

Relational Database Implementation and usage in STAR

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The STAR experiment at Brookhaven National Laboratory's Relativistic Heavy-Ion Collider (RHIC) has been accumulating 100's of millions events over its already 5 years running program. Within a growing Physics demand for statistics, STAR has more than doubled the events taken each year and is planning to increase its capability by an order of magnitude to reach billion events capabilities by 2008.

Under such a rate stress imposed by the event rate, the run condition support and database back-end needed to rapidly mature to follow the demand while preserving user convenience and time evolution but also allow for in depth technology changes as required.

In this talk, we will present the use of relational databases in STAR organized as a three tier architecture model: a front-end user interface, a middle tier homegrown C++ library (StarAPI) that handles all of the unique requirements arising from an active experiment, and finally, the lower level DBMS requirements and data storage. Paramount considerations include maintaining flexibility and scalability with modular construction and consistent namespace; ensuring long-term analysis integrity with three-dimensional time-stamping or range of validity which in turn allows for solid schema evolution; and ensuring uniqueness with expanded primary keys.

We will identify and discuss trade-offs and challenges that have occurred during the evolution of our experiment, and specifically the challenge introduced by detectors which could only be described in terms of million leaves within an ultra-fine granularity of calibration values.

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