

## The Experiment of the Big-Data Handling in "i-Jishin" Cloud System

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### 1. "i-Jishin" Cloud System

Since January 2011, we are developing the "i-Jishin" Cloud System. In this system, the MEMS accelerometer built in the Personal Digital Assistant like iPhone/iPod touch/iPad is used. "i-Jishin" performs data observation by continuous measurement and records the trigger data, and automatically uploads the data on Cloud. We can see the position of a terminal, a trigger waveform, etc. by a browser through the Internet.

Since the release in August 2010, the number of downloads of the "i-Jishin" software is reaching about 87,000 as of January, 2013. The number of earthquake early warnings is 5000 times or more from the beginning of mission of the system in January, 2011 to the present. More than 40,000 earthquake data related with the earthquake early warnings, and other individual 120,000 data from all over the world have been gathered in the Cloud server. It is expected that these data continue to increase further.

In order that users may treat a huge quantity of these data efficiently, it is necessary to display data on between space-time. As part of this trial, first of all, we built the mechanism of extracting the earthquake information related with the earthquake early warning.

### 2. Time-line display

As on the upper part of the figure, the distribution of hypocenters is created. The horizontal axis is time, and the vertical axis is the depth of the focus. Each earthquake was indicated by the time line with the circle which changed the size of the radius according to the magnitude of an earthquake. The scale of the horizontal axis can be changed from 1 year to 1 hour. User can choose the past data from the calendar or the scale bar under a time-line display. In the map under the figure, the same earthquakes as currently displayed on the time line are expressed as the circle whose center is epicenter. If an earthquake is chosen with a mouse on the time line or a map, the earthquake will change to yellow. If user clicks the yellow domain, "i-Jishin" terminals triggered by the earthquake early warning will be expressed as a balloon on the map, and will be displayed in a table list. When user clicks the balloon which shows "i-Jishin" terminal on a map, the position information such as latitude and longitude of the terminal is shown. Moreover, the user can see the triggered waveform, download data, and to use the analysis soft via browser.

### 3. Handling of Data which is not related with Earthquake Early Warning

At present, the waveform data which are triggered at each terminal and not related with an earthquake early warning, are also being accumulated in the Cloud server. These data is collected as "Earthquake Information" in the WEB page of geonavi. On "Earthquake Information" page, we can see the 500 latest data, but this page is not a legible state. In order to perform better observation, the seismic observation system created by using commercial strong-motion seismograph (SU102) and the Cloud server of "i-Jishin" is also built. However, since the observational data here is not being related with the earthquake early warning, either, it is not written on the time line. It is necessary to consider and build the structure which the user can use easily.

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