Casino Database

NoSQL and data proccessing course work

2025

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Casino Database: Entity Descriptions and OLTP Schema

# 1. Entity Descriptions

## player

Represents casino players.  
Attributes: email (PK), first\_name, last\_name, dob, phone, registration\_date, loyalty\_points.  
Relationships:  
- Plays games (player\_game)  
- Uses slot machines (slot\_play)  
- Redeems rewards (player\_reward)  
- Makes transactions (transaction)  
- Logs in (login\_history)

## staff

Represents casino staff members.  
Attributes: staff\_email (PK), first\_name, last\_name, position, hire\_date, salary.  
Relationships:  
- Assigned to tables (staff\_assigned\_tables)  
- Performs auditable actions (audit\_log)

## casino\_location

Represents physical casino branches.  
Attributes: location\_code (PK), name, address, city, state, country.  
Relationships:  
- Hosts tables (table\_game)  
- Hosts slot machines (slot\_machine)

## game

Represents casino games.  
Attributes: game\_name (PK), type, min\_bet, max\_bet.  
Relationships:  
- Played by players (player\_game)  
- Has results (game\_result)  
- Linked to transactions  
- Associated with table games

## player\_game

Junction table for M:N relationship between player and game.  
Attributes: player\_email, game\_name, play\_time, amount\_bet, amount\_won.  
Primary Key: (player\_email, game\_name, play\_time)

## table\_game

Represents a specific table for a game.  
Attributes: table\_code (PK), game\_name, location\_code, status.  
Relationships:  
- Staff assignment (staff\_assigned\_tables)  
- Game results (game\_result)

## staff\_assigned\_tables

M:N relationship between staff and table\_game.  
Attributes: staff\_email, table\_code, shift\_start, shift\_end.  
Primary Key: (staff\_email, table\_code, shift\_start)

## slot\_machine

Represents individual slot machines.  
Attributes: machine\_code (PK), location\_code, status, model.  
Relationships:  
- Used in slot\_play records

## slot\_play

Tracks player activity on slot machines.  
Attributes: machine\_code, player\_email, play\_time, bet\_amount, win\_amount.  
Primary Key: (machine\_code, player\_email, play\_time)

## reward

Represents loyalty rewards.  
Attributes: reward\_code (PK), name, points\_required, description.

## player\_reward

M:N relationship between player and reward.  
Attributes: player\_email, reward\_code, redeem\_date.  
Primary Key: (player\_email, reward\_code, redeem\_date)

## transaction

Tracks financial events.  
Attributes: transaction\_code (PK), player\_email, amount, transaction\_type, transaction\_time, game\_name.

## game\_result

Captures outcomes of table games.  
Attributes: result\_code (PK), game\_name, table\_code, result\_time, outcome\_description.

## login\_history

Logs player login sessions.  
Attributes: login\_id (PK), player\_email, login\_time, ip\_address, device.

## audit\_log

Tracks staff-performed actions.  
Attributes: log\_code (PK), event\_type, event\_time, performed\_by, details.

# 2.1 OLTP Schema Description

**Type:** Online Transaction Processing (OLTP)  
  
Purpose:  
Designed for real-time transactional operations in a live casino system, ensuring fast inserts, updates, and lookups.  
  
Characteristics:  
- Highly normalized schema to avoid redundancy and ensure data integrity.  
- Numerous foreign keys for referential integrity across entities.  
- Composite primary keys in junction tables to ensure uniqueness.  
- Indexed columns to support frequent queries and fast joins.  
  
Transaction Types Supported:  
- Player actions (playing, logging in, redeeming rewards)  
- Staff actions (assignments, audits)  
- Game outcomes and betting results  
- Reward system with loyalty tracking  
- Machine and table management  
  
Performance Aids:  
- Indexes on frequently queried foreign keys  
- Default timestamps for tracking activity  
- Check constraints to enforce business rules

# 2.2 Casino Data Warehouse (OLAP) Schema

The OLAP (Online Analytical Processing) schema of the casino database is designed to support decision-making, trend analysis, and reporting by structuring data into facts and dimensions. The schema follows a hybrid of snowflake and star schema models. It includes historical tracking (Type 2 Slowly Changing Dimensions) for dimensions like players and staff.  
  
Key components of the OLAP schema:  
  
1. **dim\_time** – A date and time dimension used to analyze data across days, months, quarters, holidays, and weekends.  
  
2. **dim\_game** – Stores game metadata such as name, type, betting limits, and active status.  
  
3. **dim\_slot\_machine** – Contains slot machine details including code, model, and status.  
  
4. **dim\_location** – Represents each physical casino location with geographical attributes.  
  
5. **dim\_player** (SCD Type 2) – Captures historical snapshots of player data including loyalty tier and registration date. Enables trend analysis over time.  
  
6. **dim\_staff** (SCD Type 2) – Maintains historical staff information with tracking of position and departmental changes.  
  
