Group Project

> *Rules:* The projects will be done by groups of 4 students (groups of 5 were exceptionally created). You will need to upload 3 files. The script for the project will be named *exclusively* `barbarbqr.py`. A requirement file (`requirements.txt`) is also demanded. Requirement files can be generated automatically (your task is to find out how). A `requirements.txt` sample is provided at the end of this document. Finally, the image representing the output of your script, `QRGreat.png`, is the third file that you need to upload. Any change in file names will be penalized. Other files besides the script, the requirement file and the image will not be considered. The files must be uploaded on the platform before the deadline. The deadline will be clearly marked on the upload section created for this project. Any delay will be sanctioned with 0/20 for the missing uploads.

Code, code, code

General description:

This project aims to implement a small command line program that extracts barcode information (stored in `.png` images) from a distant folder, builds up a secret key, extracts a secret paragraph ID and with the key and the ID extracts some text from a hidden link. The text will be transformed into a QR code that is finally stored on the disk.

Input:

- A distant root link that will be employed to obtain the barcodes: https://chifu.eu/teachings/mfr/rabrab/

Command line arguments:

- the URL for the root link;
- the filename for the output QR code image file (optional argument).

> Check the command line interaction example below.

Output:

- A PNG image file containing the required QR code (the filename may be given as a command line argument).

> Hint: Check out the `qrcode` module.

Step description:

Barcodes

1. The images are stored on a server (the root link should be given as a command line argument and it is https://chifu.eu/teachings/mfr/rabrab/, as mentioned above). The images are stored in a particular order (from one to N). The value of N is unknown to you. For instance, if N = 16, there are 16 images on the server and the name of each image is in the following format: 000001.png for the first image and 000016.png for the 16th image, respectively. Thus, the complete link for the 13th image is: https://chifu.eu/teachings/mfr/rabrab/000013.png. Figure 1 depicts one png image.

   ```
   Good luck ;-)
   ```

   Figure 1. Barcode image example

2. You will have to retrieve all the images, in order, and decode them. Every barcode corresponds to a string composed of digits and letters.

   > Hint: The modules `pyzbar` and `cv2` will be useful for the previous step.

3. You will have to build a secret key as follows:

   1. Take all the codes obtained in step 2 and check their validity. A code is valid if the sum of its digits is not a prime number. For instance the code `03aGh11r` is not valid (the sum of its digits is 5, thus a prime number), while the code `34hJk3l` is valid (the sum is 10).
   2. From all the valid codes extract the digits (and only the digits) and concate them, in order to obtain a secret key. Very important, you should treat the codes in order. For example, if two valid consecutive codes are `02aGh11r` and `112rTtt721`, the string digits `0211` and `112721`, respectively, must be concatenated (`0211112721`) and added to the secret key.
4. From the first valid code (Step 3.1), you must extract a paragraph ID, as follows:
   1. Obtain the first valid code
   2. Concatenate its letters (not the digits)
   3. The concatenated string represents the paragraph ID

Webpage

1. Use the key obtained in the step Barcodes.3 to build a link. The link is the root link (the input of the program), concatenated with the secret key, and ending with the `.html` extension. For instance, if the key is `0211112721`, the obtained link should be https://chifu.eu/teachings/mfr/rabrab/0211112721.html.
2. From the link obtained at the previous step, you must retrieve the html code.

> Hint: The `BeautifulSoup` module (`bs4`) deals well with html code.

3. From the html code obtained at the previous step, you must extract only the text of the paragraph that has the paragraph ID constructed in the step Barcodes.4.

QR Code

1. Create a QR code that contains the text retrieved in the step Webpage.3.

> Hint: The `qrcode` module (obviously) deals with QR Code generation.

2. Save the QR code as a png image (this is the output of your script). If the filename is given as a command line argument, the respective filename should be the name of your png image. Otherwise, the default filename for your output image must be `QRGreat.png`.

Concepts to keep in mind:

- Installing python modules with `pip` (`pip install qrcode`, for instance)
- Variables
- Input from file
- Reading from distant servers
- Loading images
- Reading barcodes from images
- Parsing HTML files
- Parsing command line arguments
- Generating and saving QR codes
- Functions
- Loops (while, for)
- Conditions

Modules to consider:

- `cv2`
- `pyzbar` (*Pay attention to the `zbar` installation*)
- `math`
- `urllib.request`
- `bs4` (`beautifulsoup4`)
- `qrcode`
- `skimage` (*To install it, it will take a different name*)

