Laboratoire 4 - Scripting

ADS

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Task 0 (optionnal) : Install ImageMagick and Apache on your local machine

You can do the development on the server or on your local machine. If you want to develop on your local machine do the following.

Install ImageMAgick :

```
sudo apt install imagemagick
```

Install Apache web server :

```
sudo apt install apache2
```

To create the same setup as on the remote machine enable the Apache `userdir` module (files in the directory `public_html` in your personal directory will be served by the web server):

```
sudo a2enmod userdir
```

Finally restart Apache:

```
sudo systemctl restart apache2
```

To be able to access port 80 on the guest VM from your host configure a port forwarding rule in your hypervisor (VirtualBox, VMware). Add a rule to forward, say, port 8080 on your host to port 80 on the guest.

Transferring files between local and remote machine

To transfer files between your local machine and the remote machine you can use the `scp` (secure copy) command that is part of SSH. `scp` works like the `cp` command except that it transfers the files over the network. It uses the SSH protocol and the authentication mechanism of SSH. In practice it means that whenever you can `ssh` into a machine, you can also copy files to it using `scp` . In theory you could launch `scp` on your local machine and connect to the remote machine, or run it on the remote machine and connect to your local machine. However, because your local machine is behind a NAT it is not visible from the remote machine. You can connect from the local machine to the remote, but not vice-versa. Therefore, always run scp from your local machine. Running `scp` on your local machine you can copy a file to the remote machine like so:

```
scp <path/to/sourcefile> <userid>@<host>:<path/to/destfile>
```

Where

- ‘ is the file on your local machine you want to copy
- `<userid>` is your user id on the remote machine
- `<host>` is the name of the remote machine
- `<path/to/destfile>` is the destination of the file on the remote machine

To do the opposite, i.e. copy a file from the remote machine to the local machine:

```
scp <userid>@<host>:<path/to/srcfile> <path/to/dstfile>
```

Task 1 : Set up web directory

On the server ads.iict.ch we have set up a web server. You can make files available through this server by creating directory named public_html in your home directory. If you place a file named filename in that directory it will be available on the web server under the URL http://ads.iict.ch/~albert_einstein/filename (replace albert_einstein with your user id).

1. Create the directory public_html. Create a file foo.txt in it and retrieve the file using the browser on your local machine.

Commands :

```
labc@ads:~$ mkdir public_html
labc@ads:~$ cd public_html/
labc@ads:~/public_html$ nano foo.txt
```

In the file “foo.txt”, we just write “test”.

