

# Development of JT-60SA Experiment Database System

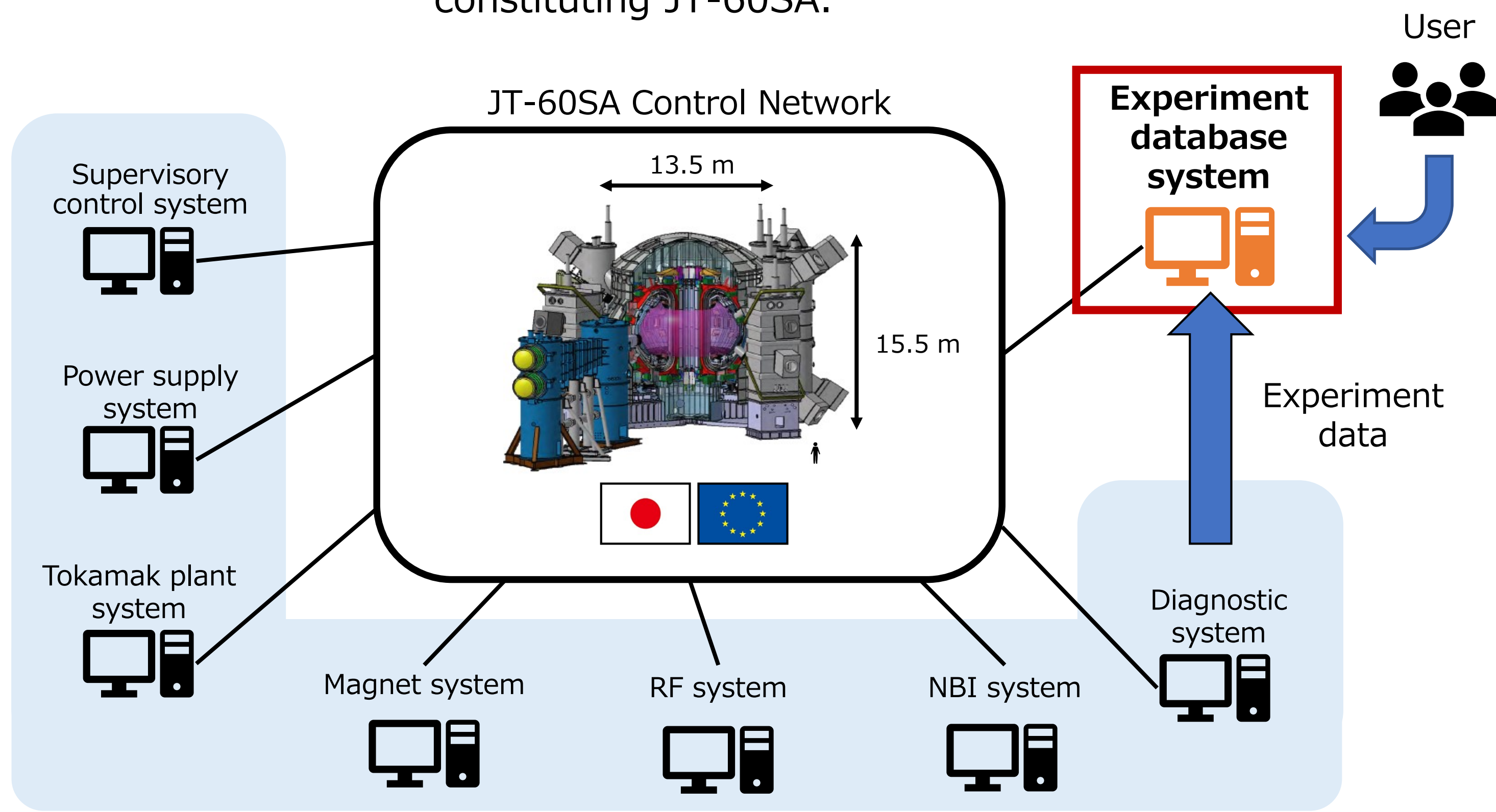
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## Summary

