



Intranet Quiz System

Project Proposal

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SIMPLE RELIABLE SOLUTIONS

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1 About This Document

This document is a proposal to build an Intranet Quiz System. It describes the purposes of the system and its proposed budget.

2 General Description

2.1 Product Functions

The intranet quiz system will facilitate sessions of computerized quizzes and examinations. It will support multiple-choice quiz type with mutually-exclusive choices. The quiz sessions will be held in an intranet setting. The system will also automate the generation of the grade report of the quiz.

2.2 User Characteristics

There are generally two types of users to the system: An *instructor* and several *students*. The instructor will provide the system of a quiz, hold the quiz session, and generate a grade report afterwards. During the session, the student answers the quiz questions. Those users will be considered computer-literate and are familiar with the use of a web browser.

2.3 General Constraints

To comply with the existing installed base, the system must be able to run on Windows NT. It must also utilize Oracle Database for its database management software.

The system must be able to serve a moderate sum of simultaneous users – in the order of 150 simultaneous connections – without a significant decrease in performance nor the loss of reliability. It is also imperative that the system is stable, reliable and able to be deployed with minimal efforts.

To simplify deployment and facilitates security, the system will need to be web-based. It is a centralized-processing system which are accessed via a web browser software.

The development time frame will need to be quick. This has the implications that the system will only provide the most necessary features.

Arcle Technologies will build the system using Java-based server-side solutions. These multi-platform technologies have been proven robust, reliable, and stable by many organizations. It has a large installed base and extensive developers support.

3 System Environment

This section describes the environment, in terms of logical and physical surroundings, in which the system is to operate.

3.1 Network Environment

The following diagram illustrates a typical setup of the system when deployed. Minor variations of this setup may be accommodated. One example is to split the quiz server into two separate hardware: the web server and the database server.

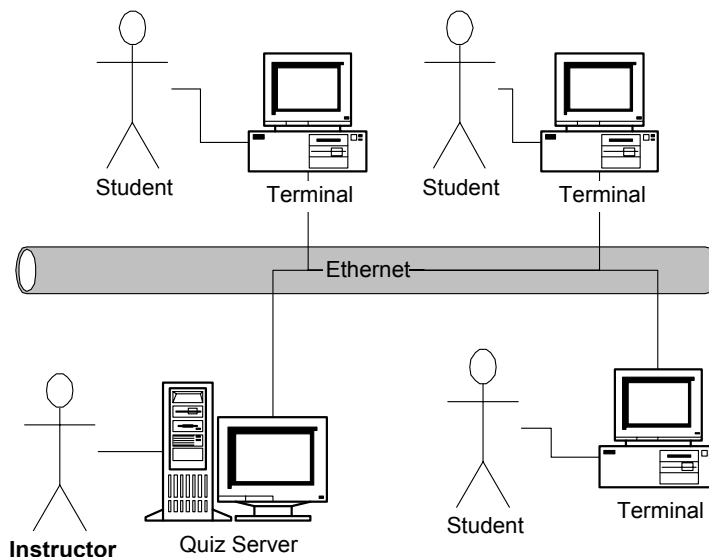


Figure 1 Network deployment diagram.

The instructor controls the quiz server. Each participating student is provided with a computer equipped with a web browser that allows access to the system. A quiz session is to be held in a closed chamber where all of the participating students reside. This way the instructor will be able to supervise the students.

The system is to be deployed in an intranet setting, which is characterized by low-latency and less prone to security attacks. It is possible to allow outside access to the system (i.e., via the Internet), but optimal use of such setups will require additional considerations and security measurements beyond the scope of this project.

3.2 Domain Environment

The following diagram depicts the environment of the problem-domain entities in which the system operates.

