



ASIPP

Data Processing for EAST Remote Participation

Xiaoyang Sun

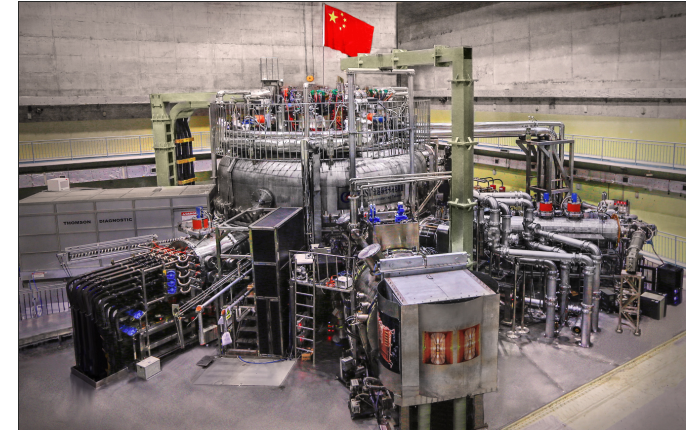
on behalf of EAST Central Control Group

IEEE 20th Real-Time Conference, 8 June 2016, Padova, Italy



Background

- **Remote Participation** will play an important role of international collaboration in EAST research.
- **Remote Data Access** is the core function of Remote Participation
- The main objective of **data processing** is to improve the performance of remote data access.



Experimental Advanced Superconducting Tokamak (EAST)

Data Types in EAST remote participation: **engineer data**, **scientific data**, **camera data**.

The remote access speed is limited by :

