

Project Description

ACTSI Informatics Architecture Software Testing

Background

The Atlanta Clinical and Translational Science Institute (ACTSI) is funded by the CTSA program (<http://www.ctsaweb.org/>) to promote discovery in clinical and translational research and build novel translational research capabilities. It is a multi-institutional partnership, led by Emory University, Morehouse School of Medicine, and Georgia Institute of Technology, that supports a wide range of studies at collaborating institutions.

The Biomedical Informatics Program (BIP) of the ACTSI has initiated an effort to design and develop an informatics architecture framework and middleware infrastructure, building on existing standards and best practices from the Web, Web Services, Semantic Web, and Grid Computing communities. This effort is driven by use cases and research applications from studies supported by the ACTSI. These studies capture, generate, and reference a variety of datasets stored and managed in multiple systems hosted by different groups and institutions. The ACTSI informatics architecture will support the management, federated query, and integration of databases from ACTSI-supported studies and collaborating institutions, effectively creating a federated ACTSI-wide data warehouse. The federated data warehouse will contain a distributed collection of interoperable databases of various data types, including study specific clinical data, omics data, imaging data (Radiology and microscopy images), tissue specimen information, ECG data, and laboratory data obtained from EMRs.

The databases in the ACTSI federated data warehouse environment may be stored in a variety of database systems and applications. These include caArray, Research PACS, OpenClinica, RedCAP, the Analytical Information Warehouse, microscopy imaging databases, caTissue and Nautilus LIMS, and i2b2. The integration of these systems and federated access to distributed data will be supported by the core components of the ACTSI architecture. These core components provide support in the form of services for ACTSI-compliant data and analytical services, ACTSI-wide identifiers, security, federated query, workflow, and provenance tracking.

Scope of Work

There is need for a software-testing environment to ensure a robust, interoperable, correct implementation and deployment of the ACTSI informatics middleware infrastructure, study specific data services, and ACTSI infrastructure components. This work request covers a portion of the software testing development and deployment activities.

Specific tasks to be performed:

- Task 1: Develop a testbed that will mimic the ACTSI Informatics Architecture

and its environment.

- This task will include the development of testbed instances of 1) a prototype enhanced patient registry based on the AIW architecture, 2) a prototype research PACS, 3) a prototype gene array database (caARRAY), and 4) a prototype LIMS instance (based on caTissue or Nautilus LIMS).
 - These prototype data sources will be populated with synthetic data and will be deployed as ACTSI-services and will be federated using the ACTSI architecture core components.
 - The testbed must be openly accessible to all Emory, Morehouse and GT ACTSI BIP, BERD and CIN researchers and software developers. All software developed will be open source under a caBIG style license.
- Task 2: Develop tools and techniques that will enable (semi-automated) generation and execution of tests for a given data source and federated query types involving the data source.
 - The tools and techniques should support “off-line” testing of data source implementations, i.e., before deployment in the ACTSI environment.
 - The tools and techniques should support “on-line” testing. That is, they should support continuous testing of deployed data sources to ensure the integrity and correct execution of the ACTSI environment.
 - Task 3: Evaluate the tools and techniques developed in Task 2 using the testbed from Task 1.

Requirements:

- The design of the tools and techniques must be driven by the use cases from the ACTSI supported studies and those identified by the ACTSI informatics architecture design effort.
- The tools must be compatible with the ACTSI informatics architecture design and the ACTSI informatics middleware infrastructure. The design of the tools and techniques must be done in close working collaboration with the ACTSI informatics architecture team.
- The software, development and testing environment must be openly accessible to all Emory, Morehouse and GaTech ACTSI BIP, BERD and CIN researchers and software developers. **All software developed will be open source under a caBIG style license.** ACTSI will supply the hardware and software development environment if necessary.
- The development team must actively collaborate with the ACTSI informatics architecture working group. All funded participants must attend the weekly working group meeting in person or by phone.
- The all student, postdoc and developer team members must work at least one

day at Emory to collaborate with the ACTSI informatics architecture team.