

# Assignment 2

## Problem 1: HTTP Proxy

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**Date of Submission:** 24/2/2013

### Task

To build a basic web proxy capable of accepting HTTP requests, forwarding requests to remote (origin) servers, and returning response data to a client.

### HOW TO USE

- Copy all the files in one directory.
- In the terminal:
  - `cd /path/to/code/`
  - `make`
  - `./proxy <port_number>`
- The server should start listening for connections.

- Connect to the server using a **web client or telnet**.
- Send a HTTP request, like:  
GET http://www.google.com/ HTTP/1.0
- The headers and HTML of the Google homepage will be displayed on the terminal screen.

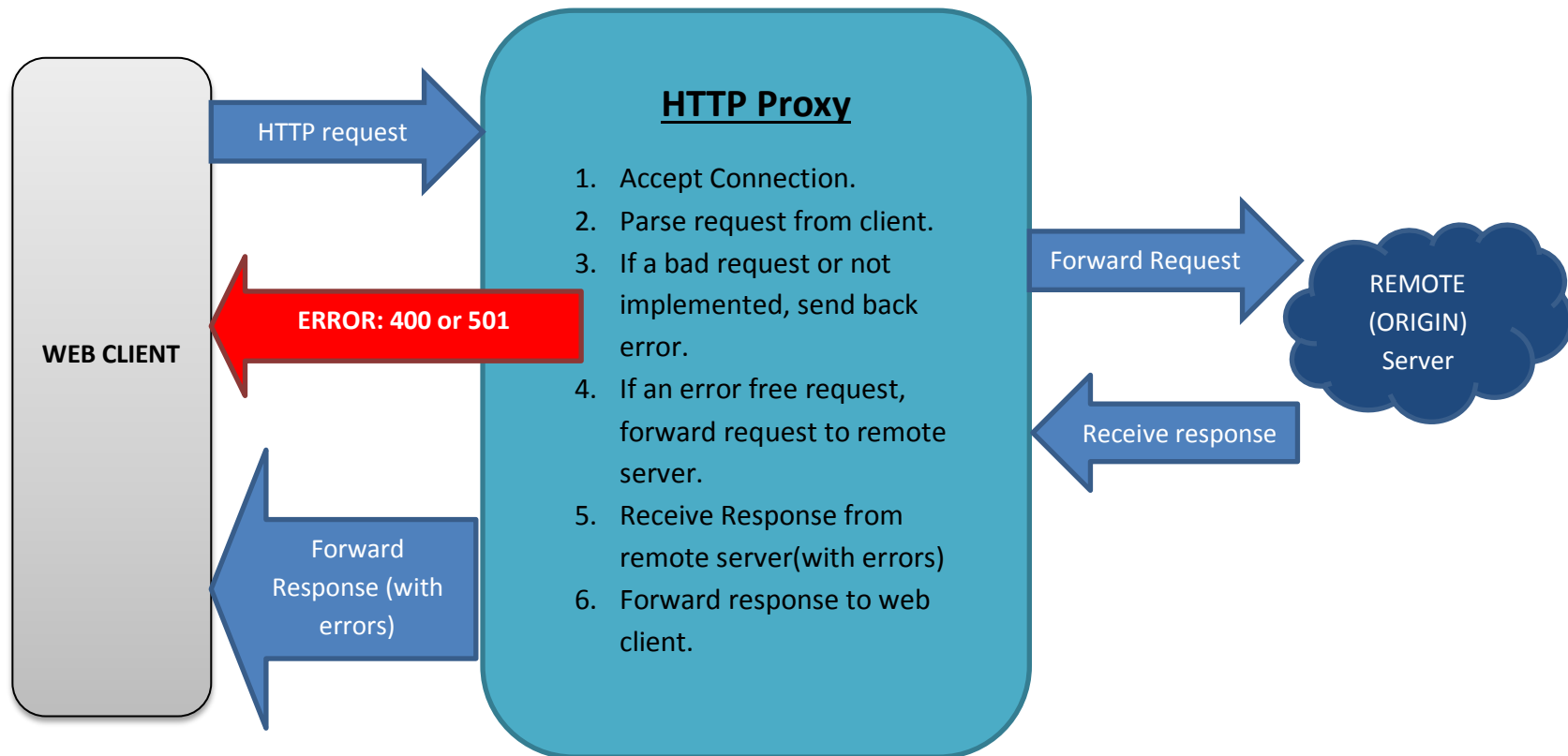
## **LIMITATIONS**

- It does not handle concurrent requests, only sequential requests.
- Only HTTP/1.0 implemented.
- Only “GET” method is implemented.
- Connection: keep-alive not implemented.

