# Screen Sketches

# Crypt of the Cubes

## 3rasel6

John Draa

Yingxuan Ye

Alexandra Alter

# Actors and Functionality

**Actor 1 - Game Player**
- Sign up/sign in

- Browse character catalog; unlock & select character

- Start/join match (WebSocket); send inputs

- Receive state updates; earn coins/score

- View personal stats and leaderboards

**Actor 2 - Developer**
- **Frontend:**
  Build and test player UI (login, character select, shop, in-match).
  Handle inputs, animations, and WebSocket events.

- **Backend:**
  Implement APIs and game logic for accounts, progress, and matches.
  Manage database schema and ensure data consistency.

- **Shared:**
  Configure map settings and balance character stats.
  Inspect logs and metrics to verify system performance.

**Actor 3 - Admin / Moderator**
- Manage accounts (deactivate/ban, reset password)

- Seed/update/deactivate characters (cost/stats/active)

- Adjust user_progress (coins/score) for support cases

- Review leaderboard anomalies; roll back obvious cheats

- Run maintenance tasks (reseed, sanity checks)

# Non Functional Requirements

## 1) Real-time Performance
- Server update rate: 20 Hz (every 50 ms).

- Tick budget: ≤10 ms per tick.

- Avg outbound update: ≤2 KB per player per tick.

## 2) Fairness & Data Integrity
- Server-authoritative damage/coins/score.

- DB constraints (FK/unique) on accounts, progress, unlocks.

## 3) Stability
- Concurrency target: up to 10 matches × 4 players = 40 players.

- During a 10-minute session: ≤2% 5xx, no hard crashes.

- Backpressure: reject new lobbies if activeMatches ≥ 10 or CPU >70% or DB pool >80%.

# Tables and Fields

**1) accounts** 1–1 user_progress, 1–N user_character_unlocks, 1–N match_participants, 1–N matches (as winner), N–N characters (via unlocks)
- `Int id` - PK
- `String email` - unique
- `String username` - unique
- `String password` - write-only

**2) user_progress** 1–1 accounts
- `Int id` - PK
- `Int account_id` - FK → accounts.id (unique)
- `Int coins` - coins earned in matches
- `Int total_score` - score earned in matches
- `LocalDateTime created_at` - timestamp
- `LocalDateTime updated_at` - timestamp

**3) characters** 1–N user_character_unlocks, 1–N match_participants, N–N accounts (via unlocks)
- `Int id` - PK
- `String code` - unique (stable key)
- `String name` - character name
- `Int cost` - cost in coins
- **Stats:** `Int health`, `Int move_speed`, `Int attack_speed`, `int damage_mult`, `Int crit_chance`
- `Int range_units` - attack range
- `Enum attack_style` - {CONE, PROJECTILE, AOE, ORB}

