

Abstract

The Online Auction System is a web-based application developed using Spring Boot that enables users to participate in real-time auctions. Registered users can list items for auction, place bids, and automatically determine winners based on the highest bid when the auction ends. The system ensures secure authentication, efficient bid management, and transparent winner selection, making the auction process reliable and user-friendly.

Introduction

With the rapid growth of e-commerce, online auction platforms have become an effective way to buy and sell products competitively. This project aims to develop an Online Auction System that allows users to register, log in, create auction items, and place bids securely. The system automates auction scheduling, bid validation, and winner declaration, reducing manual intervention and ensuring fairness in the auction process.

Key Features

- User registration and authentication
- Role-based access for users
- Create and manage auction items
- Place bids on active auctions
- Automatic auction closing using scheduler
- Highest bid winner selection
- Secure data handling using Spring Data JPA
- RESTful APIs for auction operations

Entities of the Project

1. User

- Stores user details such as username, password, and role
- Manages authentication and authorization

2. AuctionItem

- Represents items listed for auction
- Contains item details, base price, start time, and end time

3. Bid

- Stores bid amount, bidder details, and associated auction item
- Used to track and validate bids

4. Winner

- Stores winner information after auction completion
- Linked to the auction item and highest bid

```
mysql> desc auction_item;
```

Field	Type	Null	Key	Default	Extra
item_id	bigint	NO	PRI	NULL	auto_increment
title	varchar(150)	NO		NULL	
description	text	YES		NULL	
base_price	decimal(10,2)	NO		NULL	
start_time	timestamp	NO		NULL	
end_time	timestamp	NO		NULL	
status	varchar(20)	YES		ACTIVE	
seller_id	bigint	NO	MUL	NULL	

8 rows in set (0.00 sec)

```
mysql> desc bid;
```

Field	Type	Null	Key	Default	Extra
bid_id	bigint	NO	PRI	NULL	auto_increment
bid_amount	decimal(10,2)	NO		NULL	
bid_time	timestamp	YES		CURRENT_TIMESTAMP	DEFAULT_GENERATED
bidder_id	bigint	NO	MUL	NULL	
item_id	bigint	NO	MUL	NULL	

5 rows in set (0.00 sec)

```
mysql> desc winner;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| winner_id | bigint | NO | PRI | NULL | auto_increment |
| item_id | bigint | NO | MUL | NULL |
| user_id | bigint | NO | MUL | NULL |
| winning_amount | decimal(10,2) | NO | | NULL |
| declared_time | timestamp | YES | | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)
```

```
mysql> desc users;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| user_id | bigint | NO | PRI | NULL | auto_increment |
| name | varchar(100) | NO | | NULL |
| email | varchar(150) | NO | UNI | NULL |
| password | varchar(255) | NO | | NULL |
| role | varchar(20) | YES | | USER |
| created_at | timestamp | YES | | CURRENT_TIMESTAMP | DEFAULT_GENERATED |
+-----+-----+-----+-----+-----+-----+
6 rows in set (0.00 sec)
```

Problem Statement

Traditional auction systems are time-consuming and lack transparency. Manual bidding can lead to errors, delays, and unfair practices. There is a need for a secure, automated, and efficient online auction platform that allows users to list items, place bids, and declare winners fairly without manual intervention.

Objectives

- To develop a web-based online auction system
- To allow users to create and participate in auctions
- To automate bid handling and winner selection
- To ensure data security and transparency
- To reduce manual effort in auction management

Modules Description

1. User Module

- User registration and login
- Authentication and authorization

2. Auction Management Module

- Create auction items
- Set base price, start time, and end time
- View auction details

3. Bidding Module

- Place bids on active auctions
- Validate bid amount
- Track bid history

4. Auction Scheduler Module

- Automatically closes auctions at end time
- Triggers winner selection

5. Winner Management Module

- Determines highest bidder
- Stores and displays winner details

Entities with Attributes

User

- userId
- username
- password
- role

AuctionItem

- itemId
- itemName
- description
- basePrice
- startTime
- endTime

Bid

- bidId
- bidAmount
- bidTime
- userId
- itemId

Winner

- winnerId
- userId
- itemId
- winningBidAmount

Relationships:

- One User can place many Bids
- One AuctionItem can have many Bids
- One AuctionItem has one Winner
- Winner is linked to User and AuctionItem

```

mysql> SELECT * FROM users;
+-----+-----+-----+-----+-----+-----+-----+-----+
| user_id | name | email | password | role | created_at | created | seller_id |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | Ravi Kumar | ravi@gmail.com | pass123 | SELLER | 2026-01-20 10:15:22 | 2026-01-20 10:15:22 | 
| 2 | Anjuli Shama | anjali@gmail.com | pass123 | USER | 2026-01-21 10:16:20 | 2026-01-20 10:16:01 | 
| 3 | Rahul Verma | rahul@gmail.com | pass123 | USER | 2026-01-24 10:16:20 | 2026-01-29 10:16:45 | 
| 4 | Priya Singh | priya@gmail.com | pass123 | USER | 2026-01-20 10:17:20 | 2026-01-20 10:17:30 | 
| 5 | Admin | admin@gmail.com | admin123 | ADMIN | 2026-01-20 10:18:20 | 2026-01-20 10:18:00 | 
+-----+-----+-----+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)

mysql> SELECT * FROM auction_item;
+-----+-----+-----+-----+-----+-----+-----+-----+
| item_id | title | description | base_price | start_time | end_time | status | seller_id |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | iPhone 14 Pro | Apple iPhone 14 Pro 128GB | 70000.00 | 2026-01-25 | 2026-01-30 10:00 | ACTIVE | 1 |
| 2 | MacBook Air M | Apple MacBook Air M1 8GB RAM | 85000.00 | 2026-01-24 | 2026-01-29 09:00 | CLOSED | 1 |
+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)

mysql> SELECT * FROM bid;
+-----+-----+-----+-----+-----+
| bid_id | bid_amount | bid_time | bidder_id | item_id |
+-----+-----+-----+-----+-----+
| 1 | 72000.00 | 2026-01-25 | 11:10:00 | 2 |
| 2 | 75000.00 | 2026-01-25 | 12:15:30 | 3 |
| 3 | 78000.00 | 2026-01-25 | 13:45:10 | 4 |
| 4 | 87000.00 | 2026-01-26 | 10:20:00 | 2 |
| 5 | 90000.00 | 2026-01-26 | 12:40:20 | 2 |
+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)

mysql> SELECT * FROM winner;
+-----+-----+-----+-----+-----+
| winner_id | item_id | user_id | winning_amount | declared |
+-----+-----+-----+-----+-----+
| 1 | 2 | 95000.00 | 95000.00 | 2026-01 |
+-----+-----+-----+-----+-----+
1 rows in set (0.00 sec)

```

Future Enhancements

- Online payment gateway integration
- Real-time bidding using WebSockets
- Email/SMS notifications
- Admin dashboard for monitoring auctions
- Auction analytics and reports
- Mobile application support