

Automatic Wrapping of Legacy Code and the Mediation of its Data

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Key words to describe the work : Legacy Code, Java, C Wrapping, JNI, Data Mediation, Triana

Key Objectives: To provide a complete automated solution to the wrapping and compilation of legacy code

Motivation for the work (problems addressed): Extend the capabilities of Triana as a Grid capable platform for scientific and engineering applications by developing an automated procedure for integrating legacy codes within Triana units (written in Java) and to provide a *Data Mediation Interface* for mediating the data types between the Java classes and the native libraries. This system is completely stand alone and will work within any Java software system.

Abstract :

Recently, Scientific and Engineering communities are employing Grid enabled software applications. To be widely adopted, Java applications in particular will require more support the integration of legacy applications [1]. Triana is an example of such an application and therefore, here, it is used to prototype the development of our plug-in legacy code support. C programming is the language used extensively for scientific applications and consequently, the requirement for a method to incorporate software and applications in C is of prime importance. In the future, we will include support for C++ and other languages.

The software we are developing consists of three components: Jacaw [2], a data-mediation interface and a compilation wizard

Jacaw:

Jacaw is used to generate a Java wrapper class that is used to call functions from the C library. The wrapper class uses JNI (Java Native Interface) to interface with the C library (which is compiled as a shared library) [3].

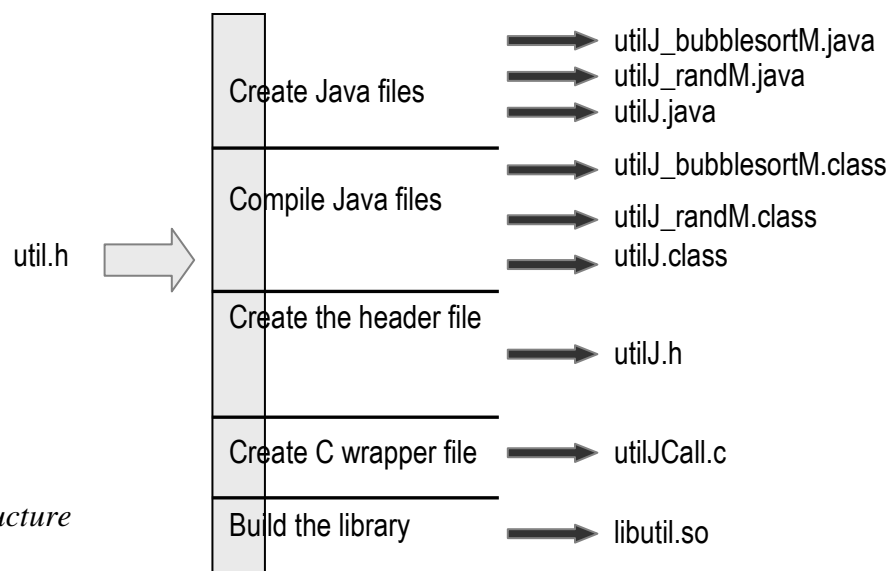


Figure 1: JACAW structure

Data Mediation Interface:

The data mediation interface automates the process of mediating the data types between the Java classes and the C function calls. This is accomplished by providing a graphical user interface (GUI) that takes the user through a set of steps to select the parameters for the wrapped function from an input class and then to initialize and set the data for the output class. For example, a Triana unit takes a Java data-type class as its input and outputs a Java data-type class (which can be different to the output class).

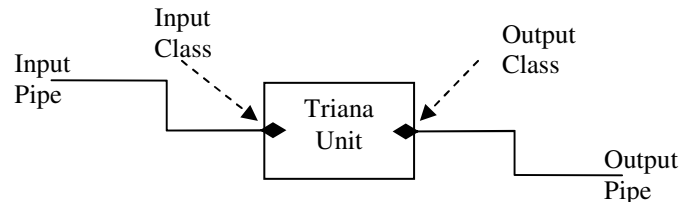


Figure 2: Diagram of the Triana Unit (Wapped Legacy Code) receiving Input and delivering Output.

Briefly, the GUI is divided into three sections. The first allows the user to choose the mapping of the Java instance variables (via Java-bean *getParameter()* type function calls) to the arguments of the C function call. The second stage allows the user to mediate the data returned from the C function to the Java code. Lastly, the user can then mediate any other data between the input Java class and the output Java class which may not be needed by the C function. The allows the input object to be decomposed and then reconstructed after the native call allowing the user to integrate the C function call without writing any Java code.

Compilation Wizard:

This module is a user friendly interface that complements JACAW. It enables compilation and creation of a shared library from legacy codes in order to incorporate applications written in C into Triana. The Wizard initially detects the operating system and instructs the user to select C source file(s), libraries, output file and takes the user through steps in selecting preferred C compiler to create.

The following figure illustrates overall relation between Triana units [4] and use of legacy application.

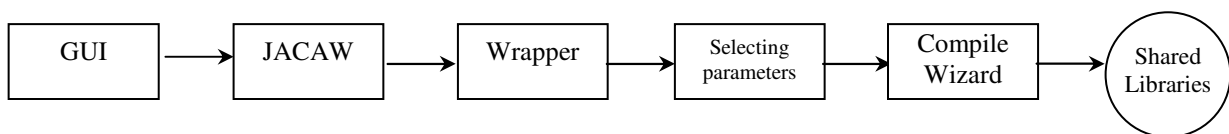


Figure 3: Diagram of stages involved in incorporating legacy codes for Java

References

1. GridOneD: <http://www.gridoned.org>
2. <http://www.cs.cf.ac.uk/user/Yan.Huang/research/JACAW/JACAW.htm>
3. Web Services For Grid-Enabled Problem-Solving Environments, a presentation on the Access Grid on 15 March 2002, <http://www.cs.cf.ac.uk/user/David.W.Walker/WebServicesPSEs.ppt> on slide 50
4. Triana Software Environment: <http://www.triana.co.uk>

