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Exploring the Hypertext Transfer Protocol

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Abstract: *This paper, HTTP Explorer, an interactive tool for investigating the Hypertext Transfer Protocol, is presented. The tool will be used in a course on web-based applications to help the study of HTTP, the most important protocol now in use on the internet. Students can send requests to any HTTP server connected to the internet using a web-based user interface, making the data flow between the client and the server clearly visible. Beginners can use the tool to experiment with HTTP, while advanced users can use it to test out more complicated capabilities. We also discuss some preliminary findings from using HTTP Explorer in a live classroom.*

Keywords: HTTP, Simulator, WWW, e-learning

I. INTRODUCTION

Because of the Web's popularity and ubiquity, as well as the nature of its capabilities, a wide range of new, complicated distributed applications are emerging in the Web ecosystem. The web provides an information representation that allows for the interlinking of various types of content from many sources as well as quick access for end users to a wide range of information.

Due to the popularity and ubiquity of the Web itself, and the nature of its nature, a wide range of new and complex distributed applications are emerging in the Web environment. The Web provides a representation of information that supports linking all types of content from various sources and makes it easily accessible to end users using the tools available. Successful development, deployment, operation, and maintenance of such applications require a deep understanding of the underlying protocol, HTTP. Misconceptions about cache control and transport encoding slow down your application's responsiveness. Familiarity with content and language negotiation chunked encoding and byte ranges will help you use the web smarter. Familiarity with cookies is a prerequisite for personalized, session-aware applications and is ubiquitous in commercial web-based systems. To make learning HTTP easier, an interactive tool called HTTPExplorer was developed. This tool allows you to try HTTP from any internet-connected web server. This gives you full visibility of the flow of data between client and server. Compared to HTTP simulators, which use HTTP-compliant implementations according to RFC 2616, this approach has the advantage of providing real-world experience of her HTTP implementations, allowing you to see differences in individual server implementations. The tool also allows the user to see how her HTTP server reacts when faced with syntactically or semantically incorrect or incomplete requests.

Two usage types are supported:

- Applications can be written in plain text with input masks and will be sent unchanged from then on
- You can use the help menu to build your request based on previous requests and responses. This allows you to quickly compose complex requests and reduces the chance of syntax errors

Two usage modes are suitable for beginners and advanced users respectively. This tool is intended as a supplement to courses on HTTP. In other words, it is not a standalone lesson on HTTP. It contains many exercises that can be used in combination. The work presented is part of the research project Knowledge Workshop Computing Systems, a joint project of 12 German universities. This tool integrates well with the learning materials developed in this project. This is accomplished through hyperlinks that join HTTPExplorer entities and relevant sections of the learning material via HTTP. The next section describes the functionality and implementation of the tool and its integration into your learning environment.

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II. THE TOOL

HTTPExplorer has a web front end that allows you to compose HTTP requests in different ways. When a user sends a request to HTTPExplorer, the assembled HTTP request is forwarded via the HTTP POST (piggyback-style) method. Figure shows the overall architecture and data flow of HTTPExplorer. This tool consists of two components. It acts like a web server to clients and acts as a web client to the Internet. The server component receives the request and constructs the actual HTTP request from the content body. The request is passed to the client component, which sends it to the target server. After receiving the response, the HTTP headers and content body are forwarded to the server component. This information is then used to generate a response document that is ultimately forwarded to the user. Users behind firewalls can configure HTTPExplorer to use a proxy. Using a proxy is completely transparent. The user interface consists of a series of window-like structures on one her web page. These windows can be minimized and maximized at any time (similar to windows in graphical user interfaces). The user should close currently unrelated windows to avoid scrolling. The most important windows are

2.1 Main Window

The main data entry window of the application. You can manually construct the HTTP request. This window has input fields for URL, HTTP method, and HTTP version. Based on these values, HTTPExplorer can generate a minimal request (relative to the selected version of HTTP) to retrieve the document. The user can manually add additional request headers and finally execute the request. There is a text field for displaying error messages related to general operation of the tool (such as network connection timeouts). This window also contains sections for viewing requests and responses. A raw parsed view is available for each of these sections. A raw view shows a request or response sent by HTTP without modification. The parsed view primarily contains hyperlinks to learning material (see Section 4). Finally, this window allows you to view the requested document in three different views.

- A *raw view* shows content transferred over HTTP.
- A *plain view* shows the content after the outgoing encoding (such as chunks) has been decoded.
- The *live view* shows the content after the content encoding (such as zip) has been decoded.

A. Cookies Window

This window provides a tabular list of the contents of all cookies received during the current session. Each cookie can be added to the current request.

B. Quick Headers

A menu containing all the headers defined in RFC 2616 is available. The user must manually enter the header value. Neither syntax nor semantics of values are checked.

C. Header Assembler

This window supports the creation of individual HTTP headers. Headers are grouped into seven categories according to the value format. The purpose of this window is to reduce the possibility of syntax errors in header values. Where possible, a menu with all acceptable values will be provided.

III. SUPPORT FOR DIFFERENT USER LEVELS

Configuration is done by administrators, not learners. On the server, information is saved. This flexibility allows a fairly basic and limited version for beginners. This makes the first encounter with the tool very easy and students are not overwhelmed by a complicated user interface and do not have to configure the tool. During this phase, the learner always enters the request manually. To avoid typos, a history of all previously submitted requests can be made available at this point. Students can select a previously created query as the basis for a new query. After changing, removing, or adding new headers, you can submit your query. Several helper applications provided for advanced users are:

- Menus with all HTTP-methods and headers as defined In RFC 2616
- Header-dependent menus to generate legal values
- Alist with all cookies received so far

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IV. INTEGRATION INTO A LEARNING ENVIRONMENT

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V. EXPLORING OTHER PROTOCOLS

After successfully using HTTPExplorer, we plan to apply the basic ideas to other protocols and applications. Basically, a protocol or application has two requirements:

- be text-based
- have a request-response characteristic

These requirements are rooted in the nature of HTTP. Possible protocols include WebDAV and SOAP, but it also allows access to applications such as compilers and simulators. In this case, communication between the tool and the target application is based on APIs or network protocols used directly by the tool. If no such protocol is available, a simple wrapper around TCP/IP can provide this service. Our goal is to define an API so that all learning tools can use a common core. I want to develop a joint test environment

V. CONCLUSION

This post introduced HTTPExplorer, a tool that supports learning the Hypertext Transfer Protocol defined in RFC 2616. The tool has a web interface and can be tailored for different user groups. Hyperlinks embedded in appropriate learning materials bring HTTPExplorer to your learning environment. This tool was successfully used in a web-based application course

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