**4) user_character_unlocks** N–1 accounts, N–1 characters
- `Int id` - PK
- `Int account_id` - FK → accounts.id
- `Int character_id` - FK → characters.id
- `LocalDateTime unlocked_at` - timestamp
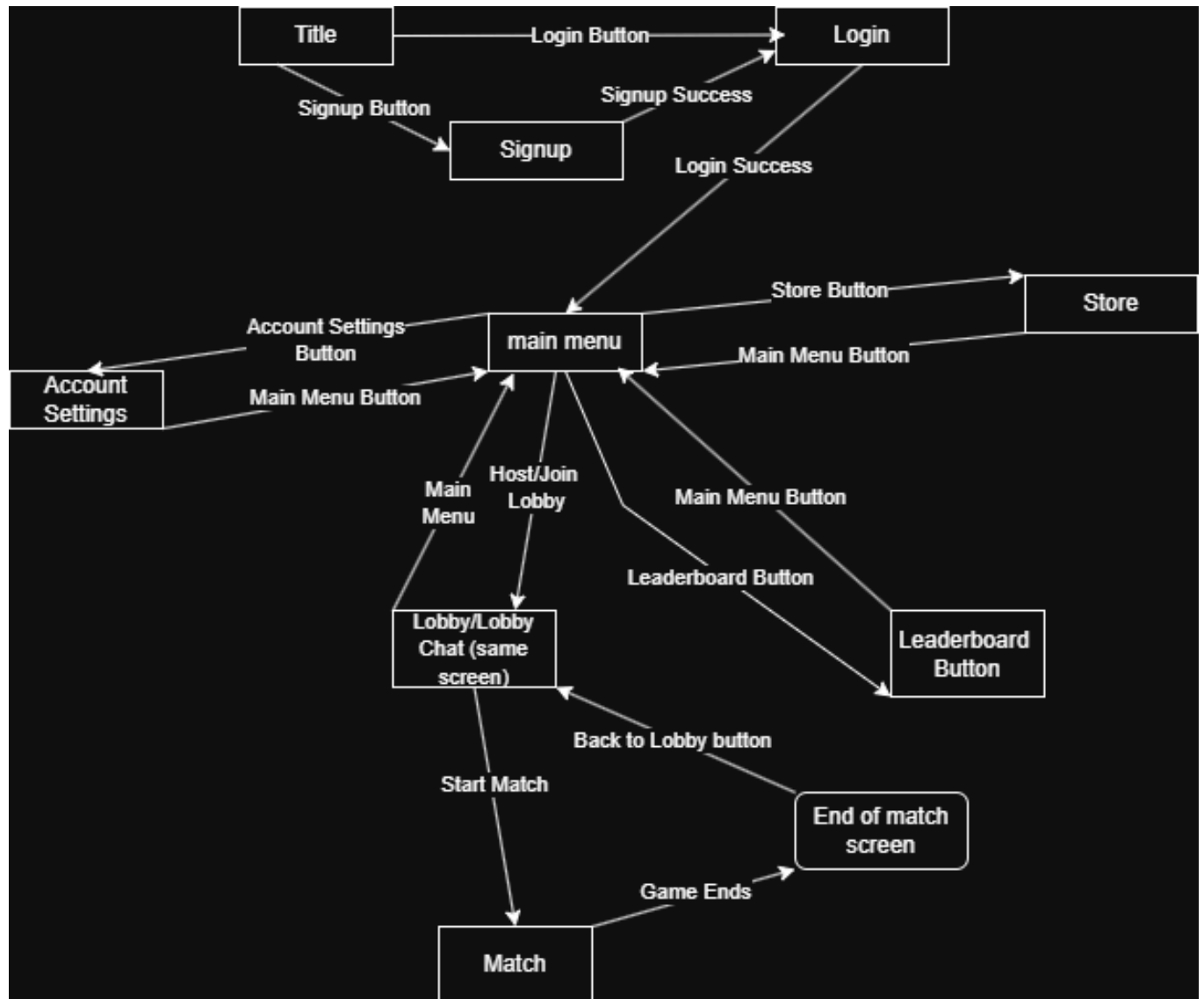- **unique pair:** (`account_id`, `character_id`)

**5) matches** 1–N match_participants, N–1 accounts (winner)
- `Long id` - PK
- `Enum status` - {STARTED, ENDED, ABORTED}
- `Int winner_account_id` - FK → accounts.id (filled by time_alive winner)
- `LocalDateTime created_at`, `ended_at` - timestamps

