

# Asynchronous Data Change Notification (ADCN)

## Between Database Server and Accelerator Control Systems

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### The Problem

Database data change notification (DCN) is a commonly used feature. Not all database management systems provide an explicit DCN mechanism. Even for those database management systems which support DCN (examples include Oracle, IBM DB2, and Microsoft SQL server), some server side and/or client side programming may be required to make the data change notification system work. This can make the setup of data change notification between database server and interested clients tedious and time consuming.

### The solution

In accelerator control systems, there are many well established software client/server architectures (such as CDEV, EPICS, and ADO) that can be used to implement data reflection servers that transfer data asynchronously to any clients using the standard SET/GET API. This paper describes a method of using such a data reflection server to set up asynchronous DCN (ADCN) between a DBMS and clients. This method works well for all DBMS systems which provide database trigger functionality.

An example is shown in Figure 1. In a target database, set up a database trigger to send DCN messages to a CDEV server device. The CDEV server device reflects the data to any connected clients. When the data changes on the database server, DCN messages flow asynchronously to the independent clients.

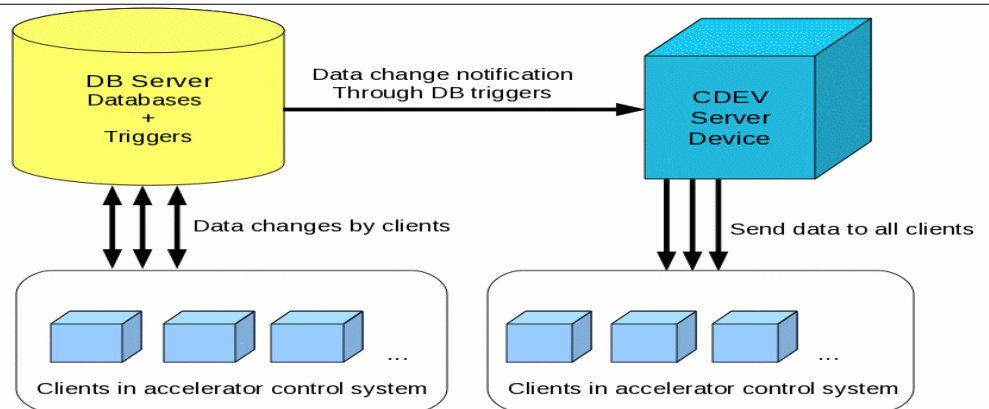


Figure 1. Diagram of ADCN system setup

### An Example ADCN System

In the RHIC access controls system, IRIS recognition data are generated from the IRIS access control devices and stored in an MS SQL Server 2005 database on a security sub-network on a Windows PC. The MCR (Main Control Room) of RHIC needs to be notified asynchronously whenever IRIS data in the database changes. To achieve this, a database trigger is created in the MSSQL database. When IRIS data changes, the changed data is transferred to the pre-defined CDEV server objects on a Linux host. An MCR application monitors and logs the data from the CDEV server objects, and uses the live IRIS data changes for security access controls of the RHIC machine complex. Figure 2 shows how the system works.

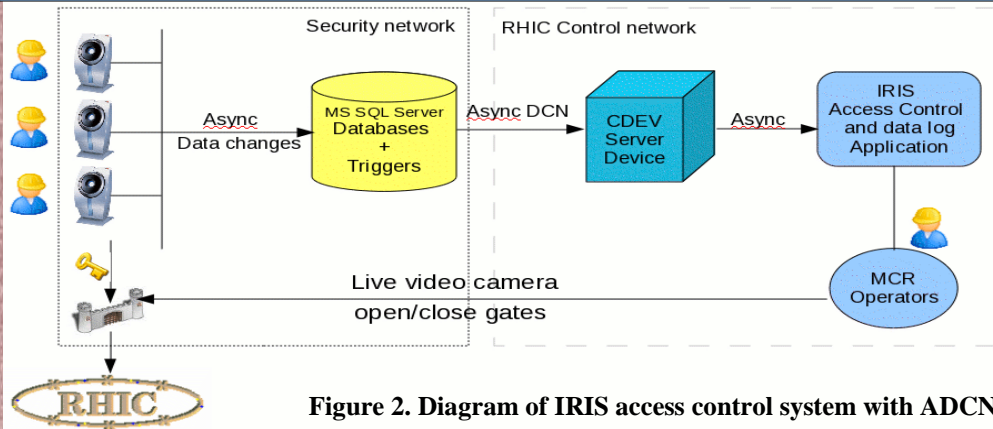


Figure 2. Diagram of IRIS access control system with ADCN

### Summary

Asynchronous data change notification(ADCN) between database server and clients can be realized by combining the use of a database trigger mechanism, which is supported by major DBMS systems, with server processes that use client/server software architectures that are familiar in the accelerator controls community (such as EPICS, CDEV or ADO). This approach makes the ADCN system easy to set up and integrate into an accelerator controls system. Several ADCN systems have been set up and used in the RHIC-AGS controls system.