7. **dim\_device** – Categorizes login devices for player behavior analysis by hardware and software types.  
  
8. **bridge\_game\_player** – A bridge (many-to-many) table that connects players and games, tracking aggregate stats like total plays and winnings over time.  
  
9. **fact\_gaming\_activity** – A central fact table logging player interactions with games, including bets, wins, net results, device and session data.  
  
10. **fact\_financial\_transactions** – Stores monetary transaction events like deposits and withdrawals, associated with time, player, location, and staff.  
  
11. **agg\_daily\_gaming\_summary** – A pre-aggregated summary of daily game activity across locations, helpful for dashboards and KPIs.  
  
This schema enables multidimensional queries for understanding patterns in player behavior, financial performance, and operational efficiency.

## We can try to answer those questions:

* What age groups or demographics engage with which types of games most?
* Which games generate the highest revenue or most engagement?
* What are monthly/yearly revenues by game, location, or player segment?
* What are the most popular locations among players?

3. Scripts Running Instruction:  
  
The sripts should be run in the order of steps of this course work.

## **3.1. OLTP Schema and Tables**

1. 1.1-oltp-tables-script/00-create-oltp-schema.sql
2. 1.1-oltp-tables-script/01-create-oltp-tables.sql

## 3.2. Load Data into OLTP Tables (from CSVs)

Run these in order (01 to 15) from the 1.3-scripts-to-load-data-from-csvs/ directory:

1. 01-load-player-from-csv.sql
2. 02-load-staff-from-csv.sql
3. 03-load-casino-location-from-csv.sql
4. 04-load-game-from-csv.sql
5. 05-load-player-game-from-csv.sql
6. 06-load-table-game-from-csv.sql
7. 07-load-staff-assigned-tables-from-csv.sql
8. 08-load-slot-machine-from-csv.sql
9. 09-load-slot-play-from-csv.sql
10. 10-load-reward-from-csv.sql
11. 11-load-player-reward-from-csv.sql
12. 12-load-transaction-from-csv.sql
13. 13-load-game-result-from-csv.sql
14. 14-load-login-history-from-csv.sql
15. 15-load-audit-log-from-csv-not work.sql (if/when fixed)

## 3.3. OLAP Schema and Indexes

1. 2.1-0-olap-schema/01-create-olap-schema.sql
2. 2.1-0-olap-schema/02-create-olap-indexes.sql

## 3.4. ETL Utilities, Dimensions, Facts, Triggers, and Initial Load

**(Within 2.2-etl/, follow the subfolder and file numbering):**

**Utility Scripts**

* 2.2-etl/01-utility/01-etl-logging.sql
* 2.2-etl/01-utility/02-time-dimension-utility.sql

**Dimension Tables**

* 2.2-etl/02-dimensions/01-player-dimension.sql
* 2.2-etl/02-dimensions/02-staff-dimension.sql
* 2.2-etl/02-dimensions/03-device-dimension.sql

**Fact Tables**

* 2.2-etl/03-facts/01-gaming-activity.sql
* 2.2-etl/03-facts/02-financial-transactions.sql
* 2.2-etl/03-facts/03-daily-summary.sql
* 2.2-etl/03-facts/04-process-facts.sql

**Triggers**

* 2.2-etl/04-triggers/01-create-triggers.sql

**Initial Load**

* 2.2-etl/05-initial-load/01-load-initial-data.sql

**Execute ETL**

* 2.2-etl/06-execute-etl/00-execute-all.sql
* 2.2-etl/06-execute-etl/02-execute-facts.sql

## 3.5. Analysis/Reporting

* 2.3\_course\_casino\_report.pbix (Power BI report, open in Power BI Desktop)
* 3-casino-insights-queries.sql (for running analytical queries after ETL is complete)

# PowerBI Dashboard:

Изображение выглядит как текст, снимок экрана, диаграмма, Шрифт

Содержимое, созданное искусственным интеллектом, может быть неверным.

Here we have answered the questions given at the beginning of the OLAP designing proccess:

* What age groups or demographics engage with which types of games most?
* Which games generate the highest revenue or most engagement?
* What are monthly/yearly revenues by game, location, or player segment?
* What are the most popular locations among players?

# OLTP (Operational Database) Queries

1. **Which games are most popular by month and year?**

* *What are the most played games by time period?*

1. **Player loyalty analysis and spending patterns**

* *Who are our most valuable players and what are their spending patterns?*

1. **Financial transaction analysis by type and time**

* *What are the patterns in deposits, withdrawals, bets, and wins?*

# OLAP (Analytical Database) Queries

1. **Gaming activity trends by time dimension**

* *How does gaming activity vary by time periods (day, month, quarter)?*

1. **Player segmentation and behavior analysis**

* *How can we segment players based on their behavior and value?*

1. **Game performance and profitability analysis**

* *Which games are most profitable and popular across different locations?*