

Introduction

AMC is a software which can be used to generate and score multiple choice exams. The benefit of AMC over other software is that it allows a teacher to create individualized exams for each student (that is, questions appear in different order for each student). After the exam, the response sheets can be scanned and read by AMC and a score allocated.

AMC has greater flexibility than other software, however it requires a basic understanding of Linux and LaTeX and of using .csv files. Given the investment in time required to set it up, it is probably most suitable for those who have large student numbers and who intend to use the system over a number of years. For those who do not have this background knowledge, or who have smaller student numbers, other software (such as [Remark OMR](#)) may be more suitable.

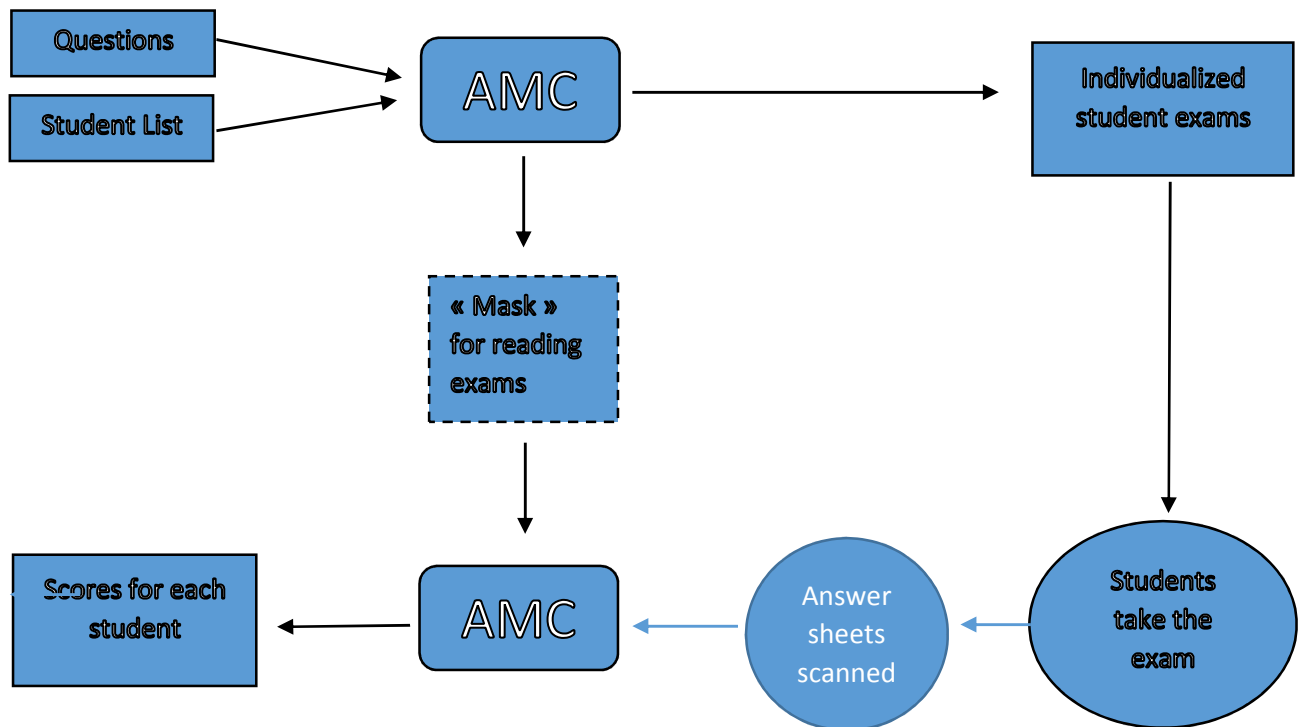


Figure 1: AMC workflow

The basic procedure involves:

1. The teacher generates multiple choice questions (text format) and a student list (csv format)
2. These are imported into AMC
3. AMC creates an individualized exam for each student (in a pdf) and a file which will read the response sheets and identify correct and incorrect responses (called a “mask” – this file is held within AMC and is not viewed by the user)
4. Students take the exam
5. Student answer sheets are scanned (to pdf) and are imported into AMC
6. The individualized answer sheets are automatically compared to the individualized mask by AMC
7. A score for each student is calculated

In this guide we go through each stage in this process step by step. This is a quick start guide, not a [user manual](#). We propose one set of options for AMC (use of a single answer sheet etc.). If you would like to explore the broader range of options for using AMC please consult [the manual](#).