2. Navigate to the URL http://ads.iict.ch/~albert_einstein/foo.txt. You should see the contents of the file.

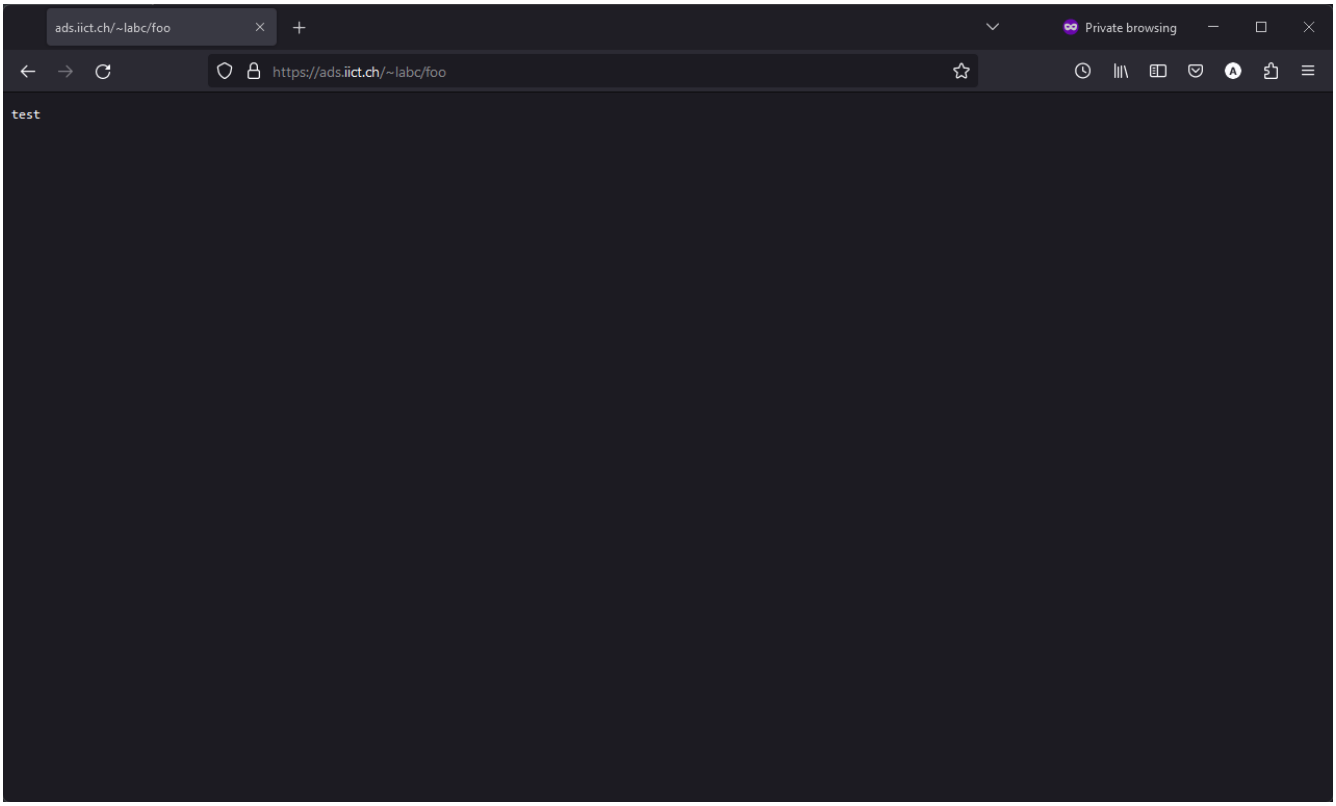


Figure 1: image-20240405192147637

Task 2 : Create thunmbnails

1. Download a zip archive containing the picture and brochure files from this URL: http://ads.iict.ch/lab04_raw_files.zip Use the commands curl to download and unzip to unarchive.

   By placing the files into your web directory you can inspect them using your browser.

2. Display the dimensions of a few pictures by using ImageMagick’s identify command. This command has a powerful feature where one can specify a format string (similar to the printf() format string in C) that specifies the information to print.

   ```
   identify -format 'width: %w, height: %h' picture.jpg
   ```

```
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h\n' cheseaux.png
width: 2500, height: 1667
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h\n' cours.jpg
width: 2500, height: 1667
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h\n' dcim439.jpg
width: 1200, height: 867
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h\n' img-430.png
width: 1920, height: 858
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h\n'
↪  showroom_fabrik.jpg
```

