJ-RDMA, CA-method)



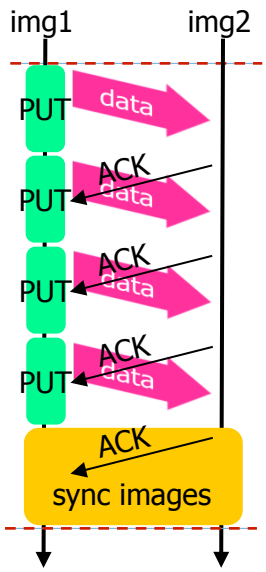
(b) HA-PACS
(MPI-3, RS-method)



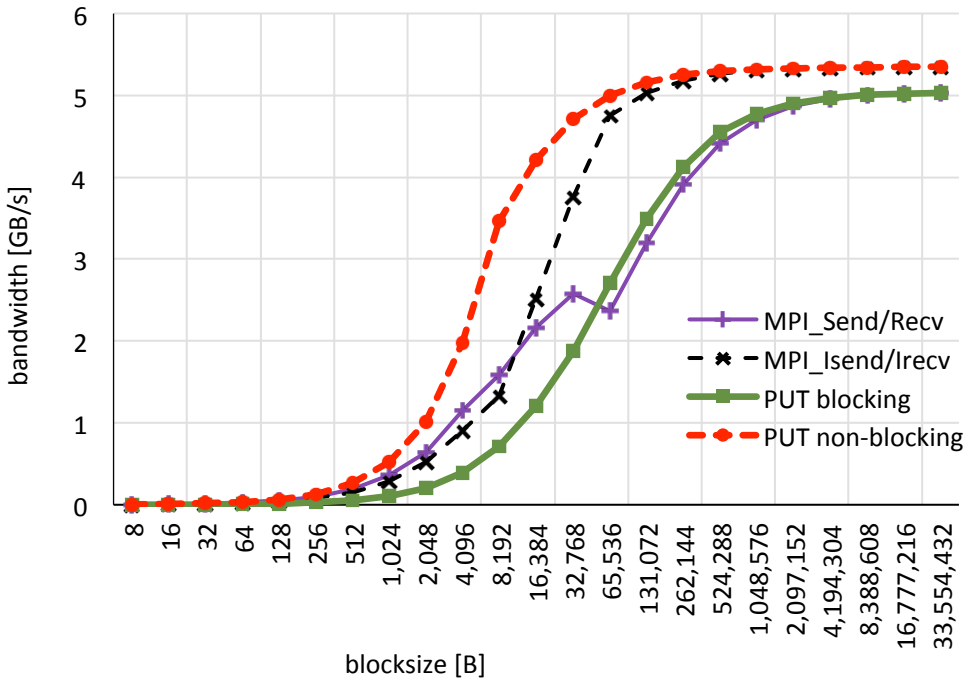
(a) 1-variable/ blocking



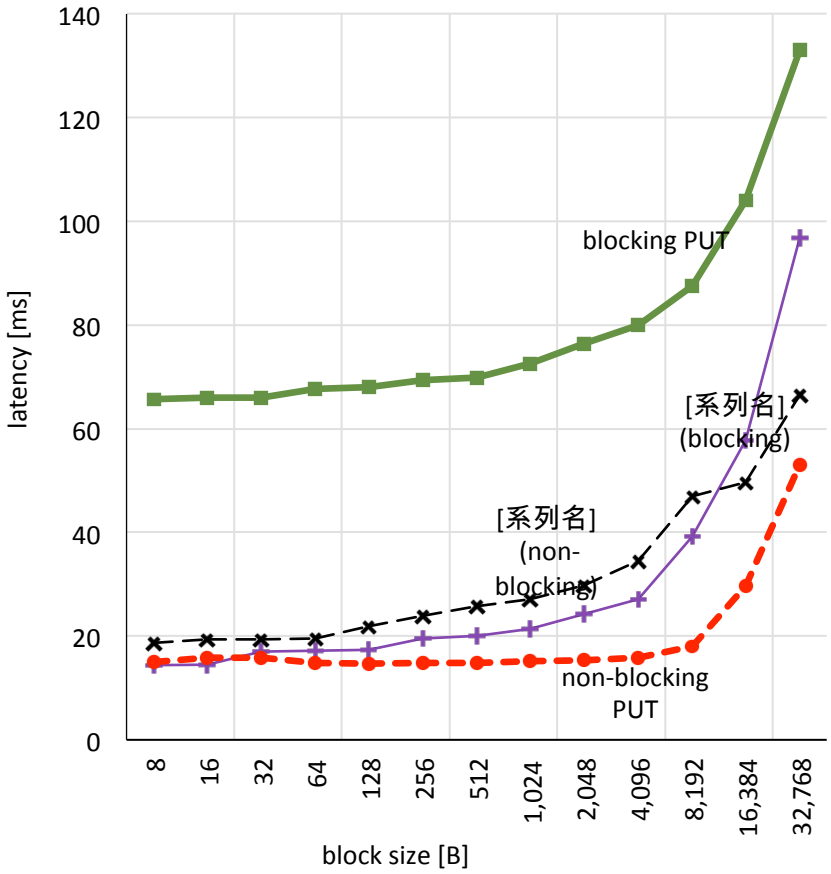
(b) *n*-variable/ blocking