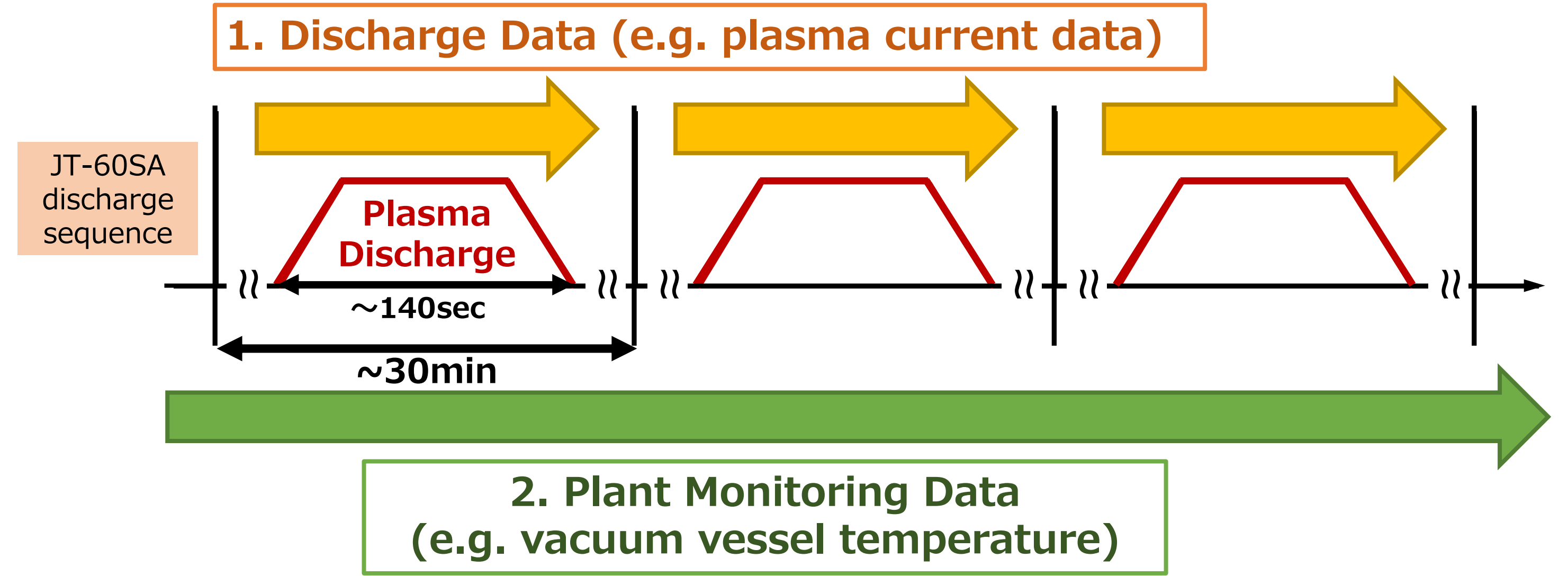
- We have developed the experiment database system for the JT-60SA operation.
- JT-60SA DB meets 3 requirements:
  - to hold all the JT-60SA data and prevent loss of data
  - to allow users to use the data without knowing internal configuration and structure of database
  - to manage revision of the data so that the stored data can be traced back to an older revision

## Introduction

Various experiment data are acquired by all systems constituting JT-60SA.



Experiment data are categorized into 3 types:

