TCExam 12

Software for managing exams, tests, surveys and quizzes.

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TCExam

- TCExam is a Free Open Source Software solution (*CBA - Computer Based Assessment*) to simplify the evaluation process for schools, universities, recruiting firms as well as private and public organizations, allowing professors, teachers and examiners to create, distribute and manage exams, tests, surveys and quizzes.

- Once installed on a server and connected to your computer network, TCExam can be used as a normal Internet Website via a common Web browser (e.g.: *Mozilla Firefox* or *Internet Explorer*).

- Compared to traditional *Pen-and-Paper Testing* (*PPT*), TCExam simplifies the process of evaluation reducing costs and improving quality and reliability of the exams.

TCExam Project

- TCExam project was started in 2004, translated in 24 languages and used all over the world by top universities, schools, private and public institutions, independent educators and research centers.

- TCExam is currently the most commonly used Free CBA Software in the world with more than 180,000 downloads (source *SourceForge.net*).

Exam

- *A set of questions, problems, or the like, used as a mean of evaluating the knowledge, abilities, skills, or performance of an individual or a group.*

- Examinations constitute a fundamental aspect of the teaching and learning process, both in traditional courses as well as e-learning environments, as they provide the necessary information to adapt and improve the activities of teachers and students.

- The frequent use of the evaluation systems can favor the development and the strengthening of the meta-cognitive abilities in the students, but may also behave excessive efforts and costs.

Pen-and-Paper Testing (PPT)

- The traditional examinations with pen and paper (PPT) involve a long trial that must be repeated for every test and it is particularly liable to human errors:

  - preparation;
  - printing on paper;
  - distribution;
  - execution;
  - submission;
  - evaluation;
  - delivery of results;
  - filing.

Electronic Exam

- The **electronic exam** is a test conducted using a *personal computer* (PC) or an equivalent electronic device, in which the responses are electronically recorded and assessed.

- Electronic exams are also know as:

  - *Computer Based Assessment (CBA);*
  - *Computer Based Testing (CBT);*
  - *e-exam;*

- Electronic exams were initially developed more than forty years ago for professional certifications in the IT industry, and progressively evolved to satisfy the most complex evaluation needs.

- Currently more than one billion e-exams are performed every year all over the world.

CBA vs PPT (1)

- Several comparative studies between traditional *Pen and Paper Testing* (**PPT***) and electronic exams* (**CBA**), confirmed by exhaustive literature review[1], found the following:

  – test results are independent of delivery mode;
  – CBA systems are largely preferred by examinees;
  – the level of computer skills does not significantly influence the result of the tests;
  – the use of CBA systems can positively influence the entire learning process.

(1) Vrabel M, "Computerized versus paper-and-pencil testing methods for a nursing certification examination: a review of the literature", Comput Inform Nurs. 2004 Mar-Apr;22(2):94-8; quiz 99-100. Review.

CBA vs PPT (2)

- CBA systems can support the entire cycle of the evaluation process: preparation, distribution, execution, submission, evaluation, delivery of results, and filing.

- Among the main advantages of TCExam over traditional Pen-and-Paper Testing (PPT) there are:

  - increased delivery, administration and grading efficiency;
  - reduced costs for many elements of the testing life cycle;
  - improved test security due to electronic transmission and encryption;
  - consistency and reliability;
  - faster and more controlled test revision process with shorter response time;
  - faster decision-making as the result of immediate grading and reporting;
  - unbiased test administration and grading;
  - fewer response entry and recognition errors;
  - fewer comprehension errors caused by the testing process;
  - improved translation and localization with universal availability of content;
  - new advanced and flexible item types;
  - increased examinee acceptance and satisfaction;
  - evolutionary step toward future testing methodologies..

Key Features

- Flexibility and Configurability
- Open Source Software
- Web-based Architecture
- Internationalization (I18N)
- Accessibility and Usability
- Results and Statistics
- Data Import and Export
- Paper Testing with Optical Mark Recognition
- Multimedia Content
- Unique Tests
- Security

Flexibility and Configurability

- The *TCExam software* has been engineered to offer a high grade of adaptability to a variety of utilization scenarios.

- Numerous configuration parameters allow modeling TCExam to fit your needs.

- The system can be expanded to include new functionalities.

Open Source Software

- The TCExam software is distributed with **GNU-AGPLv3** (*Affero General Public License*) of *Free Software Foundation* for non-commercial use.

