

# Introduction to Web Science

## Assignment 4

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Tutorial on: November 25, 2016, 12:00 p.m.

In this assignment we cover two topics: 1) **HTTP** & 2) **Web Content**

For all the assignment questions that require you to write code, make sure to include the code in the answer sheet, along with a separate python file. Where screen shots are required, please add them in the answers directly and not as separate files.

Team Name: QUEBEC:

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2. Stefan Vujovic
3. Igor Fedotov

# 1 Implementing a simplified HTTP GET Request (15 Points)

The goal of this exercise is to review the hypertext transfer protocol and gain a better understanding of how it works.

Your task is to use the python programming language to create an HTTP client (`httpclient.py`) that takes a URL as a command line argument and is able to download an arbitrary file from the World Wide Web and store it on your hard drive (in the same directory as your python code is running). The program should also print out the complete HTTP header of the response and store the header in a separated file.

Your programm should only use the socket library so that you can open a TCP socket and and sys library to do command line parsing. You can either use `urlparse` lib or your code from assignment 3 in order to process the url which should be retrieved.

Your programm should be able to sucessfully download at least the following files:

1. `http://west.uni-koblenz.de/en/studying/courses/ws1617/introduction-to-web-science`
2. `http://west.uni-koblenz.de/sites/default/files/styles/personen_bild/public/_IMG0076-Bearbeitet_03.jpg`

**Use of libraries like `httplib`, `urllib`, etc are not allowed in this task.**

## 1.1 Hints:

There will be quite some challenges in order to finnish the task

- Your program only has to be able to process HTTP-responses with status 200 OK.
- Make sure you receive the full response from your TCP socket. (create a function handling this task)
- Sperated the HTTP header from the body (again create a function to do this)
- If a binary file is requested make sure it is not stored in a corrupted way

## 1.2 Example

---

```
1: python httpclient.py http://west.uni-koblenz.de/index.php
2:
3: HTTP/1.1 200 OK
4: Date: Wed, 16 Nov 2016 13:19:19 GMT
5: Server: Apache/2.4.7 (Ubuntu)
6: X-Powered-By: PHP/5.5.9-1ubuntu4.20
7: X-Drupal-Cache: HIT
8: Etag: "1479302344-0"
9: Content-Language: de
```

```
10: X-Frame-Options: SAMEORIGIN
11: X-UA-Compatible: IE=edge,chrome=1
12: X-Generator: Drupal 7 (http://drupal.org)
13: Link: <http://west.uni-koblenz.de/de>; rel="canonical",<http://west.uni-koblenz.de/de>
14: Cache-Control: public, max-age=0
15: Last-Modified: Wed, 16 Nov 2016 13:19:04 GMT
16: Expires: Sun, 19 Nov 1978 05:00:00 GMT
17: Vary: Cookie,Accept-Encoding
18: Connection: close
19: Content-Type: text/html; charset=utf-8
```

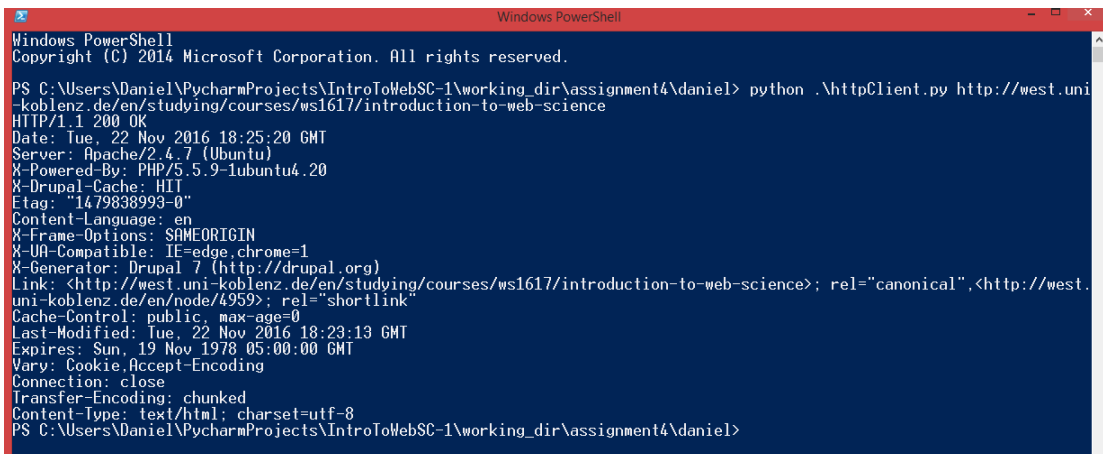
---

The header will be printed and stored in `index.php.header`. The retrieved html document will be stored in `index.php`