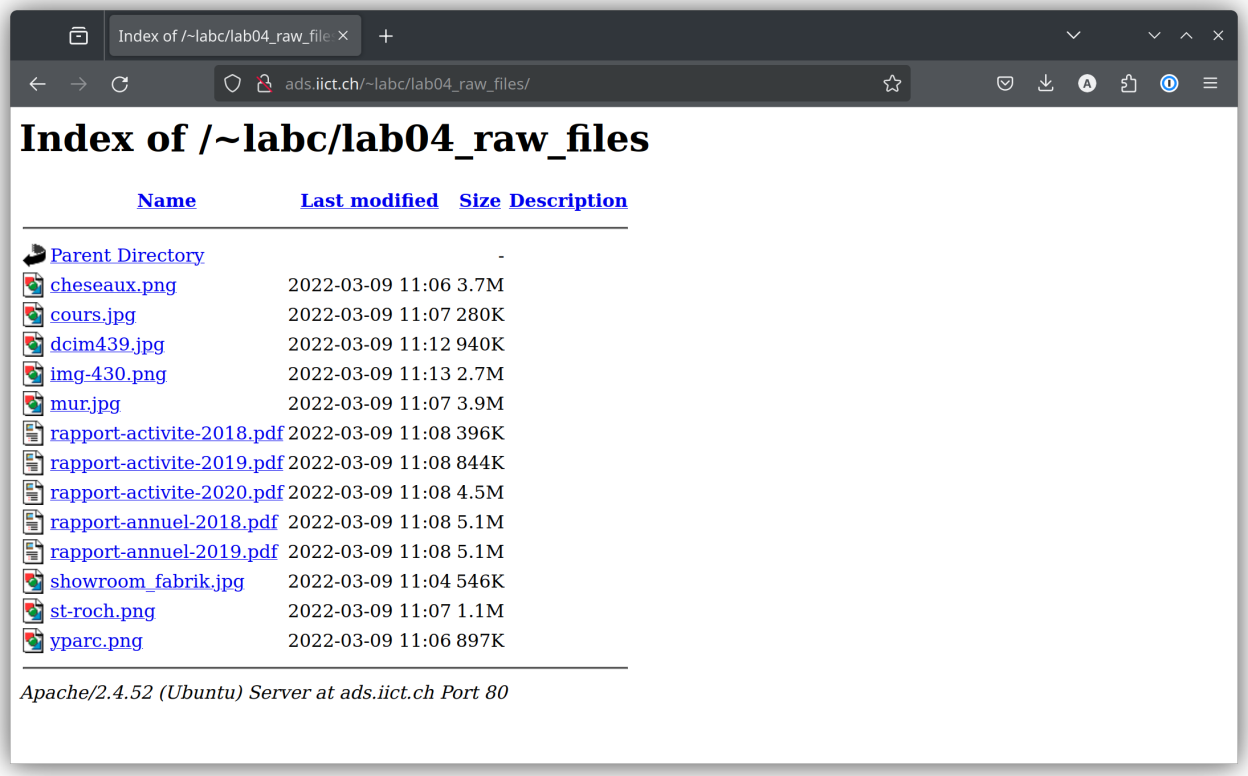


Figure 2: image-20240405192147637

```
width: 3456, height: 4608
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h\n' st-roch.png
width: 1200, height: 800
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h\n' yparc.png
width: 1200, height: 800
```

3. Write a script called show_dimensions that loops through all the picture files and shows for each its name and its dimensions. For the loop use the for `..` `in` `..` `do` `..` done control structure.

   Assumptions:

   - The script is launched with public_html as the current directory.
   - The picture files are in the directory public_html/lab04_raw_files .

   Deliverable: script show_dimensions

Script "show_dimensions" :

```bash
#!/bin/bash

raw_dir="lab04_raw_files"

# Loop through JPEG and PNG files to display their dimensions
for img in "$raw_dir"/*.{jpg,png}; do
    [ -e "$img" ] || continue  # Skip if no files found
    dimensions=$(identify -format 'width: %w, height: %h\n' "$img")
    echo "$(basename "$img"): $dimensions"
done
```

Output :

```
cours.jpg: width: 2500, height: 1667
dcim439.jpg: width: 1200, height: 867
mur.jpg: width: 2501, height: 1667
showroom_fabrik.jpg: width: 3456, height: 4608
cheseaux.png: width: 2500, height: 1667
img-430.png: width: 1920, height: 858
st-roch.png: width: 1200, height: 800
yparc.png: width: 1200, height: 800
```

4. Write a script called `rename_pictures` that produces picture files that have the dimensions in their name. For example if a picture is called building.jpg and has a width of 1024 and a height of 768 pixels the script should create a file building_1024_768.jpg . The script should not modify the original files, but create new ones.

   When you run the script several times how do you prevent the dimensions from accumulating in the name, like building_1024_768_1024_768_1024_768.jpg‘ ? The orginal files can be named anything. They could have the dimensions in the file name accidentally. Change the script and/or the organization of the files so that the dimensions don’t accumulate ad infinitum. Put a comment into the script explaining how you did it. Hint: There is a very simple solution. Analyzing the filename is way too complicated.

   Assumptions: like for the previous script

   Deliverable: script rename_pictures

Script `rename_pictures` :

```bash
#!/bin/bash

# Check if ImageMagick is installed
if ! command -v convert &> /dev/null; then
    echo "ImageMagick is not installed. Please install it to continue."
    exit 1
fi

# Set the source and destination directories relative to this script
src_dir="lab04_raw_files"
dst_dir="renamed"

# Create the destination directory if it doesn't exist
mkdir -p "$dst_dir"

# Loop through JPG and PNG files in the source directory to rename them with dimensions
for img in "$src_dir"/*.{jpg,png}; do
    [ -e "$img" ] || continue  # Skip if no files found
    base=$(basename "$img")
    filename="${base%.*}"
    extension="${base##*.}"

    # Get dimensions of the image
    dimensions=$(identify -format '%w_%h' "$img")

    # Construct the new filename with dimensions
    new_filename="${filename}_${dimensions}.${extension}"

    # Full path to the new file in the destination directory
    target_path="${dst_dir}/${new_filename}"

    # Copy the file to the destination directory with the new name
    # That prevents the images to accumulate the file dimensions
    cp "$img" "$target_path"
```

```
    echo "Renamed $img to $target_path"
done
```