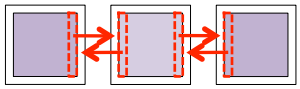
(c) *n*-variable/ nonblocking

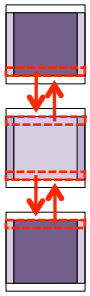


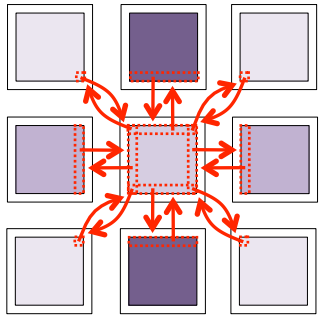
PRIMEHPC FX100
8-var Ping-pong

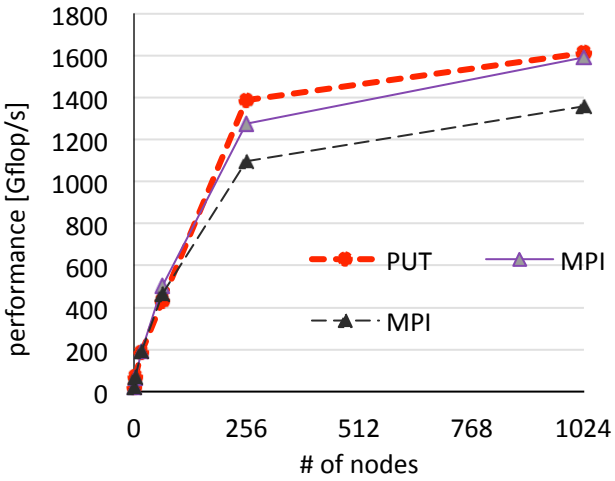


