



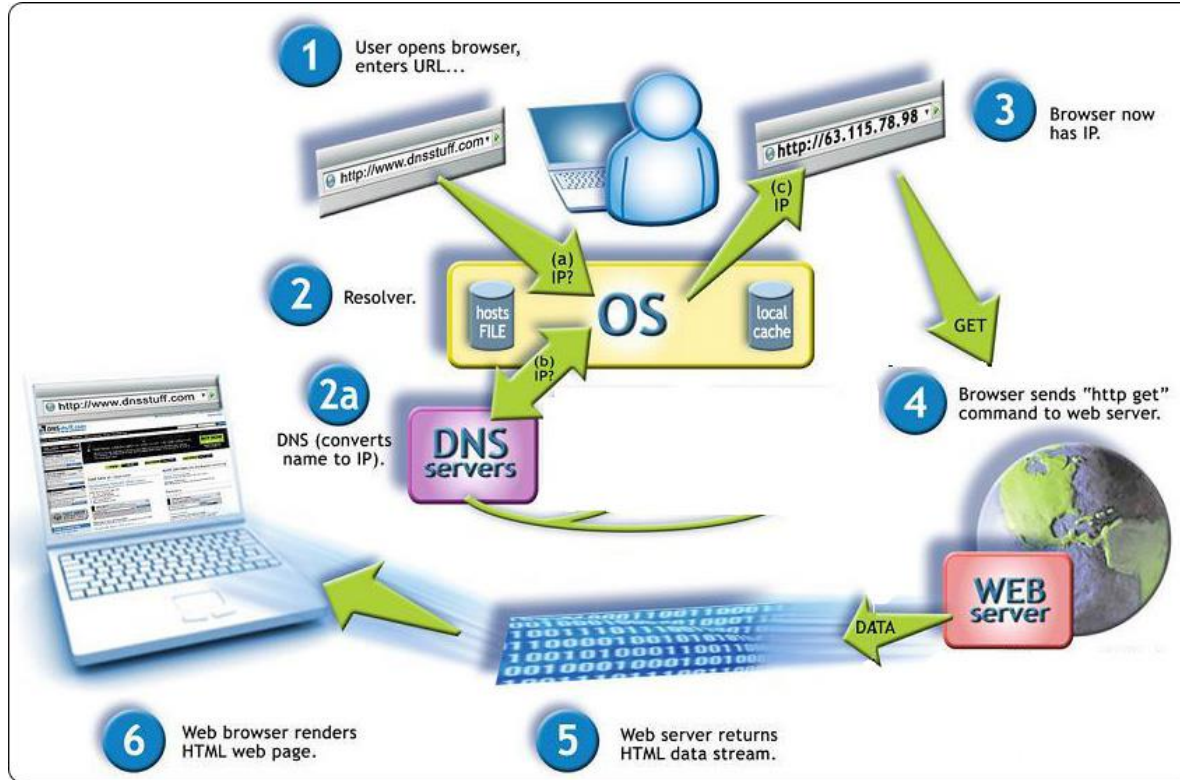
HOW BROWSER WORKS?



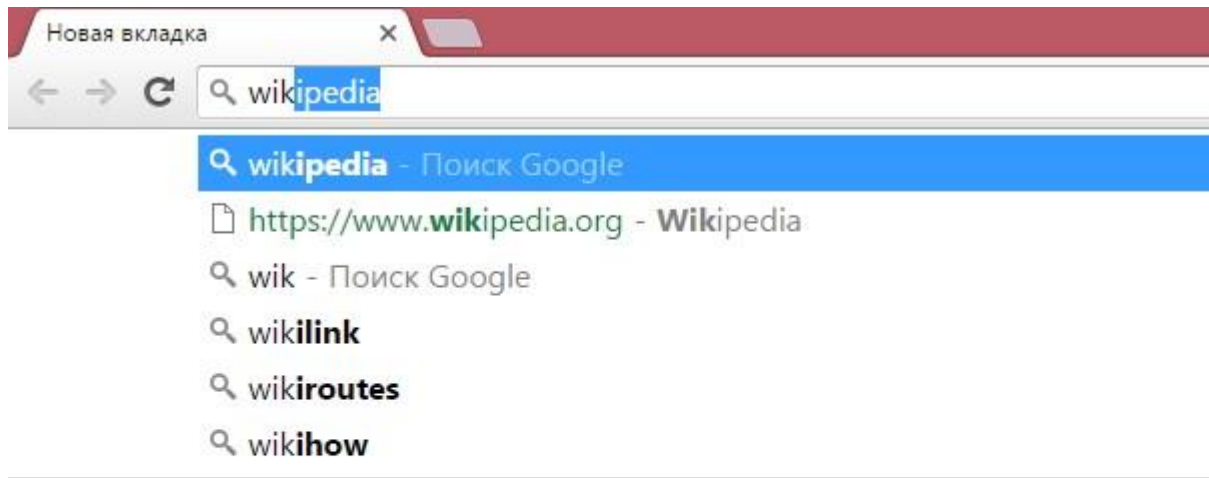
Agenda:

- **How browser works?**
- **URL full scheme**
- **HTTP methods and HTTP status code**
- **DOM**
- **Web Dev Tools**

How browser works?