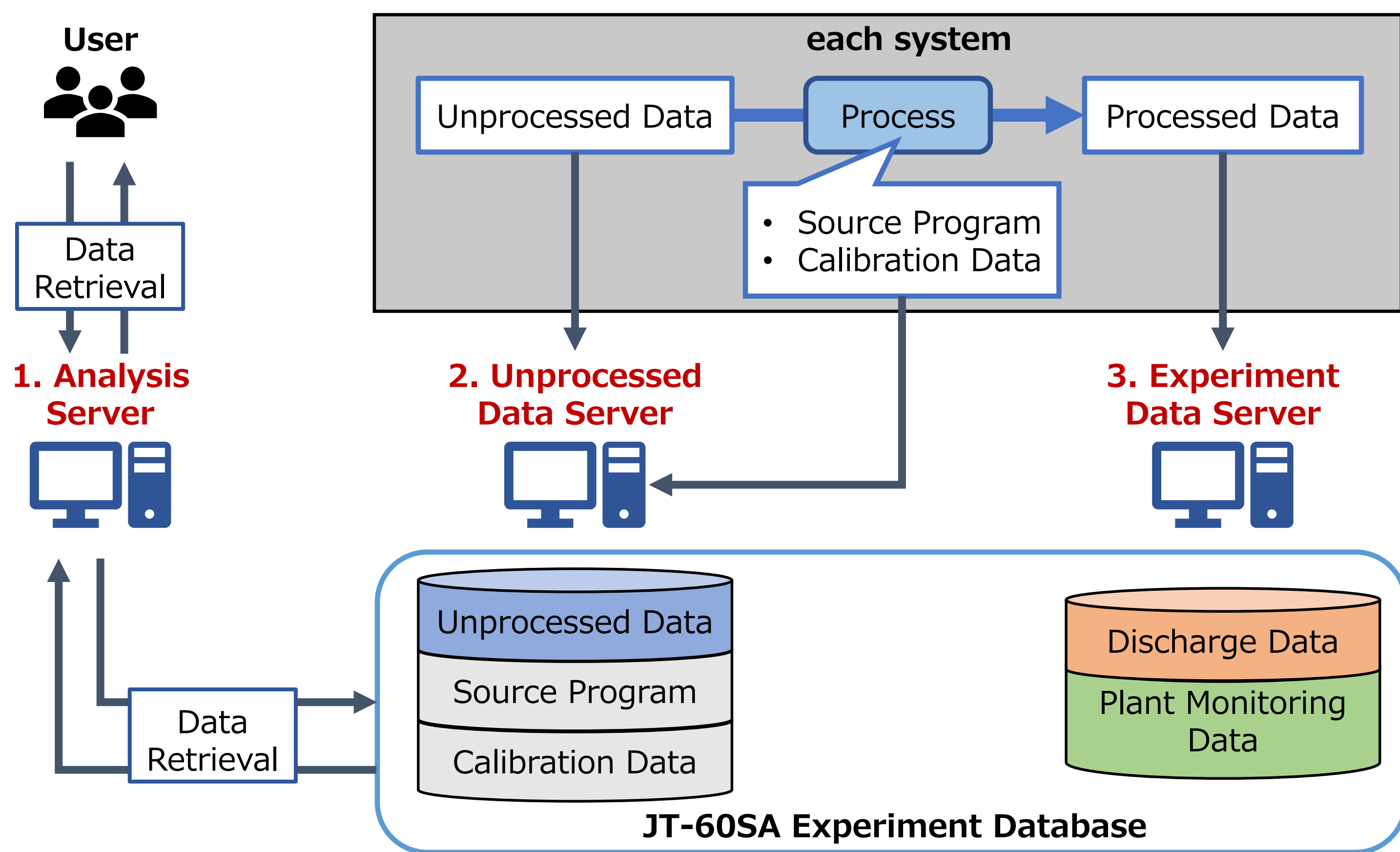


Maximum Data Amount of JT-60SA

	Discharge Data	Plant Monitoring Data	Unprocessed Data
Number of Data	1096	2611	131
Data Amount (1sec)	38MB	-	1.1GB
Data Amount (140sec/shot)	5.3GB	-	154GB
Data Amount (20shot/day)	106GB	1.0GB	3080GB
Total Data Amount (1day)			3.2TB

