

---

**correctexam**

*Release latest*

**Barais Olivier**

**Dec 11, 2023**



# USER DOCUMENTATION

<b>1</b>	<b>The main features are as follows:</b>	<b>3</b>
1.1	Contents . . . . .	3



A [French](#) version is also available.

**CorrectExam** is a tool to help with the correction of paper copies. Its primary aim is to enable students to receive quickly, more detailed feedback on their work, and teachers to see detailed analyses of assignments and questions. It's a simple way of saving work in digital form, preserving the original work and enabling quick and easy viewing from anywhere.



## THE MAIN FEATURES ARE AS FOLLOWS:

- Have students consult corrected papers to learn from their mistakes,
- Correct more accurately
  - Provide a statistical view of results
  - Enable on-the-fly changes to the grading scale
- Correct more efficiently
  - simultaneous correction with colleagues
  - question by question
  - by batch
  - automated correction for MCQs
  - on tablet or computer

This documentation describes:

- in the *user manual* section, the user documentation.
- in the *installation* section, elements for compiling, installing and configuring the project
- in the *developement* section, architectural elements to help you understand the project's structure and see how to contribute.

---

**Note:** This project is still in an active development phase.

---

## 1.1 Contents

### 1.1.1 The main stages to achieve to evaluate an exam

The main stages of exam marking are as follows

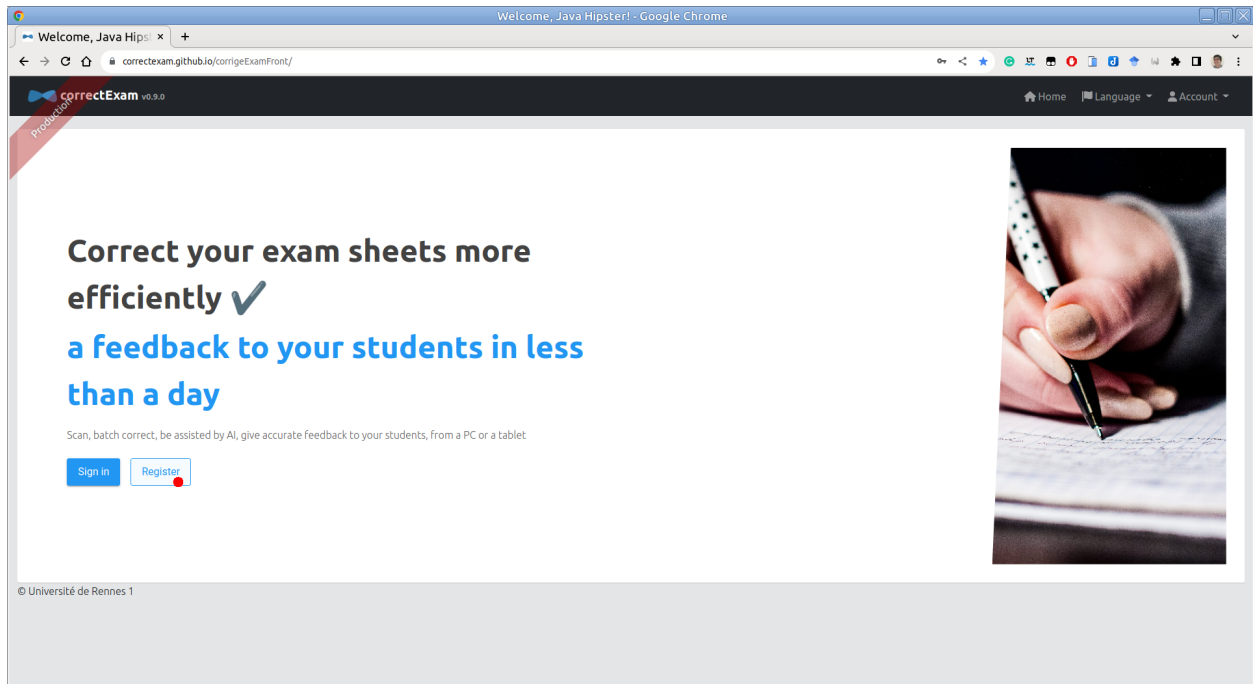
0. Create an account on the platform ?
1. Create a course and an exam (this includes creating your exam using a word processor (word, google doc, libre-office) or latex ;) and upload the list of students who can take the exam.
2. Create your marking scheme (how each question will be graded, typical comments per question, ...)
3. Load scans of exam papers in the right order
4. Straighten your scans

5. Associate each copy with a student (assisted by AI)
6. Correct copies (question by question or student by student or any other combination)
7. Look at the statistics associated with passing the exam to potentially adjust the grading a little.
8. Send feedback to students
9. Export grades in excel format for transmission to school department

A demonstration video is available [here](#) in French.

### Step 0: How do I create an account on the platform?

You can go to the [platform](#), click on **register**, fill in a few details. You will receive an e-mail to validate your account.