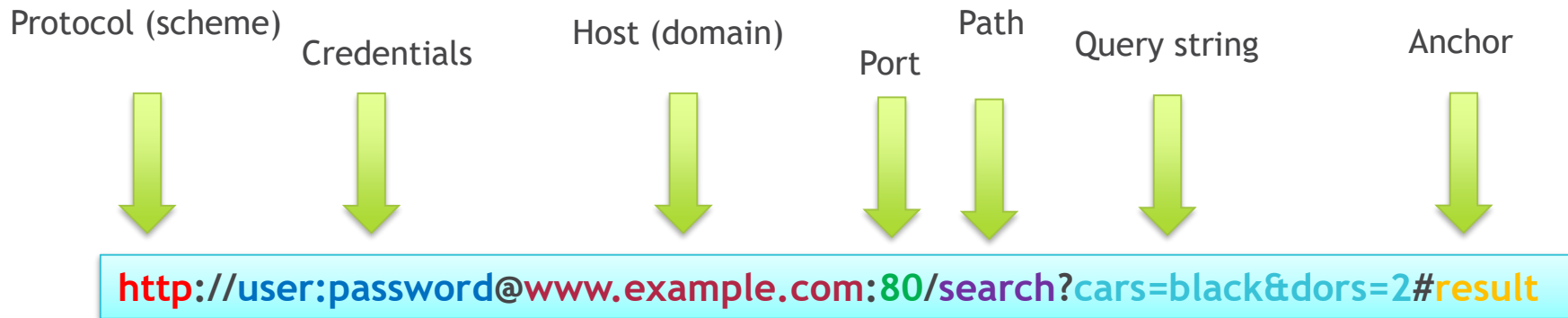


Step 1: When you press the first key browser suggest resources for you

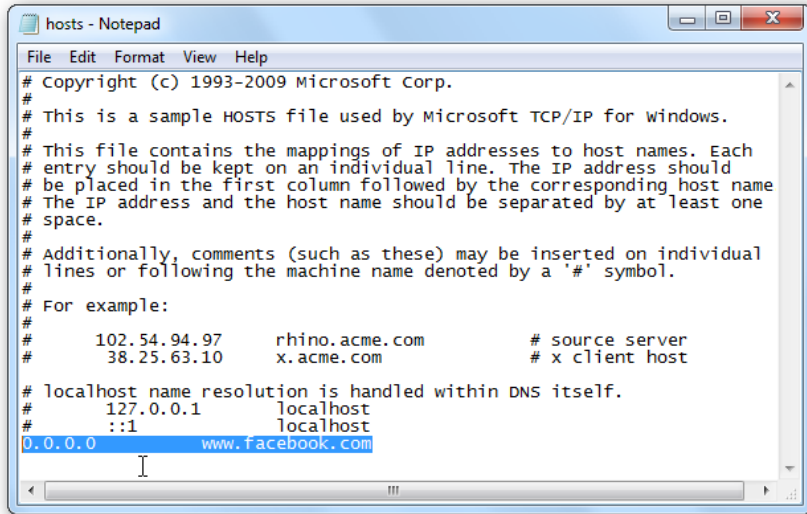


Step 2: URL parsing

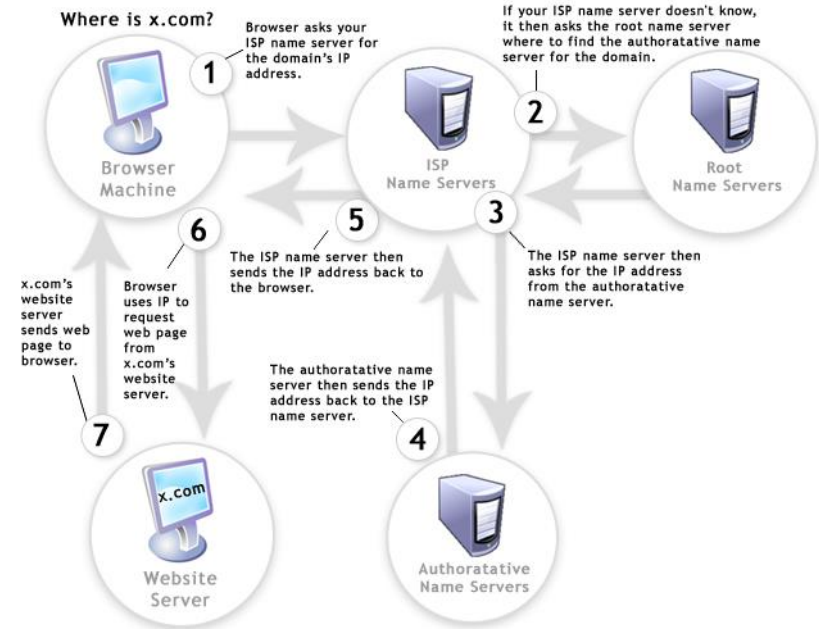
Uniform Resource Locator



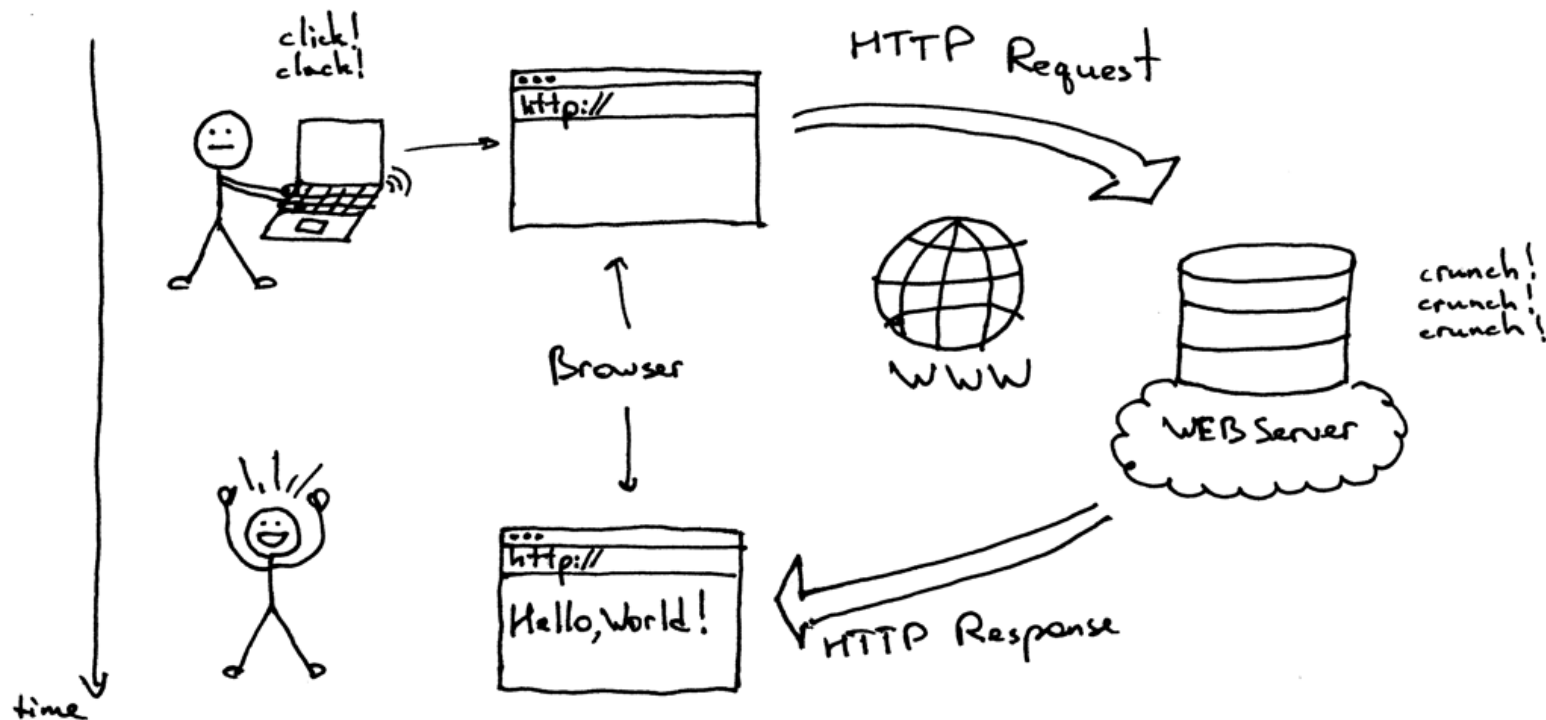
Step 3: DNS resolve



```
hosts - Notepad
File Edit Format View Help
# Copyright (c) 1993-2009 Microsoft Corp.
# This is a sample HOSTS file used by Microsoft TCP/IP for Windows.
# This file contains the mappings of IP addresses to host names. Each
# entry should be kept on an individual line. The IP address should
# be placed in the first column followed by the corresponding host name
# The IP address and the host name should be separated by at least one
# space.
# Additionally, comments (such as these) may be inserted on individual
# lines or following the machine name denoted by a '#' symbol.
# For example:
#      102.54.94.97      rhino.acme.com      # source server
#      38.25.63.10      x.acme.com          # x client host
# localhost name resolution is handled within DNS itself.
# 127.0.0.1      localhost
# ::1            localhost
0.0.0.0 www.facebook.com
```