## **FEATURES**

- Accepts “GET” requests. Otherwise, responds back with a 501(Not Implemented) error.
- Flexibility in choosing the server port for the server.
- Accepts all the available formats for HTTP headers. If something goes wrong, responds with a 400(Bad Request) error.
- Works with HTTP/1.0  
Also accepts HTTP/1.1 requests, but forwards the request to remote(origin) server with HTTP version 1.0
- Closes the client and remote server connection after a request is complete.
- Parses the given HTTP request, separates the different parts of the requests into a map of (string, string) to make a well formatted string to be forwarded.
- Proxy works behind another proxy (without authentication). **NOTE:** Proxy details have to be specified in the code using a macro, file: http\_proxy.cpp

## FLOW DIAGRAM



## IMPLEMENTATION DETAILS

1. *http\_proxy.cpp* contains the flow of the program, i.e.,
  - I. Make a socket to listen to with the port number provided as an argument.
  - II. Accept connection from a client and receive a HTTP request.
  - III. Parse the request for remote server name, port (optional), path and other headers.
  - IV. Make a well formatted request to be forwarded to the remote server.
  - V. Receive response from the remote server, which may even contain errors.

- VI. Forward the response to the client.
  - VII. Close the connection.
  - VIII. Waits for another connection from a client. (goes back to step II)
2. *eventLogger/eventLogger.hpp* contains the functions to log events with their timings to the standard input and standard error.
  3. *HttpHeadersParser/http\_requests\_parser.hpp* contains a class which handles HTTP requests. Given a request,
    - I. It first tokenizes the string using “\r\n” or “\r” as a delimiter.
    - II. Reads the first line of request for the HTTP method, URI, HTTP version.
    - III. Reads the subsequent lines to form a map of headers and their values.
    - IV. Finally, forms a well formatted string of the request.
  4. *server/proxy\_server.hpp* contains the functions to setup a socket and connect to it. It gracefully handles all the errors internally in making a connection. It also contains functions to receive and send message through the socket in the form of string or unsigned character (overloaded functions). It can even set a timeout on the sockets.
  5. *client/proxy\_client.hpp* contains the functions to handle the part of proxy to connect to the remote server. It helps in forwarding the request and receiving the response from the remote server.
  6. *makefile* contains the required commands/dependencies to compile and make an executable.

## SAMPLE INPUT/OUTPUT:

## WEB CLIENT-SIDE

**chirag@chirag1992m:~\$ telnet localhost 4567**

Trying 127.0.0.1...

Connected to localhost.

Escape character is '^['.

GET /~maths/ HTTP/1.0

host: shiloi.iitg.ernet.in

HTTP/1.1 200 OK

Date: Sun, 24 Feb 2013 13:44:02 GMT

Server: Apache/2.2.15 (Red Hat)

X-Powered-By: PHP/5.3.2

Content-Length: 5502

Connection: close

Content-Type: text/html; charset=UTF-8

<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">

<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">

<head>

<meta http-equiv="Content-Language" content="English" />

```
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
<title>Department of Mathematics, Indian Institute of Technology Guwahati</title>
<link rel="stylesheet" type="text/css" href="default.css" media="screen" />
```

```
<link rel="stylesheet" type="text/css" href="csshorizontalmenu.css" />
```

```
<script type="text/javascript" src="csshorizontalmenu.js" >
```

```
/******
```