- Open Source promotes Software reliability and quality by supporting independent peer review and rapid evolution of the source code.

- The general advantages derived by the adoption of the Open Source model are:

  - **Openness** - visibility of the code avoids vendor lock-in;
  - **Stability** - it is promoted by the wide community of users;
  - **Adaptability** - adoption of Open Standards makes easy to adapt software to other systems;
  - **Quality** - it is promoted by the wide community of users;
  - **Innovation** - everybody has the possibility to add value and provide services;
  - **Security** - security by obscurity is not a secure practice in the

Web-based Architecture

- TCExam is Web-based and developed with LAMP (*Linux, Apache, MySQL or PostgreSQL, PHP*) technology, but can also be installed on different Operating Systems and Web Server.

- User-friendly interface allows you to install and use TCExam by simply connecting one cable to the switch of your computer network. All the computers on the network will be able to use TCExam independently from the client's operating system, with no need to install any additional software or plug-in.

- TCExam is used as a normal Internet Web-site through a common Web browser (i.e.: *Mozilla Firefox, Google Chrome* or *Internet Explorer*).
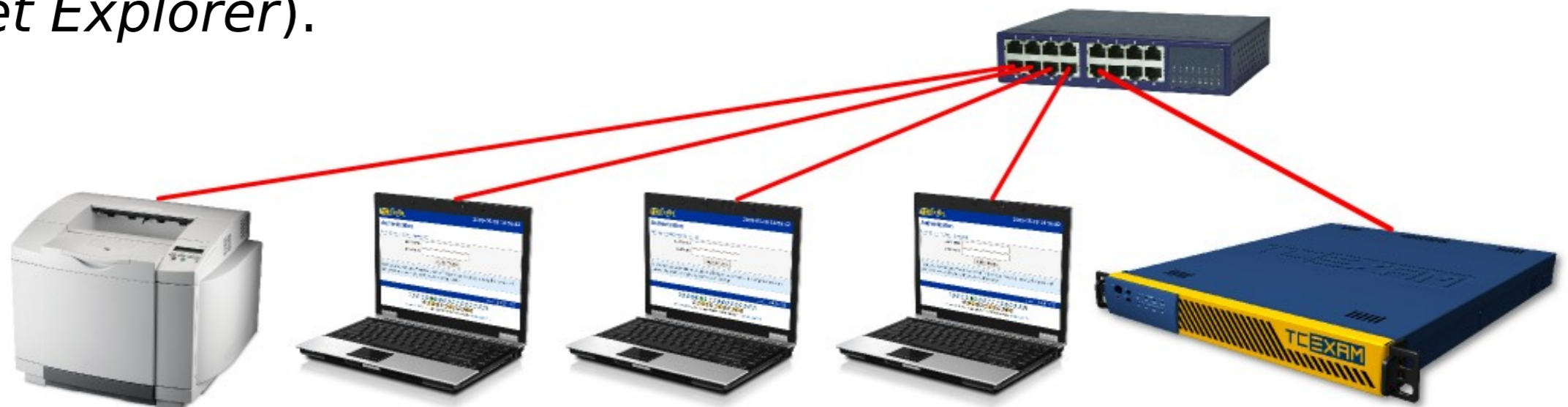
Internationalization (I18N)

- TCExam is language-independent through the adoption of the UTF-8, Unicode and TMX (*Translation Memory eXchange*) standards.

- TCExam supports the Right-To-Left (RTL) languages as Arabic and Hebrew, and currently includes translations in 24 different languages.

- It is possible to instantly switch to a different language by using the special selector set at the bottom of the pages.

AR | AZ | BG | BR | CN | DE | EL | EN | ES | FR | HI | HE | HU | ID | IT | JP | MR | MS | NL | PL | RO | RU | TR | VN

Accessibility and Usability

- It is essential that CBA tools be accessible in order to provide equal access and equal opportunity to people with disabilities.

- TCExam Web interfaces conforms to the **XHTML 1.0 Strict** standard, the guidelines on **Accessibility** (**W3C-WAI-WCAG 1.0**) and **Usability** (*qualitative measure of the interaction between the user and the software application*).

- TCExam is also successfully used by blind people.

Results and Statistics

- TCExam outputs a variety of result pages, enabling various selection filters and providing numerous statistical indexes.