Step 4: HTTP request and HTTP response



HTTP request – HTTP response

```
GET /doc/test.html HTTP/1.1
Host: www.test101.com
Accept: image/gif, image/jpeg, */*
Accept-Language: en-us
Accept-Encoding: gzip, deflate
User-Agent: Mozilla/4.0
Content-Length: 35

bookId=12345&author=Tan+Ah+Teck
```

Annotations for Request:

- Request Line: `GET /doc/test.html HTTP/1.1`
- Request Headers: `Host: www.test101.com`, `Accept: image/gif, image/jpeg, */*`, `Accept-Language: en-us`, `Accept-Encoding: gzip, deflate`, `User-Agent: Mozilla/4.0`, `Content-Length: 35`
- A blank line separates header & body
- Request Message Body: `bookId=12345&author=Tan+Ah+Teck`

```
HTTP/1.1 200 OK
Date: Sun, 08 Feb xxxx 01:11:12 GMT
Server: Apache/1.3.29 (Win32)
Last-Modified: Sat, 07 Feb xxxx
ETag: "0-23-4024c3a5"
Accept-Ranges: bytes
Content-Length: 35
Connection: close
Content-Type: text/html

<h1>My Home page</h1>
```

Annotations for Response:

- Status Line: `HTTP/1.1 200 OK`
- Response Headers: `Date: Sun, 08 Feb xxxx 01:11:12 GMT`, `Server: Apache/1.3.29 (Win32)`, `Last-Modified: Sat, 07 Feb xxxx`, `ETag: "0-23-4024c3a5"`, `Accept-Ranges: bytes`, `Content-Length: 35`, `Connection: close`, `Content-Type: text/html`
- A blank line separates header & body
- Response Message Body: `<h1>My Home page</h1>`

HTTP Methods

Method	Destination
GET	Retrieve a resource from the provided URL
HEAD	Like GET, but retrieve head only
POST	Send information as a block of data
PUT	Store information in the provided URL
DELETE	Delete the specified resource
TRACE	Echo back request, audit changes made by intermediate servers
OPTIONS	Return supported HTTP methods
CONNECT	Enter "dumb" mode, convert to a transparent TCP/IP tunnel
PATCH	Apply partial modifications to a resource

HTTP status codes

TYPE	STATUS CODES	EXAMPLES
Informational	1xx	100 - Continue, 101 - Switching Protocols
Success	2xx	200 - OK, 201 - Created, 202 - Accepted
Redirection	3xx	300 - Multiple Choices, 301 - Moved Permanently, 302 - Found
Client Error	4xx	400 - Bas Request, 403 - Forbidden, 404- Not Found
Server Error	5xx	500 - Internal Server Error, 503 - Service Unavailable

http://gomel.epam.com/dfs

GET

http://gomel.epam.com/dfsgdfsg

Params

Send

Save

AuthorizationHeadersBodyPre-request ScriptTests

Generate Code

TypeNo Auth

BodyCookiesHeaders (4)Tests

Status: 404 Not FoundTime: 136 ms

PrettyRawPreviewHTML

```
1 <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
2 <html xmlns="http://www.w3.org/1999/xhtml">
3   <head>
4     <meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1"/>
5     <title>404 - File or directory not found.</title>
6     <style type="text/css">
7       <!--
8       body{margin:0;font-size:7em;font-family:Verdana, Arial, Helvetica, sans-serif;background:#EEEEEE;}
9       fieldset{padding:0 15px 10px 15px;}
10      h1{font-size:2.4em;margin:0;color:#FFF;}
11      h2{font-size:1.7em;margin:0;color:#CC0000;}
12      h3{font-size:1.2em;margin:10px 0 0 0;color:#000000;}
13      #header{width:96%;margin:0 0 0 0;padding:6px 2px 6px 2px;font-family:"trebuchet MS", Verdana, sans-serif;color:#FFF;
14      background-color:#555555;}
15      #content{margin:0 0 0 2%;position:relative;}
16      .content-container{background:#FFF;width:96%;margin-top:8px;padding:10px;position:relative;}
17      -->
18
19     </style>
20   </head>
21   <body>
22     <div id="header">
23       <h1>Server Error</h1>
24     </div>
25     <div id="content">
26       <div class="content-container">
27         <fieldset>
28           <h2>404 - File or directory not found.</h2>
29           <h3>The resource you are looking for might have been removed, had its name changed, or is temporarily unavailable.</h3>
30         </fieldset>
31       </div>
32     </div>
33   </body>
34 </html>
```