- \* CSS Horizontal List Menu- by JavaScript Kit ([www.javascriptkit.com](http://www.javascriptkit.com))
- \* Menu interface credits:
- \* <http://www.dynamicdrive.com/style/csslibrary/item/glossy-vertical-menu/>
- \* This notice must stay intact for usage
- \* Visit JavaScript Kit at <http://www.javascriptkit.com/> for this script and 100s more

```
*****/
```

```
</script>
```

```
</head>
```

```
<body>
```

<div id="wrap">

<div id="header">

<table border="0" cellpadding="0" cellspacing="0" width="780">

<tr>

<td></td>

<td><h2 class="toptext">Department of Mathematics<br />

<a href="http://www.iitg.ernet.in/">Indian Institute of Technology Guwahati</a></h2>

<h4 class="toptext">Guwahati 781 039, India</h4></td>

</tr>

</table>

</div>

<div class="horizontalcssmenu">

<ul id="cssmenu1"><li><a href="index.php">Home</a></li><li><a href="#">Programmes</a><ul><li><a href="acads/btech.php"> B.Tech.  
</a></li><li><a href="acads/minor.php"> Minor in Maths</a></li><li><a href="acads/msc.php"> M.Sc. </a></li><li><a href="acads/phd.php"> Ph.D. </a></li></ul></li><li><a href="#">People</a><ul><li><a href="people/faculty.php"> Faculty </a></li><li><a href="people/students.php"> Students </a></li><li><a href="people/staff.php"> Staff </a></li></ul></li><li><a href="#">Research</a><ul><li><a href="research/publications.php?y=2013"> Publications</a></li><li><a href="research/projects.php"> Projects </a></li><li><a href="research/thesis.php"> Thesis </a></li></ul></li><li><a href="#">Events</a><ul><li><a href="events/workshop.php"> Workshops </a></li><li><a href="events/mseminars.php"> Mathematics Seminar Series </a></li><li><a href="events/rseminars.php"> RS Seminar Series </a></li></ul></li><li><a href="people/members.php">Committees </a></li><li><a href="placements/placement.php">Placement </a></li><li><a href="contact.php">Contact </a></li></ul><br style="clear: left;" />

</div>

<div id="content">

<div class="left"><p>The Department of Mathematics IIT Guwahati from its very inception in 1995

has aimed to be a center of excellence in mathematics and

computing and been vigorously engaged in both research and teaching.

The vision of the department is not only to transform young people to

competent and motivated professionals but also to contribute to the

development of the nation, particularly the North-East, through

research, consultancy and training activities. The department has at

present 32 energetic and dedicated faculty members, and has a good number of

distinguished mathematicians visiting it every year. The department has its

own state-of-the-art computing laboratory and also houses the National

Board of Higher Mathematics (NBHM) Regional Library.

The department has also been actively engaged in organizing conferences, workshops, QIP

short term courses and Mathematics Training and Talent Search Programme (MTTS).</p>

<br />

<p>Having started the PhD programme in 1996, the department commenced a

2-year M.Sc. programme in Mathematics and Computing in 2000.

From the academic year 2006-2007, the department has

started a unique 4-year B.Tech. programme in Mathematics and Computing,



the first of its kind in the country.

The department also supports the engineering departments

by offering core and advance courses in mathematics at the undergraduate

B.Tech. level in various semesters.</p>

</div>

<div class="right">

<h2>News & Upcoming Events</h2>

<ul>

<li><a href="ext/phd/"><font style="color: blue; font-weight: bold;">Selected Candidates for Ph.D. (December, 2012)</font></a></li>

<li><a href="ext/NLA/workshop/info.html"><font color="blue">NCM ATMW on Numerical Linear Algebra</font></a></li>

<li><a href="ext/NLA/conference/index.html"><font color="blue">NLAA 2013</font></a></li>

<li><a href="http://www.iitg.ernet.in/wmf2012/"><font color="blue">WMF2012</font></a></li>

<li><a href="http://www.iitg.ernet.in/recruitment/facultyrecruitment"><font color="blue">Faculty Interview</font></a></li>

