# Proposal of the problem

Once developed the system that can obtain questions, the NoGame company has decided to start the Trivial game creation stage. To that end, they have decided to develop a first game that can be used as a traditional desktop application.

The game will take the questions from the question store developed in the first deliverable and will show a graphical user interface where the competitors can play the Trivial Pursuit game. Although the official board is composed of a track with a wheel shape and six spokes, it is possible to define a simplified version where instead of a wheel, the track follows a straight line with an end square. The number of competitors that can participate in each game will be 1..N where N is the number of available colors.

The company wants to store information about the players so each player will have its login name and a password. When the game starts, a configuration screen will be shown where the players can be specified and each player will login. From there, the computer will generate die rolls for each player, it will ask the player to which square he wants to move and it will show him the question that corresponds according to the square’s category.

When a player matches the question of a given category, he is assigned the wedge of the corresponding color and he can follow on playing. If he doesn’t match, the turn goes to the next player. The player that obtains the wedges with all the colors can proceed to the end square. If he matches the question of that square, the game ends and he will be the winner.

The company is very interested to use the game as a learning tool, so they want to have an administrative screen where users with some privileges can obtain information about which users have been playing, how many questions they have matched, which are the most difficult questions, etc.

Given that in the future, the company wants the game to run different platforms (desktops with different operating systems, mobile devices, etc.), they want to experiment with different visual representations. To that end, the company hopes to have a clear separation between the game visualization aspects and the rest of the game functionality like user interaction, or game logic. In fact, they have proposed the developers that the users can modify the application look & feel when they want.

# Methodology employed

The study of the architecture will follow the Attribute-Driven Design (ADD) (Bass, et al., 2003) and the standard of the SEI (ANSI/IEEE 1471, 2000).

# Identification of the stakeholders

The first step is to contextualize the problem and identify the stakeholders.

This project will be named “Trivial Game” (TG), so that the context of references and stakeholders can be determined. The client is a company named NoGame.

In this case, the stakeholders are:

* People in charge of NoGame.
* Development team of the TG.
* Players of the TG.
* Privileged users that can access the game stats.

## People in charge of NoGame

These are the directors of the corporation, in charge of the budget, from which they allocate funds for the project.

They have to ensure that the project remains with a low cost and that can be ended before the given deadline.

## Development team of the TG.

This team will be in charge of developing the system based on the architecture.

Some of their objetives are:

* Low technological intensity of the project, in order to obtain a controlled and predictable development process.
* Profitable project, that is to say, a project that can be developed with the established budget with a rate of profitability that makes it attractive for the development.

# Initial identification of the Quality Attributes

The following quality attributes have been identified:

* **Availability**
  + The system must be played any time 24 – 7.
* **Modifiability**
  + Easy introduction of new question types and puntuation algorithms.
* **Performance**
  + Since it is a end-user application, the application must ensure that:
    - There is no lag in the Graphical User Interface (GUI).
    - The questions must be loaded from the database at a reasonable speed so that the user doesn’t have to wait for them.
* **Security**
  + The stats of the game must be accesible only to privileged users.
* **Testability**
  + The reliability of the system must be easy to test, since it guarantees that the movements of the piece are correctly done.
* **Usability**
  + The system must provide some ways to ease game playing to handicaped people (for example, tooltips for blind people).
* **Reusability**
  + The core game engine must be reusable to develop the same game with different GUIs.
* **Reliability.**
  + The movements of the piece must be correct.

# First approach to the solution

Once the initial requirements have been studied, we choose a solution based on the MVC architecture.

## Risks related to the solution

The system has to face certain risks that have to be identified:

* **Guarantee the reliability of the calculations of the movements.** This is related to the reliability attribute.
* **Time to end movements calculations.** This is related to the performance attribute. All computers must be able to perform the calculations instantaneously for a good user experience.
* **Easiness of acceptance by clients’ computers.** The system must not impose complex configurations in order to be installed or used and must work in different computers and operating systems.

In order to solve the aforementioned tasks, a series of approaches have been proposed:

* **Guarantee the reliability of the calculations of the movements.** Intensive testing must guarantee that all posible movements are correctly calculated.
* **Time to end movement calculations.** A prototype created and tested in different computers showed that any common computer with a processor faster that 1 GHz and more than 512 MB of memory can run the game without any performance issue.
* **Easiness of acceptance by clients’ computers.** The configuration required for installation must be minimal. The parameters required for playing the game must also be minimal, being the board size the only required parameter.

## Impact of the solution

The chosen solution has added new quality attributes, and two new stakeholders: **the players of the TG and the privileged users of the TG.**

These stakeholders have special characteristics, since they have no representatives in the team.

# Updated list of stakeholders

This is the updated list of stakeholders:

|  |  |  |
| --- | --- | --- |
| Code | Stakeholder | Interests |
| ST-01 | People in charge of NoGame | Low development cost:  they have to ensure that the project remains with a low cost and that can be ended before the given deadline. |
| ST-02 | Development team | Ensure to keep the development process controlled and predictable.  Develop the project with the given budget. |
| ST-03 | Players of the TG | Easiness of use and installation.  Reliability in all calculations. |
| ST-04 | Privileged users of the TG | Ease of access to game stats.  Reliability of game stats.  Quantity of game stats. |

Table 1. List of stakeholders and interests

# List of Quality Attributes

The following list of quality attributes is created based on the previous tasks.

|  |  |  |
| --- | --- | --- |
| Code | Description | Type of Attribute |
|  | Availability of the system to be played any time | Availability |
|  | Easy introduction of new questions types | Modifiability |
|  | Scalability of the system, since it may be necessary to eventually change it | Modifiability |
|  | Guarantee a reasonable computation time | Performance |
|  | Guarantee that the GUI has a great responsiveness | Performance |
|  | Easiness to test the reliability of the system, guaranteeing that all calculations are correctly performed. | Testability |
|  | Easiness of use | Usability |
|  | Easiness of use for handicapped people | Usability |
|  | Questions loading time from the database | Performance |
|  | Reusability of the game logic | Reusability |
|  | Accessibility of the game stats | Security |

# Business description of the solution

## Solution

After thorough study of the quality attributes, we found that following the guidelines of the MVC (Model-View-Controller) architecture pattern is the most suitable option.

# Quality scenarios

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Scenario Number | Source of the stimulus | Stimulus | Environment | Artifact | Response | Response Measure | Affected quality attribute |  |
| 1 | New type of question | Introduce the new question type | Exploitation | System | Include the new question type | The included question type must be available in the game and its visualization has to be correct | AT002 |  |
| 2 | Change in the number of players | The number of players has to change | Exploitation | System | Change the number of players. | The game must be able to be played for the decided number of players | AT003 |  |
|  | User click | The user has interacted with the system through the view | Exploitation | View | React to user interaction | The system has to react properly in < 1 ms |  |  |
|  | Questions loading | The system loads the questions from the database. | Exploitation | Questions loader | Load the questions from the database | The questions have to be loaded in < 1 second |  |  |
|  | Need to develop another trivial in another format | The company needs to develop the trivial for other platforms to continue making money | Development | Model | Develop another system reusing the game logic | Another system can be develop using the existing core game engine. |  |  |
|  | Attempt to access game stats | A user tries to access the game stats using his account. | Exploitation |  | Allow access to game stats according to the user’s account type. |  | If the user has an admin / privileged account, he will be able to see the game stats. If not, access is denied. |  |
|  | Easiness of access to game stats | A user tries to access the game stats | Exploitation | Stats module | Provide an easy way to access game stats for privileged users | The user can access game stats in a simple way using only his username and password. |  |  |