Output :

```
Renamed lab04_raw_files/cours.jpg to renamed/cours_2500_1667.jpg
Renamed lab04_raw_files/dcim439.jpg to renamed/dcim439_1200_867.jpg
Renamed lab04_raw_files/mur.jpg to renamed/mur_2501_1667.jpg
Renamed lab04_raw_files/showroom_fabrik.jpg to renamed/showroom_fabrik_3456_4608.jpg
Renamed lab04_raw_files/cheseaux.png to renamed/cheseaux_2500_1667.png
Renamed lab04_raw_files/img-430.png to renamed/img-430_1920_858.png
Renamed lab04_raw_files/st-roch.png to renamed/st-roch_1200_800.png
Renamed lab04_raw_files/yparc.png to renamed/yparc_1200_800.png
```

5. With a few pictures try to create a smaller thumbnail where the largest side is 300 pixels. Use ImageMagick's convert command like so:

   ```
   convert -geometry 300 picture.jpg picture_thumb.jpg
   ```

Output :

```
labc@ads:~/public_html/lab04_raw_files$ convert -geometry 300 cheseaux.png cheseaux_thumb.png
labc@ads:~/public_html/lab04_raw_files$ identify -format 'width: %w, height: %h'
↪  cheseaux_thumb.png
width: 300, height: 200
```

6. Write a script called make_thumbnails that loops through all the picture files and creates a thumbnail for each. If the picture file is named building.jpg the corresponding thumbnail should be named building_thumb.jpg.

   When you run the script several times how do you prevent making thumbnails from thumbnails? Add a comment to the script explaining your solution.

7. With a few PDF files try to create a thumbnail. In contrast to pictures PDF documents can have several pages. One needs to specify to the convert command that only the first page should be processed. This is done by appending the string [0] to the filename like so (no space between the two):

   ```
   convert -geometry 300 document.pdf[0] document_thumb.jpg
   ```

   Since the latest versions of ImageMagick, PDF conversion is disabled by default for security reasons. Automated conversion of PDF documents provided by visitors, e.g. uploaded on a website, can cause the execution of malicious code contained in the PDF.

   To reactivate this feature, you must comment out the `<policy domain="coder" rights="none" pattern="PDF" />` line at the end of the `/etc/ImageMagick-6/policy.xml` file

8. Improve the script so that it generates thumbnails for both pictures and PDF documents.

   Deliverable: the final make_thumbnails script

Script `make_thumbnails` :

```
#!/bin/bash

# Check if ImageMagick is installed
if ! command -v convert &> /dev/null; then
    echo "ImageMagick is not installed. Please install it to continue."
    exit 1
fi

# Set the source and destination directories relative to this script
src_dir="lab04_raw_files"

# We send the thumnail to another directory, avoiding making thumbnails from thumbnails
dst_dir="thumbnails"
```

```
# Create the destination directory if it doesn't exist
mkdir -p "$dst_dir"

# Loop through JPG and PNG files to create thumbnails
for img in "$src_dir"/*.{jpg,png}; do
    [ -e "$img" ] || continue  # Skip if no files found
    base=$(basename "$img")
    filename="${base%.*}"
    extension="${base##*.}"

    # Define the thumbnail filename, preserving the original extension
    thumbnail="${dst_dir}/${filename}_thumb.${extension}"

    # Create a thumbnail for the image
    convert -geometry 300 "$img" "$thumbnail"
    echo "Created thumbnail for image at $thumbnail"
done

# Loop through PDF files to create thumbnails, using png as the thumbnail extension
for pdf in "$src_dir"/*.pdf; do
    [ -e "$pdf" ] || continue  # Skip if no files found
    base=$(basename "$pdf")
    filename="${base%.*}"

    # Define the thumbnail filename for PDF, using jpg as the extension
    thumbnail="${dst_dir}/${filename}_thumb.png"

    # Create a thumbnail for the first page of the PDF
    convert -geometry 300 "${pdf}[0]" "$thumbnail"
    echo "Created thumbnail for PDF at $thumbnail"
done
```