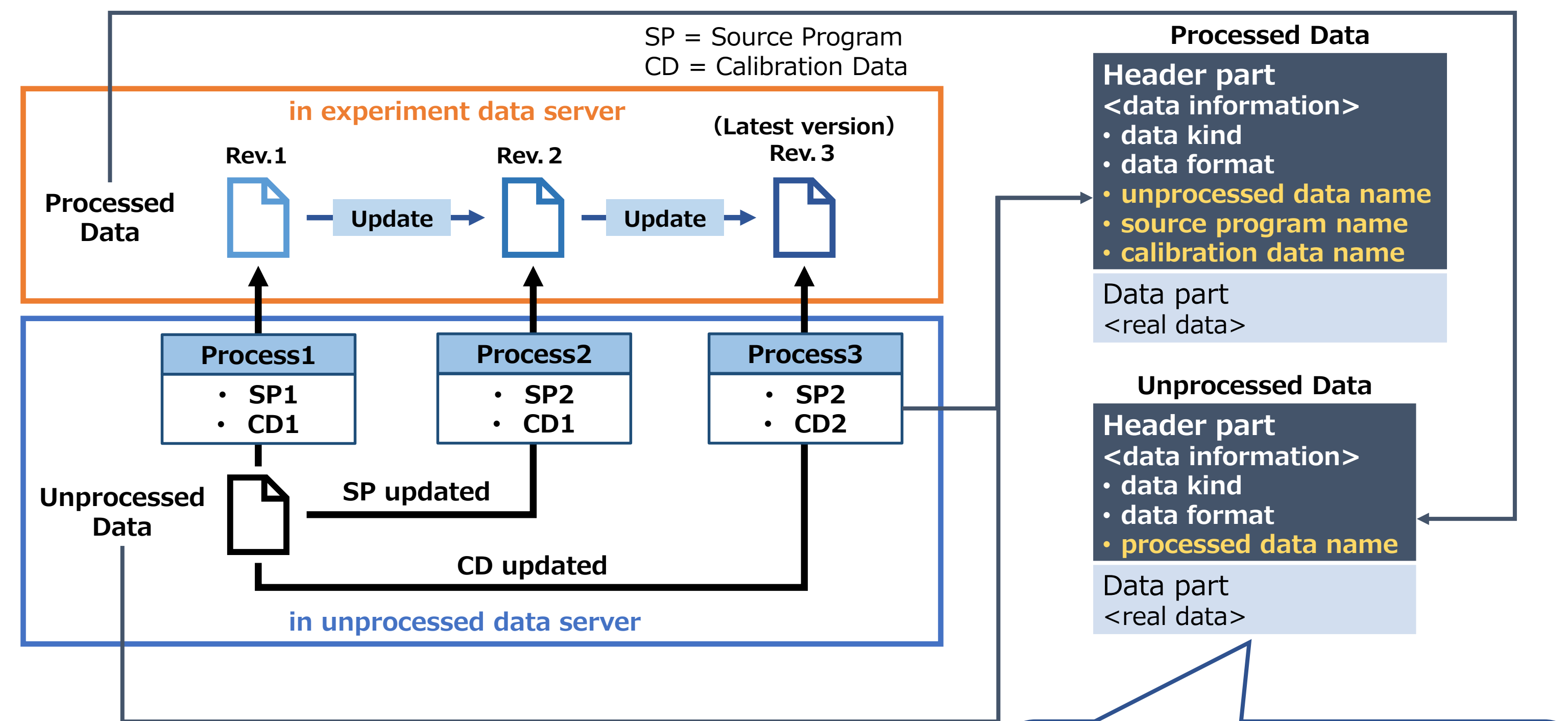
## JT-60SA Experiment Database System

JT-60SA database system consists of 3 servers.



## Management of data revision

- Unprocessed data is used to analyze a discharge more in detail after the experiments.
- Unprocessed data is used for re-processing it into discharge data.



To record the data update history,
 

- Discharge data is managed with the revision number to trace back to an older revision.
- Unprocessed data is associated with the corresponding discharge data and program used for the processing.