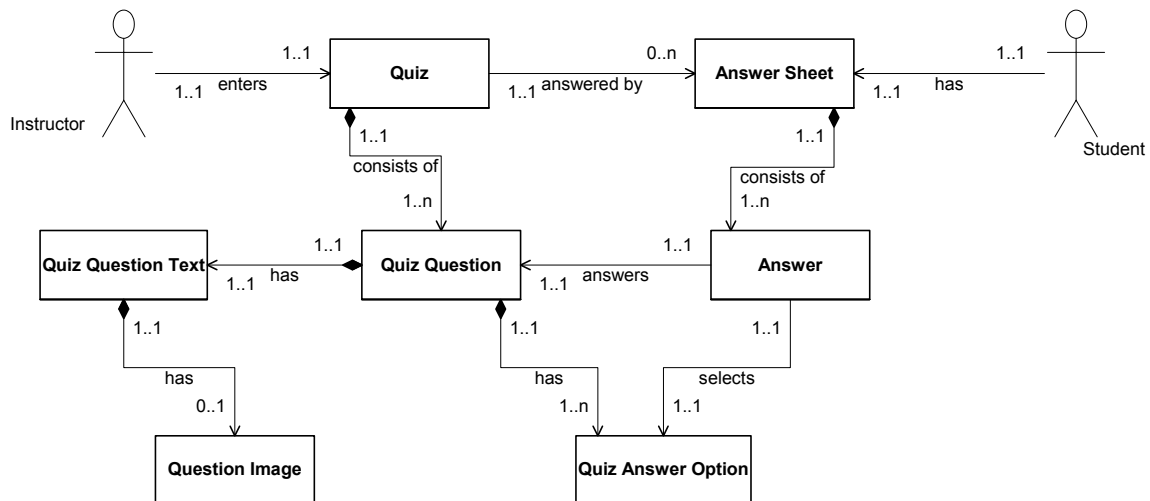


Figure 2 Context diagram of the system

The **Instructor** inputs a **Quiz** into the system. The Quiz consists of several **Quiz Questions**, each possesses a fixed amount of **Quiz Answer Options**, which for each question only one of them is correct. Each Quiz Question has a **Quiz Question Text** which is the question text that is read by the students. Each Quiz Question Text may or may not have a **Question Image** associated with it.

The **Students** answers the quiz through an **Answer Sheet**. The Answer sheet contains instances of **Answers** which signifies for each Quiz Question which Quiz Answer Option that was selected by the student.

4 Functional Requirements

The following diagram depicts the major uses of the system. It elicits major system functions along with the targeted users of those functions.

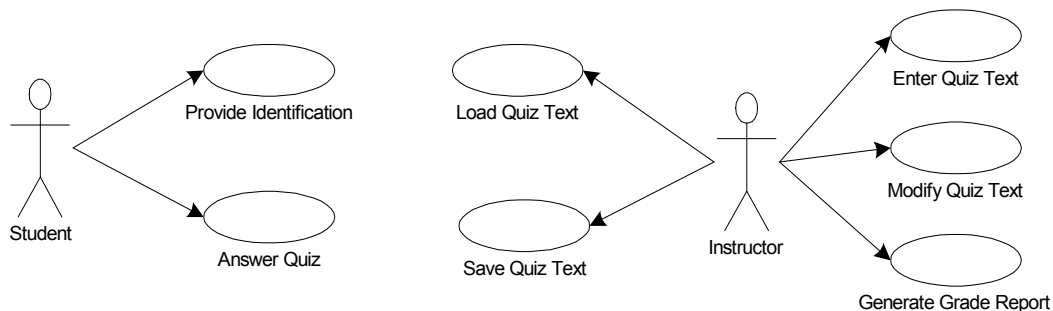


Figure 3 Use cases overview

4.1 Enter quiz text

Prior to the session, the instructor will need to enter the quiz questions. The system will provide a mechanism that allows the instructor to input each of the questions consisting the quiz. The inputs for this functionality are:

- The quiz question.
- The image for the quiz question (when necessary).
- A list of possible answers for each question.
- The correct answer for each question.

4.2 Modify quiz text

After been entered, the instructor is given the option to modify the quiz text. The most probable cause for this requirement is to correct typing errors and/or to improve the clarity of the quiz. The inputs for this functionality are:

- The quiz question.
- The image for the quiz question (when necessary).
- A list of possible answers for the question.
- The correct answer for each question.

4.3 Generate grade report

When the session is complete, the instructor will generate a grade report. This report summarizes the result of the quiz. The information contained in the report are the grade point obtained by each student and statistics

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assessing the grades for all of the students. In particular, the outputs for this functionality are:

- Each student's name.
- Each student's grade.
- Average of all grades.
- Standard deviation of all grades.

4.4 Save quiz text

After being entered to the system, the quiz will need to be able to be stored in a file for later retrieval. This will allow quizzes to be re-used for other sessions. This functionality will output the following information into the file:

- Each quiz question.
- The image for each quiz question in an encoded binary format.
- The list of all of the possible answers for each question.

4.5 Load quiz text

Naturally, the quiz that has been saved will need to again be re-loaded into the system. This will speed up data entry, since the quiz text will not need to be re-typed. The input for this functionality is the encoded file saved from the *Save quiz text* functionality.

4.6 Answer quiz

This is the ultimate functionality of the system: To allow students to take computerized quizzes. The students will see a metaphor very similar to a conventional paper-based quiz. The primary exception is that it is displayed on a computer screen by a web browser. The input for this functionality is the list of answers for each question.

