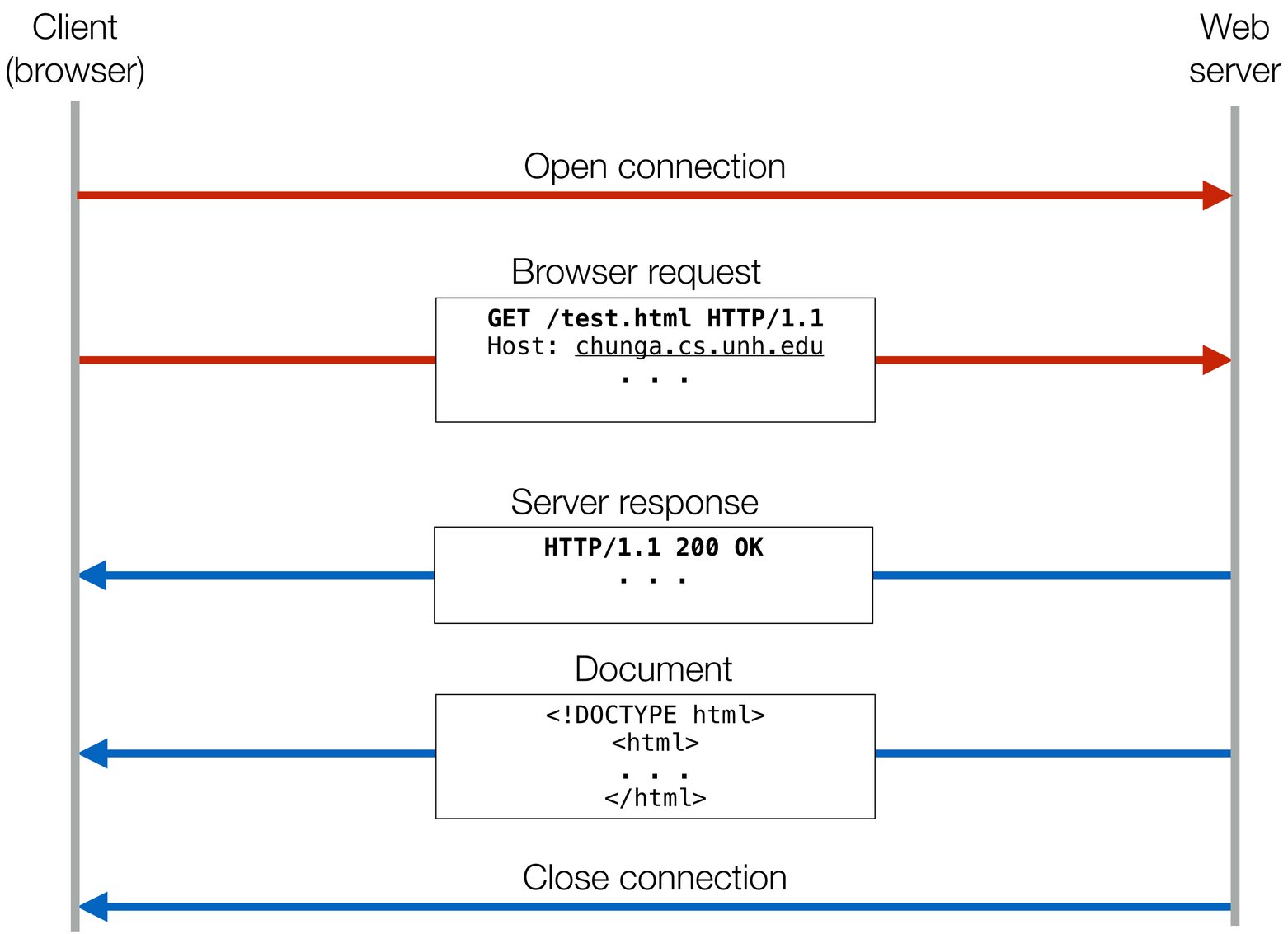
CS 725/825 & IT 725
Lecture 10
Application Layer