Output :

```
Created thumbnail for image at thumbnails/cours_thumb.jpg
Created thumbnail for image at thumbnails/dcim439_thumb.jpg
Created thumbnail for image at thumbnails/mur_thumb.jpg
Created thumbnail for image at thumbnails/showroom_fabrik_thumb.jpg
Created thumbnail for image at thumbnails/cheseaux_thumb.png
Created thumbnail for image at thumbnails/img-430_thumb.png
Created thumbnail for image at thumbnails/st-roch_thumb.png
Created thumbnail for image at thumbnails/yparc_thumb.png
Created thumbnail for PDF at thumbnails/rapport-activite-2018_thumb.png
Created thumbnail for PDF at thumbnails/rapport-activite-2019_thumb.png
Created thumbnail for PDF at thumbnails/rapport-activite-2020_thumb.png
Created thumbnail for PDF at thumbnails/rapport-annuel-2018_thumb.png
Created thumbnail for PDF at thumbnails/rapport-annuel-2019_thumb.png
```

Task 3 : Generate HTML file

In this task you will write a script that produces the HTML file. The webmaster hascreated a template for the pages of the website. It is available here : http://ads.iict.ch/lab04_template.zip.

The template page is provided in 2 versions, HTMP and PHP. For this task both versions can be used without real difference. The PHP version will be needed for the last task of this lab, you have the following choices : * Working with index.html file in this task. For the next task you'll upload both generated index.html and index.php (renamed for example to task4.php) * Working directly with index.php in this task and ignore index.html.

The HTML code can be divided into three pieces: a beginning, a middle and an end. Only the middle piece depends on the pictures and brochures, the beginning and end are always the same. Thus the script has only to produce the middle piece, and can simply copy the beginning and end from two files.

The middle should have the following structure:

```
<article class="container article">
 <div class="row">
     <div class="col-md-10 col-md-pull-3 col-md-offset-4 article__content">
         <div>
             <div><h2>Découvrez-nous en images</h2></div>
         </div>
         <div class="row">
             <div class="col-md-6 col-xs-12">
                 <a href="files/cheseaux.png"><img class="vignette"
                 ↪  src="files/cheseaux_thumb.png" /></a>
             </div>
             <div class="col-md-6 col-xs-12">
                 <a href="files/cours.png"><img class="vignette"
                 ↪  src="files/cours_thumb.png" /></a>
             </div>
             <!-- Add more elements here if needed -->
         </div>
     </div>
 </div>

 <div class="row" style="margin-top: 40px;">
     <div class="col-md-10 col-md-pull-3 col-md-offset-4 article__content">
         <div>
             <div><h2>Téléchargez nos brochures</h2></div>
         </div>
         <div class="row">
             <div class="col-md-6 col-xs-12">
                 <a href="files/rapport-activite-2018.pdf"><img class="vignette"
                 ↪  src="files/rapport-activite-2018.jpg" /></a>
             </div>
             <div class="col-md-6 col-xs-12">
                 <a href="files/rapport-activite-2019.pdf"><img class="vignette"
                 ↪  src="files/rapport-activite-2019.jpg" /></a>
             </div>
             <!-- Add more elements here if needed -->
         </div>
     </div>
 </div>
</article>
```

1. Download the HTML template and using a text editor create two files called template_begin.html and `template_end.html` containing the fixed beginning and end of the template.
2. Write a script called make_html that produces the HTML for the middle.

   Assumptions:

   - The script is launched with `public_html`as the current directory.
   - The picture files are in the directory `public_html/raw_files`.
   - The script writes the HTML file to the directory `public_html`.
3. Extend the script so that it produces a single HTML file called page.html in your web directory public_html . When viewed with a browser, the URL http://ads.lan.iict.ch/~albert_einstein/page.html should show the complete page with clickable pictures and brochures.