PRIMEHPC FX100
8-variable Ping-pong

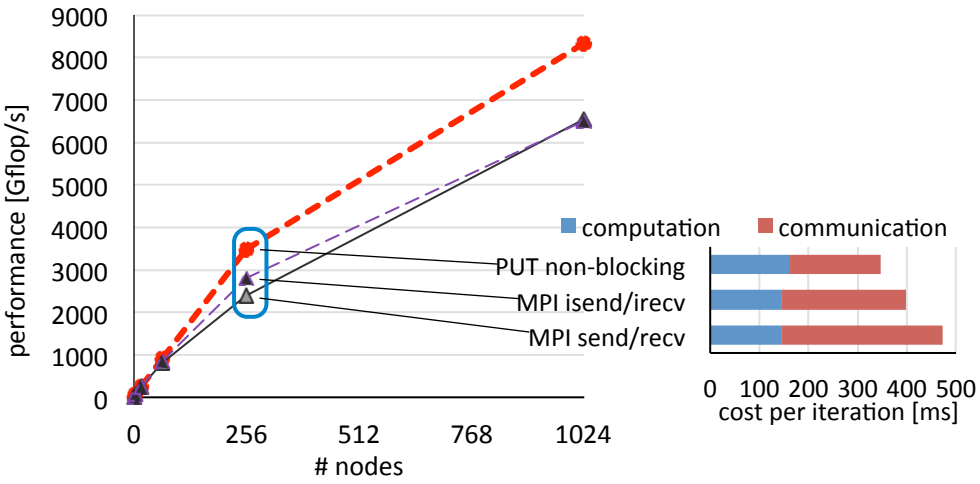




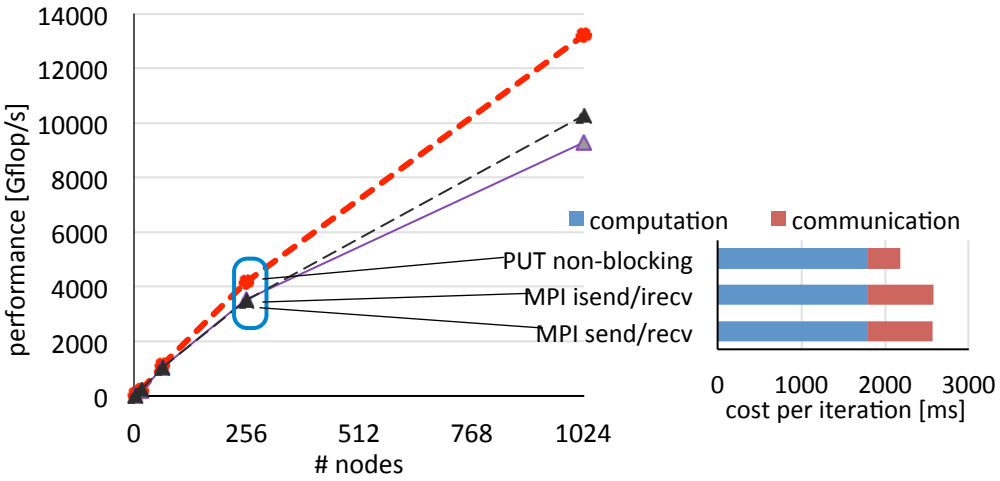




(a) Himeno Size-M (256x128x128)



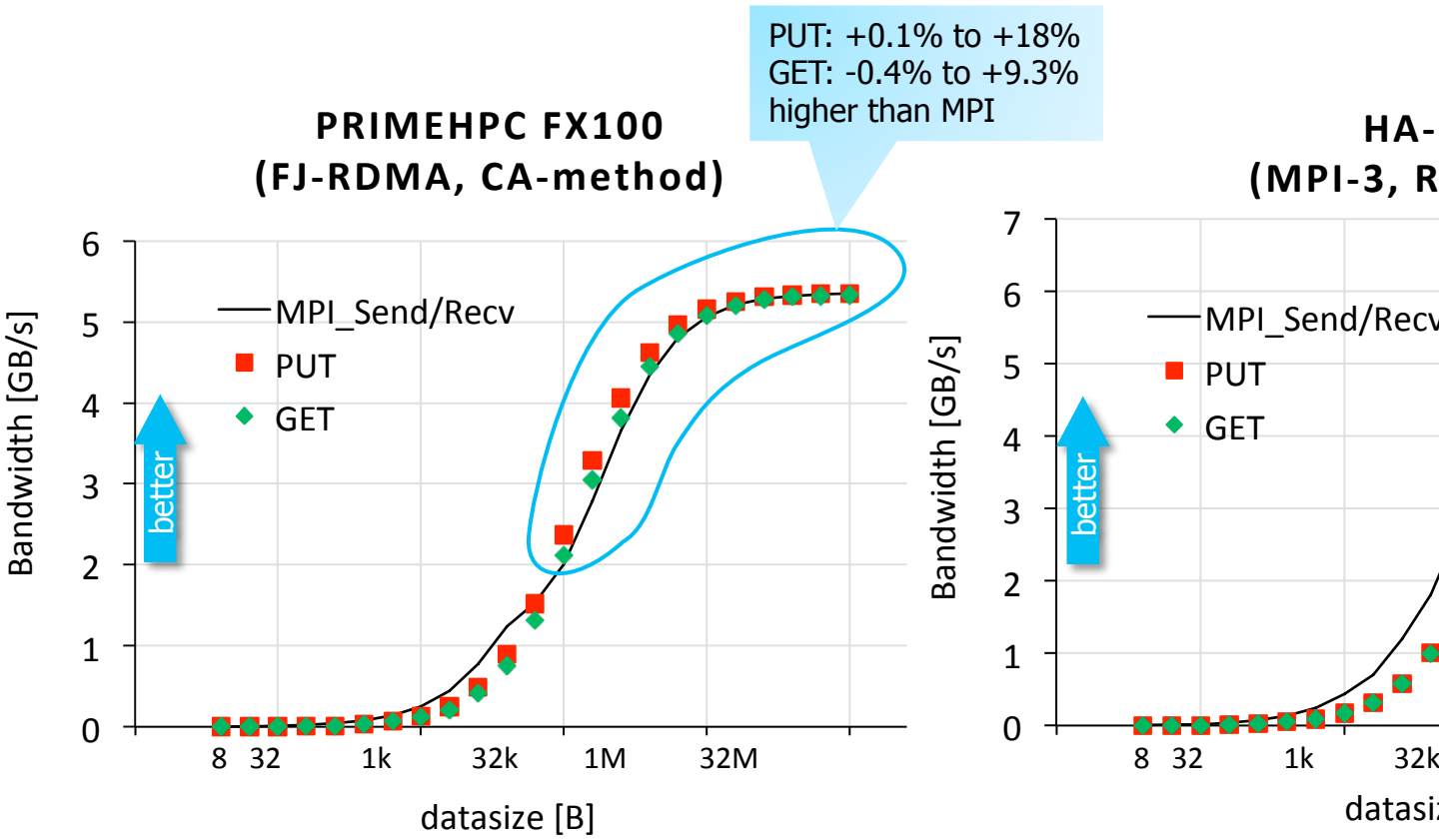
(b) Himeno Size-L (512x256x256)