- The network bandwidth
- Data size
- Disk read-time



data compression
data-caching



On-site Model

VS

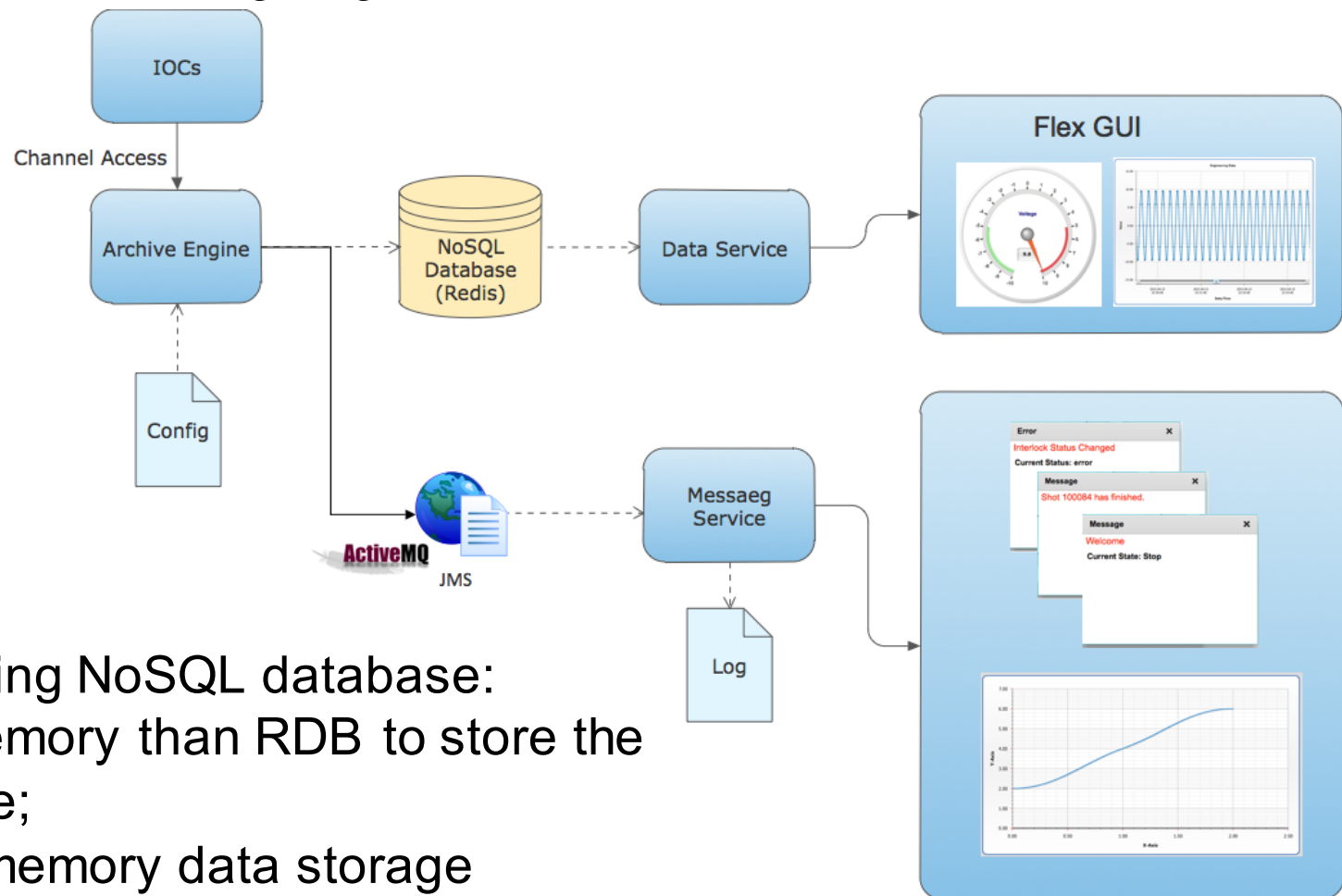


Remote Model



Engineer Data Processing

A new EPICS data archiving Engine

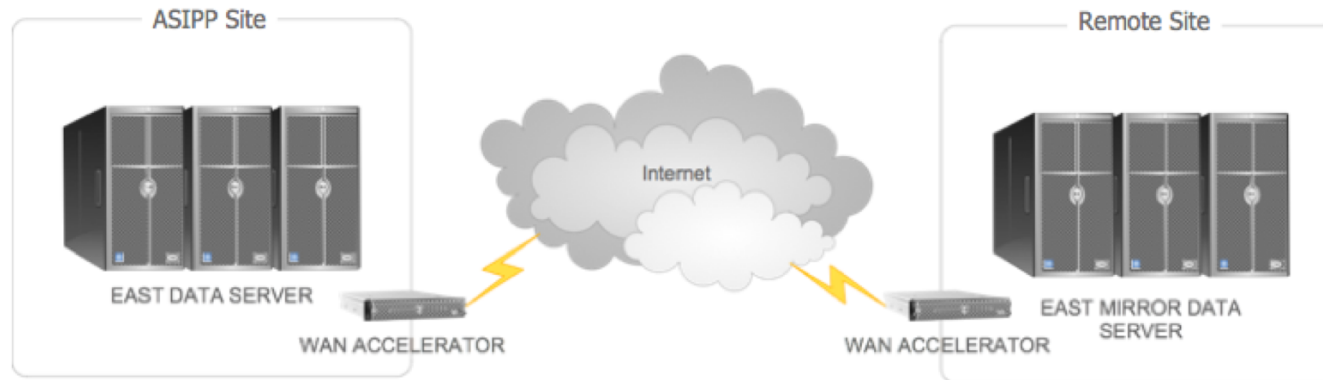


Advantages of using NoSQL database:

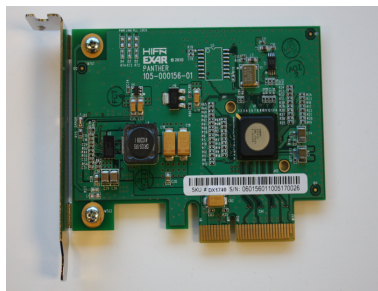
- To use less memory than RDB to store the same database;
- To support in-memory data storage



Scientific Data Processing



To use acceleration card and open source wan optimization software (WAN Proxy) to replace the commercial wan acceleration tools.