</ul>

<h2>Students Corner</h2>

<ul>

<li><a href="http://www.thedimension.org">DIMENSION<br />(A Technical Confluence)</a></li>

<li><a href="ext/time\_table.pdf">Time Table</a></li>

<li><a href="http://www.siam.org/students/chapters/current/iitg.php">IITG Chapter of SIAM</a></li>

<li><a href="http://www.matrixiitg.in/">MATRIX</a></li>

</ul>

<h2>Intranet &nbsp;(local)</h2>

<ul>

<li><a href="https://172.16.68.5/~soft/">Download</a></li>

<li><a href="http://172.16.68.7">Ububtu 12.04 Repo</a></li>

<li><a href="https://172.16.68.5/~cloud">Department Cloud</a></li>

</ul>

</div>

<div style="clear: both;"> </div>

</div>

<div id="footer">

Last updated: 22 February 2013</div>

</div>

</body>

</html>

Connection closed by foreign host.

**chirag@chirag1992m:~\$ telnet localhost 4567**

Trying 127.0.0.1...

Connected to localhost.

Escape character is '^['.

POST / HTTP/1.0

host: shiloi.iitg.ernet.in

501 Not Implemented

Connection closed by foreign host.

## **PROXY SERVER-SIDE**

**chirag@chirag1992m:~\$ ./proxy 4567**

24/2/2013 19:13:28 - Starting Server at port: 4567

24/2/2013 19:13:28 - getaddrinfo() success: return value = 0

24/2/2013 19:13:28 - socket() success: return value = 3

24/2/2013 19:13:28 - getsockopt() success: return value = 0

24/2/2013 19:13:28 - bind() success: return value = 0

24/2/2013 19:13:28 - Setting up of server success.

24/2/2013 19:13:28 - listen() success: return value = 0

24/2/2013 19:13:28 - accepting connections on port: 4567

24/2/2013 19:13:33 - accept() success: return value = 4

24/2/2013 19:13:33 - Got connection from 127.0.0.1

24/2/2013 19:14:3 - Message(requests) received from client:

24/2/2013 19:14:3 - "GET /~maths/ HTTP/1.0

host: shilloi.iitg.ernet.in

"

24/2/2013 19:14:3 - Parsing of given request starting.

24/2/2013 19:14:3 - Parsing of request completed!

24/2/2013 19:14:3 - 200 OK

24/2/2013 19:14:3 - Formatted request:

24/2/2013 19:14:3 -

GET /~maths/ HTTP/1.0

host:shilloi.iitg.ernet.in

24/2/2013 19:14:3 - Connecting to host through ProxyClient

24/2/2013 19:14:3 - client getaddrinfo() success: return value = 0

24/2/2013 19:14:3 - client socket() success: return value = 5

24/2/2013 19:14:3 - client connect() success: return value = 0

24/2/2013 19:14:3 - Client Connecting to 202.141.80.5

24/2/2013 19:14:3 - Connection to host successful!

24/2/2013 19:14:3 - Forwarding requests to host!

24/2/2013 19:14:3 - Receiving reply from host!

24/2/2013 19:14:3 - 5697 length of reply received.

24/2/2013 19:14:3 - Forwarding reply from host to client.

24/2/2013 19:14:3 - Receiving reply from host!

24/2/2013 19:14:3 - 0 length of reply received.

24/2/2013 19:14:3 - Forwarding reply from host to client.

24/2/2013 19:14:3 - closing currently connected client.

24/2/2013 19:14:3 - accepting connections on port: 4567

24/2/2013 19:14:18 - accept() success: return value = 4

24/2/2013 19:14:18 - Got connection from 127.0.0.1

24/2/2013 19:14:50 - Message(requests) received from client:

24/2/2013 19:14:50 - "POST / HTTP/1.0

host: shiloi.iitg.ernet.in

"

24/2/2013 19:14:50 - Parsing of given request starting.

24/2/2013 19:14:50 - Parsing of request completed!

24/2/2013 19:14:50 - 501 Not Implemented

24/2/2013 19:14:50 - closing currently connected client.

24/2/2013 19:14:50 - accepting connections on port: 4567