This sequence diagram tutorial describes the web caching feature on the web browser side. HTTP primitives that facilitate the implementation of web browser level caching are shown using a live example.

Two scenarios are covered:
- The user revisits the EventHelix.com home page.
- The user issues a refresh command for the EventHelix.com home page.

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Scenario: The user revisits the EventHelix.com home page.

- The browser checks if a local copy of the page is available. In this case, it is available. The timestamp of the local copy in the browser cache is recorded. This timestamp will be sent to the web server in the following HTTP GET.
  - The browser requests the home page by specifying the requested URI as "/" and the If-Modified-Since header with the timestamp "Mon, 03 Oct 2005 10:31:47 GMT".
  - The web server checks the page modification time against the time specified in the HTTP request.
  - The web server determines that the page has not been modified since "Mon, 03 Oct 2005 10:31:47 GMT", so it sends HTTP 304 Not Modified to notify the browser.
  - The browser checks if the requested page has been modified since "Mon, 03 Oct 2005 10:31:47 GMT".
  - The CSS file has not been modified since the specified time, the web server sends HTTP 304 to signal that.
  - The web server has indicated that the page has not been modified, thus the cache entry is current. The browser displays the page from the cache.
  - The browser also assumes that none of the images contained in the page have been modified.

- The browser requests the Cascading Style Sheet used in the page from the web server. Again, the timestamp from the cache is sent to the web server.
  - The browser requests the CSS file using the If-Modified-Since header.
  - The web server checks the CSS file modification time.
  - The CSS file has not been modified since the specified time, the web server sends HTTP 304 to signal that.
  - The web server has indicated that the CSS file has not been modified, thus the cache entry is current. The browser displays the page from the cache.

- The browser also assumes that none of the images contained in the CSS file have been modified.

The browser checks if a local copy of the page is available. In this case, it is available. The timestamp of the local copy in the browser cache is recorded. This timestamp will be sent to the web server in the following HTTP GET.

The browser (Internet Explorer 6.0) requests the home page by specifying the requested URI as "/" and the If-Modified-Since header with the timestamp "Mon, 03 Oct 2005 10:31:47 GMT".

The web server checks the page modification time against the time specified in the HTTP request.

The web server determines that the page has not been modified since "Mon, 03 Oct 2005 10:31:47 GMT", so it replies back to the browser that the page has not been modified. HTTP 304 code is used to notify that the page has not changed since the specified date.

The web server has indicated that the page has not been modified, thus the cache entry is current. The browser displays the page from the cache. In this case, the browser also assumes that none of the images contained in the page have been modified.

The browser requests the Cascading Style Sheet used in the page from the web server. Again, the timestamp from the cache is sent to the web server.

The web server checks the CSS file modification time.

The CSS file has not been modified since the specified time, the web server sends HTTP 304 to signal that.
Web Page Caching and Refresh Handling (Web Page Refresh Cache Handling)

Client | HTTP Server | EventHelix.com/EventStudio 2.5
WeBrOwser | Web Server | 10-Oct-05 04:42 (Page 2)
Port 1368 | Port 1367 | Port 1366 | Port 80

This Tutorial Sequence Diagram was generated with EventStudio System Designer 2.5 (http://www.EventHelix.com/EventStudio).

LEG: Web Cache handling when the user refresh command for the home page

Scenario: The user issues a refresh command for the EventHelix.com home page.

This case differs from a revisit as the web browser will issue an HTTP GET for each event element contained in the page.

Also note that the browser uses two client end ports to speed up the page refresh. Web page elements are being concurrently requested via two different ports.

Request the page from the web server.

The web server indicates that the page has not been modified since the specified time.