Step 1: Get set up

1(a): Prepare the questions: Multiple Choice Questions can be valid and reliable if the questions are well prepared. For advice on writing good multiple choice questions and answers please consult the teaching portal page on [writing multiple choice tests](#).

1(b): generate a list of students: A list of students should be generated (this can be done within IS Academia). For each student the file should contain a simple ID number, their Sciper ID number, their name, and their email address. The file should be saved with the filename 'students.csv' in csv format with utf-8 encoding (see Annex I for more details).

1(c): access AMC: There are two options for accessing AMC.

- (I) You can load AMC directly onto your desktop or laptop. To do so, you need to be running Linux. To download and see the full list of requirements check the [AMC website](#).
- (II) You can get remote access to the AMC software managed by CAPE. To do so contact pierre-olivier.valles@epfl.ch. More details on how to connect to AMC using this method are provided in Annex II.

Step 2: Enter the questions into AMC

2(a): Entering questions into AMC

In AMC questions can be entered directly through the graphical interface. Details on how to do so are included in the [user manual](#). The Teaching Support Centre has developed a set of scripts which also enable users to enter questions and generate exams. This second approach is described here.

2(a)(i): Write questions in LaTeX. Using a text editor software (e.g. notepad) write your questions in the LaTeX format described in annex III. Write a single question per file. Save the question files into a folder on your desktop with a .tex file extension using UTF-8 encoding.

```

\begin{question}[q:write_the_question_ID_here_without_spaces]
write the question stem here
\begin{responses}
\bonne{write the correct response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\end{responses}
\end{question}

```

Figure 2: Screenshot of a question template in Notepad

2(a)(ii): Transfer the question files onto the AMC server: Using WinSCP, connect to the AMC server and log in with the account details that you have been provided. Your active folder on the AMC

server is called `cape-scripts (/home/username/cape-scripts)`. All the files you use will be within this folder and its subfolders.

In this folder there are three subfolders called `'/exam'`, `'/scans'` and `'/students'`. You will use the `'/exam'` folder for all the preparation of the exam.

Transfer the exam questions into the following folder (for questions in French):

```
/home/username/cape-scripts/exam/questions/fr
```

Transfer the exam questions into the following folder (for questions in English):

```
/home/username/cape-scripts/exam/questions/en
```

2(a)(iii): Configuring the Exam: You now need to tell AMC some details about the organization of the exam so that it can lay out the exam question sheet.

Using WinSCP open the following folder:

```
/home/username/cape-scripts/exam/teachers
```

This contains a folder called `'skel'` which contains templates for the exam information. Copy this folder and rename it with the teacher's name (`/home/username/cape-scripts/exam/teachers/teacher_name`).

Within this folder correct the exam details:

- A. Within the `lang.conf` file, set the language (either `'fr'` or `'en'`)
- B. Within the `prof.conf` file, identify the teacher, the course, the duration the date and the total number of pages for the question sheet

```
PROF_NAME:Ens: teacher_name
EXAM:course title
DURATION:X heures
DATE:day month year
TOTAL_PAGES:X
```

- C. Within the `sections.conf` file, list the question filenames separated by a comma (i.e. the questions previously uploaded). For exams with more than one part, list filenames for each part of the exam on a separate line.

```
mc-01.tex,mc-02.tex
tf-01.tex,tf-02.tex
```

Also transfer into this folder (`/home/username/cape-scripts/exam/teachers/teacher_name`) the `'students.csv'` file which includes the student names (prepared during Step 1(b)).