- Results and statistics can be exported into various formats for filing or reworking. Electronic filing offers evident advantages, among which a sensible saving of paper and space.

- Examinees can be immediately informed of their results at the end of the test.

- The results can automatically be sent via email to each examinee.

Data Import and Export

- TCExam uses standard (Open Standard) protocols for data filing and interchange: **TSV** (*Tab Separated Values*), **XML** (*eXtensible Mark-up Language*) and **PDF** (*Portable Document Format*).

- The structure of the database is completely documented to be easily extended or used by external applications.

- It is possible to add custom filters to import data from other systems.

- TCExam supports different remote authentication and single-sign-on protocols: **LDAP** (*Lightweight Directory Access Protocol*), **RADIUS** (*Remote Authentication Dial In User Service*), **CAS** (*Central Authentication Service*), **Shibboleth SSL** and **HTTP Basic**.

Paper Testing with Optical Mark Recognition

- TCExam can generate printable PDF documents for pen-and-paper testing.

- The OMR answer sheets can be scanned and uploaded to TCExam for automatic test importing, scoring and reporting.
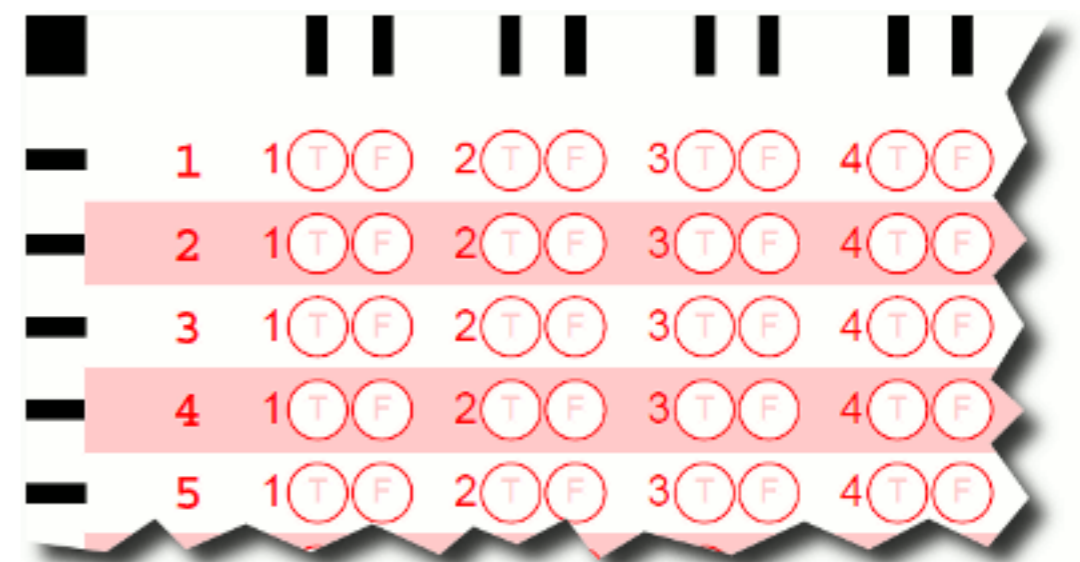
Unique Tests

- In TCExam, questions are grouped into modules and topics. TCExam can store an unlimited number of modules. Each module can contain an unlimited number of topics. Each topic can contain an unlimited number of questions and each question can have an unlimited number of alternative answers.

- TCExam can generate unique tests for each user by randomly selecting and ordering questions and alternative answers.

- This feature drastically reduces or eliminates the chances of cheating on the test.

Modules ▶ **Topics** ▶ **Questions** ▶ **Answers**
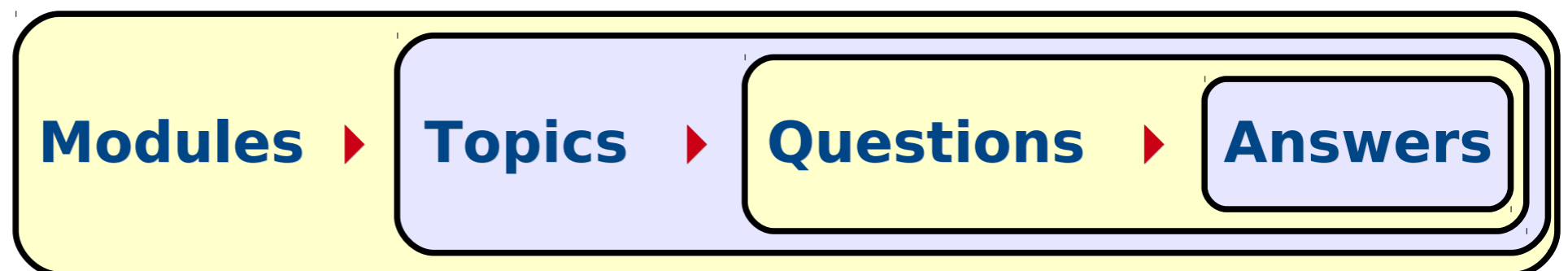
Security

