A Communication System Based On Web Services and Its Application In Image Processing

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Due to the exponential growing of Internet, distributed systems have broken not only into the field of object technology and database systems but into the computational-intensive application space, as well. Since there are a huge number of resources with quite different computational capabilities on the Web, distribution of such computational tasks have become more and more important.

One of our goals was to establish such a framework which enables the demonstration of image processing operations via Web. This allows for workstations with limited resources to access and make use of computational-intensive applications. On the other hand, legacy operations—which could be implemented by others—should be used in a 'black-box' manner which can therefore be reused. Our research goes beyond these goals: we have developed a general communication model based on distributed resources which can be used for solving other problems that require a distributed environment, as well.

The system consists of three kinds of software architecture. Users interact the system through thin clients (i.e., Web browsers). Services are placed at Service Controllers and Service Providers. The number of Service Providers is arbitrary. There should be a Web server software running on Service Providers which is used for providing the given services. Service Controllers themselves could also be Service Providers but they have a back-end database for both storing the results of operations—it allows the later reuse of a result of an operation or a sequence of operations—and a repository of the known Service Providers and the services they provide. Services provided by Service Providers and Service Controllers can be thought of like 'functions': starting from input data they produce some output data. It is important, that this process is fully controlled by the user: he starts it—by requesting an operation from a Service Controller—and the results are presented to him, as well, giving the user the possibility of coming to a decision of whether to make these results persistent—by storing it into the database—or not.

Implementation is based on the latest open standards: inputs and outputs of services are given using XML; WSDL and UDDI are used for describing and discovering Web Services; semantics of services are defined with the help of RDF. The generality of the system gives the possibility of extending it to be a general Web-based workflow system.