Finally, Using WinSCP open the following folder, depending on the language of the exam:

For French language exams: `/home/username/cape-scripts/exam/data/fr`

For English language exams: `/home/username/cape-scripts/exam/data/en`

Within this folder is a file called 'first_page.tex', the text of which is included below. This file identifies the content of the first page of the exam which gives instructions to students. The section in red (below) can be altered as per your own exam's requirements.

```

% First page - FRENCH

\noindent
\begin{minipage}[c]{350pt}
  \bf \prof~~~\ExamName~~~\SECTION \\
  ~ \\
  \bf \ExamDate~~~durée : \Time
\end{minipage}
\begin{minipage}[c]{100pt}
  \includegraphics[scale=0.24]{Logo_EPFL}
\end{minipage}

\vfill
\begin{minipage}[c]{\textwidth}
\noindent
\hfill\fontsize{100}{120}{\selectfont{\ID{}}}\hfill
\vspace{1cm}
\par
\noindent
\hfill\fontsize{40}{48}{\selectfont{\NOM{}}}\hfill~
\end{minipage}
\vfill

\noindent
\namefield{SCIPER: {\Large \bf \SCIPER{}} } \\
~ \\
\noindent
\textbf{Attendez le d'ebut de l'\epreuve avant de tourner la page.}
\textbf{Ce document est imprim'e recto-verso, il contient \totalPages\ pages,
les derni\eres pouvant \^etre vides.}
\textbf{Ne pas d'egrafer.}

\medskip
\begin{itemize}
\item[-] Posez votre carte d'\etudiant sur la table.
\item[-] \textbf{Aucun} document n'est autoris'\{e}.
\item[-] L'utilisation d'une \textbf{calculatrice} et de tout outil
\textbf{electronique} est interdite pendant l'\epreuve.
\item[-] Pour les questions \a \textbf{choix multiple}, on comptera:
  \begin{itemize}
    \item [\$+3\$] points si la r'eponse est correcte,
    \item [0] point si la question n'est pas r'epondue ou s'il y a plusieurs
croix,
    \item [\$-1\$] point si la r'eponse est incorrecte.
  \end{itemize}
\item [-]Pour les questions de type \textbf{vrai-faux}, on comptera:
  \begin{itemize}
    \item [\$+1\$] point si la r'eponse est correcte,
    \item [0] point si la question n'est pas r'epondue ou s'il y a plusieurs
croix,
    \item [\$-1\$] point si la r'eponse est incorrecte.
  \end{itemize}
\item[-] Utilisez un \textbf{crayon} et effacez proprement avec une
\textbf{gomme} si n'ecessaire.
\item[-] Respectez les consignes suivantes pour \textbf{marquer vos réponses} :
\end{itemize}

\hfill \includegraphics[scale=0.2]{good_bad_square} \hfill

%% End of first page

```

2(c) Check the formatting of the exam

Now the questions have been written, transferred onto the AMC server and the required details have also been provided. AMC can now generate the student exams.

We recommend that you first generate a test set of exam papers in order to check that the layout is appropriate.

- Connect using PuTTY (as described in annex II).
- Type `'cd /home/username/cape-scripts/exam'` (this will transfer you to this folder)
- Type `'./build project'` (this will build the exam within AMC using the data previously entered)
- Type `'./build check'` (this will check that the LaTeX syntax is correct. If the syntax is not correct you will be told that it is not building correctly. You will then need to review your files to check the LaTeX syntax.)
- Type `'./build sample'` (this will generate a sample exam with the 4 members of the Beatles as student names. The sample exam will be created within the following folder: `'/home/username/cape-scripts/exam/pdf-samples'`).

Check the layout of the exam sample. If there are layout problems these can be rectified by altering the corresponding file for the appropriate question.

If you change any of the LaTeX files that make up the exam, you will need to rebuild the exam using the following command:

```
./build clean project'
```

There are other functions which can be used associated with this 'build' script. These can be identified using the command `'./build help'`.