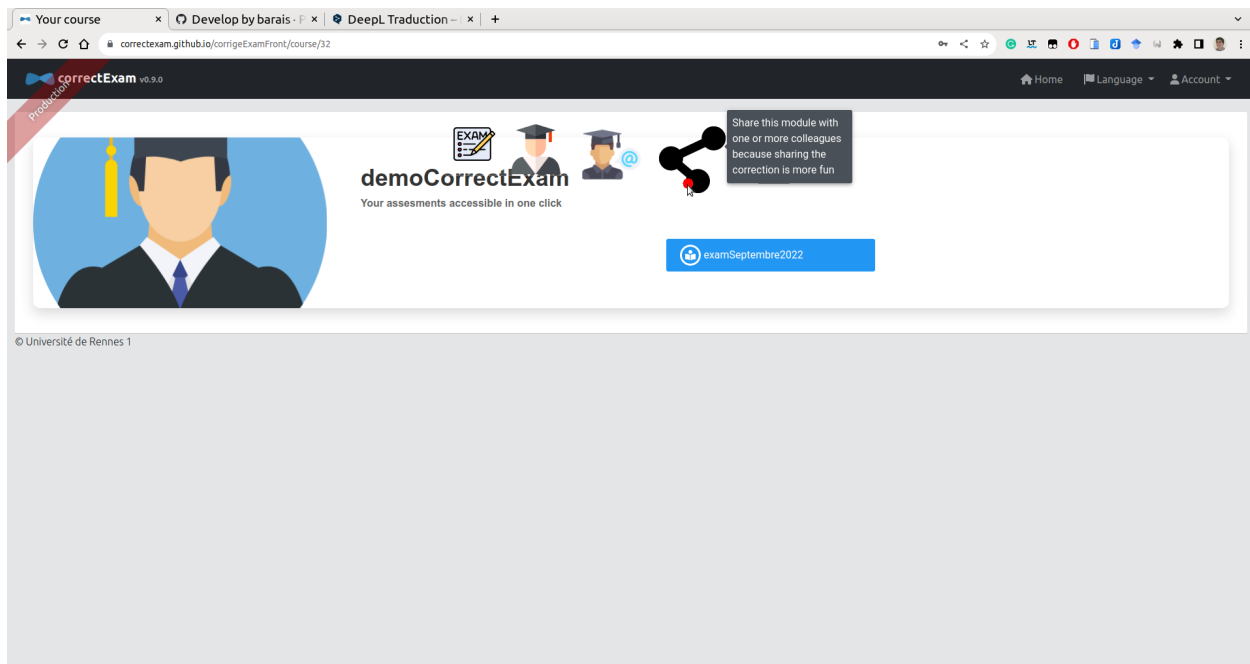


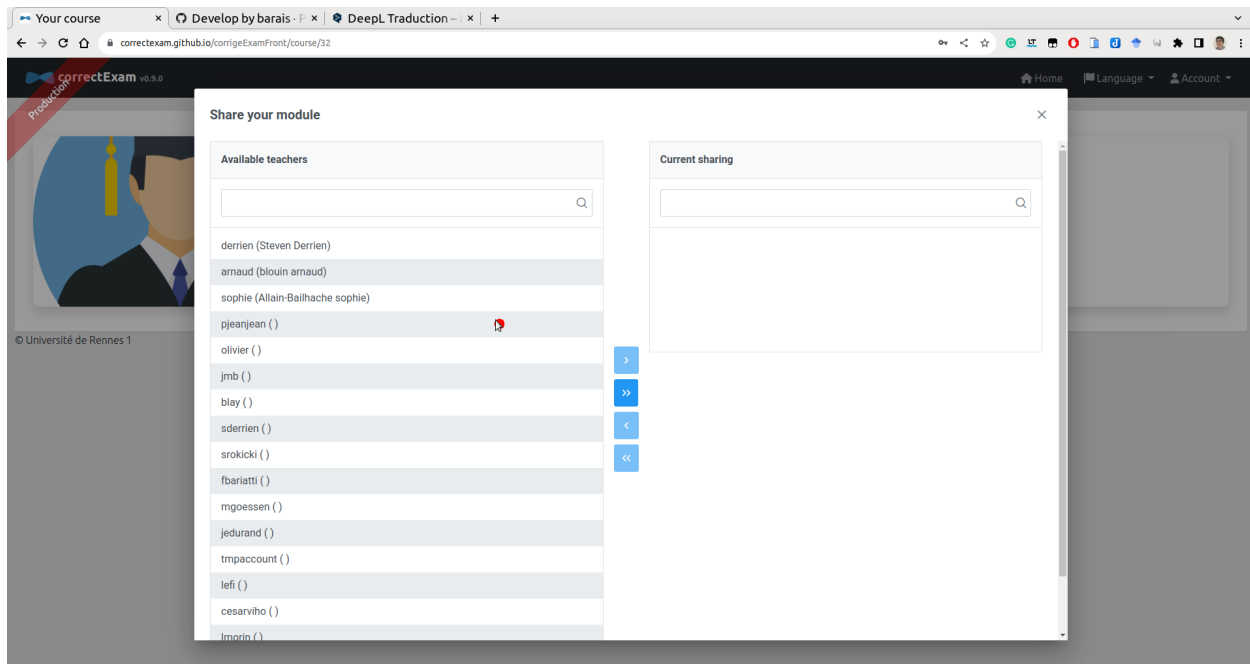
You can then fill in your account information in the menu. *Account -> Settings* menu

### Step 1: Create your course and exam (This includes creating your exam using a word processor (word, google doc, libreoffice) or latex ;)

Once logged in, on the home page, click on the + symbol *create a course*. You need to give the course a name.

If you'd like to correct with several people, when you click on the module, you'll have access to a shared action in the action list, enabling you to share this module with one or more colleagues. These colleagues will then see the module in their list of modules.





To create an exam, once you've entered the module page, you can use the (+) command to create a new exam or import an existing one. In the view that allows you to create an exam, you have access to a number of templates for creating your exam. The application's philosophy is to allow each teacher to create his or her own exam with the tool that suits them best.

It is then necessary to load the list of students in this module. To correct, we associate each answer key with a student. This list is needed to perform the assignment task. (In the worst case, if you don't want any names, you can always associate them with numbers entered on the copy and a list of students with names such as student1/student2, etc.).

**Note:** For Univ Rennes, this list is available here: <https://mdw.univ-rennes1.fr/>

## Step 2: Create your grading scale (how each question will be graded, typical comments per question, etc.)

To create your marking scheme, once you've entered the page for a module, then for the exam in question, you have access to an annotate template button. This is where you define all the zones of interest, as well as the scale for each question. You need zones of interest with last name, first name and/or student number. You also need zones of interest that define the areas in which the student will answer each of the questions asked.

## Understanding the different question types

For the moment, there are roughly four types of question.

- Direct questions. The **DIRECT** notation (*Manual and Direct*) for which the teacher manually scores the answers to this question, assigning a mark to each student for this question.
- Positive questions. **POSITIVE\*\*** notation (*manual and POSITIVE*). This is an item for which the teacher can define a set of comments along the way that gives points to the answers to this question (starting from zero). The total number of points obtained cannot exceed the maximum number of points associated with this question.

- Negative questions. The **NEGATIVE** notation (*Manual and NEGATIVE*). This is an element for which the marker can define a set of comments along the way, which removes points from the answer in question (the starting point is the maximum number of points possible for this question). The total number of points obtained cannot be less than zero.
- Hybrid questions. The **HYBRID** notation (*Manual and HYBRID*). This is the correction that should eventually become the default correction, as it unifies the different correction modes. (See <https://github.com/correctexam/corrigeExamFront/issues/427>). The idea is to define a maximum mark for a question and a default mark. From there, it is possible to define comments that add or subtract points in absolute or relative terms (as a percentage of the maximum mark). In addition, it is possible to define from 1 to 12 brackets for each comment to apply part of the bonus or penalty. Once the final score has been computed, the application of each comment cannot exceed the maximum score for the question or fall below zero.
- The **QCM** for which the application provides scoring assistance.

---

**Note:** Comments associated with a question can be defined here or during correction in the correction view.

---

## How the scoring system works with different question types

For each question, you'll need to define the question number, the total number of points and a notion of *steps*. The question number can be the same for several questions (if, for example, the answer zone is located on two separate pages). The number of points corresponds to the maximum score for that question. The notion of *steps* defines the possible increment per point.