- TCExam can use **SSL** (*Secure Socket Layer*) encryption to guarantee a secure communication through non secure channels (as Internet).

- The Public area and the Administration area of TCExam are physically separated in the filesystem.

- TCExam includes various authentication systems to discriminate the access to the various sections (user / password, access level, user group, IP address).

- The test time is kept by the server. At the end of the allowed time the test is automatically closed.

- The examinees' activity is recorded by the server, including the statistic (i.e. the time of reaction) and security (i.e. the IP address) information.

Structure
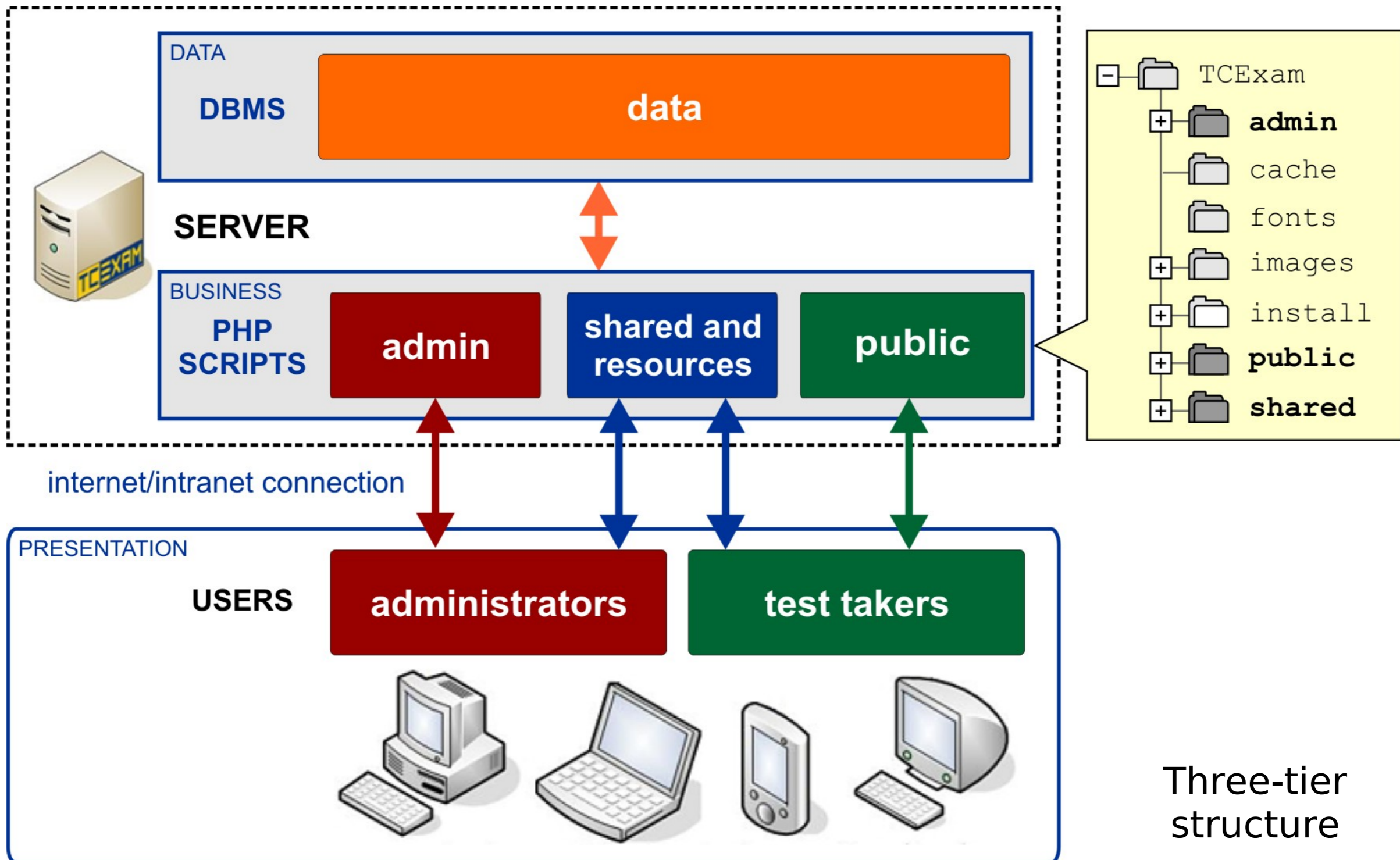
Three-tier structure

User Interface

- The TCExam user interface consists in Web pages accessible via a common Web-browser as *Mozilla Firefox, Google Chrome* or *Internet Explorer*.

- The users can apply their preferences to the Web browser to adapt the TCExam user interface to their needs (for instance modifying the dimension of the window or the text size).
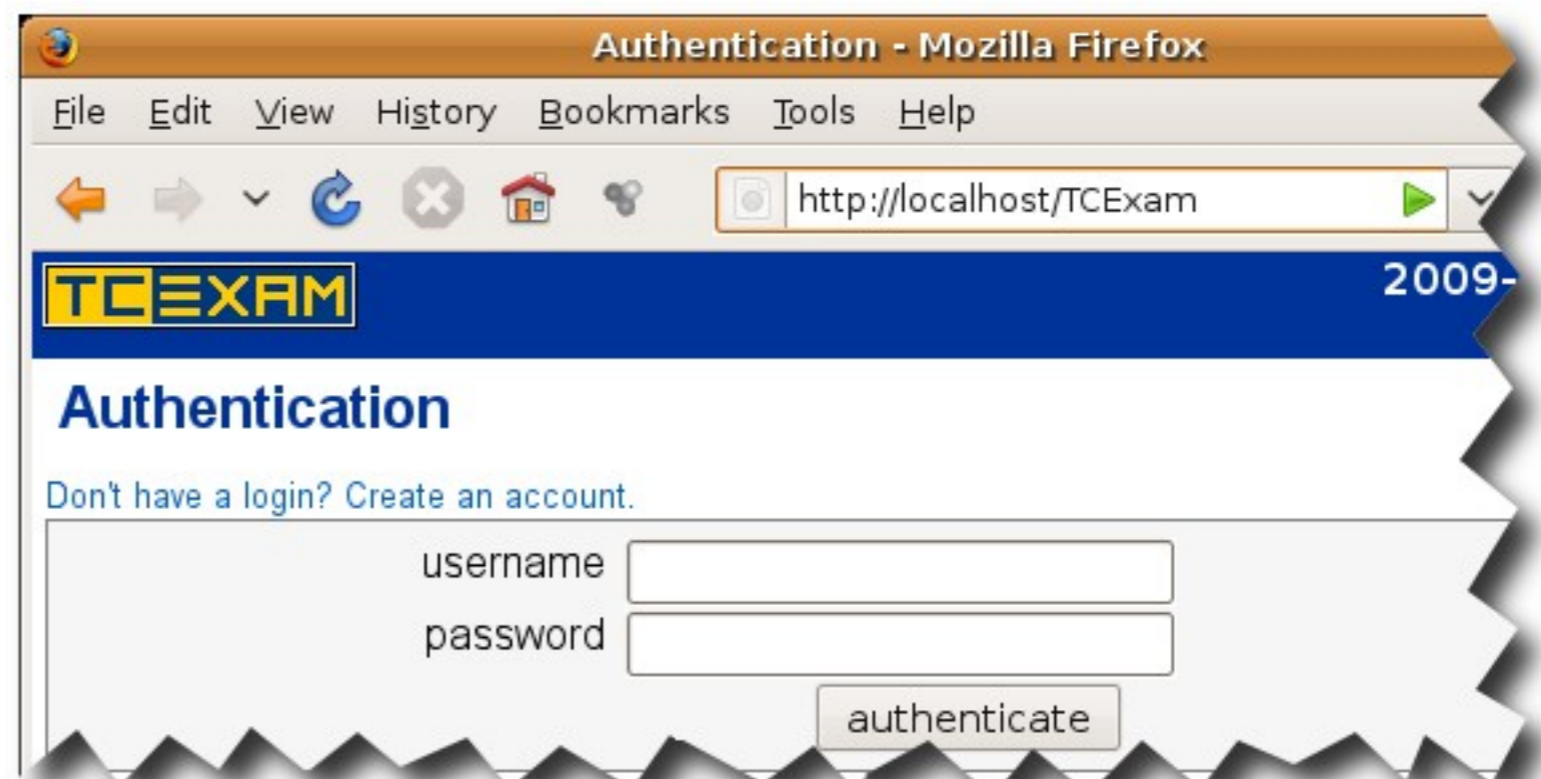
Interface with CSS