Step 3: Generating Exam

Once you are happy with the layout of the exam, you can generate an exam with individualized exams for each student.

If you are not already logged in as in Step 2, log in using PuTTY, and type `'cd /home/username/cape-scripts/exam'` (this will transfer you to this folder).

- Type `'./build pdf list'` (this will build both (i) the exam within AMC with a separate exam for each student and (ii) a numbered list of students which can be used to allocate seating in the exam. AMC will also produce a mask for each student that will be used for marking the completed exams, but you will not see this).

Four different files are generated by this process. Three will be found in `'/home/username/cape-scripts/exam/pdf-exams'`. They are:

- A pdf of students' exams (this is the file to be printed)
- A pdf of the correct responses for each student (this should not be printed)
- A log outlining the number of pages generated and number of student exams generated). This can be used to check that the total number of pages generated matches the expected number of pages.

Included in the pdf of the exams is a number of additional/spare exams without student names and sciper. These can be used for students who are not on your initial list.

The fourth file will be found in '/home/username/cape-scripts/exam/pdf-lists'. This is a pdf of numbered list of students (a .csv version is also produced).

Step 4: Print the exam

Depending on the size of the exam (number of pages and number of students) you may need to book printing time with the reprographie service one week in advance.

Please remember that you should maintain the security of your exam pdf when transferring the file for printing (e.g bring on a USB key rather than using email, etc.).

Step 5: Administer the exam

According to exam regulations, students should each be allocated a seat. This can be done using the numbered list of students produced by AMC.

Seats can be allocated by placing an exam on each seat (since AMC produces exams with the student name and allocated number on the front page and there are no questions on the front page).

The exam list can be posted outside the exam hall so that students know to which seat they are allocated.

Step 6: Collect the Papers

According to the exam regulations, the teacher is responsible for ensuring that they collect an exam for each student who has signed in as present in the exam.

For scanning purposes please remember:

- Answer sheets should be sorted into order
- Each sheet should be checked to make sure there are no additional pages/sheets within the answer sheet

For the security of exam questions, you may wish to ensure you have collected all of the exam sheets.

Step 7: Scan the completed exams

Exams can be scanned at any multifunction scanner.

Normally all the exams will be scanned into multipage pdf files, produced with the following scanning parameters:

- 200 to 300 dpi (in French: ppp) quality
- Recto-verso (duplex) if needed
- Greyscale (not black and white)

Step 8: Read the scanned completed exams

- Using WinSCP copy the pdf or pdfs of the completed exams to '/home/username/cape-scripts/scans'.
- Follow the instructions in annex II to open the graphical user interface for AMC (further details on using the AMC graphical user interface are available in the [user manual](#) – please refer to the user manual for any questions).
- In the project menu, chose 'open'. Select the directory in which your exam project is stored – your username should be displayed in the places list. Select this then navigate to 'username/cape-scripts/exam/exams', and click 'OK'.
- A list should be displayed in a new dialogue box with a single project, identified by the teacher's name. Select this and click 'open'.
- Select the 'data capture' tab near the top of the graphical user interface.
- Click on the button marked 'Automatic'. A dialogue box will appear. Select the pdf file that you have uploaded (in '/username/cape-scripts/scans'). Click OK.
- A box should appear telling you that automatic data capture has been completed.

Step 9: Check unclear responses

Upon completion of step 8, a the list of pages which have been read by AMC appears in the 'Data Capture' screen. To identify pages with potentially unclear responses, pages can be sorted using the sensitivity column. Click on 'sensitivity' column header to sort pages. Pages which are listed as having sensitivity of 4.0 or higher should be checked.