- For example, an answer to a two-point **DIRECT** question with a step of 4 can be marked from 0.25 to 0.25, i.e. 0; 0.25; 0.5; ...; 1.75 or 2.
- For example, an answer to a question of the **POSITIVE** type on two points with a step of 4 will make it possible to define comments that will add points worth 0; 0.25; 0.5; ...; 1.75 or 2. Note that even if two positive comments result in a total score greater than 2, the score will be reduced to 2, the maximum value for the question.
- For example, an answer to a **NEGATIVE** question on two points with a step of 4 will allow you to define comments that will remove points worth 0; -0.25; -0.5; ...; -1.75 or -2. Even if two negative comments result in a total score of less than 0, the score will be reduced to 0, the minimum value for the question. If no negative comments are applied, the student receives the maximum mark for this question, i.e. in our example 2.
- For example, for an answer to a question of type **HYBRID** the marker can define a hybrid comment "spelling" for which he/she wishes to apply a maximum penalty of 20% of the total mark for this question with 4 bands and another hybrid comment "Accuracy" for which he/she sets a mark of 100% over 5 bands and a default mark for this question of 0%. He could then give each answer a mark of 0, 20, 40, 60, 80 or 100%, plus a spelling penalty of 0%, 5%, 10%, 15% or 20%. He could also have set a single band for this 'spelling' comment and thus had the choice of setting only -0% or -20% of the overall mark. Once the final score has been computed, the application of each comment cannot exceed the maximum score for the question or fall below zero.
- For example, for an answer to a **QCM** question, it will be necessary to give all valid answers. If the student's answer is valid, he/she will receive the maximum mark for the question. If the answer is not valid, he/she will for the moment have the penalty which is defined at the time of the scale as - 1/10; - 1/8; - 1/6; ...; -1/2; -1 or 0 \* the maximum mark. If the student has left a blank, he will get 0 for the question. So if you set the number of points to 2, the penalty is 1/4. If the student got it right, he gets 2 points; if he got it wrong, he gets -0.5; if he didn't answer, he gets 0.

### Step 3: Load scans of correctly ordered exam papers

The next step is to load the student copies into the application. We recommend using grayscale at 150 DPI to keep the file size reasonable, but there's no problem with a color scan at 300 DPI if necessary. Avoid pure black and white, which could interfere with the algorithm that recognizes students' names/first names/identifiers (INE) in the next step.

**Attention:** The scan must arrive in **ONLY ONE PDF FILE**. It must be **clean**, i.e. no missing page(s), no page(s) in the wrong order. The application does not provide a mechanism to improve scans after import.

Use [pdfarranger](#). This is an excellent tool for cleaning up student scans.

---

**Tip:** Staple the student copies before the students compose. Ask them not to remove the staples. Use a paper cutter to remove staples before scanning your copies.

---

### Step 4. Straighten your scans

Now it's time to run the image alignment process to eliminate any distortion caused by scanning the copies. If you have marks (black circles) at the four corners of the copies, use alignment with mark, otherwise without mark it will take longer. If you don't have any MCQs and your scanner doesn't distort the copies very much, you can also choose not to straighten the copies.

You can ask to realign only part of the copies by selecting the pages to be realigned. This allows you to see in particular the point at which it has made its alignment. This is sometimes useful to understand why the alignment is going wrong.

### Step 5: Associate each copy with a student (AI-assisted)

The next step is to associate each copy with a student from the student list. It is possible to filter the students already assigned to a copy.

At the end of this stage, if you have correctly assigned all the copies, you can move on to the correction phase. If not, it's probably because a copy has not yet been assigned.

### Step 6: Correct copies (question by question or student by student or any other combination)

We now enter the correction phase. On the same or another piece of equipment (e.g. a tablet), you can correct copies (question by question or student by student). You can annotate the image with a pencil, add comments, set a grade, automatically correct MCQs, etc.

A dashboard lets you see the progress of the correction.

If you are correcting on a computer and not on a tablet, there are keyboard shortcuts for efficient navigation, or you can define your own keyboard shortcuts to apply or remove predefined comments. Press *F1* to review existing keyboard shortcuts.

During this phase, it's a good idea to tag "excellent" answers and "outstanding" wrong answers. This automatically creates an answer sheet for the students, and allows these remarkable wrong answers to be discussed anonymously with the students later on.

### Step 7: View the statistics associated with passing the exam to potentially adjust the grading slightly

During or at the end of marking, you can view the statistics associated with this exam in the **see results** view, in order to adjust the grading, for example, by modifying the value associated with comments for **POSITIVE** or **NEGATIVE** grading. For **DIRECT** grading, it will not be possible to modify the grading after marking, and it will therefore be necessary to go through all the papers again if you wish to change the grading.

### Step 8: Sending feedback to students

Once the correction has been completed correctly, you can use the **see results** view to send copies to students. Students will receive a unique link to consult their copy, and will be able to view the answers tagged excellent anonymously. The sending e-mail can be configured just before sending.

**Warning:** If you've graded your answers, they will not be graded on the online instance, but on an instance installed on your own machine. You'll need to export the module and re-import it onto the main platform or that of your establishment for the mail sending to work correctly.

---

**Note:** This stage of transmission to students is not compulsory. It's the tool's primary motivation, but the tool can just be used to evaluate without seeking to give systematic feedback to students.

---

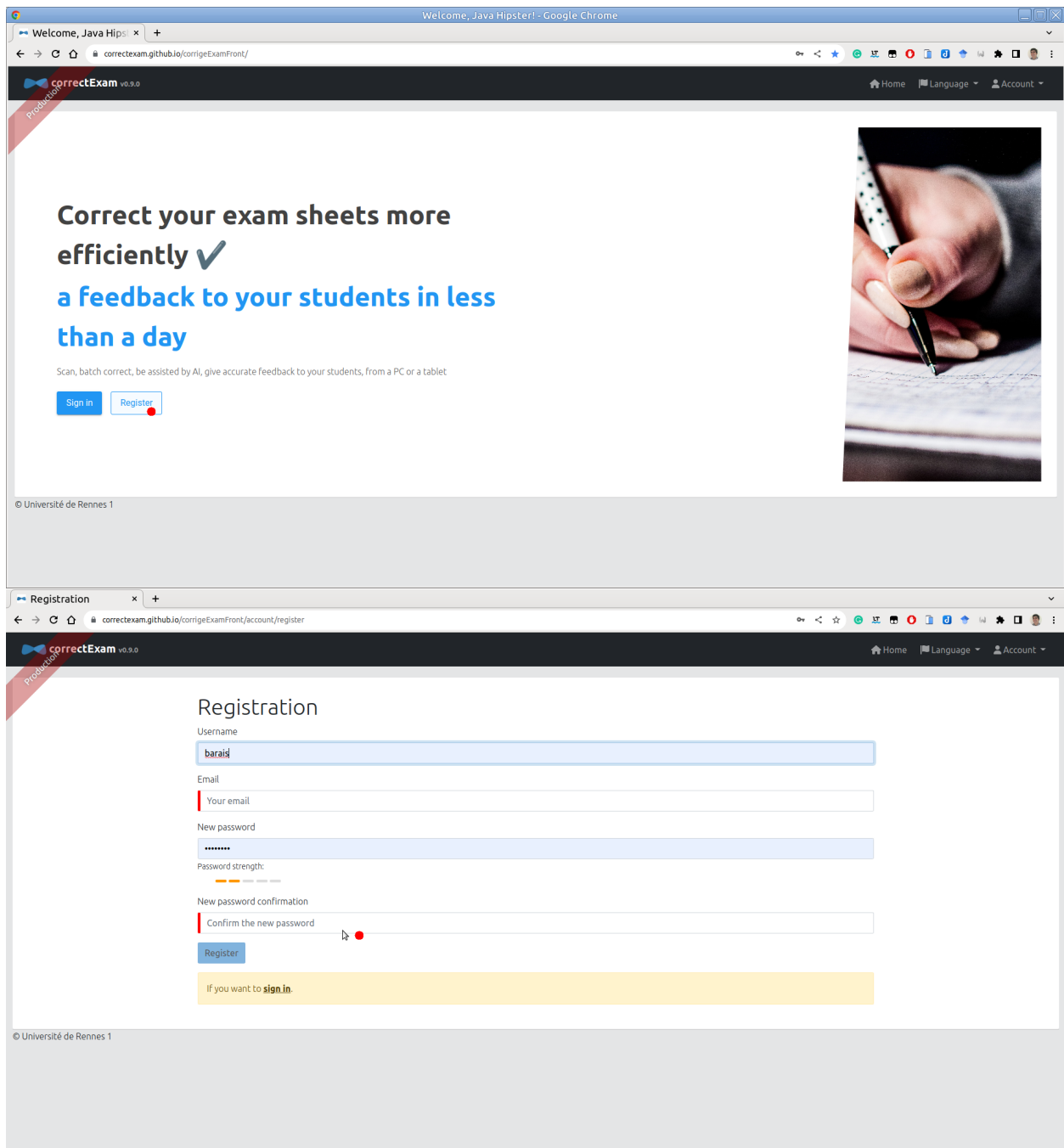
### Step 9: Export grades in Excel format for transmission to school authorities

