

Real-time Earthquake Information Display System

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My laboratory have developed method of prediction of wave field(Hoshiba et al. 2015) and I have developed real-time earthquake information display system. The system consists of data receiving program rcvt, data format transformation program shmdump and wave server program.

rcvt and shmdump are part of WIN System.

wave server has wave buffer on memory and send JSON format seismic wave data, seismic intensity data and maximum acceleration data to client at request from web browser.

Web browser accesses to wave server per second and display received data using JavaScript program in HTML file.

Wave server needs to process observed data over several hundreds stations and must have high performance processing.

I tested the performance of parallel processing for high performance using GPU. JMA seismic intensity needs Fourier transform and it is important to speed up Fourier transform.

First, I tested performance of Fourier transform using several libraries.

Test environment consists of OS Windows 8.1(64bit version), CPU Intel Core i7-4770K(3.5GHz, 4 cores), GPU NVIDIA GeForce GTX 760, C compiler gcc 4.9, FFT library FFTW 3.3, FFT library for GPU cuFFT of NVIDIA CUDA Toolkit 7.5.

Number of data is 2 to the 22nd power(4 million).

Performance of cuFFT using GPU is 10 times of its of FFTW.

Next, I tested performance of JMA seismic intensity and real-time seismic intensity.

I used seismic data with 100Hz sampling and 5 minutes data period(number of data is 30000).

Performance of JMA seismic intensity using FFTW is lower than real-time seismic intensity but performance using GPU is faster than real-time seismic intensity.

I plan to test application of GPU to multi station data using parallel processing.

References

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