Web — Master 1 IFI
Lab Session #3: The Common Gateway Interface

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Abstract

We will write a simple CGI program to generate a dynamic HTML page.

1 Introduction

The Common Gateway Interface (CGI) is a simple interface for running external programs, software or gateways under an HTTP server in a platform-independent manner.

The CGI has been in use by the World-Wide Web since 1993. The full specification of the 'CGI/1.1' can be found here:

https://tools.ietf.org/html/draft-robinson-www-interface-00.

In order to implement the following requirements, you will need to have an HTTP server (e.g., Apache 2) installed and properly configured on your machine. For Linux machines, it is recommended to install the "LAMP" stack; for Windows machines, the equivalent stack is called "WAMP" and for MacOS machines "MAMP".

Please refer to the documentation of your HTTP server for how to configure it to set up a directory to serve GCI executables. For instance, with Apache 2 running under Linux, the `/cgi-bin` path is an alias for the `/usr/lib/cgi-bin` directory, which is enabled to serve CGI executables (i.e., binaries). One only needs to enable the CGI module by issuing the command

```
sudo a2enmod cgid
```

By the way, to allow `.py` files to be executed as scripts, one has to add the `AddHandler cgi-script .py` directive to the `cgi-bin` directory in the `serve-cgi-bin.conf` file. Notice that the Python script *must* have the correct path to the Python interpreter on its first line, for instance

```
#!/usr/bin/python3
```

for the HTTP server to know which interpreter it is supposed to launch to execute it.

2 Requirements

We are going to develop a CGI program that takes a natural number as input and produces an HTML page providing its prime factor decomposition.

1. You can write your CGI program in C or Python.

2. The CGI program will be invoked by a HTTP request with method GET. Assuming the script is called `td3` in the `/cgi-bin` directory of the HTTP server, it should be invoked with a URI like

   `http://localhost/cgi-bin/td3?n=1234567890`,

   where 1234567890 is the natural number for which a prime factor decomposition is sought for.

3. The CGI program will generate a (valid) HTML page showing the answer in a human-readable format like
   $$1234567890 = 2 \times 3^2 \times 5 \times 3607 \times 3803.$$

   Use HTML tags like `<sup>` to obtain superscipts and entities like `×` to obtain the $\times$ symbol.

4. Check the validity of the query string and generate an HTML page showing an error message in case the query string does not comply with the syntax:

   `n=`$\langle unsigned\_\ decimal\_\ integer \rangle$.

5. Write a static HTML page containing a form to allow a user to enter a natural number and compute its decomposition by invoking your CGI program.

6. Modify your CGI program to generate the above static HTML page when it is invoked without the query string, i.e., with a URI like

   `http://localhost/cgi-bin/td3`

   and to generate the prime factor decomposition below the form when invoked with a valid query string. The user should be able to use the generated page to submit a new request for another natural number.