October 2, 2023

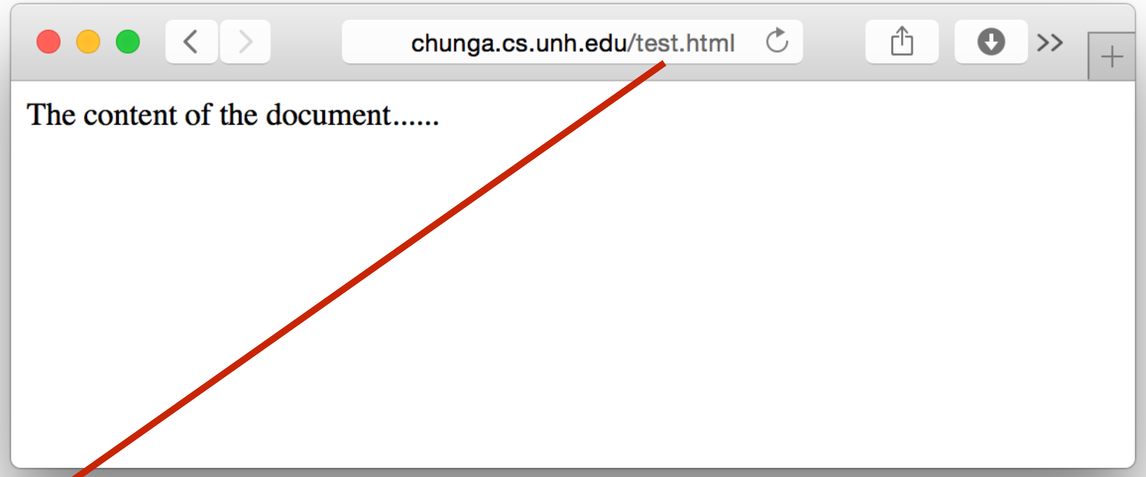
Main HTTP Methods

- GET
  - client requests data from the server
  - server sends data
- POST
  - client informs server about data to be delivered
  - client sends data
  - server sends data (response) back
- also: HEAD, PUT, DELETE, TRACE, CONNECT, …

HTTP GET Request



GET Request Details




```
GET /test.html HTTP/1.1
Host: chunga.cs.unh.edu
DNT: 1
Connection: keep-alive
Accept: text/html,application/xhtml+xml,application/xml;q=0.9,*/*;q=0.8
User-Agent: Mozilla/5.0 (Macintosh; Intel Mac OS X 10_10_2)↩
            AppleWebKit/600.3.18 (KHTML, like Gecko)↩
            Version/8.0.3 Safari/600.3.18
Accept-Language: en-us
Accept-Encoding: gzip, deflate
Cache-Control: max-age=0
```

Browser request

Terminated by a blank line

GET Response Details

```
HTTP/1.1 200 OK
Date: Wed, 25 Feb 2015 21:24:38 GMT
Server: Apache/2.4.10 (Unix) PHP/5.5.14
Last-Modified: Wed, 25 Feb 2015 21:17:51 GMT
ETag: "86-50ff02af7bdc0"
Accept-Ranges: bytes
Content-Length: 134
Keep-Alive: timeout=5, max=100
Connection: Keep-Alive
Content-Type: text/html
```

Server response

blank line

```
<!DOCTYPE html>
<html>
<head>
    <title>Title of the document</title>
</head>
<body>
    The content of the document......
</body>
</html>
```

