XcalableMP

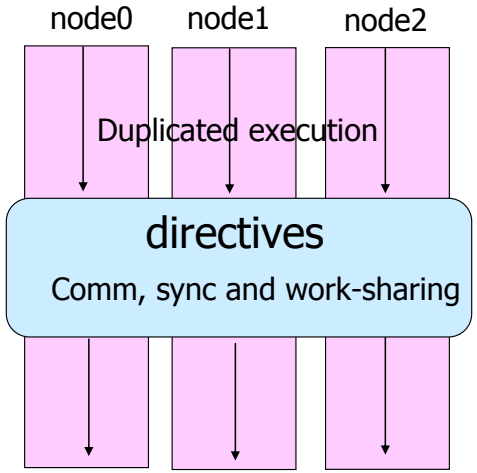
http://www.xcalablemp.org

# XcalableMP : directive-based language eXtension for Scalable and performance-aware Parallel Programming

- A PGAS language. Directive-based language extensions for Fortran95 and C99
  - To reduce the cost of code-rewriting and education
- Global view programming with global-view distributed data structures for data parallelism
  - A set of threads are started as a logical task. Work mapping constructs are used to map works and iteration with affinity to data explicitly.
  - Rich communication and sync directives such as "gmove" and "shadow".
  - Many concepts are inherited from HPF
- Co-array feature of CAF is adopted as a part of the language spec for local view programming (also defined in C).

```
int array[N];
#pragma xmp nodes p(4)
#pragma xmp template t(N)
#pragma xmp distribute t(block) on p
#pragma xmp align array[i][ with t(i)

#pragma xmp loop on t(i)  reduction(+:res)
  for(i = 0; i < 10; i++)
    array[i] = func(i,);
    res += …;
```



# Status of XcalableMP

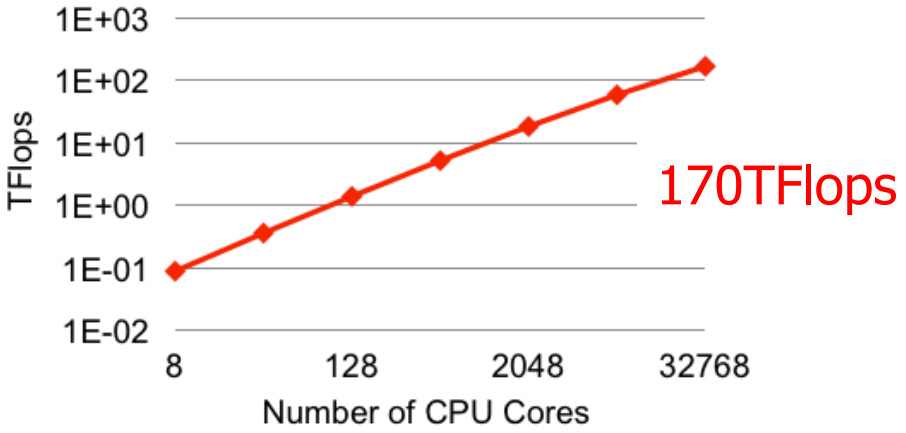
- Status of XcalableMP WG
- Monthly Meetings and ML, supported by PC Cluster Consortium Japan.
- XMP Spec Version 1.0 was published (at SC11). It includes XMP-IO and multicore extension as a proposal in ver 1.0.
- Version 1.1: it is revised at SC12

- Compiler & tools
- XMP/C prototype compiler (version 0.6, beta) is available.
- XMP/Fortran F95 is now in alpha release (version 0.6 alpha).
- Open-source, source-to-source compiler with the runtime using MPI

- Codes and Benchmarks
- HPCC benchmarks, Jacobi ..
- Platforms supported
- Linux Cluster, Cray XT5 … the K computer
- Any systems running MPI. The current runtime system designed on top of MPI

**HPL performance**

- **Block-cyclic Distribution**
- **Panel Broadcast by gmove directive**




**RA performance**

- **Coarray is used**
- **Performance comparable to MPI**