

Objectivity Case History - Glen Finston

Customer: FOM Institute of Plasma Physics

Status: ☒ (X) SOLD ☐ () Prospect ☐ () Integrator

Industry: Physics Research

Application Domain: Plasma Physics Research

Status: In Development

Platform: Solaris

Compiler: C++

Other Tools: CORBA

Overview

FOM is the center for Plasma Physics research in Holland. They are storing data related to experiments they perform both in Holland and in Germany. The end users are Plasma Physics researchers in both Holland and Germany. They are currently storing the data in flat files. They have a pulsed experiment, which can deliver each 10 minutes an amount of Data (20 Mbyte to 1 Gbyte). This data is coming from up to 10 different diagnostics if they are running the experiment in Holland. If they are running the experiment in Germany, there may be up to 100 diagnostics. Most of the diagnostics have their own computer. The principal reason for the selection of Objectivity is not only our HEP presence, but also our distributed nature, with the design currently set as 1 database per diagnostic within a single federation. The data is unique and hierarchical and must be stored as raw as possible.

Several strategies could be used for the solution to the pulsed experiment using Objectivity. Although the experiment is pulsed and runs every 10 minutes, the actual data generation part of the experiment runs very quickly, in fact it takes only 10 seconds. It is estimated that each diagnostic will store at most 64 Mbyte of data for a single pulse. The 10 minute timeline is as follows: 10 sec to produce the data, then write the data to the database, either in real-time from the diagnostics if possible, or write to a file and read the file into the database - one database per diagnostic so no lock conflict--ever, distribute the data if necessary (see below for discussion on distribution of the data if necessary), study the data, recalibrate the next experiment based on the data, and start the next pulse. All the above activities must take place within the 10 minute interval.

The raw storage of the data in Objectivity will take place shortly after the data is generated. At most Objectivity can write about 5 Mbyte per sec (upper limit of disk hardware - performed at CERN), so a 64 Mbyte DB in 10 sec is just beyond our capacity. The storage will most likely be performed into a temporary flat file. Any attempt to store the data directly from the diagnostic into Objectivity should be in a single transaction, have sufficient memory and cache sizing if appropriate, and pre-size VArray's and containers. The current plan is to have 1 federation per day for the raw experimental data, perhaps 1 container per pulse (i.e. 1 DB per diagnostic per day), or 1 DB per pulse. These issues will resolve themselves when they begin looking at real-data. As mentioned above, the "real experiment" will take place in Germany where they have up to 100 diagnostics. They have a smaller version of the same experiment (only 10 diagnostics) in Holland and will perform initial Objectivity application development and setup in Holland. When they are running the experiment in Holland, it is a simple matter of examining the data from the pulse on the local federation. If the experiment takes place in Germany the problem is more interesting given the 10 minute interval. Probably the best method to view the data from the German experiment in Holland is using an Objectivity thin client architecture - i.e. use CORBA or another form of remote method invocation (could even use X11 rlogin to a German machine) to access the data.

Another aspect of their problem is that they would like to have an online federation which contains all the experimental data gathered over the past year. This repository of experimental data will be located in

Germany and they need to be able to query the year long data from Holland, but they don't need all the data in Holland itself (only a subset).

Why Objectivity

Distribution and Scalability

SQL support via ODBC

7 X 24 Operation

Schema Evolution

Explicit Clustering

Contact Information

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