Finally, it is possible to export grades in Excel format for transmission to school authorities.

## 1.1.2 Frequently asked questions for users

### How to create an account on the platform?

You can go to the [platform](#), click on **register**, fill in some information. You will receive an email to validate your account.



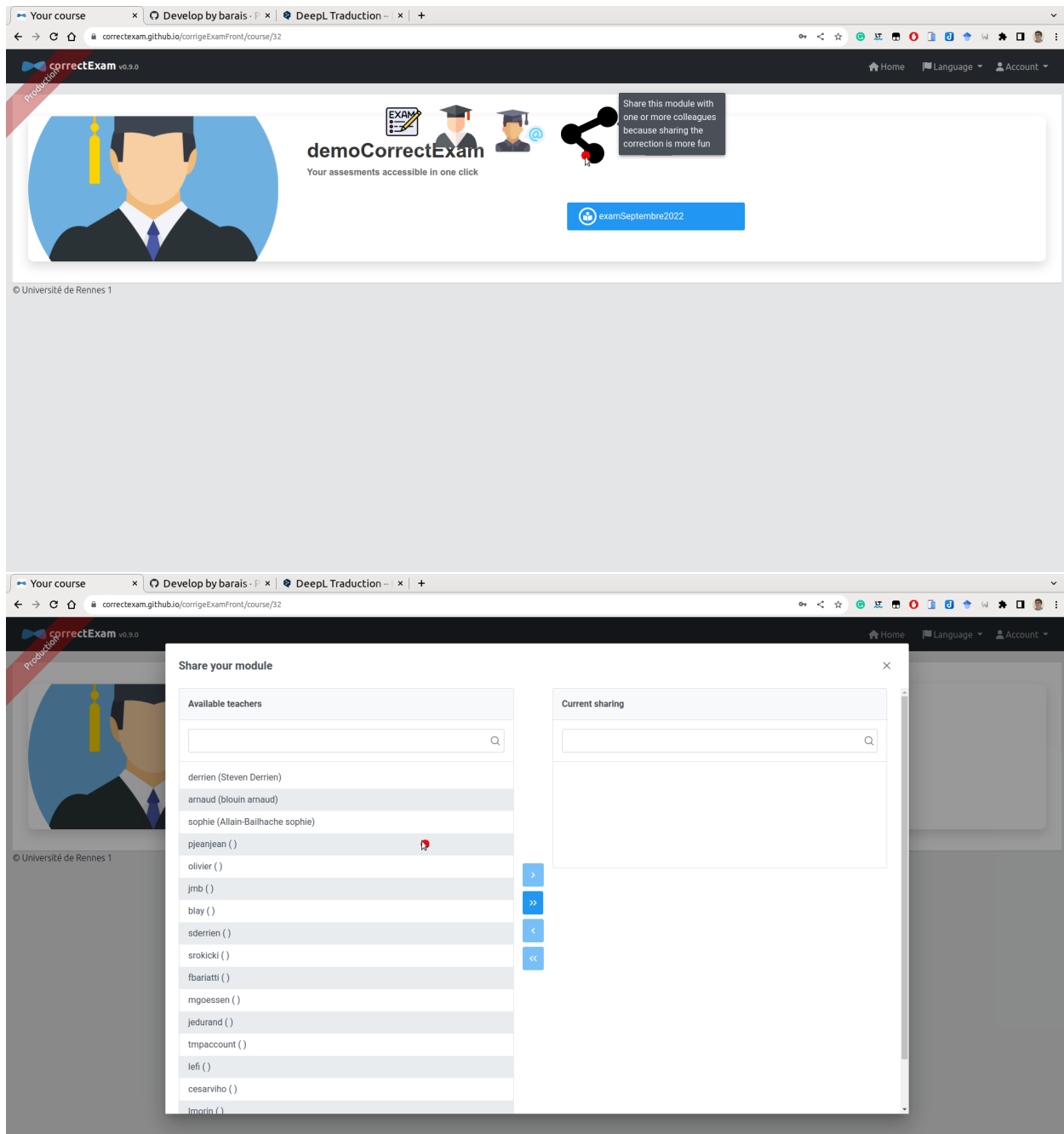
You can then fill in your account information in the menu. *Account -> Settings*

## How to create a module?

Once authenticated, on the main page, click on the + symbol *create a course*. It is required to give a name to a module.