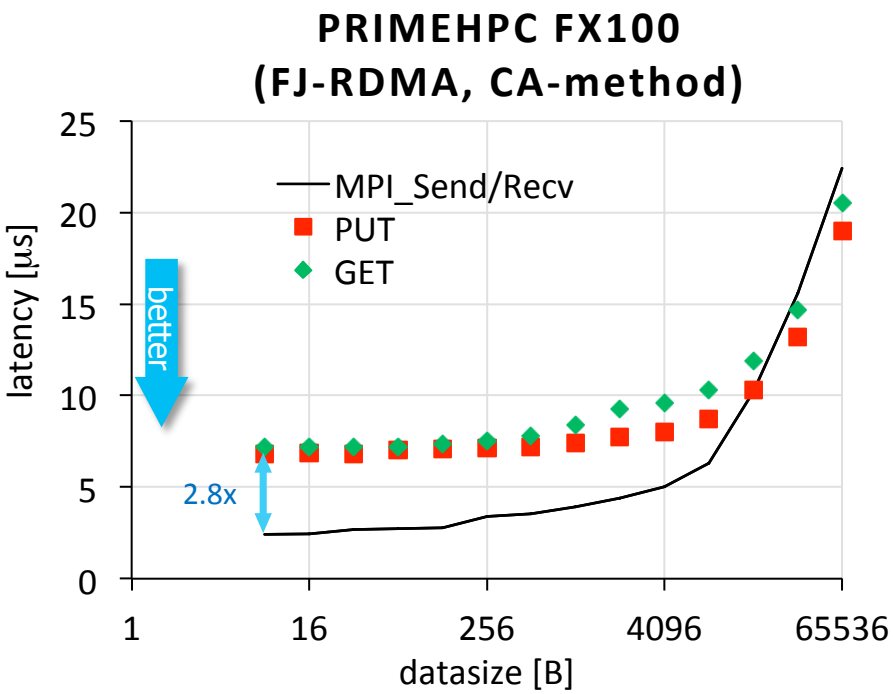
(c) Himeno Size-XL (1024x512x512)

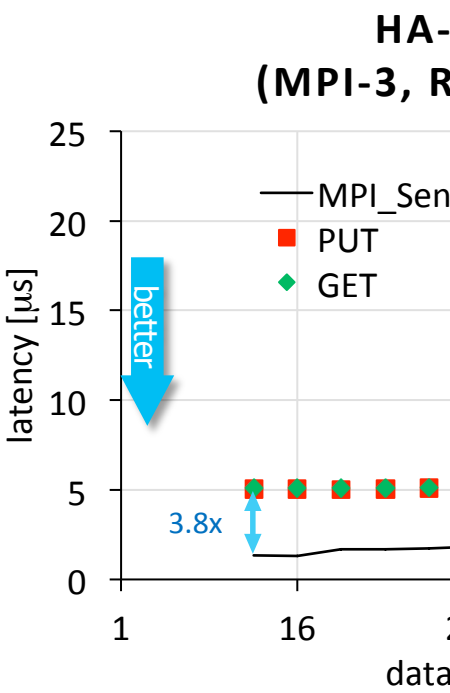
予備

- Result
  - One-sided communication slightly outperforms MPI rendezvous r
    large data.

