

# caGrid in Action

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### TRITOn: Translational Informatics Research Platform

The Translational Information Research Information Omnibus (TRITOn) is designed and implemented as an integrative translational research information management platform. The development of TRITOn is supported by an NCI-funded re-engineering effort of the software used by the Chronic Lymphocytic Leukemia Research Consortium (CLL-CRC; <http://cll.ucsd.edu/>).

CLL-CRC is a multi-institutional consortium of 9 sites conducting translational research targeting the Chronic Lymphocytic Leukemia (CLL) disease. The partner sites include Moore's Cancer Center at UCSD, M.D. Anderson Cancer Center, The James Cancer Center at Ohio State University, North Shore-Long Island Jewish Medical System, DanaFarber Cancer Institute, Mayo Clinic, The Burnham Institute, Johns Hopkins University, Harvard University, and the Queen Mary University of London. The CLL-CRC is established in 1999 and supported in part by funds from the National Institutes of Health. The consortium has a comprehensive database of phenotype, "omics", and bio-specimen data collected from a diverse cohort of over 5000 patients.

The goals of the TRITOn project are to improve the existing CLL-CRC software systems for data capture and management in terms of inter-operability and use of modern web technologies, and in doing so, to provide CLL-CRC investigators with enhanced informatics services and tools capable of facilitating more efficient multi-institutional translational research. These services include more secure and efficient data exchange capabilities, enhanced bio-specimen management functionality, adverse event detection, and tools for protocol driven decision support. TRITOn also supports technologies for integrative query and data aggregation across multiple databases and data types. The core architecture of the TRITOn platform is illustrated in Figure 1.

**Figure 1: Triton Platform Architecture**

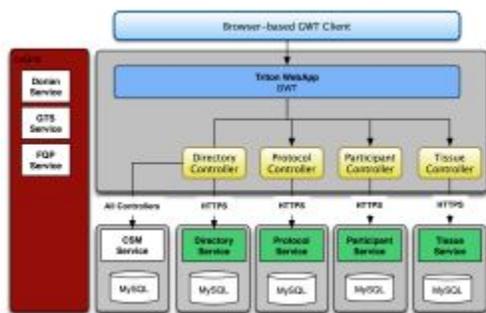


Figure 1. The platform consists of multiple databases that host different types of data such as adverse event reports, bio-specimen information, protocol information, and participant information. These databases are federated through the caGrid infrastructure and can be accessed via a Web application.

The TRITOn team turned to caGrid and other caBIG® technologies to build an extensible, scalable, federated, and secure platform. The platform uses the caBIG® caAERS service to provide support for querying of adverse event codes and electronic adverse event reporting and the caBIG® caTissue service to support management and query of bio-specimen information. Both of these services are standard caGrid services. The services for the Directory, Protocol, and Participant databases have been implemented as custom caGrid data services using caCORE SDK 4.2. These services provide interfaces for customized operations as well as standard caGrid data service interfaces. All of the services are integrated with the caGrid security infrastructure for authentication and authorization. Role based access control is provided by the caBIG® Common Security Module (CSM) service.

The implementation using caGrid of the TRITOn platform provides several advantages. First of all, TRITOn is a federated system in which different services can be deployed and managed by different institutions or at a central location. This enables flexible and scalable deployment that can comply with consortium-wide and institutional policies and can take advantage of resources distributed across institutions. Second, since all databases and applications are deployed as caGrid services with well-defined interfaces, changes to the backend systems (e.g., an upgrade to caTissue or Protocol database) can be accomplished with minimal impact to client applications. Third, being a service-oriented, interoperable platform, TRITOn allows for addition of new services as needed.

The TRITOn web application is based on the Google Web Toolkit (version 2.1) and integrates with caGrid services to provide support for 1) user registration and authentication, 2) data entry and search for institution, site, and participation information through the Directory service, 3) creation

and management of clinical protocols using the Protocol service, 4) management of participant enrollment and case report form data collection via the Participant service, 5) adverse event reporting through the caAERS service, and 6) tissue information entry and search using the caTissue service.

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TRITOn project site: <https://crcwiki.ucsd.edu:8443/>

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