   Deliverable: the final `make_html` script

Script `make_html` :

```
#!/bin/bash

output_file="page.html"
src_dir="lab04_raw_files"
thumb_dir="thumbnails"
template_begin="template_begin.html"
template_middle="template_middle.html"
template_end="template_end.html"

# Create thumbnails for the pictures and pdf files in the "files" directory
./make_thumbnails
thumbnails_exit_code=$?

if [ $thumbnails_exit_code -ne 0 ]; then
    echo "An error occurred in make_thumbnails. Exiting..."
    exit $thumbnails_exit_code
fi

# Ensure the middle content file is empty before starting
> "$template_middle"

# Start the HTML section for images
echo -e "<article class=\"container article\">\n<div class=\"row\">\n<div class=\"col-md-10
↪  col-md-pull-3 col-md-off"\
"set-4 article__content\">\n<div><div><h2>Découvrez-nous en images</h2></div></div>\n<div
↪  class=\"row\">" >> "$template_middle"

# Loop through the source directory images
for file in "$src_dir"/*.{jpg,png}; do
    filename=$(basename "$file")
    thumbnail="${thumb_dir}/${filename%.*}_thumb.${filename##*.}"
    if [ -e "$thumbnail" ]; then
        echo -e "<div class=\"col-md-6 col-xs-12\">\n<a href=\"$file\"><img class=\"vignette\"
        ↪  src=\"$thumbnail\" />"\
"</a>\n</div>" >> "$template_middle"
    fi
done

# Close the section for images
echo -e "</div>\n</div>\n</div>" >> "$template_middle"

# Start the section for PDFs
echo -e "<div class=\"row\" style=\"margin-top: 40px;\">\n<div class=\"col-md-10 col-md-pull-3
↪  col-md-offset-4 article"\
"__content\">\n<div><div><h2>Téléchargez nos brochures</h2></div></div>\n<div class=\"row\">"
↪  >> "$template_middle"

# Loop through PDF thumbnails
for file in "$thumb_dir"/*_thumb.*; do
    filename=$(basename "$file")
    pdf="${src_dir}/${filename%_thumb.png}.pdf"
    # Check if the thumbnail corresponds to a PDF file
    if [ -e "$pdf" ]; then
        # Create HTML for the PDF thumbnail linking to the PDF file
        echo -e "<div class=\"col-md-6 col-xs-12\">\n<a href=\"$pdf\"><img class=\"vignette\"
        ↪  src=\"$file\" /></a>\n</"\
```

```
"div>" >> "$template_middle"
    fi
done

# Close the section for PDFs
echo -e "</div>\n</div>\n</div>\n</article>\n" >> "$template_middle"

# Concat the beginning, middle and end template, then write to the page.html file
cat "$template_begin" "$template_middle" "$template_end" > "$output_file"

rm "$template_middle"

echo "HTML page created successfully."
```

Output :

```
Created thumbnail for image at thumbnails/cours_thumb.jpg
Created thumbnail for image at thumbnails/dcim439_thumb.jpg
Created thumbnail for image at thumbnails/mur_thumb.jpg
Created thumbnail for image at thumbnails/showroom_fabrik_thumb.jpg
Created thumbnail for image at thumbnails/cheseaux_thumb.png
Created thumbnail for image at thumbnails/img-430_thumb.png
Created thumbnail for image at thumbnails/st-roch_thumb.png
Created thumbnail for image at thumbnails/yparc_thumb.png
Created thumbnail for PDF at thumbnails/rapport-activite-2018_thumb.png
Created thumbnail for PDF at thumbnails/rapport-activite-2019_thumb.png
Created thumbnail for PDF at thumbnails/rapport-activite-2020_thumb.png
Created thumbnail for PDF at thumbnails/rapport-annuel-2018_thumb.png
Created thumbnail for PDF at thumbnails/rapport-annuel-2019_thumb.png
HTML page created successfully.
```

Task 4 : Use SSH tunneling

For this last task we will use the SSH client to setup a port redirection allowing us connect remotely a database management tool (such as MySQL-Workbench) to the MariaDB database on the server. The database is reachable on port 3306 which is not open in the firewall and accepts only local connection. Ignore the presence of phpmyadmin on this server.

The index.php page has a “dynamic” menu loaded from a table named “menu” which contains the different navigation levels. This page doesn’t respect best practices relating to PHP development or security, its sole purpose is to be used as a tool to illustrate this task.