- `argparse`

Example of command line interaction:

```
python3 barbarqr.py -u https://chifu.eu/teachings/mfr/rabrab/ -o MyWoopQR.png
```

or

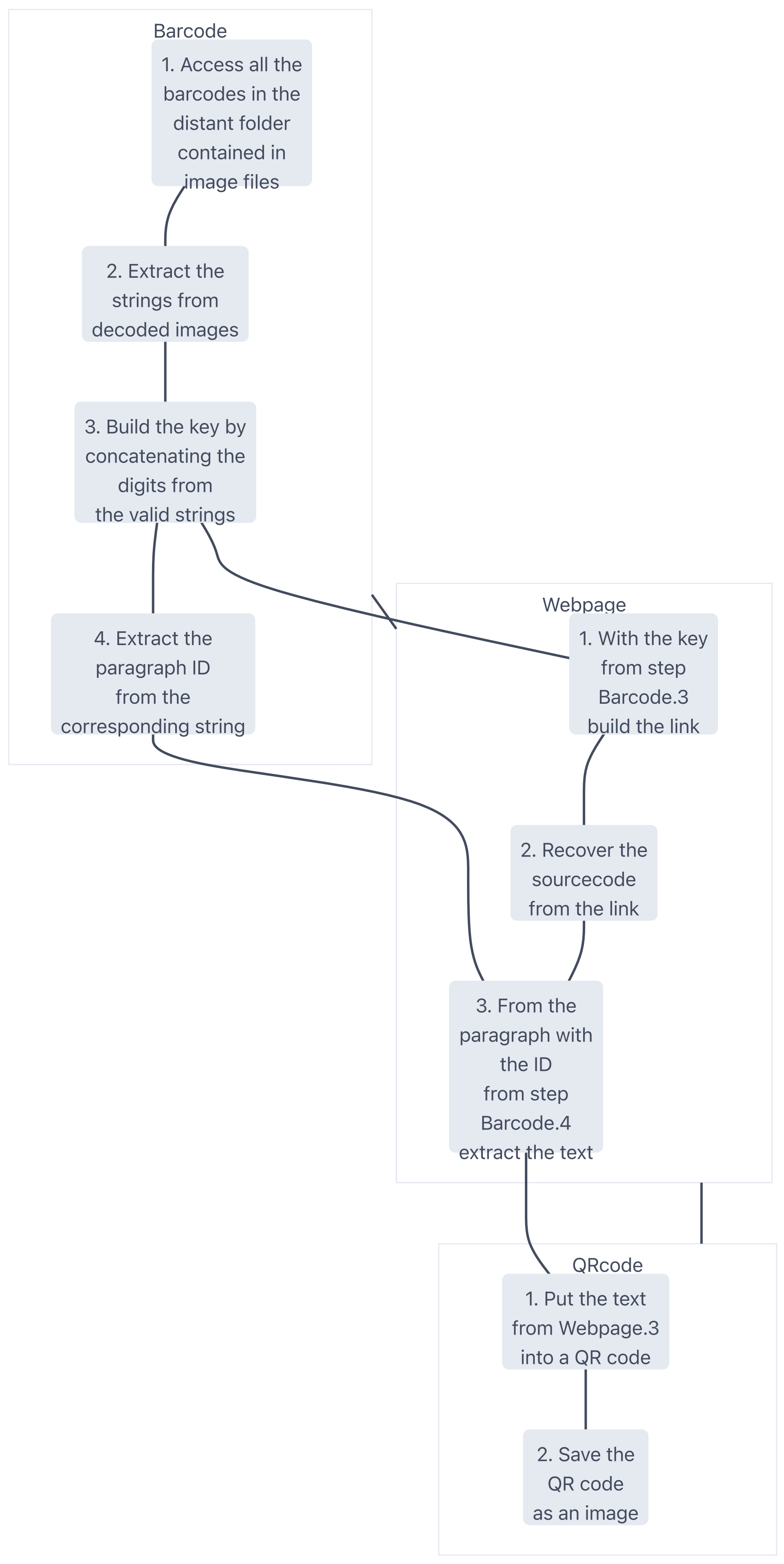
```
python3 barbarqr.py --url https://chifu.eu/teachings/mfr/rabrab/ --output MyWoopQR.png
```

> **Hint**: You may notice that long and short arguments are possible. The `argparse` module provides support for this. *Do not forget that the `--output/-o` argument is optional.*

The `requirements.txt` file sample:

```
Django==1.4.1
distribute==0.6.27
dj-database-url==0.2.1
psycopg2==2.4.5
wsgiref==0.1.2
```

Step "roadmap"


Barcode
1. Access all the barcodes in the distant folder contained in image files
2. Extract the strings from decoded images
3. Build the key by concatenating the digits from the valid strings
4. Extract the paragraph ID from the corresponding string
Webpage
1. With the key from step Barcode.3 build the link
2. Recover the sourcecode from the link
3. From the paragraph with the ID from step Barcode.4 extract the text
QRcode
1. Put the text from Webpage.3 into a QR code
2. Save the QR code as an image