http://gomel.epam.com

GET http://gomel.epam.com

Params Send Save

Authorization Headers Body Pre-request Script Tests

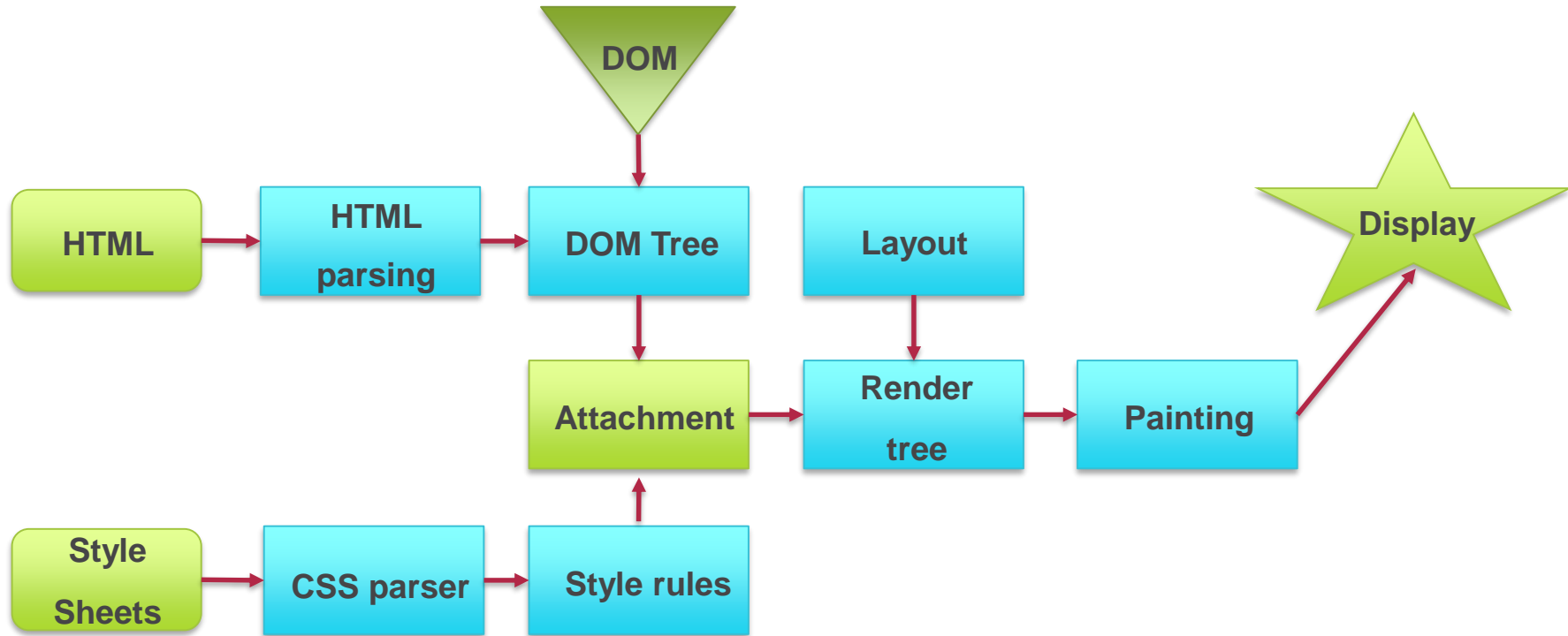
Type No Auth

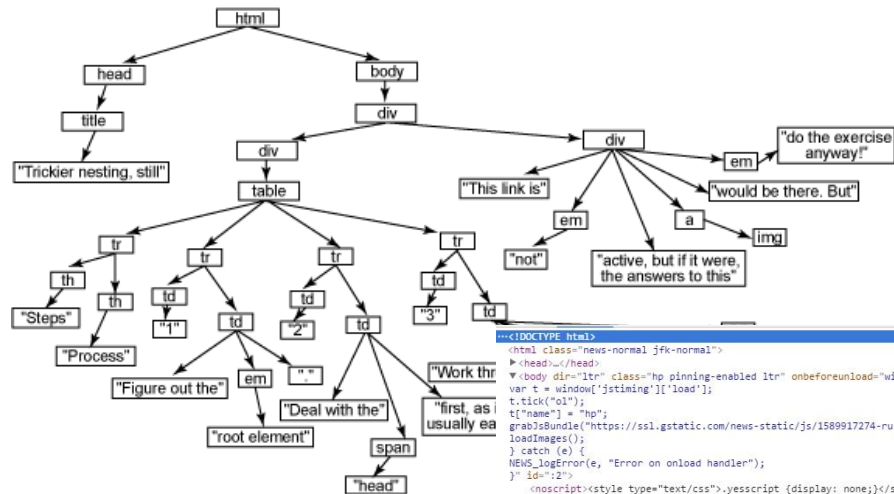
Body Cookies Headers (7) Tests

Status: 200 OK Time: 38 ms

```
1 <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN" "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
2 <html xmlns="http://www.w3.org/1999/xhtml">
3   <head>
4     <meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1" />
5     <title>IIS Windows Server</title>
6     <style type="text/css">
7       <!--
8     body {
9       color:#000000;
10      background-color:#0072C6;
11      margin:0;
12    }
13
14    #container {
15      margin-left:auto;
16      margin-right:auto;
17      text-align:center;
18    }
19
20    a img {
21      border:none;
22    }
23
24    -->
25
26    </style>
27  </head>
28  <body>
29    <div id="container">
30      <a href="http://go.microsoft.com/fwlink/?linkid=66138&clcid=0x409">
31        
32      </a>
33    </div>
34  </body>
35 </html>
```