1. Edit the page index.php with your username and MariaDB password. To avoid conflict with index.html, you can rename index.php to something.php

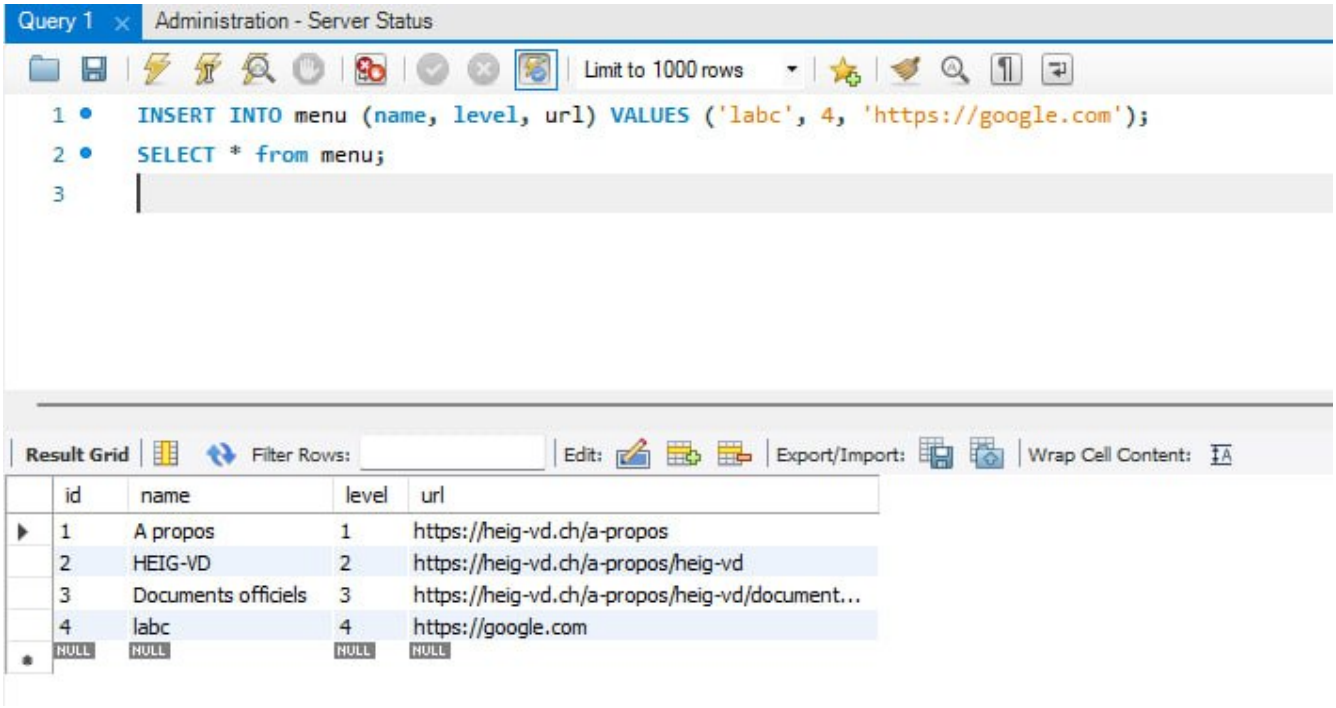
It was renamed to part4.php

2. Install locally (not on the server) a database management tool Hint: snap install mysql-workbench-community , you may have to allow access to password storage from Ubuntu software
3. Use SSH to redirect remote port 3306 to a local on, you can choose any port number above 1024 .
4. Connect database management tool to the database. Display the menu table and perform some modifications that should be visible when you refresh the index.php page in your browser.

   Deliverable: the SSH command you use and a screenshot of the database management toolshowing the database

The SSH command used was: `ssh -L 3307:localhost:3306 labc@ads.iict.ch`

Here’s the screenshot of mysql-workbench:


Query 1
Administration - Server Status
Limit to 1000 rows
1 INSERT INTO menu (name, level, url) VALUES ('labc', 4, 'https://google.com');
2 SELECT * from menu;
3
Result Grid
Filter Rows:
Edit:
Export/Import:
Wrap Cell Content:
id name level url
1 A propos 1 https://heig-vd.ch/a-propos
2 HEIG-VD 2 https://heig-vd.ch/a-propos/heig-vd
3 Documents officiels 3 https://heig-vd.ch/a-propos/heig-vd/document...
4 labc 4 https://google.com
NULL NULL NULL NULL