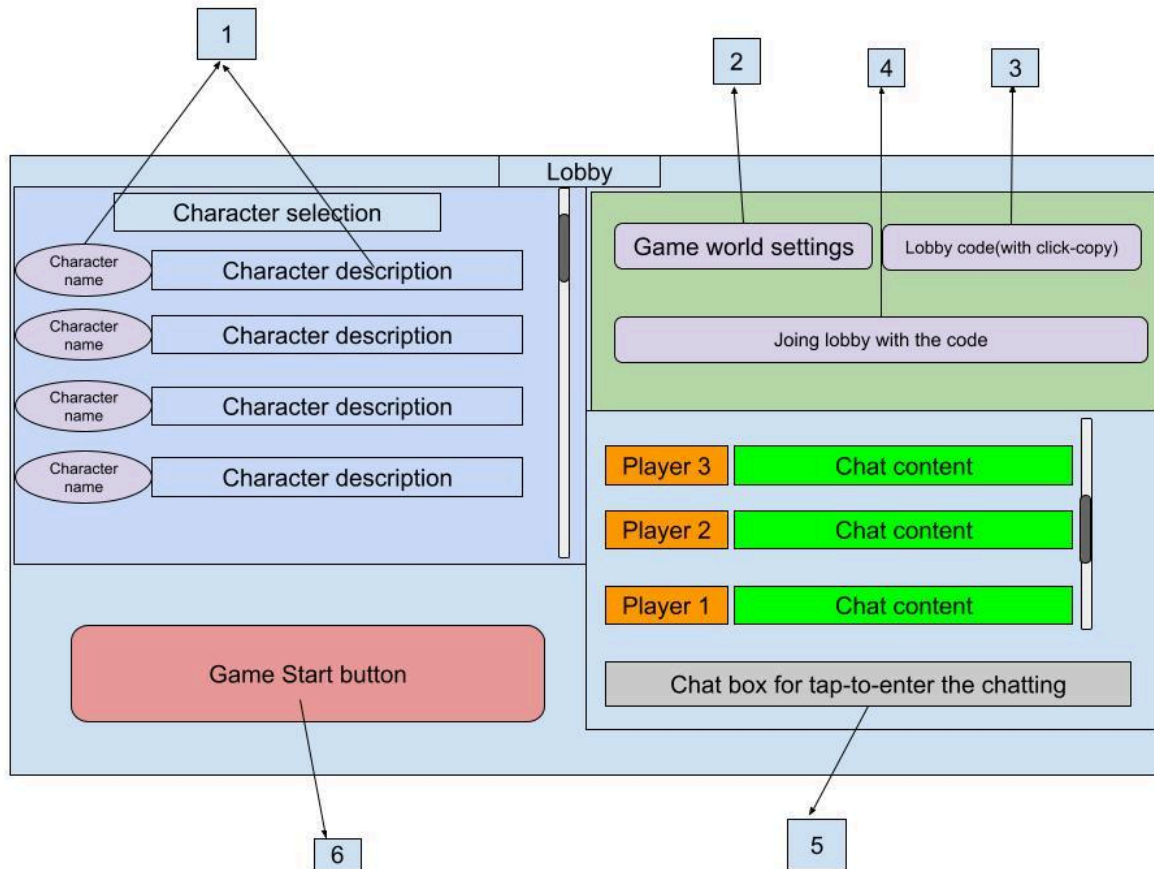**6) match_participants** N–1 matches, N–1 accounts, N–1 characters
- `Long id` - PK
- `Long match_id` - FK → matches.id
- `Int account_id` - FK → accounts.id
- `Int character_id` - FK → characters.id
- **results:** `Int score`, `Int coins_earned`, `Int kills`, `Int time_alive_ms` *(winner = max time_alive_ms; tie → higher score)*
- **unique pair:** (`match_id`, `account_id`)

# Screen Flow

# Host/Join Lobby Screen #1

## Yingxuan Ye



The lobby is the interface displayed to users/hosts after clicking "Start Game" at main menu.