Http client file:

```
1  import socket
2  from sys import argv
3  from urllib.parse import urlparse
4
5  # helper function for determining type of content
6  def parse_header(header):
7      header = header.split("\r\n")
8      for line in header:
9          if line.find('Content-Type') != -1:
10             if line.find('text') != -1:
11                 return 'wt'
12             elif line.find('image') != -1:
13                 return 'wb'
14             else:
15                 raise Exception("UNKNOWN FILE TYPE")
16
17  # saving text files
18  def save_text(filename, body, header_data):
19      with open(filename, mode='wt') as b:
20          b.write(body)
21      with open("index.php.header", mode='wt') as h:
22          h.write(header_data)
23      print(header_data)
24
25  # saving binary files
26  def save_binary(filename, body, header_data):
27      with open("bin/{}".format(filename), mode='wb') as b:
28          b.write(body)
29
30  # Making requests - makes a request, opens a socket, saves the result
31  def make_request(url_p):
32      url = urlparse(url_p)
33      if url.path.find('.') != -1:
34          filename = url.path.split('/')[-1]
35      else:
36          filename = 'index.php'
37
38      crlf = "\r\n"
39
40      request = [
41          "GET {} HTTP/1.1".format(url.path),
42          "Host: {}".format(url.netloc),
```

```
43     "Connection: Close",
44     "User-Agent: Banic_Awesome_User_Agent",
45     "",
46     "",
47 ]
48 # Set up a TCP/IP socket
49 s = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
50
51 # Connect as client to a selected server
52 # on a specified port
53 s.connect((url.netloc, 80))
54
55 s.send(crlf.join(request).encode())
56 resp = b'' #all data is recieved as binary
57 buffer = s.recv(4096)
58 while buffer:
59     resp += buffer
60     buffer = s.recv(4096)
61 # Separating header from body
62 header_data, _, body = resp.partition(b'\r\n\r\n')
63 mode = parse_header(header_data.decode())
64 if mode == 'wt':
65     save_text(filename, body.decode(), header_data.decode())
66 else:
67     save_binary(filename, body, header_data)
68
69 # Close the connection when completed
70 s.close()
71
72
73 def main():
74     url = argv[1]
75     # url = "http://west.uni-koblenz.de/sites/default/files/styles/personen_bild/public/_IMG0076-Bearbeitet_03.jpg"
76     make_request(url)
77
78 if __name__ == "__main__":
79     main()
```



```
Windows PowerShell
Copyright (C) 2014 Microsoft Corporation. All rights reserved.

PS C:\Users\Daniel\PycharmProjects\IntroToWebSC-1\working_dir\assignment4\daniel> python .\httpClient.py http://west.uni-koblenz.de/en/studying/courses/ws1617/introduction-to-web-science
HTTP/1.1 200 OK
Date: Tue, 22 Nov 2016 18:25:20 GMT
Server: Apache/2.4.7 (Ubuntu)
X-Powered-By: PHP/5.5.9-1ubuntu4.20
X-Drupal-Cache: HIT
Etag: "1479838993-0"
Content-Language: en
X-Frame-Options: SAMEORIGIN
X-UA-Compatible: IE=edge,chrome=1
X-Generator: Drupal 7 (http://drupal.org)
Link: <http://west.uni-koblenz.de/en/studying/courses/ws1617/introduction-to-web-science>; rel="canonical",<http://west.uni-koblenz.de/en/node/4959>; rel="shortlink"
Cache-Control: public, max-age=0
Last-Modified: Tue, 22 Nov 2016 18:23:13 GMT
Expires: Sun, 19 Nov 1978 05:00:00 GMT
Vary: Cookie,Accept-Encoding
Connection: close
Transfer-Encoding: chunked
Content-Type: text/html; charset=utf-8
PS C:\Users\Daniel\PycharmProjects\IntroToWebSC-1\working_dir\assignment4\daniel>
```

## 2 Download Everything (15 Points)

If you have successfully managed to solve the previous exercise you are able to download a web page from any url. Unfortunately in order to successfully render that very webpage the browser might need to download all the included images

In this exercise you should create a python file (downloadEverything.py) which takes two arguments. The first argument should be a name of a locally stored html file. The second argument is the url from which this file was downloaded.

Your program should

1. be able to find a list of urls the images that need to be downloaded for successful rendering the html file.
2. print the list of URLs to the console.
3. call the program from task 1 (or if you couldn't complete task 1 you can call wget or use any python lib to fulfill the http request) to download all the necessary images and store them on your hard drive.

