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Virtual Observatory in Astronomy: Its Construction and Outputs

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Astronomical research utilizes multi-wavelength data that are taken by various ground-based observatories scattered in the world and space-based observatories. Although it has been well known that it is essential to federate such multi-wavelength data, an infrastructure toward realizing the federation was poorly made in the past.

Astronomical Virtual Observatory can be defined as follows: "a collection of integrated astronomical data archives and software tools that utilize computer networks to create an environment in which research can be conducted". Towards a real federation, major astronomical observatories in the world have collaborated in defining standardized protocols and in constructing each virtual observatory. Consequently, as of January 2011, more than 10,000 resources can be accessed from Japanese Virtual Observatory (JVO) that was constructed at the National Astronomical Observatory of Japan (NAOJ). It should be stressed that many astronomical papers were published by using the VOs in the world.

The JVO system has been upgraded continuously. Recently we have implemented the JVOsky system that visualizes observed images and observed data by using the Google API. Further we have experimentally implemented a scalable distributed data analysis system by means of the Hadoop, demonstrating that the net data processing efficiency is some 70 times faster than a single-machine case.

Keywords: Multi-wavelength Astronomy, Database, Information Infrastructure System