

Microsoft Excel caBIG Smart Clients

<http://xl-cabig-client.sourceforge.net/>

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Introduction: For over a decade, Microsoft Office Excel has been the primary tool used by biomedical scientists for statistically analyzing cancer research data.

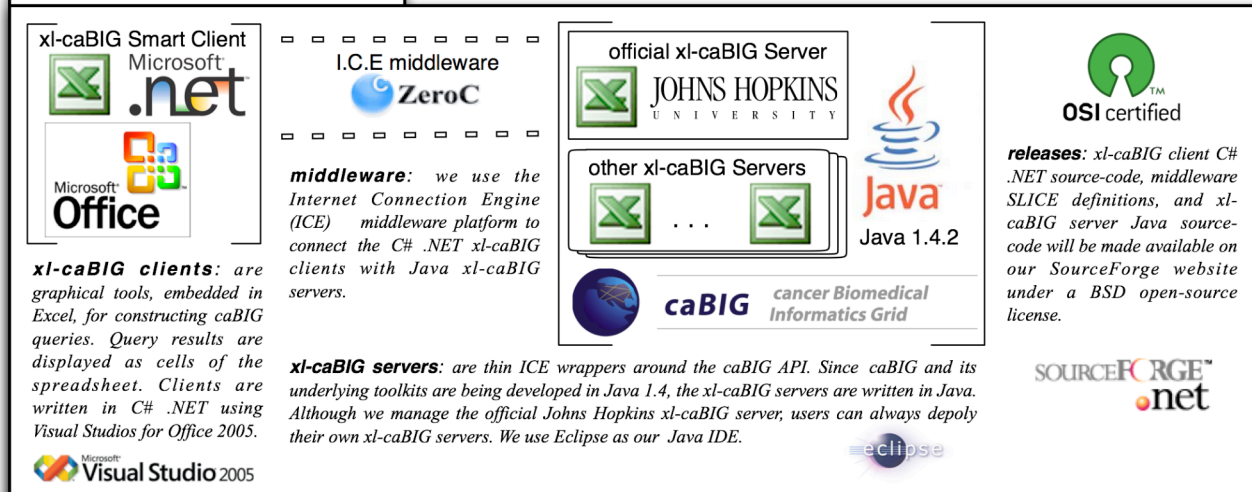
In the past, data available to scientists was limited to what was collected in their labs or made available by their collaborators. The cancer Biomedical Informatics Grid (**caBIG**) is revolutionizing past practices by empowering scientists with access to orders of magnitude more related data from researchers around the world. How will investigators synergize **caBIG** information with their own data in order to make meaningful deductions?

We are developing extensions to Excel for accessing **caBIG** data-services. Excel caBIG (xl-caBIG) smart clients will be leveraging scientists' intimate familiarity with Excel by making **caBIG** data accessible to scientists in an intuitive manner.

xl-caBIG Smart Client Functionality:

- xl-caBIG's GUIs allow scientists to browse and search the published Index Service in order to find caBIG data-services relevant to their research. Data-services can be filtered by data-service metadata descriptions (e.g. all data-services originating from a particular cancer research center) or based on service-type (e.g. which data-services provide data of a particular type: 'gene').
- After selecting a relevant service-type, users will be able to consume its objects as cells in their xl-caBIG smart-clients workbook. The columns will be service-type fields (e.g. 'patient identifier', 'age', 'gender') and the rows attributes (e.g. 'JHU0501321', '42', 'Female').
- Since a portion of data-services are available only to authenticated and authorized users, xl-caBIG smart clients should support User Credential Management via Grid User Management Service (GUMS).

xl-caBIG Architecture Schematic



xl-caBIG Client-Server Architecture: caGrid 0.5, the current test architecture of caBIG, conforms to Open Grid Services Architecture (OGSA) grid infrastructure standards. caGrid leverages the Globus Toolkit by providing the required core services (e.g. caDSR and EVS), toolkits, and wizards for the development and deployment of community provided services and APIs for building client applications. The Globus Toolkit is written in Java 1.4 as are the caGrid high-level APIs and toolkits.

The xl-caBIG smart-clients are designed with a client/server architecture. We used Visual Studio Tools for Office 2005 to embed C# NET managed code in Excel 2003 and intermediary middleware to bridge the gap between clients' .NET code and caBIG Java API hooks. xl-caBIG servers are developed in Java as thin wrappers around the caBIG high level API.

We are using the open-source middleware platform ICE (Internet Communication Engine) from ZeroC (<http://www.zeroc.com/>). ICE is suitable because the client and server can be written in different programming languages including C# and Java. Interfaces, operations, and the types of data that are exchanged between the client and server are defined using SLICE (Specification Language for ICE). The client-server contract defined in SLICE is independent of any specific programming language. SLICE definitions are compiled by ICE into an API of generated code for specific programming languages.

xl-caBIG smart-clients are leveraging .NET's features for managed deployment. Managed .NET code allows updates (in the form of DLLs) to be detected and downloaded from servers but also allows the user to exercise strong control over how the code will be executed.

xl-caBIG servers, because of their strong dependencies on caGRID 0.5 and underlying toolkits, are anticipated to be more difficult to install and configure than the smart-clients. We will be hosting the official xl-caBIG server as the default server that xl-caBIG smart-clients connect with. Advance users with special needs in terms of performance or availability can roll out their own xl-caBIG servers.

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