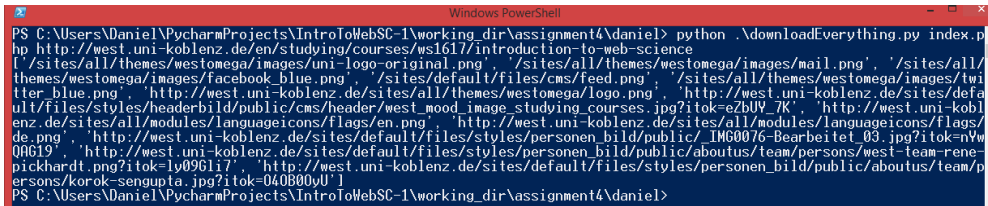
**To finish the task you are allowed to use the 're' library for regular expressions and everything that you have been allowed to use in task 1.**

### 2.1 Hints

1. If you couldn't finish the last task you can simulate the relevant behavior by using the program wget which is available in almost any UNIX shell.
2. Some files mentioned in the html file might use relative or absolute paths and not fully qualified urls. Those should be fixed to the correct full urls.
3. In case you run problems with constructing urls from relative or absolute file paths you can always check with your web browser how the url is dereferenced.

```
1 from sys import argv
2 from httpClient import make_request
3 from urllib.parse import urlparse
4
5
6 def main():
7     html_file = argv[1]
8     url = argv[2]
9     # html_file = "index.php"
10    # url = "http://west.uni-koblenz.de/en/studying/courses/ws1617/introduction-to-web-science"
11    url = urlparse(url)
12
13    # looking for urls in html file
14    urls = []
15    with open(html_file, mode='r') as html:
16        for line in html:
17            while line.find('<img') != -1:
```

```
18         img_start = line.find('<img')
19         whole_tag = line[img_start + 4:]
20         img_tag = whole_tag[:whole_tag.find('</>')]
21         src = img_tag[img_tag.find('src="') + 5:]
22         path = src[:src.find('"')]
23         urls.append(path)
24         line = line[img_start+4:]
25     print(urls)
26     for img_url in urls:
27         img_url = urlparse(img_url)
28         make_request("http://{}/{}/".format(url.netloc, img_url.path))
29
30 if __name__ == "__main__":
31     main()
```



```
PS C:\Users\Daniel\PycharmProjects\IntroToWebSC-1\working_dir\assignment4\daniel> python .\downloadEverything.py index.p
hp http://west.uni-koblenz.de/en/studying/courses/ws1617/introduction-to-web-science
l/sites/all/themes/westomega/images/uni-logo-original.png', '/sites/all/themes/westomega/images/mail.png', '/sites/all/
themes/westomega/images/facebook_blue.png', '/sites/default/files/cms/feed.png', '/sites/all/themes/westomega/images/twi
tter_blue.png', 'http://west.uni-koblenz.de/sites/all/themes/westomega/logo.png', 'http://west.uni-koblenz.de/sites/defa
ult/files/styles/headerbild/public/cms/header/west_mood_image_studying_courses.jpg?itok=eZbUY_7K', 'http://west.uni-kobl
enz.de/sites/all/modules/languageicons/flags/en.png', 'http://west.uni-koblenz.de/sites/all/modules/languageicons/flags/
de.png', 'http://west.uni-koblenz.de/sites/default/files/styles/personen_bild/public/_IMG0076-Bearbeitet_03.jpg?itok=nVw
QAG19', 'http://west.uni-koblenz.de/sites/default/files/styles/personen_bild/public/aboutus/team/persons/west-team-rene-
pickhardt.png?itok=ly09G1i7', 'http://west.uni-koblenz.de/sites/default/files/styles/personen_bild/public/aboutus/team/p
ersons/korok-sengupta.jpg?itok=040B00yU'l
PS C:\Users\Daniel\PycharmProjects\IntroToWebSC-1\working_dir\assignment4\daniel>
```

## Important Notes

### Submission

- Solutions have to be checked into the github repository. Use the directory name `groupname/assignment4/` in your group's repository.
- The name of the group and the names of all participating students must be listed on each submission.
- Solution format: all solutions as *one* PDF document. Programming code has to be submitted as Python code to the github repository. Upload *all* `.py` files of your program! Use UTF-8 as the file encoding. *Other encodings will not be taken into account!*
- Check that your code compiles without errors.
- Make sure your code is formatted to be easy to read.
  - Make sure you code has consistent [indentation](#).
  - Make sure you comment and document your code adequately in English.
  - Choose consistent and intuitive names for your identifiers.
- Do *not* use any accents, spaces or special characters in your filenames.

### Acknowledgment

This latex template was created by Lukas Schmelzeisen for the tutorials of "Web Information Retrieval".

### $\text{\LaTeX}$

Currently the code can only be build using [LuaLaTeX](#), so make sure you have that installed. If on Overleaf, there's an error, go to settings and change the  $\text{\LaTeX}$ engine to LuaLaTeX.