EXAR Express DX 1740

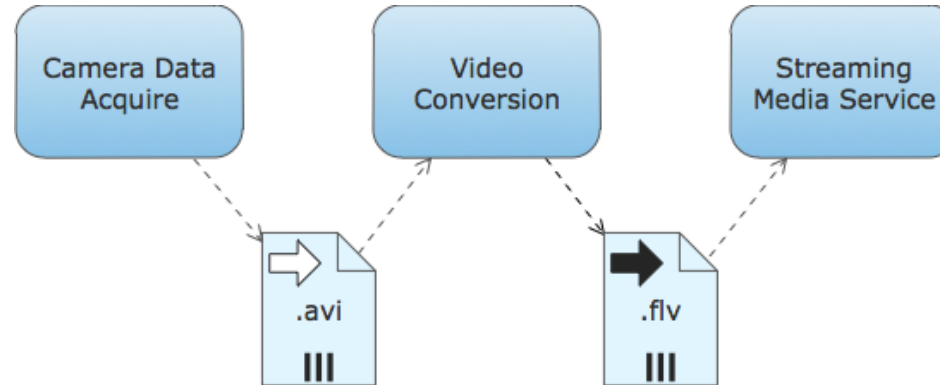
Data Compression

+ WAN Proxy

WAN optimization



Camera Data Processing

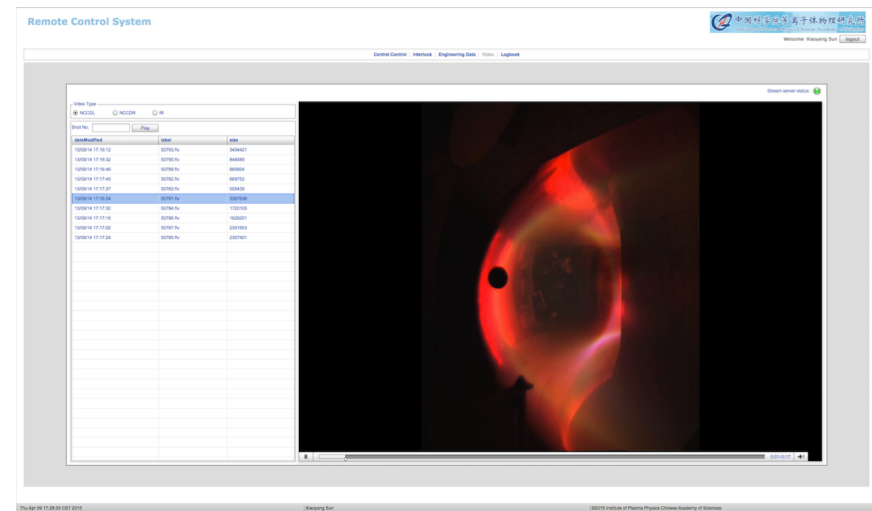


Uncompress AVI

VS



FLV





ASIPP Poster # 113

Questions and Comments are Welcome

Thanks for your time

Background

Data Processing Method

ASIPP EAST

Data Processing in EAST Remote Participation

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ABSTRACT: International Collaboration has become increasingly frequent in tokamak research. The traditional face-to-face collaboration has proved inadequate. The Remote Participation system (RPS) for the Experimental Advanced Superconducting Tokamak (EAST) is designed to provide an efficient and economical way to international collaboration. The data processing for remote access is a critical issue for EAST RPS. This paper proposes the methods of data management and processing in EAST RPS.

Background

- The international collaboration becomes popular in tokamak research.
- The traditional On-site Model, which has required high-speed network and data on international travel, is not fit for the more frequent international collaboration.
- Remote Participation will be a new solution to scientific and economical international collaboration.

System Architecture of EAST RPS

Objective & Key Technology Issues

- The main function of data process is to process EAST data because data are accepted & stored by the network bandwidth, data do not use read-data. The key technology issues for data processing in EAST RPS are data centering, data reduction and user operation.

NoSQL Based EPICS Data Archiving Engine for EAST Engineering Data

A new NoSQL based EPICS data archiving engine was developed to collect EPICS PV data from IOC in EAST engineering laboratory and dump the data to the NoSQL based engineering database & storage service. The NoSQL database has the following advantages:

- To use less memory than relational database to store the same data
- To support secondary data storage

Scientific Data Processing & VMN Optimization

- To share data with collaborators, the EAST raw data will be transferred from EAST centralized data server to mirror servers to ensure 24h x 24 x 7. The WebServers will be deployed to improve network efficiency.
- We propose to use accelerate card and open source web optimization software (Nginx, PHP) to reduce the commercial server cost.

EAST Engineering Data Line			
Max Throughput	100MB/s		
Compress Algorithm	4:1, 1:2, 1:2.5		
Encrypt/Decryption	SSL, DES, 3DES, MD5		
Indexing	SHA-1, SHA-256, MD5		

	Site	Speed	Time
1 st Time	45MB/s	6.6MB/s	57s
2 nd Time	45MB/s	30.1MB/s	15s

Camera Data Processing & Streaming Media Video Service

- The camera capability of EAST CCD diagnostic system is maximum 100 frames per second (FPS), typical resolution is 640*480 pixels and number of 100 is 5.
- The camera data is received and stored in compressed AVI format.
- For remote access, the AVI files will be converted to streaming open source real streaming.
- Real will select to build EAST video server.

Summary & Future

- In this paper, we demonstrate the data processing methods for EAST RPS, including a new EPICS data archiving engine, streaming data, data reduction, methods for scientific data and video conversion for camera data.
- A prototype EAST RPS has been developed for test and will be used for EAST operation experiments in the future.

Acknowledgement

The work was supported by a grant from the Major State Basic Research Development Program of China, ITER Project Special Fund under Grant No. 2012CB810600_004603/0006.

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