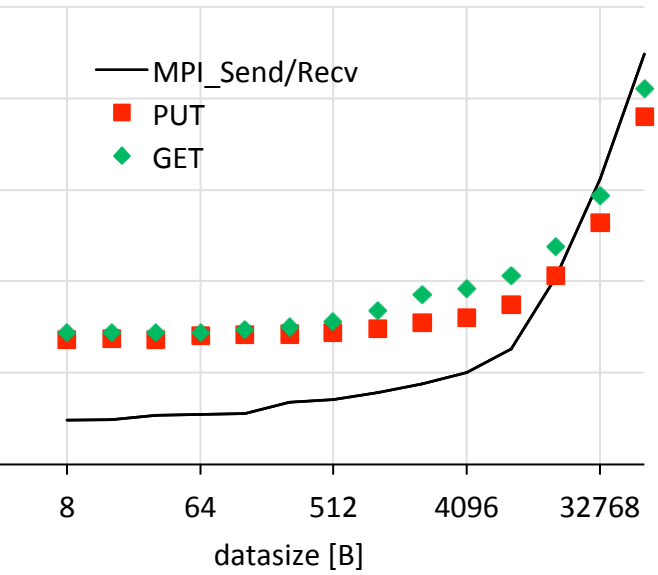


- Result
  - For small data, PUT and GET are several times slower than MPI
- Issue
  - Analysis of the reason
  - Modification of the ping-pong program and improvement of the

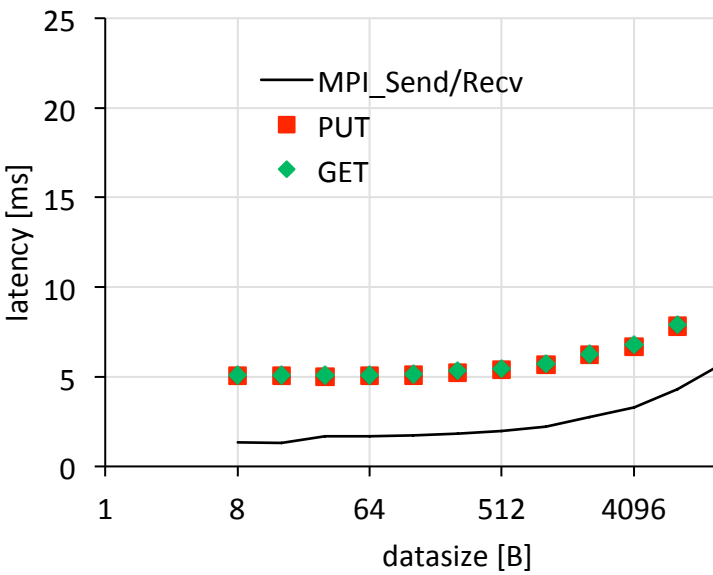




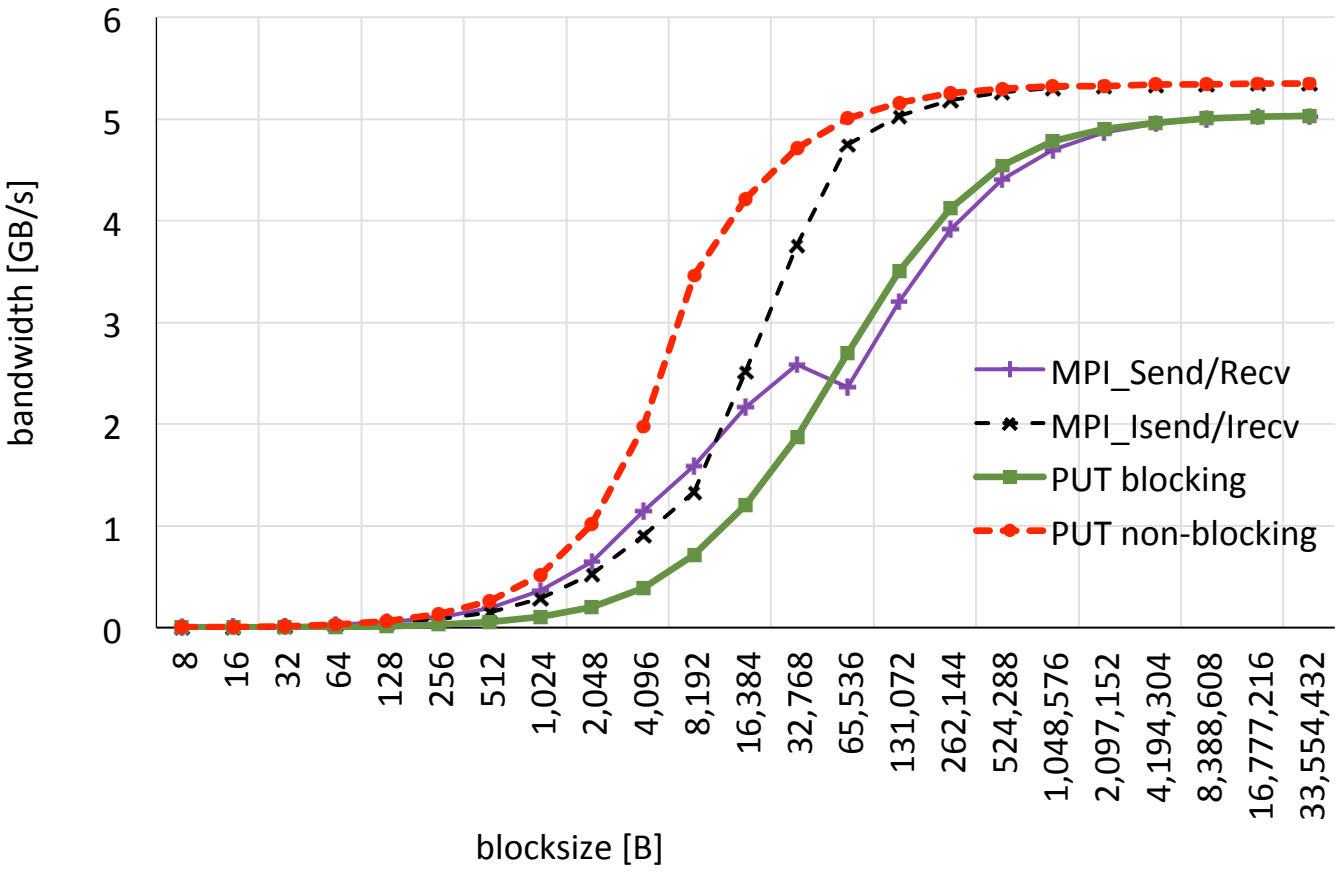
PRIMEHPC FX100
(FJ-RDMA, CA-method)