Document

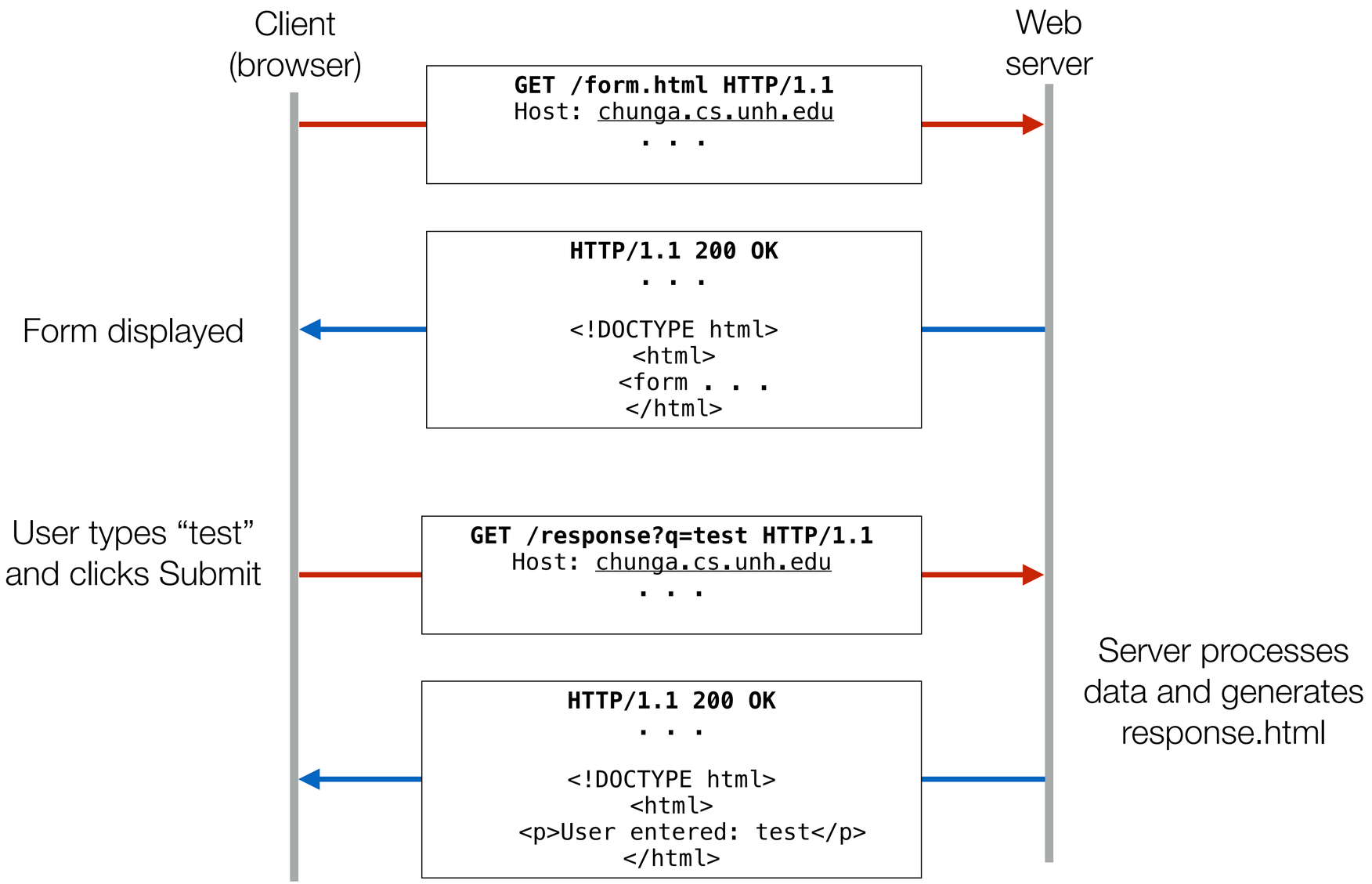
Sending data: GET

```html
<!DOCTYPE html>
<html>
<head>
    <title>Form</title>
</head>
<body>
    <form action="/response" method="GET">
        <input type="text" name="q">
        <input type="submit">
    </form>
</body>
</html>
```

