**GPI – THE BOOSTER FOR STENCIL BASED INDUSTRY APPLICATIONS**

- Easy transition from bulk-synchronous MPI
- Minimal porting effort
- Complete re-use of legacy kernels
- Improved scalability
- Improved performance

**RTM: 3D acoustic wave equation: Results**

Joint work with Mauricio Araya-Polo (Repsol USA)
b ← 0
for t = 0 to t = Nt do
   /* Compute boundary regions */
   data_{LB}[1-b] = compute (data_{LB}[b])
   data_{RB}[1-b] = compute (data_{RB}[b])
   /* Exchange boundary regions */
   write (data_{LB}[1-b])
   → data_{RH}[1-b], LN) and notify
   write (data_{RB}[1-b])
   → data_{LH}[1-b], RN) and notify
   /* Compute inner regions */
   data_{IN}[1-b] = compute (data_{LB}[b])
   /* wait for halo validity */
   WAIT for notifications
   /* Swap buffers */
   b ← 1 − b
end for

GPI

- Industry proven, small yet powerful PGAS API
- One-sided, non-blocking, truly asynchronous and zero-copy communication
- Minimal interference between computation and communication
- Full hardware utilization
- Excellent scalability TAU [1], BQCD [2], UTS [3]
- Accelerator support (NVIDIA Tesla, Intel® Xeon Phi™)

Stencil

- 3D acoustic wave equation kernel (fdtd-method: 8th-2nd order approximation)
- Bulk-synchronous legacy MPI implementation
- Domain decomposition
- Tight neighbor coupling

Asynchronous implementation