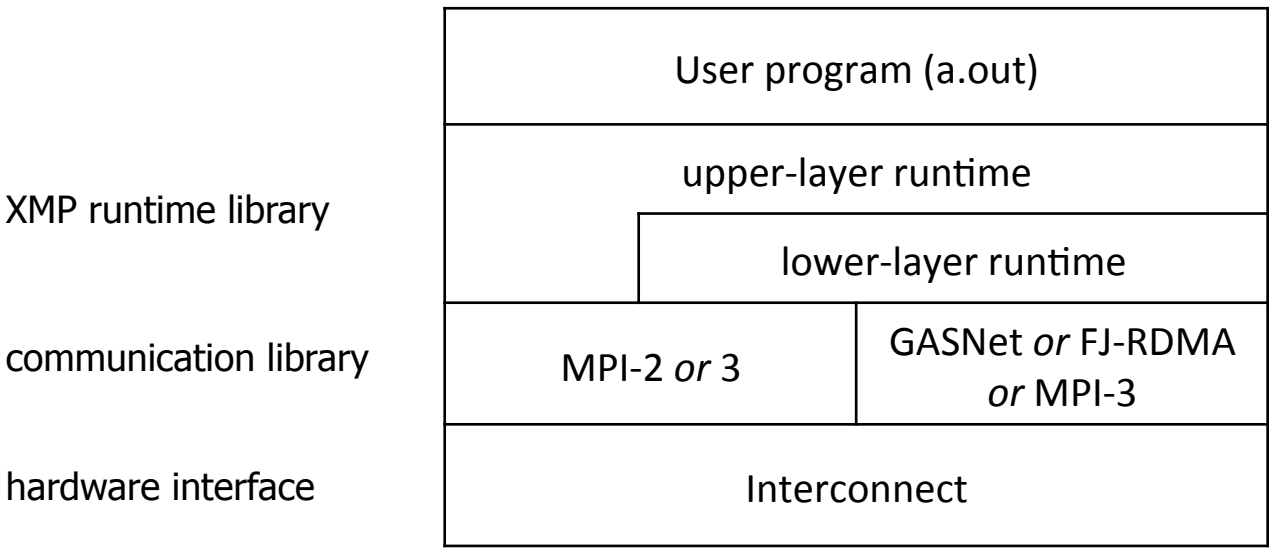


HA-PACS
(MPI-3, RS-method)



PRIMEHPC FX100
8-var Ping-pong




User program (a.out)
upper-layer runtime
XMP runtime library
lower-layer runtime
communication library
MPI-2 *or* 3
GASNet *or* FJ-RDMA *or* MPI-3
hardware interface
Interconnect