Step 5: page rendering





Document object model

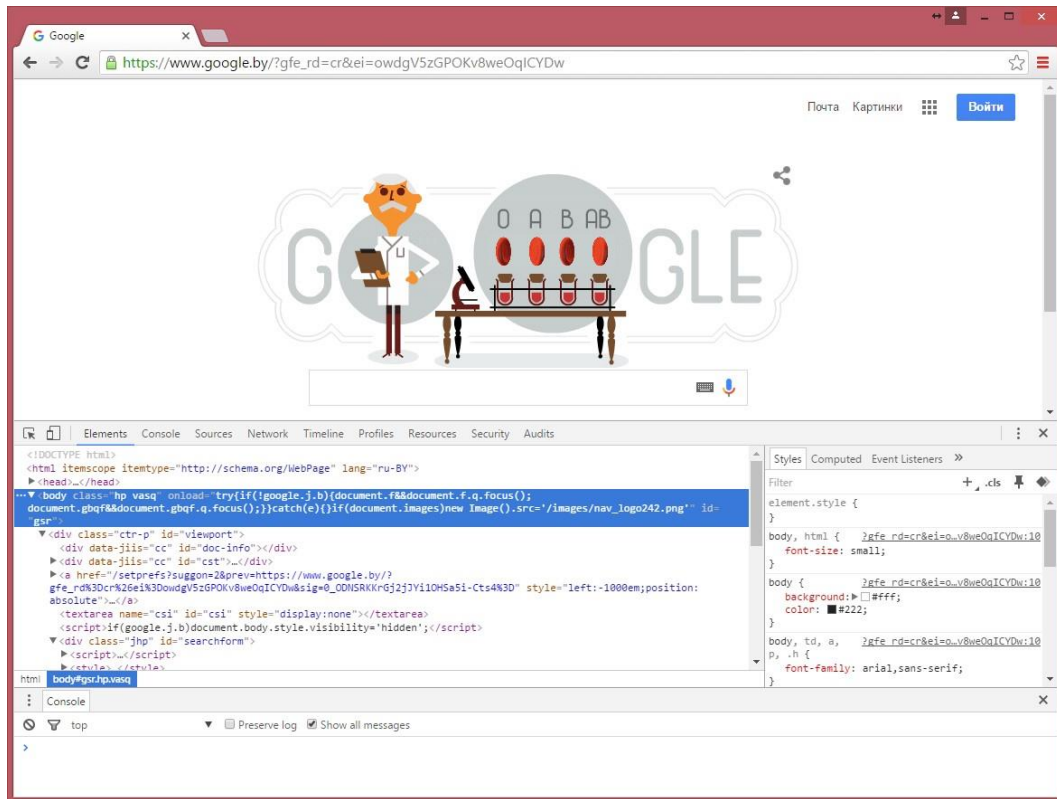
```

<!DOCTYPE html>
<html class="news-normal jfk-normal">
  <head>...</head>
  <body dir="ltr" class="hp pinning-enabled ltr" onbeforeunload="window['NEWS_beforeOnloadFired'] = true" onload="try {
    var t = window['jsTiming'] || 'load';
    t.tick('ol');
    t['name'] = 'hp';
    grabJsBundle('https://ssl.gstatic.com/news-static/js/1589917274-ru-anchorman_binary_ru.js');
    loadImages();
  } catch (e) {
    NEWS_logError(e, 'Error on onload handler');
  }" id=":2">
    <noscript><style type="text/css">.yesscript {display: none;}</style></noscript>
    <noscript>...</noscript>
    <div class="google-one-wrapper">
      <div class="gb_of gb_T" ng-non-bindable id="gb" style="min-width: 750px;">...</div>
      <div class="gb_5c" id="gba"></div>
    </div>
    <div class="ClearHeader"></div>
    <script type="text/javascript">
      (function () { function a() { var b=window.innerWidth||document.body.clientWidth;return 1060>b?"jfk-tiny":"jfk-small":"jfk-normal"}window.getJfkSizeClass=a;
      try{var c=[a()],d=window.innerWidth||document.body.clientWidth,e=0<c=document.body.className.indexOf("webapp");e?c.push("news-narrow"):760>d?c.push("news-skinny"):970>d?c.push("news-narrow"):c.push("news-normal");document.documentElement.className+=" "+c.join(" ");if(e){var f=window.innerHeight||document.body.clientHeight;document.body.className+=f?document.body.className+" landscape":document.body.className+" portrait"}}catch(b) {} })()
    </script>
    <div id="main-wrapper" class="a2">...</div>
    <form class="search-form" action="//www.google.ru/search?cf=all&hl=ru&pi=1&ned=ru_ru" method="get" id="search-hd">
      <input type="hidden" name="hl" value="ru">
      <input type="hidden" name="gl" value="ru">
      <input type="hidden" name="tbn" value="nws">
      <input type="hidden" name="btnmeta_news_search" value="1">
    </form>
    <form action="hidden-params-form" id="hidden-params-form">...</form>
    <input type="hidden" id="ptoken" name="ptoken" value="AFQjCMpDmoolioEEfEUHOIC8cnYDTkHGZQ:1465571027627">
    <form action="/news/xhr/personalize" method="POST" name="hidden_personalize_form" id="hidden_personalize-form">
      <input type="hidden" name="ptoken" value="AFQjCMpDmoolioEEfEUHOIC8cnYDTkHGZQ:1465571027627">
      <input type="hidden" name="security_token" value="AFQjCMpDmoolioEEfEUHOIC8cnYDTkHGZQ:1465571027627">
    </form>
    <div style="display:none;">...</div>
  </body>
</html>

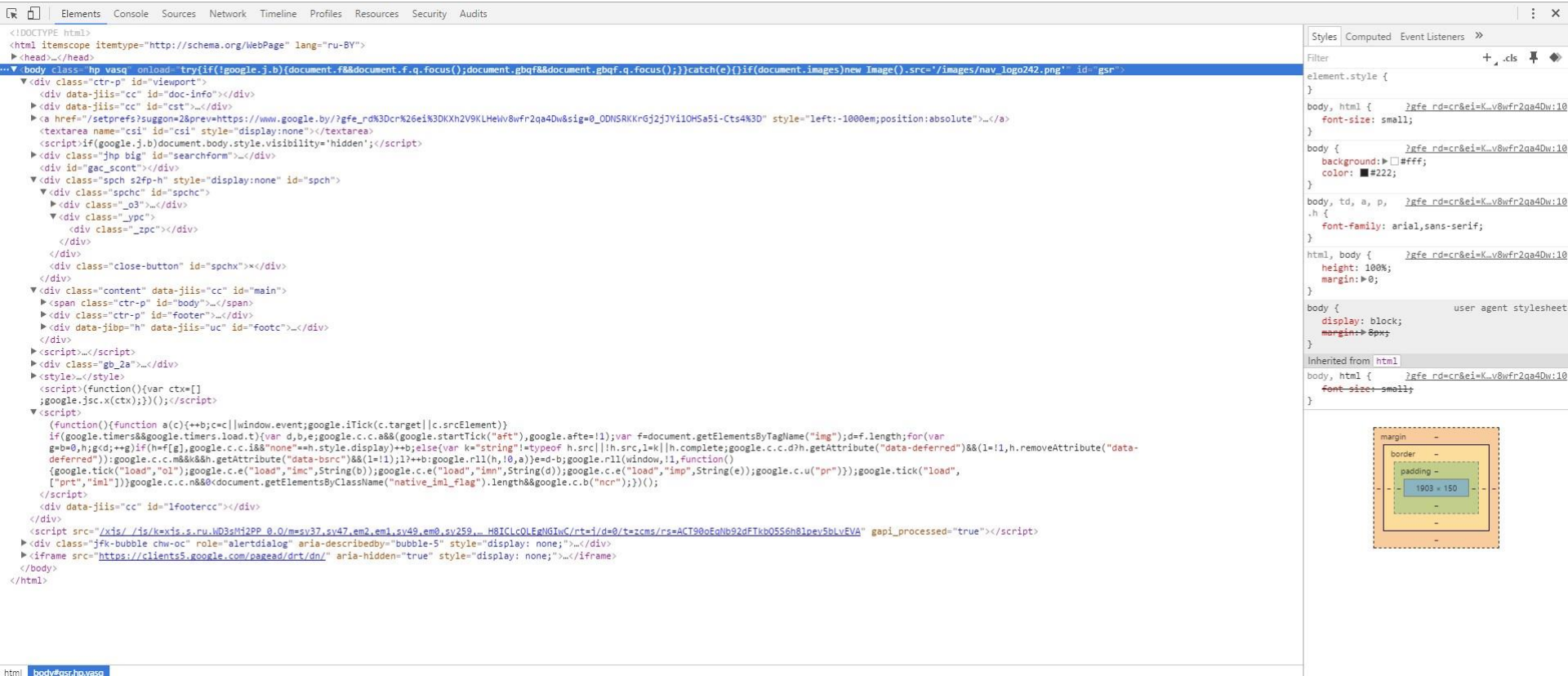
```