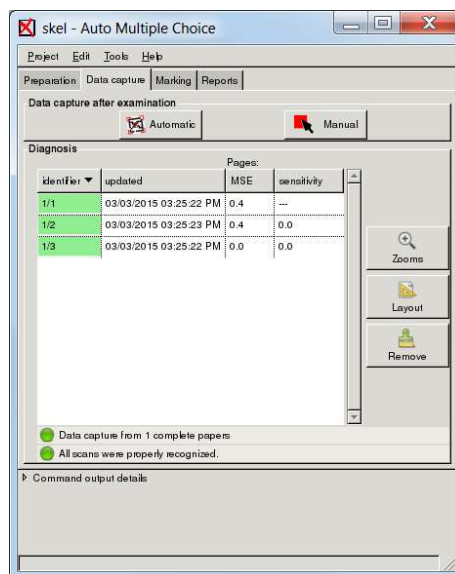


Figure 3: AMC interface, data capture, listing pages which have been read by AMC.

To check a page, select the page from the list of rows, and click the 'zooms' button. This will produce a dialogue box showing which boxes are considered as not having been marked by the student and which are considered as having been marked. For each page, you can manually re-sort the boxes by dragging and dropping.

Step 10: Score the exam

Click on 'Marking' tab near the top of the screen.

Click on the 'Mark' button. Once the marking function has completed, you can click on 'Look at marks' to view marks for each question and student (each student is identified using the ID code assigned to them).

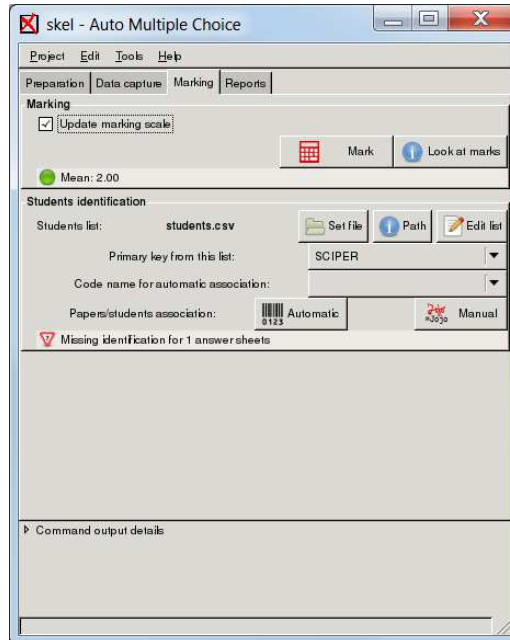


Figure 4: The marking screen

Annex I – Saving student class list

1. Open list of students in IS-Academic and export list as excel file
2. Within Excel, format list to include only the following headings (with title in capitals) ID NOM SCIPER SECTION EMAIL (see screenshot below)
3. Save as Unicode text file (*.txt)
4. The file is now saved with each column separated by a tab. It needs to be re-saved with each column separated by a comma. You can see how to do this [here](#).
5. Save the modified file using utf-8 encoding and with a .csv extension.

