Extension Justification for the Santorini Game

Overview of Redesign for Extensibility

The redesign of the Santorini game for extensibility focused on implementing the **Strategy pattern** through the introduction of the **GodCard** interface. This interface serves as a contract for various god cards, allowing the core game logic to remain unchanged while the behaviors associated with different gods can be dynamically injected. Each god card, such as Demeter, Apollo, or Minotaur, implements this interface, encapsulating unique strategies related to movement, building, and winning conditions that modify the game's standard rules according to the mythology of each god.

Design Goals, Principles, and Pattern Utilization

- **Strategy Pattern**: This pattern was chosen to allow the dynamic alteration of game mechanics, adhering to the Open/Closed Principle. By defining a common interface (**GodCard**), new god card strategies can be added without altering the existing game logic, facilitating easy extension and maintenance.
- **Single Responsibility Principle**: Each god card class is responsible for defining and handling its specific rules and actions, ensuring that classes have a single reason to change.
- **Low Coupling**: The **GodCard** interface promotes low coupling by decoupling the specific behaviors of god cards from the core game logic, allowing the **Game** class to interact with god cards through a stable interface.
- **Interface Segregation Principle**: This principle is reflected in the design as each god card only needs to implement the methods relevant to its functionality, avoiding the dependency on unnecessary interfaces.

Alternatives Considered and Trade-offs

- **Inheritance vs. Composition**: An alternative approach could have involved using a class hierarchy for god cards based on inheritance.
    - **Trade-off**: However, this was rejected in favor of composition to avoid the brittleness and limitations associated with deep inheritance chains, such as the diamond problem and the difficulty in modifying inherited behaviors.

- **Hardcoding Special Rules**: This approach was considered but ultimately discarded because it would violate the Open/Closed Principle by necessitating modifications to the core game logic whenever new god cards or rules were introduced

Conclusion

The use of the Strategy pattern in the redesign of the Santorini game provides a robust framework for extending the game's functionality through god cards. This design allows for the easy addition of new features while maintaining a clean and maintainable codebase. The chosen approach aligns well with key software design principles, ensuring that the game can evolve without significant rework, thereby enhancing both developer and player experiences.