The left section features character selection, including character icons (if available), names, and basic stats/descriptions. The "Character Name" and "Character Description" fields are planned to be covered by a large transparent button(**1**). When a user clicks this corresponding character area, the character will be selected and a status request sent to the server. The server will then lock this button, preventing other players from selecting the same character (this feature applies only to characters purchased through the store; selecting the default character will not trigger this request).
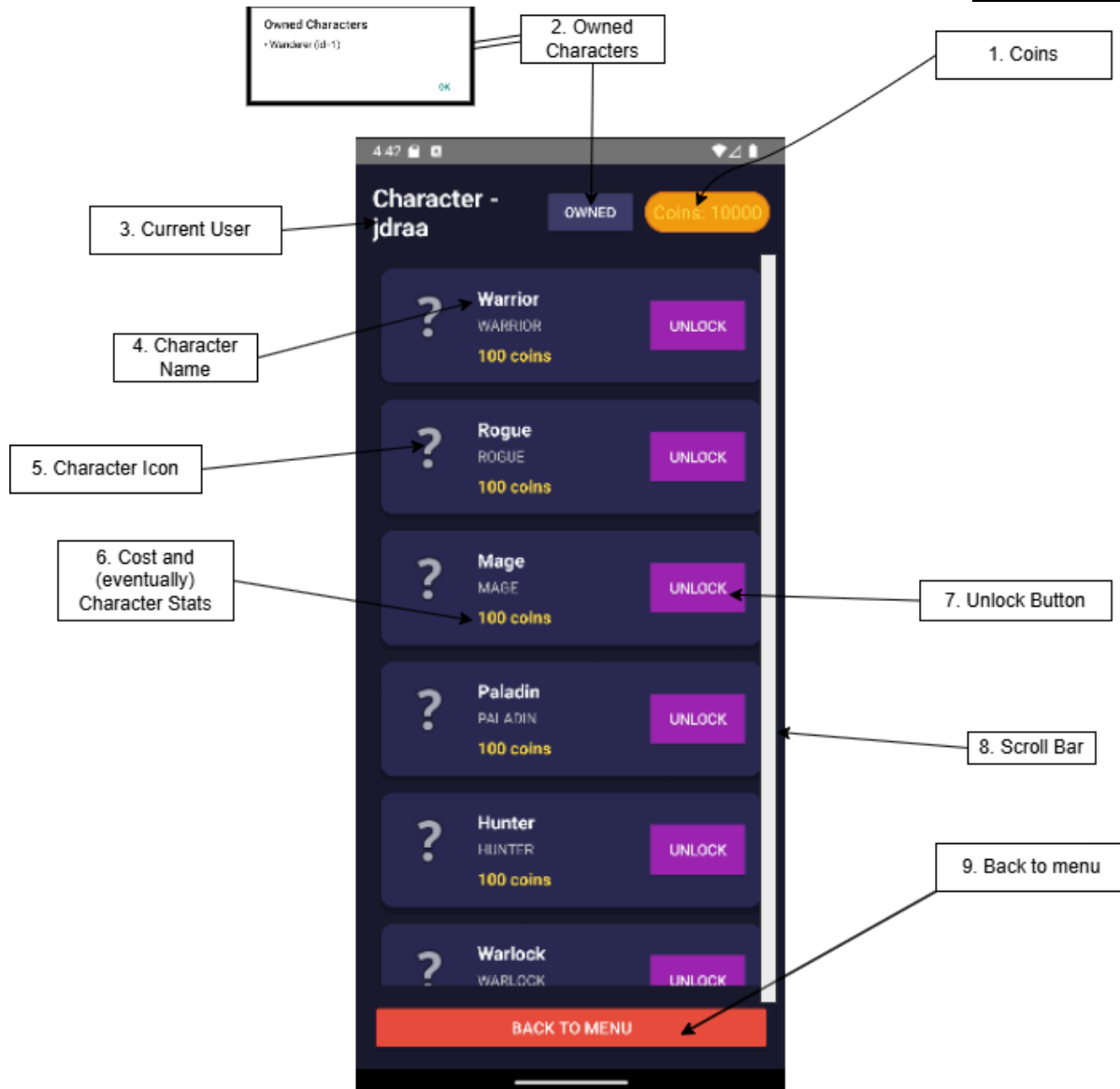
The upper right section contains the world settings entry button (for adjusting difficulty)(**2**), lobby invitation code display/copy(**3**), and the joined copied lobby code(**4**). The lobby code(**3**) button displays the current lobby's invitation code and automatically copies it when clicked. The join lobby button(**4**) attempts to recognize the last copied information on the device upon click; if it is a valid lobby code, it will automatically pull the user into the lobby.

The lower right section is the lobby chat interface where players can communicate(**5**). Once all players have selected their characters, the "Game Start" button(**6**) in the lower left corner becomes active.

The host can then lead players into the game (consider changing this button to 'Ready' instead of "Start Game" when joining as a guest which is non-host).