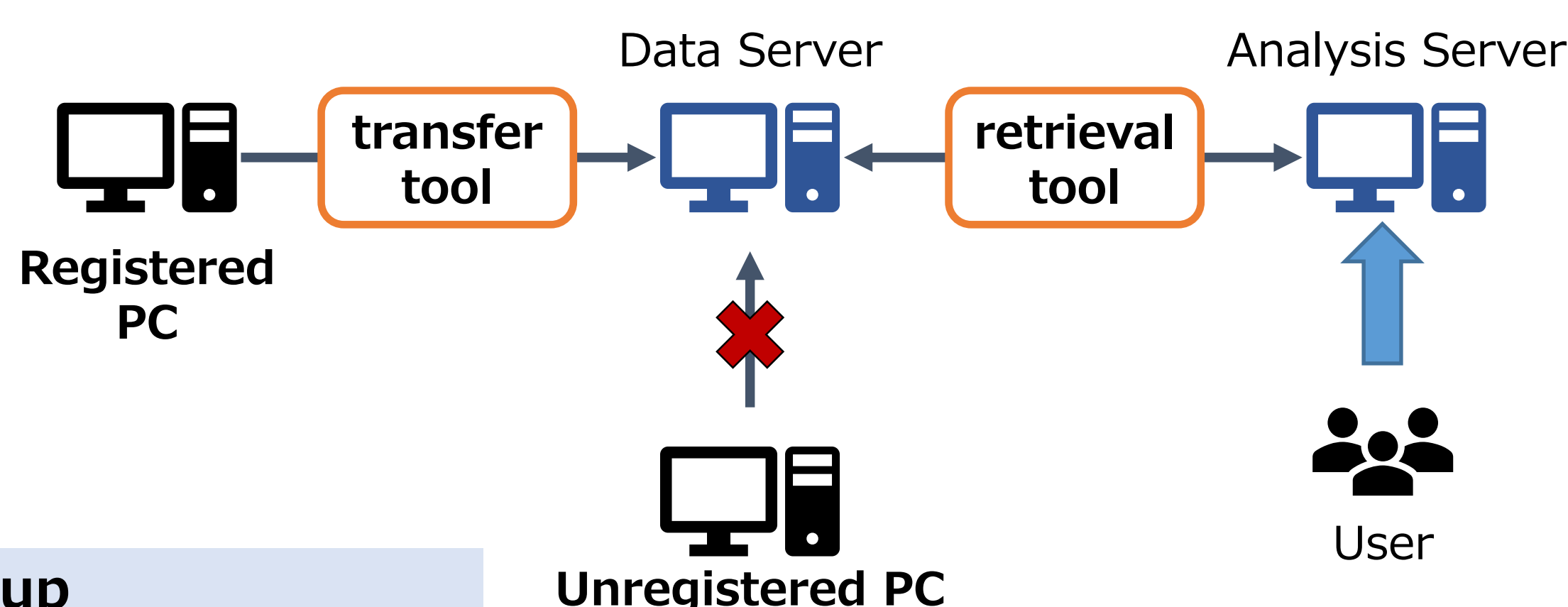
Each data is composed of a header part and a data part. The data processing information is written in the header part.

## Data security and backup

To prevent loss of data, security measures and backup measures for data are required.

