Automatic Generation of Client-Server Collaborative Web Applications from Diagrams

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Abstract. We have designed and implemented Web application generators based on a diagram approach, which is an approach to generating data-intensive Web applications by using diagrams that represent data-flow relationships among Web components. In this paper, we illustrate how to extend the generator systems to generate client-server collaborative Web applications, in which client-side programs collaborate with server-side programs in performing the whole business logic. The client-side programs contribute toward not only reducing the load on Web servers but improving security and session management of the generated application.

1 Introduction

We have designed and implemented Web application generators to support development of consistent and secure data-intensive Web applications based on a diagram approach [1–4], in which we first compose diagrams to describe overall behavior of the application, select appropriate programs from predefined and general-purpose ones, and then generate an implementation. Although the current implementation focuses on generating server-side programs, the approach is sufficiently flexible to generate *client-server collaborative Web applications*, in which client-side programs collaborate with server-side programs in performing the whole business logic. In this paper, we illustrate how to generate client-server collaborative Web applications based on the diagram approach. The extended generator systems can generate both traditional Web applications and client-server collaborative Web applications from the same diagrams.

2 Client-Server Collaborative Web Applications

As services on the Web become complex, we need client-side programs that are activated by client-side events and collaborate with server-side programs in performing the whole business logic. In this paper, we call such Web applications client-server collaborative Web applications. In general, the behavior of the application is as follows (Fig. 1).

Fig. 1. The architecture of client-server collaborative Web applications

1. A Web client first gets a Web document with client-side programs from Web servers. When the client-side programs are activated, the programs may check the query and change the client-side state.
2. The programs then decide whether a request to a Web server is necessary or not. If there are available data on the client side, the programs process the local data before sending a request.
3. After obtaining the data from the Web server, the client-side programs arrange a Web page to be generated. In addition, the programs may change the client-side state according to the result of the processing.

Client-side programs are expected to contribute toward not only reducing the load on Web servers but improving security and session management of the application. For example, the client-side programs can control the view of Web documents, process the received data before generating a Web page, handle the local data, and manage the client-side state.

3 Extension of T-Web System

T-Web system is a system to generate executable data-intensive Web applications from *Web transition diagrams*, which are special diagrams to describe the behavior of target applications. The nodes and links of the diagrams are (a) a fixed Web page node, (b) an output Web page node, (c) a processing node, (d) a database node, (e) a page transition link, and (f) a data-flow link. The T-Web system has predefined and general-purpose program templates so that it can generate executable Web applications from the diagrams.

Fig. 2 shows an example of the Web transition diagrams and the generation rules for data filtering applications. If we generate the application as a client-server collaborative Web application, the client-side programs interrupt clients' events. When users try to browse a next page or sort the items, the client-side programs process the catalog data that are downloaded on the client side and then embed the result into the Web page template. The client-side programs can be implemented by Java Applet and JavaScript. For each processing node whose processing can be done on the client side, source code of a client-side program

Fig. 2. A Web transition diagram for a Web application with data filtering

such as an applet program is generated. For each fixed/output Web page node whose events activate the above client-side program, a static/dynamic Web page document and a client-side script such as JavaScript are generated.

4 Conclusion

In this paper, we illustrated how to generate client-server collaborative Web applications based on a diagram approach. The extended T-Web system can generate both traditional Web applications and client-server collaborative Web applications from the same diagrams called Web transition diagrams. As future work, we may concentrate on generating a program that dynamically measures the capability of Web clients and invokes appropriate programs, together with programs for a variety of Web clients.

References

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