Press F12 !!!

Web development tools allow web developers to test and debug their code. They are different from website builders and IDEs in that they do not assist in the direct creation of a webpage, rather they are tools used for testing the user facing interface of a website or web application.



Tab - Elements



Tab - Console



Поиск в Google

Мне повезёт!

Google by предлагается на: Беларуская

Elements Console Sources Network Timeline Profiles Resources Security Audits

top Preserve log

```
> $x("//*[@type='submit']")
< [ <button class="lsb" value="Поиск" aria-label="Поиск в Google" name="btnG" type="submit">...</button>, <input value="Поиск в Google" aria-label="Поиск в Google" name="btnK" type="submit" jsaction="sf.chk">,
  <input value="Мне повезёт!" aria-label="Мне повезёт!" name="btnI" type="submit" jsaction="sf.ick"> ]
> $x("//input[@id='lst-ib']")
< [
  <input class="gsfi" id="lst-ib" maxlength="2048" name="q" autocomplete="off" title="Поиск" type="text" value aria-label="Найти" aria-haspopup="false" role="combobox" aria-autocomplete="both" dir="ltr" spellcheck="false" style="border: none; padding: 0px; margin: 0px; height: auto;
width: 100%; position: absolute; z-index: 6; left: 0px; outline: none; background: url("data:image/gif;base64,R01GODlhAQABAID/AMDAwAAAAACHSBAEAAAAAABAAAAAICRAEAOv%3D%3D") transparent;">
]
> |
```

Tab - Sources

Sources

Content scripts

Snippets

top

www.google.by

images

branding/googlelogo/1x

googlelogo_color_272x92dp.png

nav_log

xjs/_js/k=xjs.ru.VUDSSMjzPP_UU

m=sx,cb,cdos,cr,elog,jsa,r,hsm,qsm,j,p,d,csi/am=AjQ0C4ZE_H8IC

rs=ACT90oEqNb92dFTkbQ5S6h8lpey5bLvEVA

m=sy37,sy47,em2,em1,sy49,em0,sy259,aa,abd,sy72,sy71,sy70,sy73

?gfe_rd=cr&ei=KXh2V9KLHeWv8wfr2qa4Dw

(no domain)

apis.google.com

/scs/abc-static/_js/k=gapi.gapi.en.n58eP857IXLO/m=gapi_iframes

cb=gapi.loaded_0

clients5.google.com

lh3.googleusercontent.com

-UcM8M5PoMe4/AAAAAAAAAAAA/AAOtt-yEHqZngYt

ssl.gstatic.com

www.gstatic.com

11_1467381806915 (frame)

plus.google.com

apis.google.com

ssl.gstatic.com

s2/oz/images/notifications

spinner_32_794cfa28f324131c58c8934183d55d25.gif

clients5.google.com/

clients5.google.com

newtab-serviceworker.js

i1_1967ca6a.png

tia.png

?gfe_rd=cr&ei=K...HeWv8wfr2qa4Dw

cb=gapi.loaded_0

googlelogo_color_272x92dp.png x

nav_logo242.png

Threads

Main

newtab-serviceworker.js

Watch

response: <not available>

i: <not available>

method: <not available>

params: <not available>

args: <not available>

name: ""