Click!

```
GET /response?q=test HTTP/1.1
. . .
```

Sending date: GET



Sending data: POST

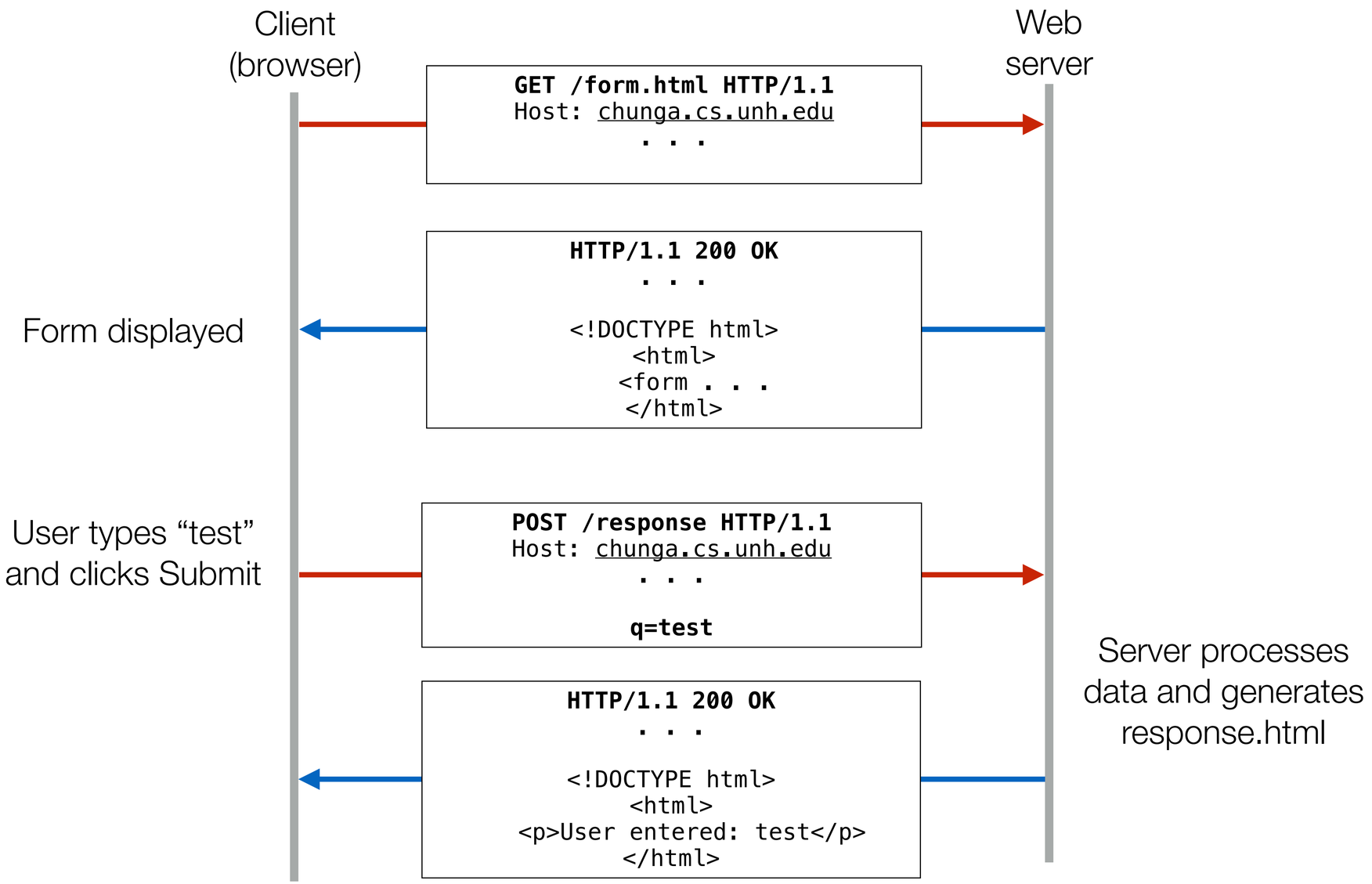
```html
<!DOCTYPE html>
<html>
<head>
    <title>Form</title>
</head>
<body>
    <form action="/response" method="POST">
        <input type="text" name="q">
        <input type="submit">
    </form>
</body>
</html>
```

Click!

```
POST /response HTTP/1.1
Host: chunga.cs.unh.edu
Content-Type: application/x-www-form-urlencoded
. . .
Referer: http://chunga.cs.unh.edu/form.html
. . .

q=test
```

