

# Development of a system for measurement beam service time in RIBF operations

A. Uchiyama,\*<sup>1</sup> M. Komiyama,\*<sup>1</sup> and N. Fukunishi\*<sup>1</sup>

To assess the performance of the accelerator facility, it is essential to measure the beam service time provided for the request from experiment users. Previously, beam service time was measured by using the handwritten log notebook records maintained by accelerator operators. In order to measure beam service time more efficiently and accurately, we developed a beam service time measurement system called Beam Status History.

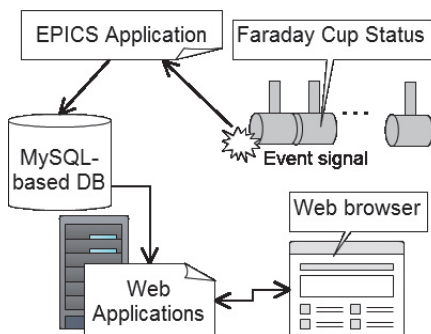


Fig. 1. System chart of developed measurement system for beam service time (Beam Status History).

The outline of Beam Status History is shown in Fig. 1. The RIBF control system consists of a distributed control system constructed using Experimental Physics and Industrial Control System (EPICS)<sup>1</sup>.

On the other hand, Beam Status History consists of EPICS-based client applications, MySQL-based database, and Web applications. Faraday cup statuses set or out, are input as digital signals into EPICS databases, and an event that identifies information about beam service availability status is triggered by the system when all faraday cups reach the out state in the experiment course.

By contrast, when even one of the faraday cups state changes from out to set, the system considers it as the beam-off status. The information of the beam on/off status is stored in the MySQL-based database by the EPICS-based client application that is written in C, and then, beam service time is calculated based on a timestamp of the beam-on/off status by the PHP-based Web applications.

For Beam Status History, servers were constructed by Linux (CentOS 5.9) on a virtualization environment for the RIBF control system<sup>2</sup>. This system consists of the Web server (Apache), MySQL server, and the server for caMonitor, which is an event-driven program that uses the Channel Access protocol, in three virtual hosts. On the other hand, user interfaces are utilized by Web applications using Asynchronous JavaScript and XML (Ajax) technology. From the viewpoint of providing many users with accelerator information, this Web technology is a convenient system. Ajax is a Web development technique used on the client-side to create asynchronous Web applications for implementing a real-time display on the Web browser. In the beam service time measurement system, Ajax is used to display the beam on/off status and the chart of the beam service time (See Fig. 2).

As a system function, all the beam-on and beam-off times, experiment user name, type of beam (ion, charge, energy, and mass) used in the experiment are recorded in the MySQL-based database automatically. Additionally, it is possible to determine the total beam-on time, beam-off time, and current status (beam-on-target or not) in the experiment at first sight.

In the future, we will attempt to improve system usability to entirely satisfy accelerator operators and users requirements.

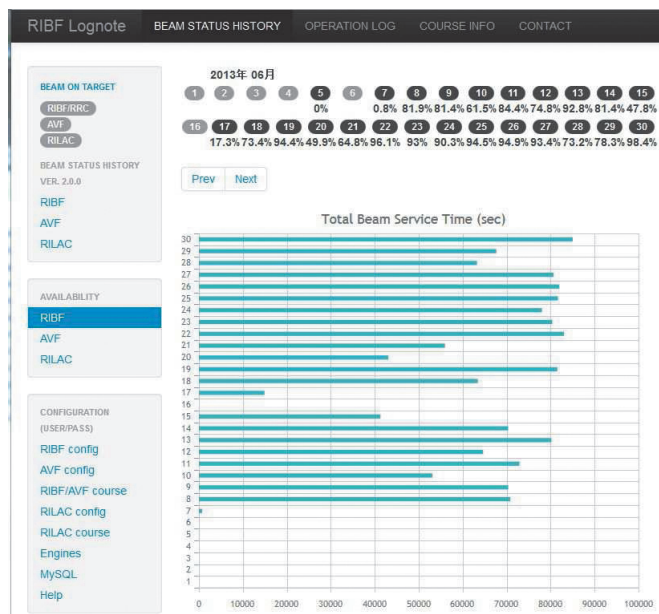


Fig. 2. User interface of Beam Status History. The total beam service time for a day and a month is displayed as a bar chart on the Web browser (Firefox).

## References

- 1) M. Komiyama et al.: in progress.
- 2) A. Uchiyama et al.: in progress.

\*<sup>1</sup> RIKEN Nishina Center