1. Game

Relationships:

- Owns God Card (Aggregation: Game (1) → (0..*) God Card)

  God cards are reusable resources (e.g., physical cards in a box). They are selected from a shared pool managed by the game but are not destroyed when the game ends. As a result god cards exist independently of any single game session. The relationship is modeled as 0..* instead of 2..* to account for the extension where players can play the game without god cards..

- Has Player (Aggregation: Game (1) → (2..4) Player)

  Players are independent entities that can exist outside the game (e.g., player profiles representing users). The game assembles players into a game session, but the players are not owned by the game. The relationship is → (2..4) Player instead of → (2) Player, because there is an extension that allows players to play with 3 or 4 people.

- Owns Board (Aggregation: Game (1) → (1) Board)

  A game of Santorini will have exactly one board. The board is treated as a reusable physical component, just like how a chessboard remains when there is no game of chess. Aggregation allows it to exist outside the game (e.g., reset for a new game session).

2. Player

Relationships:

- Selects God Card (Association: Player (1) → (0..1) God Card)

  Players temporarily "borrow" god cards from the game's pool. The association reflects usage, not ownership as the cards return to the pool after the game is completed. The relationship is (0..1) God Card as there is an extension that allows players to play the game without God Cards

- Has Worker (Composition: Player (1) → (2) Worker)

  Workers are owned and controlled by players and they represent their in-game units. If a player is removed, their workers are also removed. The relationship remains as → (2) Worker, because the number of workers per player is strictly 2, regardless of team modes.
  - In 3-player games, each player controls their own 2 workers (6 workers in total)

- In 4-player games (2v2), each player technically still owns 2 workers (but they share the workers between team members)

3. Board

Relationships:

- Consists of Tile (Composition: Board (1) → (25..*) Tiles)

  Tiles are intrinsic to the board's structure, they cannot exist independently. Destroying the board deletes all tiles (e.g., a 5x5 grid cannot exist without the board). The 25..* multiplicity supports different board configurations (e.g., 5x5, 6x5, 7x7, etc) introduced in game extensions. The minimum of 25 tiles ensures compatibility with the base game's 5x5 board, while the many (*) allows for larger or custom board size.

4. Tile

Relationships:

- Holds Building (Composition: Tile (1) → (0..1) Building)

  A tile either holds a building or no building. A building (tower) is part of the tile's state. Removing the tile destroys its building, as towers cannot exist independently (e.g., a tile at height 3 with a dome is invalid if the tile is somehow removed).

5. Worker

Relationships:

- Occupies Tile (Association: Worker (0..1) → (1) Tile)

  Workers temporarily occupy tiles but do not own them. A tile can hold at most 1 worker (Santorini rule). Workers can be not on the tile (e.g., on a different tile), hence the 0..1 multiplicity.

Key Design Choices

- Aggregation for Board and God Card
  Aggregation is used for the Board and God Card to reflect real-world physical components (e.g., reusable boards and card decks).

- No Direct Player → Board relationship
  Players interact via workers, aligning with the game's mechanics (e.g., moving workers triggers board changes).

- Variable Board Configuration Size (25..* Tiles)
  To support the extension which increases the grid size. This assumes custom rules override Santorini's default 5x5 setup.

- Association for Temporary Relationships
  Worker → Tile and Player → God Card are modeled as associations to reflect temporary interactions. Workers can move between tiles without tiles owning the worker, and God Cards are temporarily assigned to the player but remain part of the pool of God cards.

- Composition for strict ownership
  Worker, Tile, and Building utilize composition to model a strict relationship. Workers can only exist as long as their Player exist, Tiles cannot exist without Board, and Buildings cannot exist without Tile.

- Aggregation for player and game
  One of our extensions mentions a player being able to see past matches played, this would mean that players can exist outside of 'Game' thus aggregation would be most fitting.

Assumptions

1. Players are reusable entities, meaning they are not tied to a single game session.
2. God cards are reusable resources:
   Physical god cards are shared across games. If cards are game-specific, aggregation would be incorrect.
3. Extensions have to be included into the domain model.