Chapter XII

Applications of Web Services in Bioinformatics

Xin Li, University of Maryland Baltimore, USA

Aryya Gangopadhyay, University of Maryland Baltimore, USA

Abstract

This chapter introduces applications of Web services in bioinformatics as a specialized application of peer-to-peer (P2P) computing. It explains the relationship between P2P and applications of Web service in bioinformatics, states some problems faced in current bioinformatics tools, and describes the mechanism of Web services framework. It then argues that Web services framework can help to address those problems, and gives a methodology to solve the problems in terms of composition, integration, automation, and discovery.

Introduction

P2P Web Services for Bioinformatics

The idea behind Web services is to enable one computer program to call another computer program automatically through the Internet, and its basic advantages are integration and automation. The features of the Web services framework can be used to solve some of the current problems faced in bioinformatics, specifically, integration and automation. (We will discuss the details of both current problems faced in bioinformatics and Web services in the following sections.) In the integration process, we can combine different types of bioinformatics tools scattered over the Internet into one comprehensive set of Web services. This implies that different types of bioinformatics tools can call each other and get final results. In the process of calling each other, those bioinformatics tools (or, services in Web services framework) are integrated together. It is obvious that these bioinformatics tools (services) are peers. Hence, this mechanism for combining different bioinformatics tools is a specialized application of peer-to-peer computing (P2P).

Automation is also needed when people try to minimize human interference in using bioinformatics databases locally. The basic idea behind automating the retrieval and analysis of data in bioinformatics using the Web services framework is integrating the bioinformatics tools and laboratory information system together, and performing data input and output between these two systems automatically. It may seem hard to view laboratory information systems and the bioinformatics tools as peers because most common models view this relationship as client/server, in which laboratory information systems only request information from the services (bioinformatics tools). However, it is usual for biologists to upload their research results (bioinformatics data) to bioinformatics database tools, and ideally they would like to use their lab information systems to submit their results. Therefore, lab information system is not only pure data retriever but also sometimes data provider. So one can view the relationship between lab information system and bioinformatics tool as peer-to-peer.

From the above explanation, we can conclude that the Web services application on bioinformatics is a specialized application of peer-to-peer application. In the following two sections, this specialized application will be discussed in detail from two perspectives: bioinformatics and Web services.

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