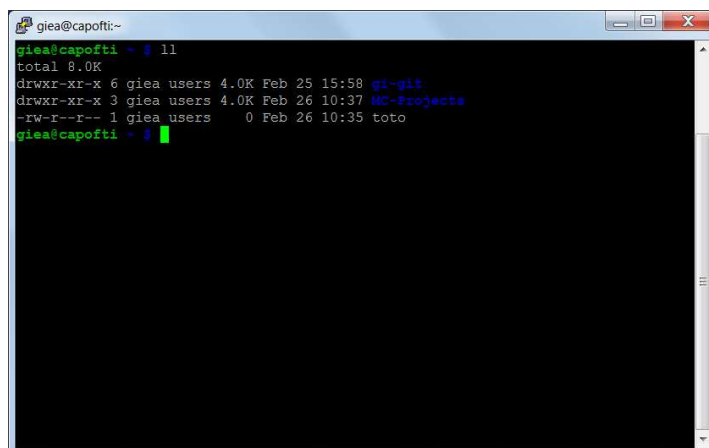
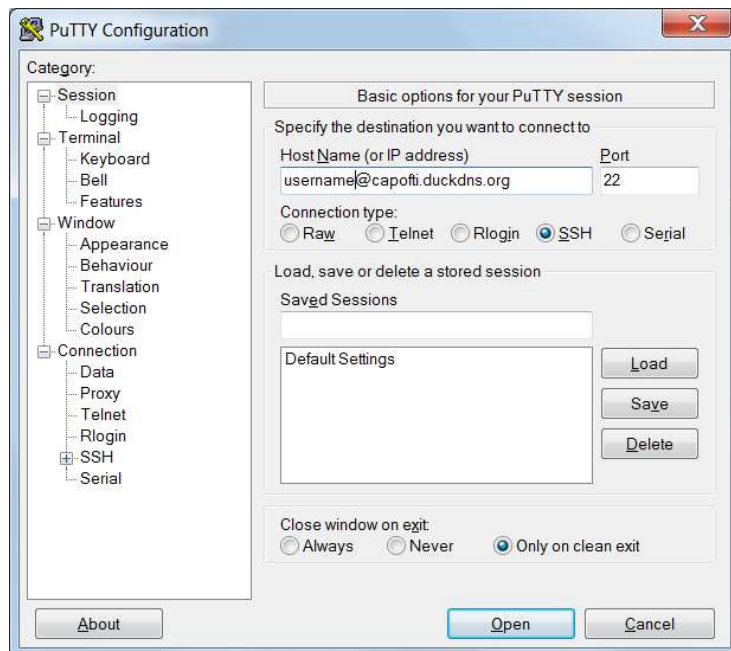
The screenshot shows the Microsoft Excel interface with the following data in the worksheet:

	A	B	C	D	E	F	G
1	ID	NOM	SCIPER	SECTION	EMAIL		
2		1 McCartney Paul	191964	SMA	paul.mccartney@abbeyroad.co.uk		
3		2 Starr Ringo	201969	SPH	ringo.starr@abbeyroad.co.uk		
4		3 Lennon John	231973	SAR	john.lennon@abbeyroad.co.uk		
5		4 Harrison George	298544	GCG	george.harrison@abbeyroad.co.uk		
6							
7							
8							
9							
10							
11							
12							

Figure 5: Student list in excel

Annex II – Remote access to AMC through CAPE

1. Contact CAPE to get a user account activated and a user name and password assigned
2. Ensure you have a ssh client (e.g. PuTTY, can be accessed [here](#)) and an Xserver running on your computer (e.g. Xming can be accessed [here](#) and may have an ssh client provided).
3. Launch the Xserver and run ssh client
4. Under connections, expand SSH and click on X11. In the pop up window enable X11 forwarding.
5. Return to “session” and enter in host name: **USERNAME@capofti.duckdns.org**
6. Click on “open”
7. Accept identification keys of server
8. You will be prompted (black screen with command line, screen shot below) to enter password
9. At the command line enter “auto-multiple-choice”
10. A graphical interface for Auto Multiple Choice will open on your desktop



Annex III – Question template formats

In each of the following templates, please replace the question ID (on line 1), the question stem, the correct response and the incorrect response(s).

Template for single correct answer multiple choice questions

```
\begin{question}{q:write_the_question_ID_here_without_spaces}
Write the question stem here
\begin{reponses}
\bonne{write the correct response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\end{reponses}
\end{question}
```

Template for true/false questions (false)

```
\begin{question}{q: write_question_ID_here_without_spaces}
Write a false statement here.
\FALSE
\end{question}
```

Template for true/false questions (true)

```
\begin{question}{q: write_question_ID_here_without_spaces}
Write a true statement here.
\TRUE
\end{question}
```

Template for questions with multiple correct answers

```
\begin{questionmult}{q:write_question_ID_here_without_spaces}
\AMCnoCompleteMulti
Write the question stem here
\bareme{b=1,m=0}
\begin{choiceshoriz}[o]
\bonne{write a correct response here}
\bonne{write another correct response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\mauvaise{write an incorrect response here}
\end{choiceshoriz}
\end{questionmult}
```