# Store Screen #2

John Draa

**Owned Characters**
• Wanderer (id=1)

OK

2. Owned Characters

1. Coins

4:42

Character - jdraa

OWNED    Coins: 10000

3. Current User

Warrior
WARRIOR
100 coins
UNLOCK

4. Character Name

Rogue
ROGUE
100 coins
UNLOCK

5. Character Icon

Mage
MAGE
100 coins
UNLOCK

7. Unlock Button

6. Cost and (eventually) Character Stats

Paladin
PALADIN
100 coins
UNLOCK

8. Scroll Bar

Hunter
HUNTER
100 coins
UNLOCK

9. Back to menu

Warlock
WARLOCK
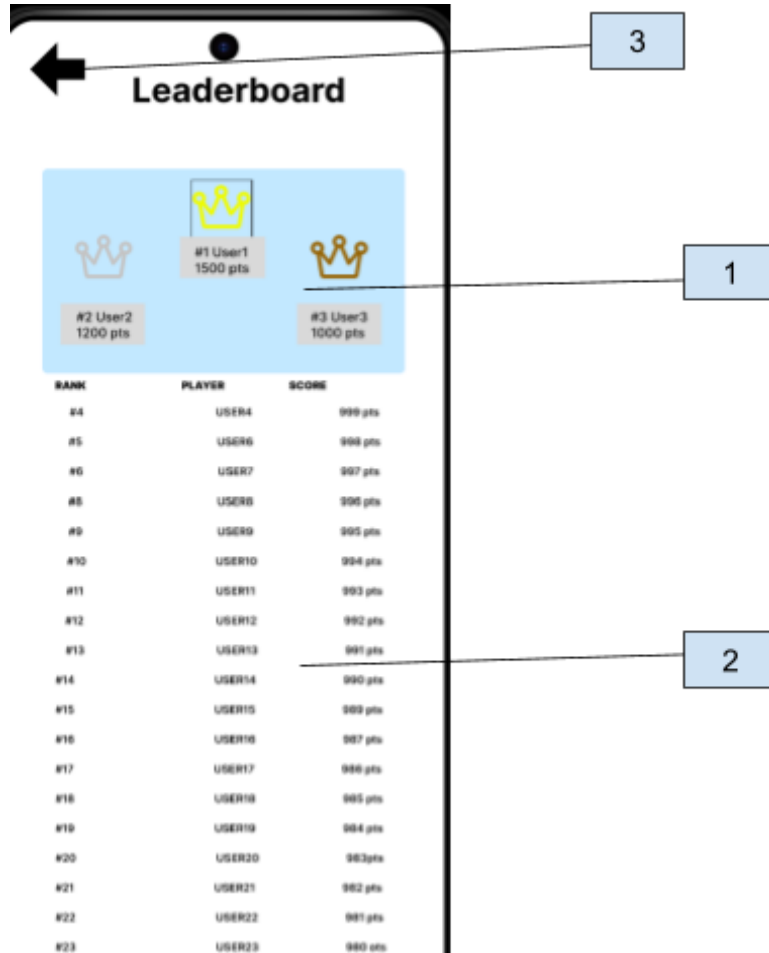UNLOCK

BACK TO MENU

      The store screen allows users to purchase characters via unlock button(7), as well as view which characters they own(2) and how many coins are in their account(1). The current user is shown in the top left(3).