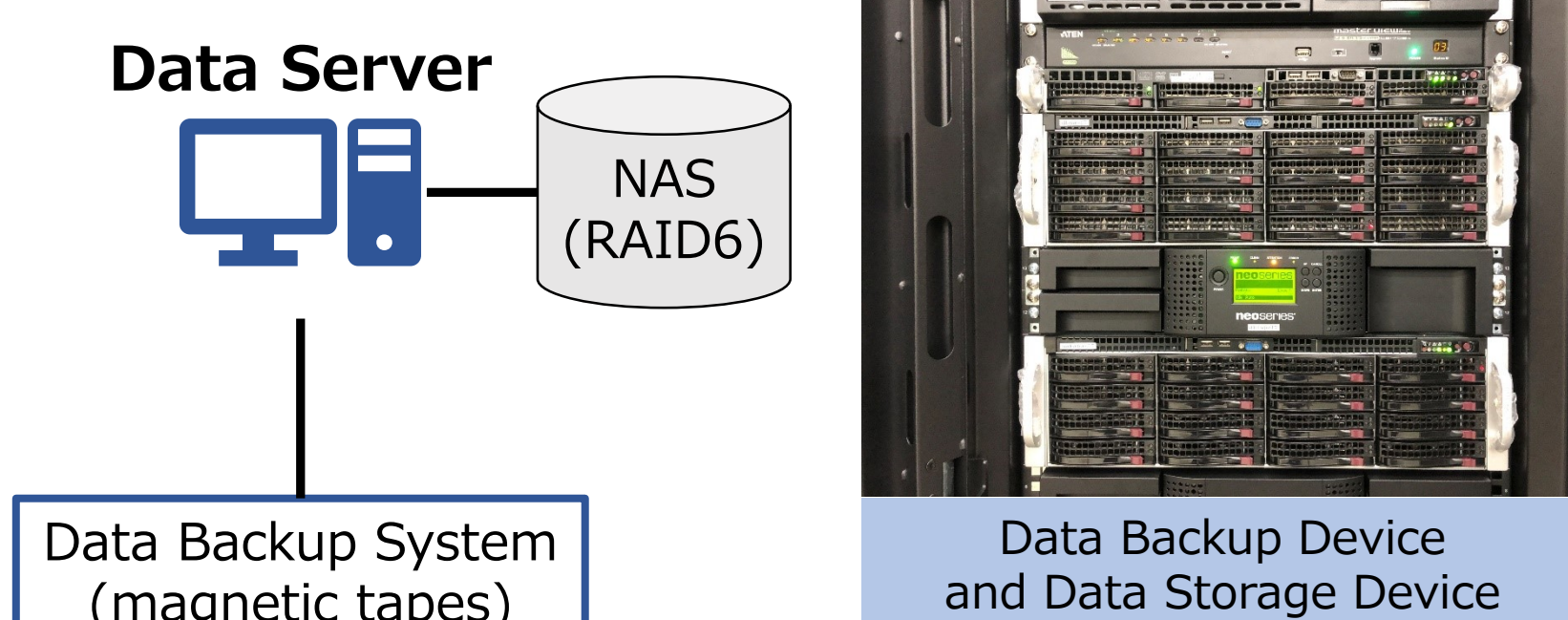
### For data security

- We have developed the dedicated access tool for data transfer and retrieval.
- The dedicated tool authenticates the computer and prevents intrusions from the unregistered computer to the servers.