## Can I share a correction with one or more colleagues?

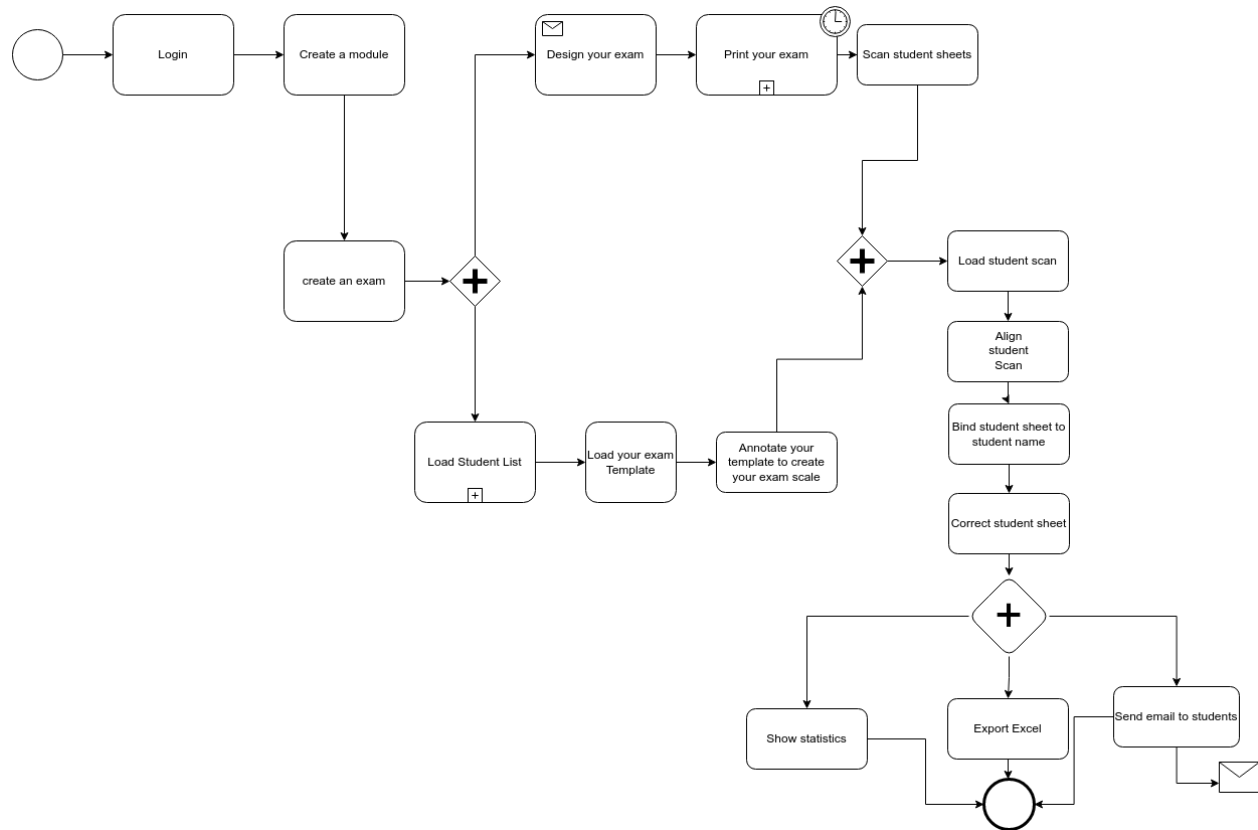
When you click on the module, you will have access in the list of actions to a shared action that allows you to share this module with one or more colleagues. These colleagues will then see this module in the list of their modules.



### Can I limit the rights of a colleague so that he can only access a subset of the questions?

No, a colleague, we can trust him ;). We do not implement any specific RBAC rules per exam.

### Do you have a diagram of the main steps to do to use this application?



### How to create an exam?

To create an exam, once you enter the page of a module, it is possible to create a new exam with the command carousel.



### Where can I find some templates for Word latex and libreoffice?

In the view that allows you to create an exam, you have access to a number of templates to create your exam. The philosophy of the application is to let each teacher create his exam with the tool he likes.

### Why am I forced to upload a list of students?

To correct, we associate each answer key with a student. This list is required to do the assignment task.

### Do I have to delete a student who did not compose?

No, it will be marked as ABI by default.

### Can you explain the different types of questions that are available?

For the moment, there are roughly five types of questions.

- **MCQs** for which the application provides marking assistance.
- The **DIRECT** scoring (*Manual and Direct*) for which the teacher manually scores the answers to this question.
- **POSITIVE** scoring (*Manual and POSITIVE*). This remains an element for which the teacher can define a set of comments along the way that gives points to the answers for this question (we start from zero). The total number of points obtained cannot exceed the maximum number of points associated with this question.
- The **NEGATIVE** notation (*Manual and NEGATIVE*). This is an element for which the corrector can define a set of comments along the way that removes points from the answer in question (we start from the maximum number of points possible for this question). The total number of points obtained cannot go below zero.
- The **HYBRID** notation (*Manual and HYBRID*). This is an item for which the marker can define a set of comments along the way which subtracts points from or subtracts points from the answer in question (we start from a default number of points defined by the marker as a percentage of the maximum mark for this question, and we add or substitute points associated with comments either absolutely or relatively to the maximum mark for the question). The total number of points obtained cannot be less than zero or more than the maximum number of points for that question. The big advantage of this type of question is that it makes it easy to update the scale during marking. Eventually, this type of question should be the default.
- 

These types of questions will be enriched in the future. Please provide your great idea.

### Can I change the type of question when the correction of a question has started?

Honestly, not recommended because not tested.

### Can I update my exam's scale?

This depends largely on the type of question.

- For questions of the **DIRECT** type. This is not recommended. If you change the scale, it is necessary to go back over all the students' papers for this question.
- For questions of type **POSITIVE** and **NEGATIVE**, you can update the scale of comments, add or remove comments. It is not recommended to update the number of points for a given question.
- For questions of type **QCM**, you can update the number of negative points to be withdrawn without restarting the automatic correction; if you change any other type of information, it will be necessary to restart the automatic correction for this question.
- For **HYBRID** questions, this is designed accordingly. All modifications are authorized. \*\*.

### How to clean the students' scan if pages are missing, duplicate page, flipped page...?

Use [pdfarranger](#) or [Stirling-PDF](#). They are great tools for this task.

### Can I reload a clean scan (see previous question) and realign it if I already start to correct an exam?

Yes, no problem, if you share the correction with colleagues or with different devices, you can force the upload and download to the server later.

### What happens if my template has an odd number of pages (e.g. 3 pages) and the scan of the student sheets is a multiple of 2 (e.g. 4 page per student)

For the moment, it is not managed correctly at the moment of the alignment. It will be necessary to remove the blank pages from the student scans beforehand with pdf manipulation tools like [pdftk](#) or [pdfarranger](#) or [Stirling-PDF](#).

### How do I scan students' sheets?

We recommend using grayscale at 150 DPI to keep the file size reasonable but no problem with a color scan at 300 DPI if necessary. Avoid pure black and white which could be detrimental to the algo that recognizes names/first names/ids (INE) of students

### Can I compose an exam template with another tool than word, libraoffice or latex?

Of course, the only important point is a circle marker in the corners to facilitate alignment and light gray squares to put the names, first names and ids (INE) of students.

### What to do when I encounter a bug in the application?

Use the github ticket system on the project <https://github.com/correctexam/corrigeExamFront>

### Can I install the solution on my computer to avoid using the online version and correct offline (on the train, for example)?

We provide [packaged releases](#) to run on all three operating systems (windows, macos, linux) for AMD64 architecture with an integrated database.

Under linux and macos, just download the binary for your os, make it executable, launch the application and go to your browser at <http://localhost:8080> (default user/user or admin/admin).

Under Windows, you'll need to download the executable as well as the two *mydb...* files corresponding to the database. Place all three files in the same directory and run the executable. Go to your browser at <http://localhost:8080> (default user/user or admin/admin).

---

**Note:** The project data can then be exported and imported into the online platform, for example if you want to test e-mailing students.

---

### Can I destroy my data on the platform?

Yes, at any time. We advise you to make a backup (course by course) if you ever wish to reupload certain data. When you destroy your data, no backup is kept, so we cannot restore the data.

### What guarantees do I have that I won't lose data in the event of a problem on the platform?

For the time being, the [online platform](#) is offered in *best effort* mode on a server of the University of Rennes. No data guarantee is provided. Please contact your school's IT department if you require a higher level of guarantee.

## 1.1.3 Installation

### Rapid deployment on your own infrastructure

#### Can I quickly test this tool on my own machine?

We provide [packaged releases](#) to run on all three operating systems (windows, macos, linux) for AMD64 architecture with an integrated database.

