In an Online Quiz Application, we'll have various entities and relationships to consider.

Below, I'll outline some of the key entities, their relationships, and related attributes while also considering normalization rules:

1. **User:**

Attributes: UserID (Primary Key), Username, Email, Password, FirstName, LastName, UserType (Admin, Student, Teacher), Profile Picture, Registration Date, etc.

1. **Quiz:**

Attributes: QuizID (Primary Key), Title, Description, Category, CreatorID (Foreign Key referring to UserID(teacher), CreatedDate, etc.

1. **Question:**

Attributes: QuestionID (Primary Key), Text, Type (multiple-choice, true/false, fill in the blank, etc.), Explanation, etc.

1. **Option (for multiple-choice questions):**

Attributes: OptionID (Primary Key), QuestionID (Foreign Key referring to Question), Text, IsCorrect (boolean), etc.

1. **Quiz Attempt:**

Attributes: AttemptID (Primary Key), UserID (Foreign Key referring to User), QuizID (Foreign Key referring to Quiz), Start Time, End Time, Score, Status (In Progress, Completed), etc.

1. **Category (for teachers):**

Attributes: CategoryID (Primary Key), TeacherID (Foreign Key referring to User), CourseID (Foreign Key referring to Course), etc.

1. **Course (for admins):**

Attributes: CourseID (Primary Key), CourseName, Description, TeacherID (Foreign Key referring to User), etc.

1. **Enrollment (for students):**

Attributes: EnrollmentID (Primary Key), StudentID (Foreign Key referring to User), CourseID (Foreign Key referring to Course), EnrollmentDate, etc.

**Relationships:**

1. **User - Quiz Relationship:**

A User can create multiple Quizzes (CreatorID in Quiz refers to UserID).

A User can attempt multiple Quizzes (UserID in Quiz Attempt refers to UserID).

A Quiz can have multiple Quiz Attempts (QuizID in Quiz Attempt refers to QuizID).

1. **Quiz - Question Relationship:**

A Quiz can have multiple Questions.

A Question can belong to only one Quiz.

1. **Question - Option Relationship (for multiple-choice questions):**

A Question can have multiple Options.

Each Option is associated with one Question.

An Option may be marked as correct (IsCorrect).

1. **User – Category Relationship (for teachers):**

A Teacher (User) can have multiple Teaching Assignments.

A Teaching Assignment is assigned to one Teacher (TeacherID in Teaching Assignment refers to UserID).

A Teaching Assignment is related to one Course (CourseID in Teaching Assignment refers to CourseID).

1. **User - Enrollment Relationship (for students):**

A Student (User) can be enrolled in multiple Courses.

An Enrollment is associated with one Student (StudentID in Enrollment refers to UserID).

An Enrollment is associated with one Course (CourseID in Enrollment refers to CourseID).

**Normalization Rules:**

1. \*\*First Normal Form (1NF): Ensure all attributes have atomic values, and each row is unique.

2. \*\*Second Normal Form (2NF): Non-key attributes should be fully functionally dependent on the primary key.

- Review each entity for 2NF compliance, addressing any partial dependencies.

3. \*\*Third Normal Form (3NF): Non-key attributes should not transitively depend on the primary key.

- Examine the entities to eliminate transitive dependencies.

4. \*\*Fourth and Fifth Normal Forms (4NF and 5NF): Depending on your specific requirements, consider further normalization steps, especially if dealing with multi-valued or join dependencies.

Normalization helps structure your database efficiently, ensuring data integrity and reducing redundancy. The above entities and relationships provide a foundation for an Online Inventory Management System, but you may need to adapt and extend them to suit your project's specific needs.