      The character "blocks" consist of 3 items other than the unlock button. The first is the character name(4). The next is the character icon(5), which will eventually be replaced with something representative of the characters rather than just a question mark. The last item in the character blocks is how much each character costs (6), and eventually each characters' stats: health, movement speed, attack speed, damage, and critical chance. There is also a scroll bar (8) to scroll through the list of characters, and a button to go back to the main menu(9).
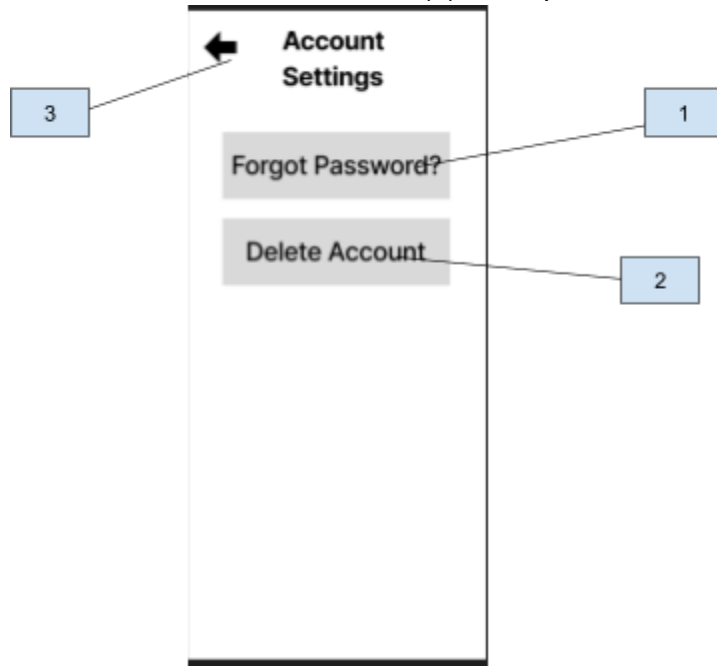
Leaderboard Screen Alexandra Alter

Allows for the user to see the rankings of the top 50 players. (1) The players that have the top 3 highest scores will appear here. (2) Players will be able to scroll to see the users and scores of the rankings 4 through 50. (3) when the user is done looking at the leaderboard they can click the back button which takes the user to the main menu.