Under linux and macos, just download the binary for your os, make it executable, launch the application and go to your browser at <http://localhost:8080> (default user/user or admin/admin).

Under Windows, you'll need to download the executable as well as the two *mydb...* files corresponding to the database. Place all three files in the same directory and run the executable. Go to your browser at <http://localhost:8080> (default user/user or admin/admin).

---

**Note:** The project data can then be exported and imported into the online platform, for example if you wish to test sending e-mails to students to consult their copies.

---

## Can I use the authentication service provided by the University or my school?

The current version supports authentication behind a CAS. Quarkus can be easily configured to use another unified authentication system such as keycloak.

## Can I test an instance of this application on my own infrastructure/laptop (I want to keep my data private) ?

Yes please go to the documentation for developers. We provide scripts to deploy this application on any type of infrastructure from a powerful server with K8S to a raspberry 4.

You can also easily test it locally. You just need docker.

```
git clone -b develop https://github.com/correctexam/corrigeExamBack
cd corrigeExamBack/src/main/docker
docker-compose -f app.yml build --no-cache back front
docker-compose -f app.yml up
```

the application is then available on <http://localhost:9000> the phpmyadmin part is available on <http://localhost:91> the fake mail server part is available on <http://localhost:9000/maildev/>

For information:

1. If you want to connect to a real mail server type share. you can have an overview of the quarkus properties as a comment in the *app.yml* file.
2. If you want to change the ports
  - for phpadmin,
    - for the host port you have to change it in the *app.yml* file
    - for the internal port, you have to change it both in the *app.yml* file and the *myadmin.conf* file (nginx container file)
  - for the application
    - for the host port, you have to change it in the *app.yml*.
    - for the internal port, you have to change it in the *app.yml* and in the *exam.conf* file (file of the nginx container) for the front and update the quarkus properties if you want to change the internal port of the back (no real reason)
1. If you want to set up reverse proxy according to a domain name, everything will happen in the files *exam.conf* and *myadmin.conf* but there is also to update the external url in the application, it's a quarkus property in the *app.yml* file.

## Build and deploy for AMD64

### Build the platform

### Backend

If you want to build it manually, you can just run the following command:

```
git clone https://github.com/correctexam/corrigeExamBack
cd corrigeExamBack
mvn -B package --file pom.xml -Pnative
docker build -f src/main/docker/Dockerfile.native -t barais/correctexam-back:manifest-
  ↪amd64 --build-arg ARCH=amd64/ .
```

The backend is also built automatically using github action. You can have access to the backend image within [docker hub](#)

**OR**

```
#if you install the quarkus cli
git clone https://github.com/correctexam/corrigeExamBack
cd corrigeExamBack
quarkus build --native --no-tests -Dquarkus.native.container-build=true
docker build -f src/main/docker/Dockerfile.native -t barais/correctexam-back:manifest-
  ↪amd64 --build-arg ARCH=amd64/ .
```

## Front

**Without docker** Just clone the project

**Attention:** update webpack/environment.js with your domain name.

```
# require nodejs v16 you can install it using nvm (https://github.com/nvm-sh/nvm)
git clone https://github.com/correctexam/corrigeExamFront
cd corrigeExamFront
# update webpack/environment.js with your domain names
npm install
npm run webapp:build:prod
## You can be inspired by webapp:build:prodgithubpage task if you want to manage a prefix.
  ↪for your webapp.
## if you want to deploy on github page, you can be inspired by the provided github.
  ↪action
```

## Using docker

To build the front, we provide a simple docker file.

**Attention:** update webpack/environment.js with your domain name.

```
git clone https://github.com/correctexam/corrigeExamFront
cd corrigeExamFront
# update webpack/environment.js with your domain name
sudo docker build -f src/main/docker/Dockerfile -t barais/correctexam-front:manifest-
  ↪amd64 --build-arg ARCH=amd64/ .
# OR
sudo docker buildx build -f src/main/docker/Dockerfile --push --platform linux/arm64,
  ↪linux/amd64 --tag barais/correctexam-front .
```

You will obtain a nginx with only the js, html and js. You have to mount the configuration if you want to manage proxy to the backend routes. I would prefer to use bunkerized nginx for the routing.

## Deploy everything on your own infrastructure

```
version: '2'
services:
  correctexam-back:
    image: barais/correctexam-back:manifest-amd64
    volumes:
# Path for
    - /tmp/files:/tmp/files:rw
    restart: always
    ports:
    - 8080:8080
# All quarkus configuration parameters (knobs) could be override through command line.
↪ You could also use different options to update the configuration parameters. https://
↪ quarkus.io/guides/config-reference
    command: ./application -Dquarkus.http.host=0.0.0.0 -Dquarkus.datasource.
↪ username=root -Dquarkus.datasource.password='' -Dquarkus.datasource.jdbc.
↪ url=jdbc:mysql://correctexam-mysql:3306/correctexam?useUnicode=true&
↪ characterEncoding=utf8&useSSL=false -Dquarkus.http.cors=true -Dquarkus.http.cors.
↪ origins=https://correctexam.github.io -Dquarkus.http.cors.methods=GET,PUT,POST,DELETE,
↪ PATCH,OPTIONS -Dquarkus.http.cors.headers=accept,origin,authorization,content-type,x-
↪ requested-with -Dquarkus.http.cors.exposed-headers=Content-Disposition -Dquarkus.http.
↪ cors.access-control-max-age=24H -Dquarkus.mailer.from=olivier.barais@univ-rennes1.fr -
↪ Dquarkus.mailer.host=partage.univ-rennes1.fr -Dquarkus.mailer.port=587 -Dquarkus.
↪ mailer.ssl=false -Dquarkus.mailer.username=olivier.barais@univ-rennes1.fr -Dquarkus.
↪ mailer.password=TOCHANGE -Dhipster.mail.base-url=https://correctexam.github.io/
↪ corrigeExamFront
  correctexam-mysql:
    image: mysql:8.0.20
    volumes:
    - ../../resources/db/migration:/docker-entrypoint-initdb.d
    environment:
    - MYSQL_USER=root
    - MYSQL_ALLOW_EMPTY_PASSWORD=yes
    - MYSQL_DATABASE=correctexam
    command: mysqld --lower_case_table_names=1 --skip-ssl --character_set_server=utf8mb4
↪ --explicit_defaults_for_timestamp
#   ports:
#   - 3308:3306
  front:
    image: barais/correctexam-front:manifest-amd64
#   ports:
#   - 90:80
    volumes:
    - ./exampleconf/exam.conf:/etc/nginx/conf.d/exam.conf
    - ./exampleconf/nginx.conf:/etc/nginx/nginx.conf:ro
```