- The graphic aspect of the user interface is managed through **CSS** (*Cascading Style Sheets*) that allows to independently manage content and graphic look of the pages.

- The user interface works independently from the graphics of the page and can be read by the screen readers used by blind users.

Public Interface

Administration Interface

Multi-language Interface

Main Functions

- **Users (administrators and examinees)**
  - user and group management
  - account import and export
 - registered and online user selection

- **Question Bank**
  - management of modules, topics, questions and answers
  - management of multimedia files (images, audio, video, ...)
  - selection, import and export

- **Test**
  - test management and selection
  - evaluation of text answers
  - create pen-and-paper tests and import results (OMR)
  - real-time results and statistics with ability to delete, lock, unlock or extend available test time for each examinee
  - export results in multiple formats, including custom formats
  - delivery of results via email

Question Types

- TCExam support 4 basic question types:

  - **MCSA** (*Multiple Choice Single Answer*): The examinee can only specify one correct answer.

  - **MCMA** (*Multiple Choice Multiple Answers*): The examinee may select all answers that apply.

  - **ORDER:** The examinee must select the right order of the alternative answers.

  - **TEXT** (*free-answer questions, essay questions, subjective questions, short-answer questions*): Answer can consist in a word, a sentence, a paragraph or a composition.
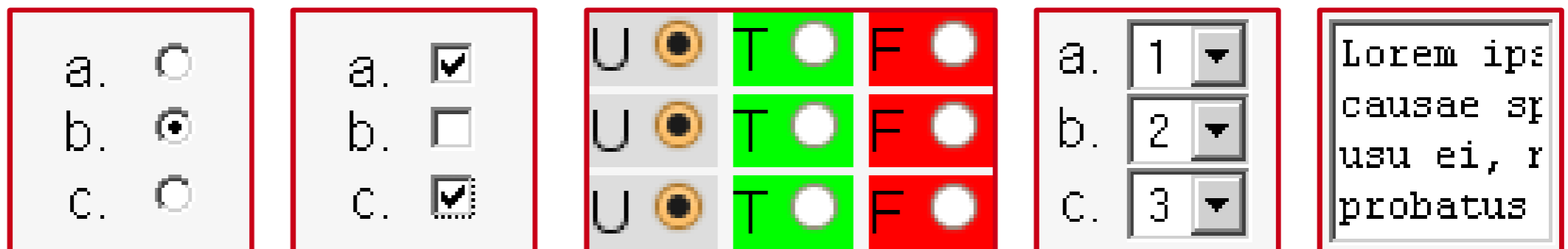
Questions and Answers Options

- Questions and alternative answers can contain text, images, sounds, video, animations, graphic, mathematical formulas and other types of content.

- For each question you can set:
  - an explanation
  - the type (MCSA, MCMA, TEXT, ORDER)
  - the difficulty (an integer from 0 to 10)
  - the visualization order (position)
  - the maximum time of visualization
  - full screen mode
  - the disposition of the alternative answers (vertical or horizontal)
  - the automatic advancement to the next question

- For each alternative answer you can set:
  - an explanation
  - the visualization order or the correct position
  - the keyboard selection key

Test Options

- A test can contain an arbitrary group of modules and arguments. For each of them it is possible to specify the number of questions, the type, the difficulty and the number of alternative answers.

- For each test you can set:
  - name and description
  - start/end date-time of test availability and maximum test duration
  - enabled user groups and IP addresses
  - basic points for correct, wrong and omitted answers
  - minimum points to pass the exam
  - random selection or ordering options for questions and answers
  - option to add the "no answer" as default alternative answer
  - option to display the menu of questions
  - option to display a box to leave a comment to the test
  - option to allow users to display grade results and/or detailed reports
  - test repeatability
  - test password and other advanced options

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