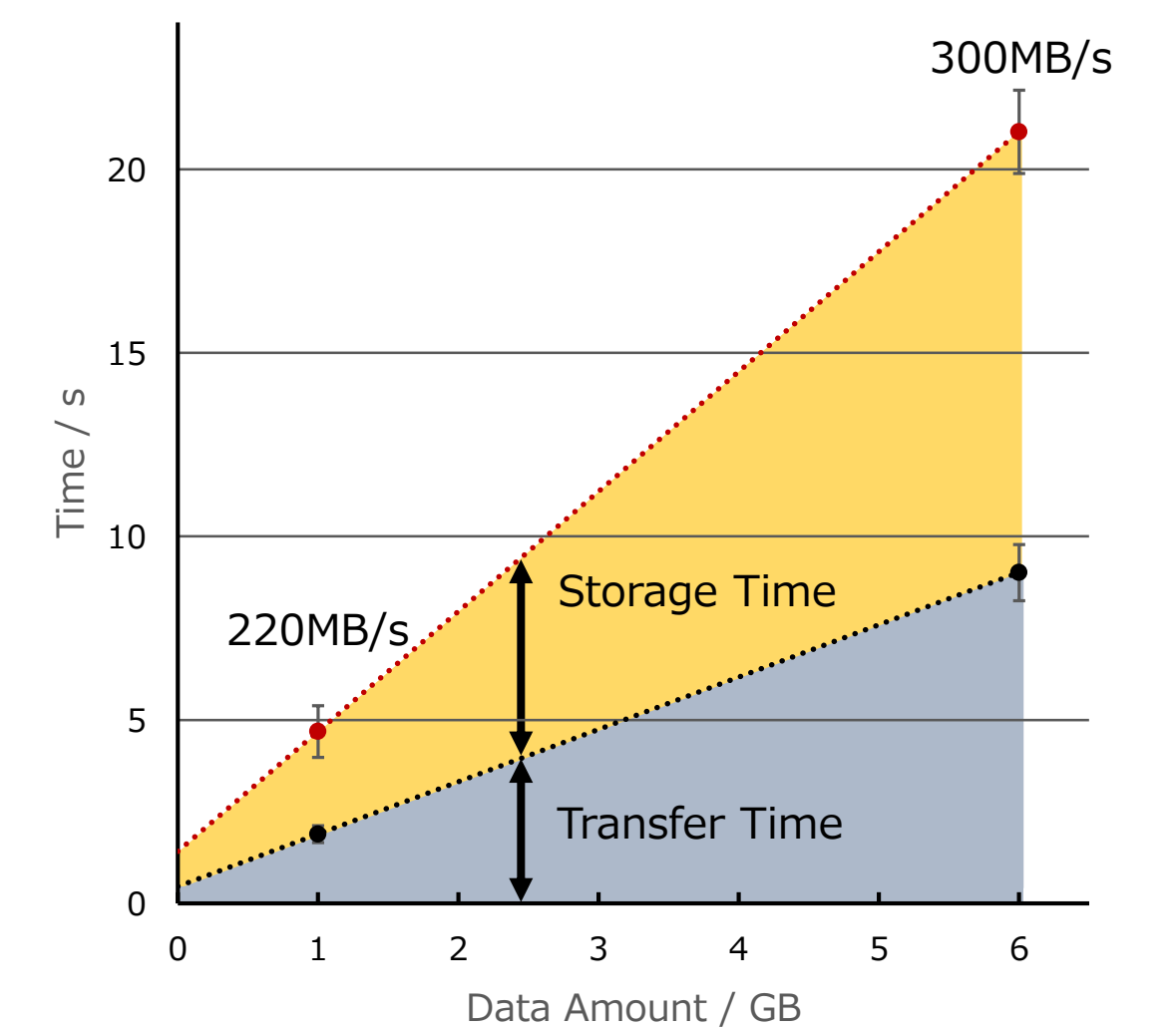
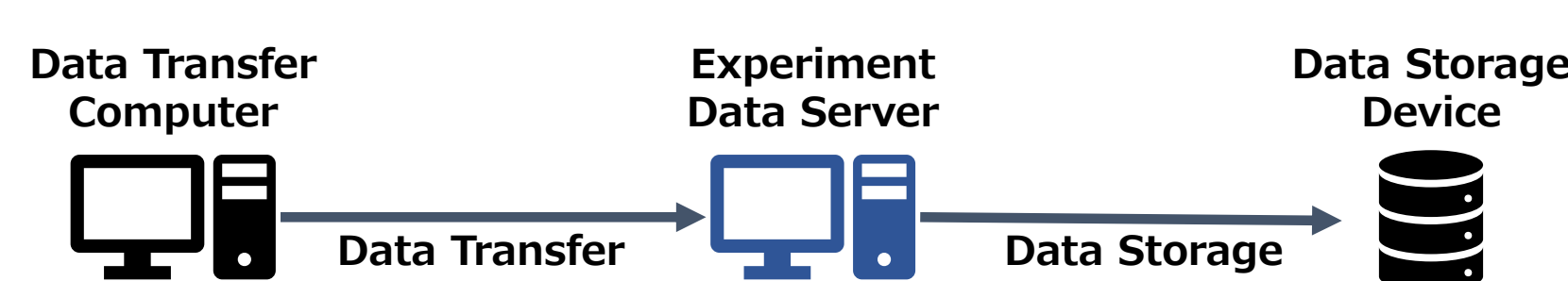
### For data backup

- We selected RAID6 for the hard disk drive(HDD) configuration to ensure HDD redundancy.
- Storing all experiment data in Network Attached Storage(NAS) allow data to be provided even in the event of a failure of the data server.
- We use magnetic tapes for the backup of data.



## Performance test

To analyze the discharge and determine operation parameters of the next discharge, discharge data needs to be referred to immediately after the plasma discharge.



The time for data storage is much longer than data transfer, but the data can be stored at a time sufficiently shorter than the discharge interval(30min).

	1GB	6GB
Data Transfer Time	1.9 s	9.0 s
Data Storage Time	2.6 s	11 s
Total Time	4.5 s	20 s

## Conclusion and future work

We have completed the development of the functions for experiment data server and unprocessed data server.

### Future Work

- We are preparing for the start of JT-60SA operation in 2020.
- We are carrying out the individual linkage tests between DB system and other JT-60SA systems.
- We will improve the functions of DB system to solve the problem of the JT-60SA operation.