**exam.conf** and **nginx.conf** could be something like that (you have to update the server name)

**exam.conf**

```
server {
    listen      80;
    listen  [::]:80;
    # server name to change based on your own domain name for your front
    server_name correctexam.barais.fr;

    #charset koi8-r;
    #access_log /var/log/nginx/host.access.log main;

    location /api {
        proxy_pass http://correctexam-back:8080/api;
        proxy_set_header Host $http_host;
    }

    location /api {
        include proxy_params;
        proxy_pass http://correctexam-back:8080/api;
    }

    location /management {
        include proxy_params;
        proxy_pass http://correctexam-back:8080/management;
    }

    location /swagger-ui {
        include proxy_params;
        proxy_pass http://correctexam-back:8080/swagger-ui;
    }

    location /v3/api-docs {
        include proxy_params;
        proxy_pass http://correctexam-back:8080/v3/api-docs;
    }

    location /auth {
        include proxy_params;
        proxy_pass http://correctexam-back:8080/auth;
    }

    location /health {
        include proxy_params;
        proxy_pass http://correctexam-back:8080/health;
    }

    location / {
        root /usr/share/nginx/html;
        index index.html index.htm;
        try_files $uri $uri/ /index.html?$args;
    }
}
```

(continues on next page)

(continued from previous page)

```

#error_page 404                /404.html;

# redirect server error pages to the static page /50x.html
#
error_page 500 502 503 504 /50x.html;
location = /50x.html {
    root    /usr/share/nginx/html;
}
}

```

## nginx.conf

```

user  nginx;
worker_processes  auto;

error_log  /var/log/nginx/error.log notice;
pid        /var/run/nginx.pid;

events {
    worker_connections  1024;
}

http {
    sendfile on;
    tcp_nopush on;
    tcp_nodelay on;
    keepalive_timeout 1000s;
    types_hash_max_size 2048;

    include      /etc/nginx/mime.types;
    default_type  application/octet-stream;

    log_format  main  '$remote_addr - $remote_user [$time_local] "$request" '
                    '$status $body_bytes_sent "$http_referer" '
                    '"$http_user_agent" "$http_x_forwarded_for"';

    access_log  /var/log/nginx/access.log  main;

    sendfile      on;
    #tcp_nopush    on;

    keepalive_timeout  65;

    gzip  on;
    client_max_body_size 900M;
    client_body_buffer_size    900M;

    include /etc/nginx/conf.d/*.conf;
}

```

(continues on next page)



(continued from previous page)

}

## Or Deploy the database and the backend on your own infrastructure and the frontend on a CDN

If you want to deploy the database and the backend infrastructure on your own infrastructure and deploy the frontend on the CDN. You must have to manage properly your CORS authorization within your CDN and withing your backend. If you use github page public site, Pages allows CORS (access-control-allow-origin header is set to \*). For the backend, you can use the quarkus properties `-Dquarkus.http.cors=true -Dquarkus.http.cors.origins=https://correctexam.github.io -Dquarkus.http.cors.methods=GET,PUT,POST,DELETE,PATCH,OPTIONS` to manage your cors. Please update the docker-compose descriptor accordingly.

To start your backend and your frontend, I will propose the skeleton of a docker-compose. Please update it for your needs. On top of that, you can configured bunkerized nginx to automatically setup your security and let's encrypt certificate. This docker compose automatically setup the database and the backend. You must update the `./resources/db/migration/ sql` file that will be executed when the database will start. It populates the database with initial data.

```
version: '2'
services:
  correctexam-back
    image: barais/correctexam-back:manifest-amd64
    volumes:
# Path for
    - /tmp/files:/tmp/files:rw
    restart: always
    ports:
    - 8080:8080
# All quarkus configuration parameters (knobs) could be override through command line.
→ You could also use different options to update the configuration parameters. https://
→ quarkus.io/guides/config-reference
    command: ./application -Dquarkus.http.host=0.0.0.0 -Dquarkus.datasource.
→ username=root -Dquarkus.datasource.password='' -Dquarkus.datasource.jdbc.
→ url=jdbc:mysql://correctexam-mysql:3306/correctexam?useUnicode=true&
→ characterEncoding=utf8&useSSL=false -Dquarkus.http.cors=true -Dquarkus.http.cors.
→ origins=https://correctexam.github.io -Dquarkus.http.cors.methods=GET,PUT,POST,DELETE,
→ PATCH,OPTIONS -Dquarkus.http.cors.headers=accept,origin,authorization,content-type,x-
→ requested-with -Dquarkus.http.cors.exposed-headers=Content-Disposition -Dquarkus.http.
→ cors.access-control-max-age=24H -Dquarkus.mailer.from=olivier.barais@univ-rennes1.fr -
→ Dquarkus.mailer.host=partage.univ-rennes1.fr -Dquarkus.mailer.port=587 -Dquarkus.
→ mailer.ssl=false -Dquarkus.mailer.username=olivier.barais@univ-rennes1.fr -Dquarkus.
→ mailer.password=TOCHANGE -Djhipster.mail.base-url=https://correctexam.github.io/
→ corrigeExamFront
  correctexam-mysql:
    image: mysql:8.0.20
    volumes:
    - ../../resources/db/migration:/docker-entrypoint-initdb.d
    environment:
    - MYSQL_USER=root
    - MYSQL_ALLOW_EMPTY_PASSWORD=yes
    - MYSQL_DATABASE=correctexam
```

(continues on next page)

(continued from previous page)

```
command: mysqld --lower_case_table_names=1 --skip-ssl --character_set_server=utf8mb4
↪--explicit_defaults_for_timestamp
ports:
- 3308:3306
```

Before building the frontend for your CDN, do not forget to update **webpack/environment.js** with your domain names.

## Build and deploy on raspberry PI (arm64)

### Install support of cross compile on your machine

```
sudo apt-get install qemu binfmt-support qemu-user-static
docker run --rm --privileged multiarch/qemu-user-static --reset -p yes # This step will
↪execute the registering scripts
docker run --rm -t arm64v8/ubuntu uname -m
```

## Build

### Build the backend

Create a docker file for quarkus to cross compile on your machine for arm64

```
FROM ghcr.io/graalvm/graalvm-ce:ol8-
↪java11@sha256:dc9effae9a92d50e0a173f1cb8113409a4b6d7fb0c44fcf2195f0e03d6161bc5 AS build
RUN gu install native-image
WORKDIR /project
VOLUME ["/project"]
ENTRYPOINT ["native-image"]
```

Build the image

```
docker build -f src/main/docker/Dockerfile.build.aarch64 -t barais/quarkus-build-aarch64
↪.
```

Next build your executable

```
./mvnw clean package -Pnative -Pprod -Dquarkus.package.type=native -DskipTests=true -
↪Dquarkus.native.container-build=true -Dquarkus.native.builder-image=barais/quarkus-
↪build-aarch64:latest
```

**OR** build it using quarkus cli

```
quarkus build --native --no-tests -Dquarkus.native.container-build=true -Dquarkus.native.
↪builder-image=barais/quarkus-build-aarch64
```

When the compilation will over (could take a long time ;), you can build the final images with the binary.