4.7 Provide identification

As common in a traditional quiz, the student is required to write his or her name on the answer sheet. The system will provide analogous functionality. The inputs for this functionality are:

- The answering student's name.
- The answering student's identification code.

5 Project Budget

This section describes the budget that is required to build the system. In order to specify an accountable budget, this section also includes an estimate on the project's size.

5.1 Estimated project size

This section provides an estimate on the size of the project. Size estimation is performed based on the functional points calculation, that is an estimate of the number of functionalities provided by the system.

5.1.1 Function points

The following table lists the estimated functional points in the targeted system. Each requirement is broken down into several measurement parameters, each depicts the associated function points for that particular functionality. The measurement parameters that are used are as follows:

- **Number of user inputs.** A count for each user input that provides distinct application-oriented data to the software. These inputs are distinguished from inquiries, which are counted separately.
- **Number of user outputs.** A count for each user outputs that provide application-oriented information to the user. These outputs include reports, screens, error messages, etc. Individual data items within a report are not counted separately.
- **Number of user inquiries.** The number of distinct on-line input that results in the generation of some immediate software response in the form of an on-line output.
- **Number of tables.** A count for each logical grouping of data that is a part of the database.
- **Number of external interfaces.** A count for all machine-readable interfaces that are used to transmit information to another system.

Functionality	Measurement Parameter	Count	Weighting Factor	Function Point
Enter quiz text	Number of user inputs	4	3	12
	Number of user outputs	2	1	2
	Number of user inquiries	2	1	2

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Functionality	Measurement Parameter	Count	Weighting Factor	Function Point
	Number of tables	2	2	4
Modify quiz text	Number of user inputs	4	3	12
	Number of user outputs	2	1	2
	Number of user inquiries	2	1	2
	Number of tables	2	2	4
Generate grade report	Number of user outputs	4	6	24
	Number of user inquiries	1	1	1
	Number of tables	4	6	24
Save quiz text	Number of user outputs	3	3	9
	Number of user inquiries	1	1	1
	Number of tables	4	3	12
	Number of external interfaces	1	5	5
Load quiz text	Number of user inputs	3	6	18
	Number of user inquiries	1	1	1
	Number of tables	4	3	12
	Number of external interfaces	1	5	5
Answer quiz	Number of user inputs	1	5	5
	Number of user inquiries	1	1	1
	Number of tables	2	3	6
Provide identification	Number of user inputs	2	1	2
	Number of user inquiries	1	1	1
	Number of tables	2	1	2
Total Count				169

5.1.2 Complexity adjustment values

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The following are complexity values¹ tailored to this specific project. Each aspect is rated using a complexity value that scales from 0 (not important nor applicable) to 5 (absolutely essential).

System aspect	Complexity
The system requires reliable backup and recovery	3
Data communications are required	1
The system employs distributed processing functions	0
Performance is critical	5
The system will run in an existing, heavily utilized operational environment	5
The system requires on-line data entry	4
The on-line data entry requires the input transaction to be built over multiple screen operations	4
The master files are updated on-line	4
Complexity of inputs, outputs, files or inquiries	3
Complexity of the internal processing	3
Code designed to be reusable	1
Conversion and installation is included in the design	2
The system is designed for multiple installations in different organizations	0
The application is designed to facilitate change and ease of use by the user	2
Total Complexity	37

5.1.3 Total functional points estimation

The total functional points are calculated using the following formula²:

$$FP = cnt \times (0.65 + 0.01 \times cplx)$$

¹ Arthur, L.J. *Measuring Programmer Productivity and Software Quality*. Wiley-Interscience, 1985.

² Pressman, Roger S. *Software Engineering: A Practitioner's Approach*. McGraw-Hill, 2001.

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cnt: The total count obtained from the table in section 5.1.1.

cplx: The total complexity obtained from the table in section 5.1.2.

With the values $cnt = 169$ and $cplx = 37$ the estimated project size is calculated to be $FP = 172.38$ functional points.

5.2 Cost Estimation

The following table lists the costs required to build the system. Each aspect in the development is considered a separate element cost and requires a distinct fee.

Development aspect	Unit Cost	Units	Aspect Cost
System analysis (\$2/Hr)	\$2.00	6 Hr	\$12.00
System design (\$2.5/Hr)	\$2.50	8 Hr	\$20.00
Project management (\$1.5/Hr)	\$1.50	5 Hr	\$7.50
System construction (\$1.20/FP)	\$1.20	172.38 FP	\$206.86
System deployment (\$2/Hr)	\$2.00	4 Hr	\$8.00
Total development cost			\$254.36
Government tax (15%)			\$44.89
Grand total			\$299.24