Request URI: /,
Request Version: HTTP/1.1,
If-Modified-Since: Mon, 03 Oct 2005 10:31:47 GMT,
tcp.len = 311

HTTP 304 Not Modified

Request Version: HTTP/1.1,
http.date = Sun, 09 Oct 2005 11:20:35 GMT,
tcp.len = 270

HTTP GET

Request URI: /_themes/eventhelix/even1000.css,
Request Version: HTTP/1.1,
If-Modified-Since: Sat, 22 Nov 2003 03:08:23 GMT,
tcp.len = 381

HTTP GET

Request URI: /EventStudio/images/hg.gif,
Request Version: HTTP/1.1,
If-Modified-Since: Thu, 17 Feb 2005 13:07:11 GMT,
tcp.len = 375

HTTP 304 Not Modified

Request Version: HTTP/1.1,
tcp.len = 215

HTTP GET

Request URI: /EventStudio/_borders/event_helix.jpg,
Request Version: HTTP/1.1,
If-Modified-Since: Sun, 18 Apr 2004 00:03:36 GMT,
tcp.len = 386

HTTP 304 Not Modified

Request Version: HTTP/1.1,
tcp.len = 215

HTTP GET

Request URI: /EventStudio/images/w2gh.gif,
Request Version: HTTP/1.1,
If-Modified-Since: Sat, 19 Feb 2005 12:38:05 GMT,
tcp.len = 377

HTTP 304 Not Modified

Request Version: HTTP/1.1,
tcp.len = 215

HTTP GET

Request URI: /EventStudio/eventstudio_icon.gif,
Request Version: HTTP/1.1,
If-Modified-Since: Wed, 25 Jun 2003 01:41:04 GMT,
tcp.len = 382
<table>
<thead>
<tr>
<th>Port 1368</th>
<th>Port 1367</th>
<th>Port 1366</th>
<th>Port 80</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Client</strong></td>
<td><strong>HTTP Server</strong></td>
<td><strong>Web Browser</strong></td>
<td><strong>Web Server</strong></td>
</tr>
<tr>
<td>HTTP 304 Not Modified</td>
<td>Request Version: HTTP/1.1, tcp.len = 215</td>
<td>HTTP GET</td>
<td>EventHelix.com/EventStudio 2.5</td>
</tr>
<tr>
<td>HTTP 304 Not Modified</td>
<td>Request Version: HTTP/1.1, tcp.len = 215</td>
<td>HTTP GET</td>
<td></td>
</tr>
<tr>
<td>HTTP 304 Not Modified</td>
<td>Request Version: HTTP/1.1, tcp.len = 214</td>
<td>HTTP GET</td>
<td></td>
</tr>
<tr>
<td>HTTP 304 Not Modified</td>
<td>Request Version: HTTP/1.1, tcp.len = 215</td>
<td>HTTP GET</td>
<td></td>
</tr>
<tr>
<td>Request URI: /images/photo.gif, If-Modified-Since: Thu, 06 Jan 2005 02:37:44 GMT, tcp.len = 365</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HTTP 304 Not Modified</td>
<td>Request Version: HTTP/1.1, tcp.len = 215</td>
<td>HTTP GET</td>
<td></td>
</tr>
<tr>
<td>HTTP 304 Not Modified</td>
<td>Request Version: HTTP/1.1, tcp.len = 215</td>
<td>HTTP GET</td>
<td></td>
</tr>
<tr>
<td>Request URI: /RealtimeMantra/desktop.gif, If-Modified-Since: Sun, 02 Jan 2005 22:17:00 GMT, tcp.len = 376</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### HTTP Request and Response

**Client**

- **Request URI**: `/images/join.gif`
- **Request Version**: HTTP/1.1
- **If-Modified-Since**: Fri, 25 Oct 2002 11:19:21 GMT
- **tcp.len**: 364

**Response**

- **HTTP 304 Not Modified**
- **Request Version**: HTTP/1.1
- **tcp.len**: 214

**Request**

- **Request URI**: `_themes/eventhelix/bullet.gif`
- **Request Version**: HTTP/1.1
- **If-Modified-Since**: Sun, 02 Nov 2003 15:57:13 GMT
- **tcp.len**: 379

**Response**

- **HTTP 304 Not Modified**
- **Request Version**: HTTP/1.1
- **tcp.len**: 215

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**Client**

- **Port**: 1368

**HTTP Server**

- **Port**: 1367

**Web Browser**

- **Port**: 1366

**Web Server**

- **Port**: 80

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**EventHelix.com/EventStudio 2.5**

**10-Oct-05 04:42 (Page 4)**