entity.id: <not available>

headers: <not available>

ciName: <not available>

s: <not available>

p: <not available>

Call Stack

Not Paused

Scope

Not Paused

Service Workers

Breakpoints

No Breakpoints

DOM Breakpoints

XHR Breakpoints

Event Listener Breakpoints

Event Listeners

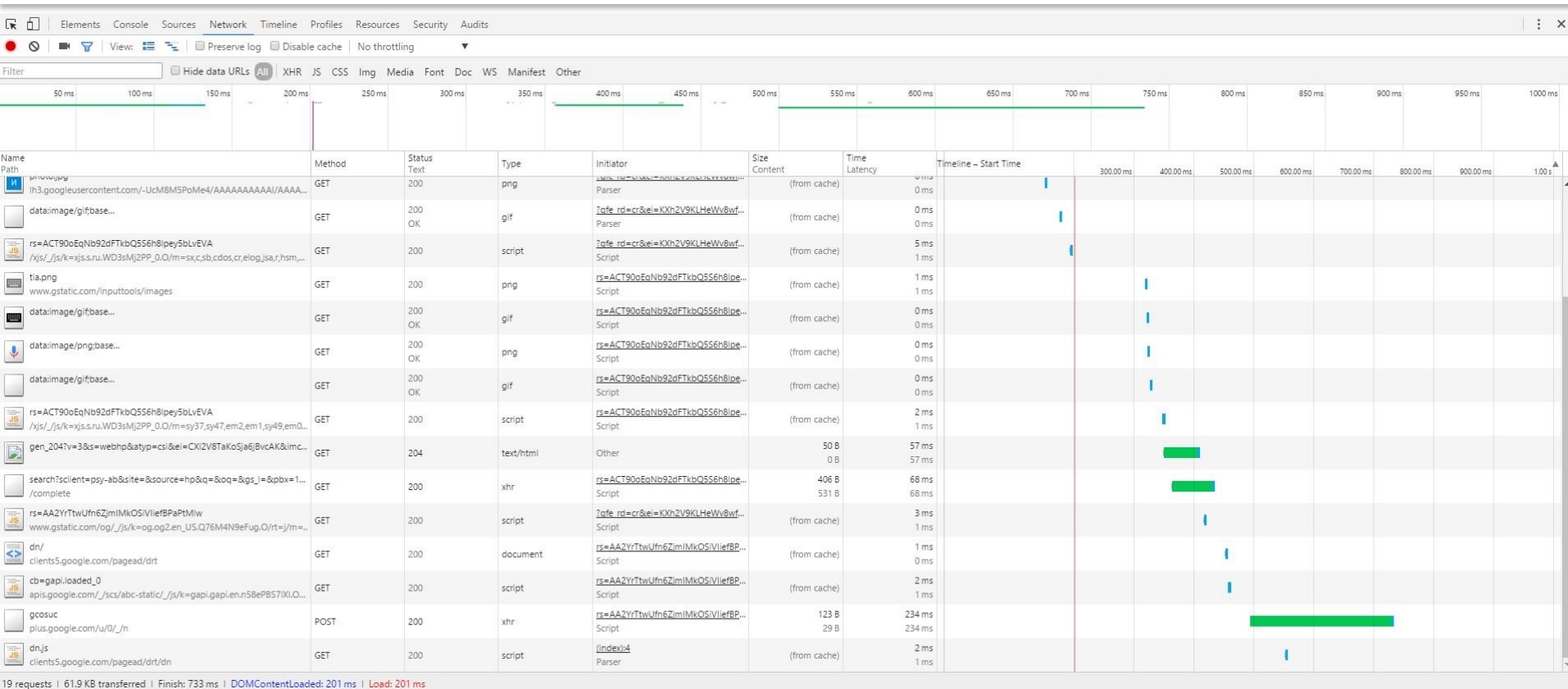
5.8 KB

272 × 92

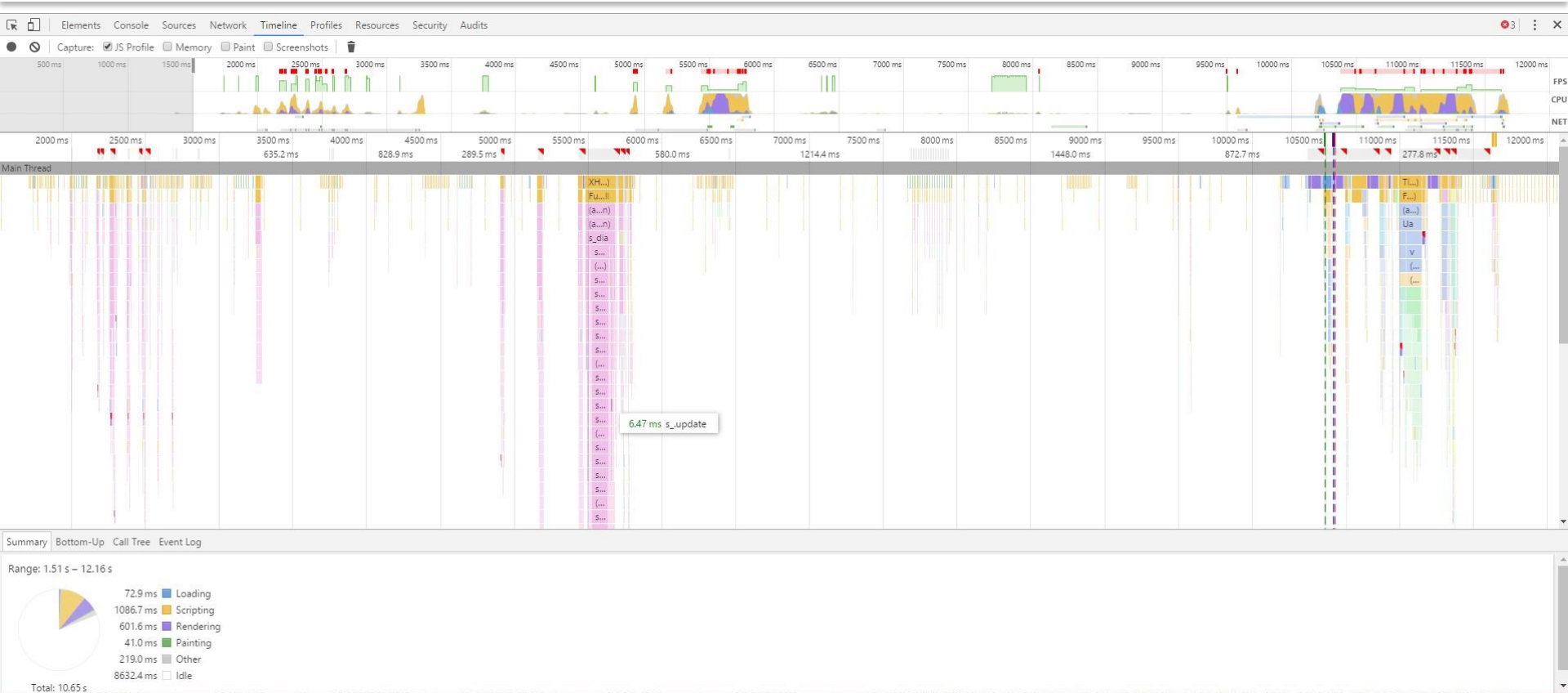
image/png



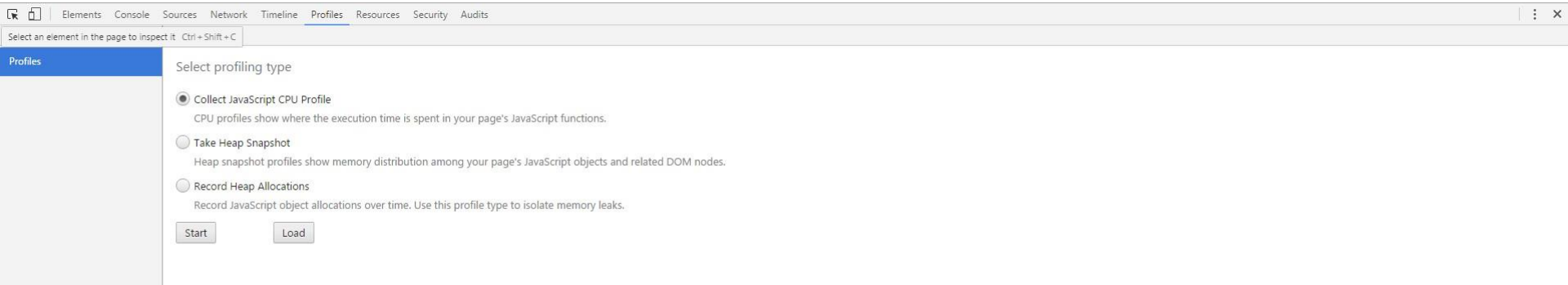
Tab - Network



Tab - Timeline



Tab - Profiles



Tab - Resources

Elements Console Sources Network Timeline Profiles **Resources** Security Audits

Frames

- (www.google.by/)
- (clients5.google.com/)
 - I1_1467382105201 (frame)
 - Images
 - spinner_32_794cfa28f324131c58c893
 - Scripts
 - Stylesheets
 - rs=AGLTcNsQDYuAKJSeT9Va6SM9
 - frame
 - Images
 - Other
 - Scripts
 - www.google.by/
- Web SQL
- IndexedDB
 - esp-newtab - https://www.google.by
- Local Storage
 - https://www.google.by
 - https://clients5.google.com
 - https://plus.google.com
- Session Storage
 - https://www.google.by
 - https://clients5.google.com
 - https://plus.google.com
- Cookies
 - www.google.by
 - clients5.google.com
 - plus.google.com
- Application Cache
- Cache Storage
 - newtab-static-l4wi52 - https://www.google.
- Service Workers

#	Request	Response
0	https://apis.google.com/_scs/abc-static/_js/k=gapi.gapi.en.cKpZMbN3RN4.O/m=gapi_iframes.googleapis_client/iframes_styles_slide_menu.plusone/r?sv=1/d=...	
1	https://apis.google.com/_scs/abc-static/_js/k=gapi.gapi.en.n58ePBSTXl.O/m=gapi_iframes.googleapis_client/iframes_styles_slide_menu.plusone/r?sv=1/d=...	
2	https://lh3.googleusercontent.com/-UcM8M5PoMe4/AAAAAAAAAAI/AAAAAAAAA/Ot-yEHqZngYtcwVCievXUtikXv0nXiG/s32-c-mo/photo.jpg	
3	https://ssl.gstatic.com/chrome/components/doodle-notifier-01.html	
4	https://ssl.gstatic.com/chrome/components/doodle-notifier-02.html	
5	https://ssl.gstatic.com/gb/images/v1_76783e20.png	
6	https://www.google.by/_chrome/newtab?espv=2&i=UTF-8	
7	https://www.google.by/images/branding/googlelogo/2x/googlelogo_color_272x92dp.png	OK
8	https://www.google.by/images/branding/googlelogo/2x/googlelogo_light_color_272x92dp.png	OK
9	https://www.google.by/images/srpr/chrome_ntp_white_logo2.png	OK
10	https://www.google.by/images/srpr/logo11w.png	OK
11	https://www.google.by/xjs/_js/k=xjs.ntp.en_US.EAKpSi43AO8.O/m=jsa.ntp.d.cs/r?sv=d=1/t=zcms/rs=ACT90FOEj9yxMOeJAew2IebFGQFZ0vSw	