Sending data: POST



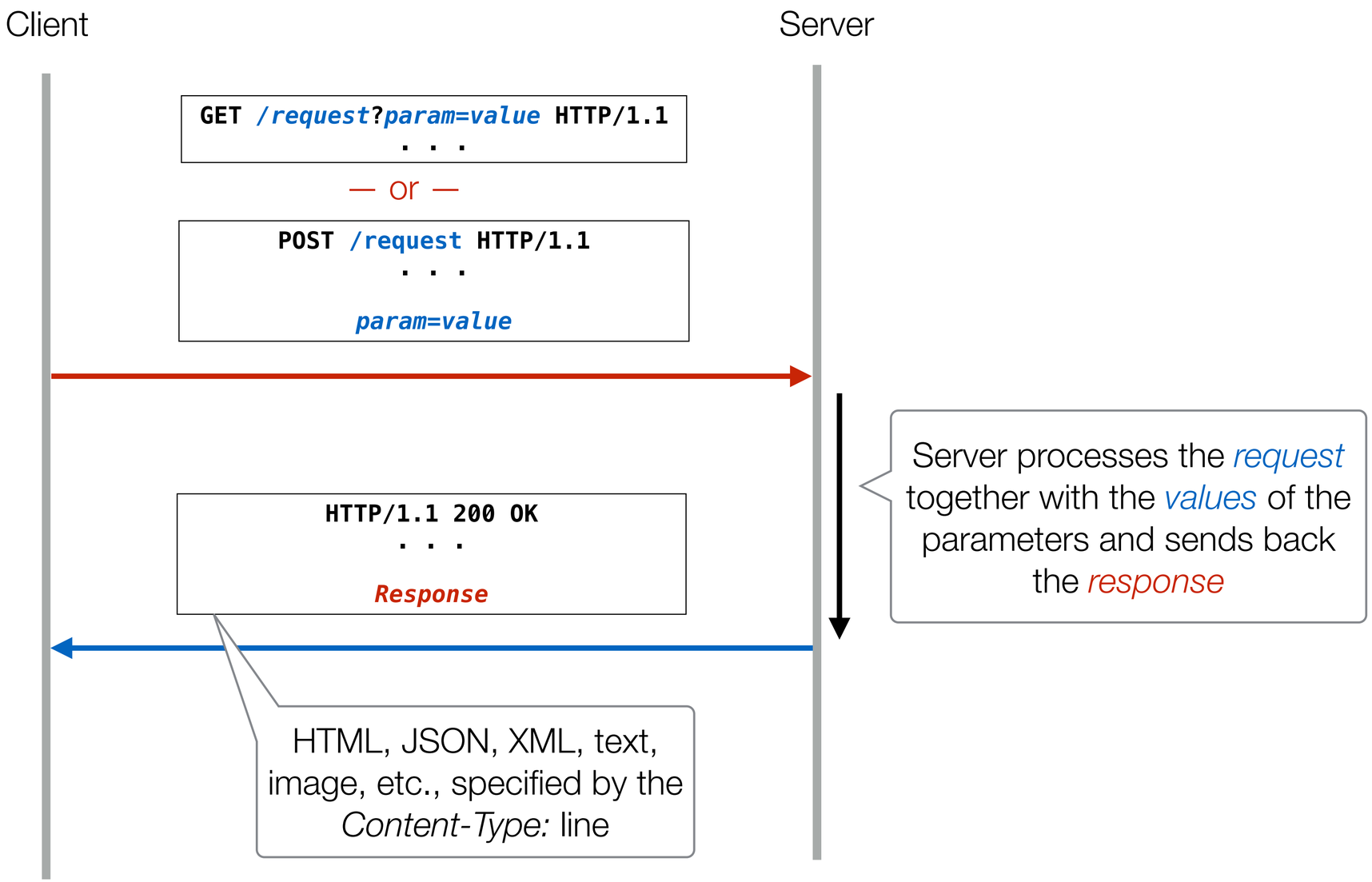
Not just forms: AJAX

```
<script>
  $("form").submit(function(f) {
    f.preventDefault();
    $.ajax({
      url: "/request",
      data: “q=“+$("#q").val(),
      type: "GET",
      success: function(data) {
        var results = JSON.parse(data);
        $("#result").html(results["result"]);
      },
      error: function(e) {
        alert("Error: "+e.status+": "+e.statusText);
      }
    });
  });
</script>
```

GET /request?q=test HTTP/1.1

{"result":"server response"}

HTTP transaction in general



Issues…

- Typical HTTP transaction is too short for TCP
  - (as you will see later in the course) TCP connection reaches full throughput after several RTTs
  - many HTTP request/responses are just a few packets
  - solution: Persistent Connections
- Shared fate: Head of Line (HoL) blocking
  - (as you will see later in the course) packet loss leads to reduced throughput
  - solution: Parallel Connections
- These two approaches are in conflict with each other…

Server Architecture

- Infinite loop
  - while True do
    Accept Connection
    Process the Connection
    done
- Concurrent request processing
  - while True do
    Accept Connection,
    have someone else to Process the Connection
    done