### Create the base image for your backend

```
FROM registry.access.redhat.com/ubi8/ubi-
↳minimal@sha256:c6592eb9cdd7ea7fa43beddf507ca2a8c2127f13ef66d49baea2fd28e37f62ba
WORKDIR /work/
RUN chown 1001 /work \
    && chmod "g+rwX" /work \
    && chown 1001:root /work
#COPY --chown=1001:root target/*-runner /work/application
# COPY --chown=1001:root ./src/main/resources/db/migration/ /work/migration
COPY target/*-runner /work/application
RUN chmod 775 /work
EXPOSE 8080
USER 1001
CMD ["/application", "-Dquarkus.http.host=0.0.0.0"]
```

```
docker build -f src/main/docker/Dockerfile.arm64 -t barais/correctexam-back:manifest-
↳arm64v8 --build-arg ARCH=arm64v8/ .
```

## Build the frontend

Clone the frontend repository.

update webpack/environment.js with your domain name.

```
git clone https://github.com/correctexam/corrigeExamFront
cd corrigeExamFront
# update webpack/environment.js with your domain name
sudo docker build -f src/main/docker/Dockerfile.arm64 -t barais/correctexam-
↳front::manifest-arm64v8 --build-arg ARCH=arm64v8/ .
# OR using buildx
sudo docker buildx build -f src/main/docker/Dockerfile --push --platform linux/arm64,
↳linux/amd64 --tag barais/correctexam-front .
```

You will obtain a nginx with only the js, html and js. You have to mount the configuration if you want to manage proxy to the backend routes. I would prefer to use bunkerized nginx for the routing.

## Deploy on your raspberry 4

You can push your built image on dockerhub (update docker image within the docker compose) and just deploy the docker compose on your own raspberry with the nginx configuration files.

```
version: '2'
services:
  correctexam-back:
    image: barais/correctexam-back::manifest-arm64v8
    volumes:
# Path for
    - /tmp/files:/tmp/files:rw
    restart: always
    ports:
    - 8080:8080
# All quarkus configuration parameters (knobs) could be override through command line.↳
```

(continues on next page)

(continued from previous page)

```

→ You could also use different options to update the configuration parameters. https://quarkus.io/guides/config-reference
  command: ./application -Dquarkus.http.host=0.0.0.0 -Dquarkus.datasource.
→ username=root -Dquarkus.datasource.password='' -Dquarkus.datasource.jdbc.
→ url=jdbc:mysql://correctexam-mysql:3306/correctexam?useUnicode=true&
→ characterEncoding=utf8&useSSL=false -Dquarkus.http.cors=true -Dquarkus.http.cors.
→ origins=https://correctexam.github.io -Dquarkus.http.cors.methods=GET,PUT,POST,DELETE,
→ PATCH,OPTIONS -Dquarkus.http.cors.headers=accept,origin,authorization,content-type,x-
→ requested-with -Dquarkus.http.cors.exposed-headers=Content-Disposition -Dquarkus.http.
→ cors.access-control-max-age=24H -Dquarkus.mailer.from=olivier.barais@univ-rennes1.fr -
→ Dquarkus.mailer.host=partage.univ-rennes1.fr -Dquarkus.mailer.port=587 -Dquarkus.
→ mailer.ssl=false -Dquarkus.mailer.username=olivier.barais@univ-rennes1.fr -Dquarkus.
→ mailer.password=TOCHANGE -Dhipster.mail.base-url=https://correctexam.github.io/
→ corrigeExamFront
correctexam-mysql:
  image: mysql:8.0.20
  volumes:
    - ../../resources/db/migration:/docker-entrypoint-initdb.d
  environment:
    - MYSQL_USER=root
    - MYSQL_ALLOW_EMPTY_PASSWORD=yes
    - MYSQL_DATABASE=correctexam
  command: mysqld --lower_case_table_names=1 --skip-ssl --character_set_server=utf8mb4
→ --explicit_defaults_for_timestamp
#   ports:
#     - 3308:3306
front:
  image: barais/correctexam-front:manifest-arm64v8
#   ports:
#     - 90:80
  volumes:
    - ./exampleconf/exam.conf:/etc/nginx/conf.d/exam.conf
    - ./exampleconf/nginx.conf:/etc/nginx/nginx.conf:ro

```

**exam.conf** and **nginx.conf** could be something like that (you have to update the server name)

**exam.conf**

```

server {
    listen      80;
    listen  [::]:80;
    # server name to change based on your own domain name for your front
    server_name correctexam.barais.fr;

    #charset koi8-r;
    #access_log /var/log/nginx/host.access.log main;

    location /api {
        proxy_pass http://correctexam-back:8080/api;
        proxy_set_header Host $http_host;
    }
}

```

(continues on next page)

(continued from previous page)

```

location /api {
    include proxy_params;
    proxy_pass http://correctexam-back:8080/api;
}

location /management {
    include proxy_params;
    proxy_pass http://correctexam-back:8080/management;
}

location /swagger-ui {
    include proxy_params;
    proxy_pass http://correctexam-back:8080/swagger-ui;
}

location /v3/api-docs {
    include proxy_params;
    proxy_pass http://correctexam-back:8080/v3/api-docs;
}

location /auth {
    include proxy_params;
    proxy_pass http://correctexam-back:8080/auth;
}

location /health {
    include proxy_params;
    proxy_pass http://correctexam-back:8080/health;
}

location / {
    root    /usr/share/nginx/html;
    index  index.html index.htm;
    try_files $uri $uri/ /index.html?$args;
}

#error_page 404                /404.html;

# redirect server error pages to the static page /50x.html
#
error_page 500 502 503 504 /50x.html;
location = /50x.html {
    root    /usr/share/nginx/html;
}
}

```

**nginx.conf**

```
user  nginx;
```

(continues on next page)

(continued from previous page)

```

worker_processes  auto;

error_log  /var/log/nginx/error.log notice;
pid        /var/run/nginx.pid;


events {
    worker_connections  1024;
}


http {
    sendfile on;
    tcp_nopush on;
    tcp_nodelay on;
    keepalive_timeout 1000s;
    types_hash_max_size 2048;

    include      /etc/nginx/mime.types;
    default_type  application/octet-stream;

    log_format  main  '$remote_addr - $remote_user [$time_local] "$request" '
                      '$status $body_bytes_sent "$http_referer" '
                      '"$http_user_agent" "$http_x_forwarded_for"';

    access_log  /var/log/nginx/access.log  main;

    sendfile      on;
    #tcp_nopush    on;

    keepalive_timeout  65;

    gzip  on;
    client_max_body_size 900M;
    client_body_buffer_size    900M;

    include /etc/nginx/conf.d/*.conf;
}

```

### Create a release on docker hub

Next for the front you can use dockerX or create your docker image for the different targeted architecture.

```

docker manifest create \
barais/correctexam-front:manifest-v1 \
--amend barais/correctexam-front:manifest-amd64 \
--amend barais/correctexam-front:manifest-arm64v8
docker manifest push barais/correctexam-front:manifest-v1

```

For the back, create your docker image for the different targeted architecture.

```
docker manifest create \  
barais/correctexam-back:manifest-v1 \  
--amend barais/correctexam-back:manifest-amd64 \  
--amend barais/correctexam-back:manifest-arm64v8 \  
docker manifest push barais/correctexam-back:manifest-v1
```

### 1.1.4 For developers

#### how to contribute ?

We try to follow a gitflow workflow to integrate new contributions. Do not hesitate to read the [gitflow documentation](#) and do pull request. We are welcome to external contributions so do not hesitate even if you are not sure of your new contributions .

Read the *following guide* to setup your own development environment.

#### how to setup your own development environment?

Read the *following guide* to setup your own development environment.