12	https://www.google.by/xjs/_js/k=xjs.ntp.en_US.EAKpSi43AO8.O/m=spch/r?sv=d=0/t=zcms/rs=ACT90FOEj9yxMOeJAew2IebFGQFZ0vSw	
13	https://www.gstatic.com/og/_js/k=og.og.en_US.NKIUp0L2Wh4.O/r?m=id.gl.is.id.nb.nw.sb.sd.p.vd.awd.st.od.eid.jp.dp.cpd.drt.bd/exm=bt.base.bn.bu.cp.el.lo.sb...	

Tab - Security

Elements

Console

Sources

Network

Timeline

Profiles

Resources

Security

Audits

Overview

Main Origin

Reload to view details

Security Overview

This page is secure (valid HTTPS).

Действительный сертификат

Для подключения к этому сайту используется действительный сертификат сервера.

View certificate

Безопасное подключение (TLS)

Подключение к этому сайту выполняется по безопасному протоколу с набором надежных шифров.

Secure Resources

All resources on this page are served securely.

Tab - Audits

Audits

RESULTS

https://www.google.by/?qfe

Elements Console Sources Network Timeline Profiles Resources Security Audits

Network Utilization

Leverage browser caching (31)

Minimize cookie size
The average cookie size for all requests on this page is 59 B

Serve static content from a cookieless domain (6)

Web Page Performance

Put CSS in the document head (6)
CSS in the document body adversely impacts rendering performance.
6 style block(s) in theywww.google.by/body should be moved to the document head.

Remove unused CSS rules (978)
978 rules (75%) of CSS not used by the current page.

- 56% is not used by the current page.
- 40% is not used by the current page.
- 67% is not used by the current page.
- 100% is not used by the current page.
- 67% is not used by the current page.
- rs=AGLTcCNsQDYuAKJSeT9Va6SM9Mg4BBzMBw: 99% is not used by the current page.
- Inline block #1: 49% is not used by the current page.
- /?qfe_rd=cr&ei=KXh2V9KLHeWv8wfr2qa4Dw#q=sdgfsdgdg: 60% is not used by the current page.
- /?qfe_rd=cr&ei=KXh2V9KLHeWv8wfr2qa4Dw#q=sdgfsdgdg: 49% is not used by the current page.
- /?qfe_rd=cr&ei=KXh2V9KLHeWv8wfr2qa4Dw#q=sdgfsdgdg: 95% is not used by the current page.

Use normal CSS property names instead of vendor-prefixed ones (151)

- <unknown>
- <unknown>
- <unknown>
- rs=AGLTcCNsQDYuAKJSeT9Va6SM9Mg4BBzMBw
- /?qfe_rd=cr&ei=KXh2V9KLHeWv8wfr2qa4Dw#q=sdgfsdgdg
- /?qfe_rd=cr&ei=KXh2V9KLHeWv8wfr2qa4Dw#q=sdgfsdgdg

Useful links

[How browser works?](#)

[HTTP](#)

[HTTP](#)

[AJAX](#)