**Leaderboard**

| 3 |

#1 User1
1500 pts

#2 User2
1200 pts

#3 User3
1000 pts

| 1 |

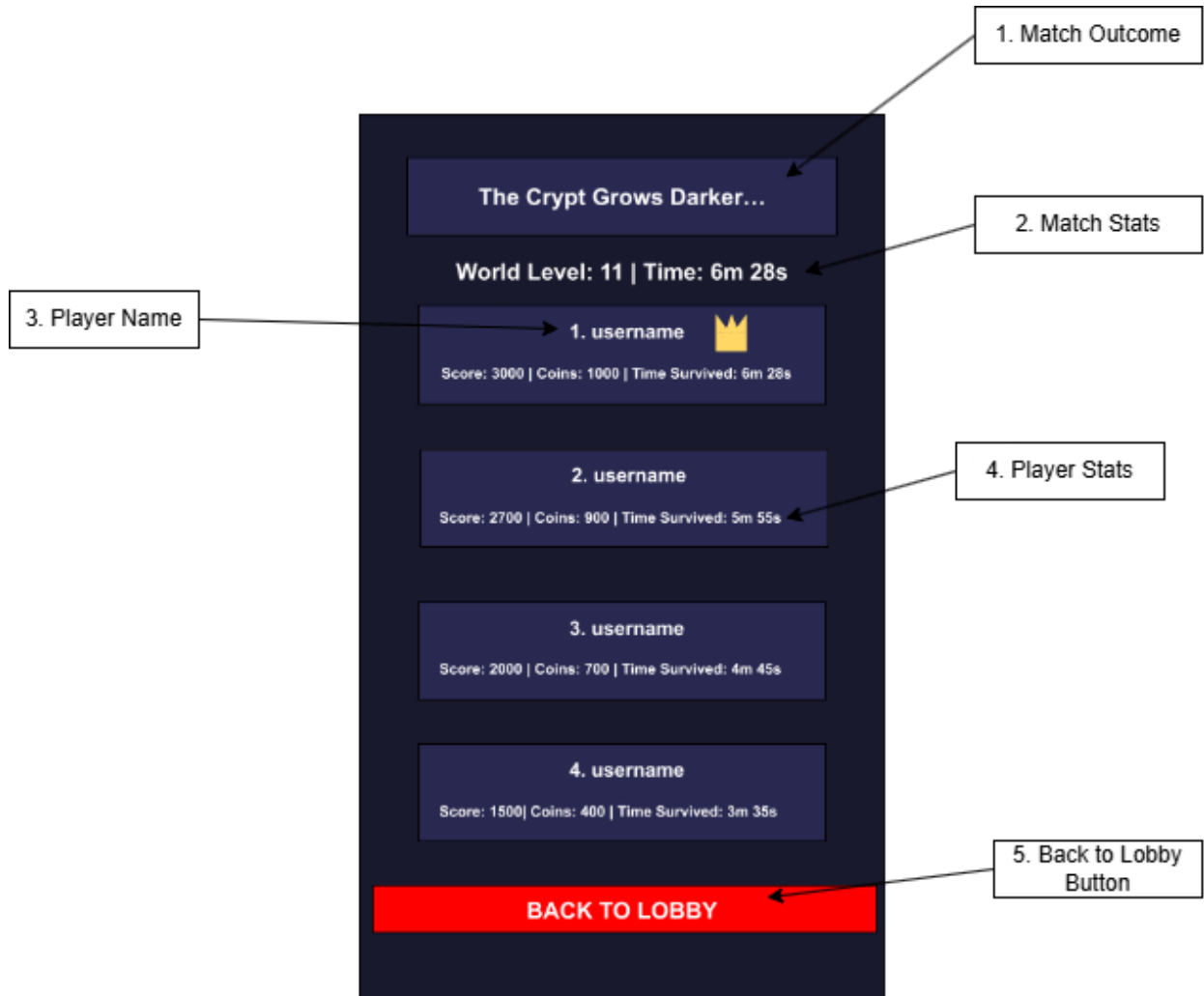| RANK | PLAYER | SCORE |
|------|--------|-------|
| #4 | USER4 | 999 pts |
| #5 | USER6 | 998 pts |
| #6 | USER7 | 997 pts |
| #8 | USER8 | 996 pts |
| #9 | USER9 | 995 pts |
| #10 | USER10 | 994 pts |
| #11 | USER11 | 993 pts |
| #12 | USER12 | 992 pts |
| #13 | USER13 | 991 pts |
| #14 | USER14 | 990 pts |
| #15 | USER15 | 989 pts |
| #16 | USER16 | 987 pts |
| #17 | USER17 | 986 pts |
| #18 | USER18 | 985 pts |
| #19 | USER19 | 984 pts |
| #20 | USER20 | 983pts |
| #21 | USER21 | 982 pts |
| #22 | USER22 | 981 pts |
| #23 | USER23 | 980 pts |

| 2 |

Account Settings Alexandra Alter

Allows the user to make modifications involving their account. (1) if a user wants to change their password they press this and they will be taken to a page where they can insert their username and insert a new password. (2) if the user wants to delete their account they press this button and they will be taken to a page where they insert their account information and it will delete the account details from the server. (3) when pressed the user will be taken to the login screen.

# End of Match Screen #5

John Draa

1. Match Outcome

2. Match Stats

3. Player Name

4. Player Stats

5. Back to Lobby Button

**The Crypt Grows Darker...**

**World Level: 11 | Time: 6m 28s**

1. username

Score: 3000 | Coins: 1000 | Time Survived: 6m 28s

2. username

Score: 2700 | Coins: 900 | Time Survived: 5m 55s

3. username

Score: 2000 | Coins: 700 | Time Survived: 4m 45s

4. username

Score: 1500| Coins: 400 | Time Survived: 3m 35s

**BACK TO LOBBY**

The end of match screen is what players will see once a match has ended, either by reaching the set world level number, or by having one player left alive in endless mode. The title shows the match outcome (1), and in this example the message is for the end of endless mode or if the players failed to reach the specified world level in fixed mode; it will be a more positive message if the players successfully reach the specified world level in fixed mode. Right under the match outcome will be the results of the match (2), which will display what world level was reached and how long the match lasted for. Each player block will have two items. The first is the username and rank of the match (3), and will have a crown next to the best player (most score or survived longest). The other item will be the player's statistics for the match (4), showing what score they received, how many coins, and how long they were alive for. The last button will return the players to the lobby (5).