

Cosmic Escape – Use Cases

Use Case: Move Astronaut One Cell

Primary Actor: Player

Goal in Context: Move the astronaut one valid cell (up/down/left/right) on the grid.

Preconditions: Game session is active; board is rendered. The astronaut is alive and not in a cut-scene.

Trigger: Player presses an arrow/WASD key.

Scenario: (1) Player presses a direction key. (2) System reads input on the current tick. (3) System checks target cell for wall/barrier. (4) If open, system updates astronaut coordinates. (5) System redraws board and HUD (score/time).

Exceptions: Target cell blocked → Ignore movement. Simultaneous key presses → Only last valid key accepted.

Priority: High

Channel to Actor: Keyboard input

Secondary Actor: None

Channels to Secondary Actors: N/A

Open Issues: None

Use Case: Collect Regular Crystal

Primary Actor: Player

Goal in Context: Increase score and remove a crystal from the board.

Preconditions: Astronaut moves into a crystal cell.

Trigger: Astronaut enters a cell containing a crystal.

Scenario: 1) System detects crystal. (2) System increments score. (3) System removes crystal. (4) System updates HUD.

Exceptions: None.

Priority: High

Channel to Actor: Keyboard input → movement to crystal cell

Secondary Actor: Scoring System

Channels to Secondary Actors: Internal function call to update score

Open Issues: None

Use Case: Spawn & Collect Bonus Power-Up

Primary Actor: Player

Goal in Context: Temporarily gain a power-up (shield, invisibility, wall-pass).

Preconditions: Game running; bonus spawn logic active.

Trigger: System spawns a bonus or player moves onto that cell.

Scenario: 1) System spawns bonus.(2) Player collects before time expires.(3) System grants effect.(4) Effect expires after timer.

Exceptions: Bonus expires before pickup → Despawn. Two bonuses overlap → Only one is active.

Priority: Medium

Channel to Actor: Keyboard input / system event

Secondary Actor: Timer System

Channels to Secondary Actors: Countdown timer managing effect duration

Open Issues: Define sound effect for power-up.

Use Case: Suffer Punishment (Slime/Radiation)

Primary Actor: Player

Goal in Context: Apply penalty for entering a punishment cell.

Preconditions: Punishment cell exists on the board.

Trigger: The astronaut moves onto a punishment cell.

Scenario: 1) System detects punishment.(2) System reduces score/time.(3) System removes punishment.(4) HUD updates.

Exceptions: $\text{Score} < 0 \rightarrow \text{Lose by Negative Score}$.

Priority: Medium

Channel to Actor: Keyboard input (movement)

Secondary Actor: Scoring System / Timer

Channels to Secondary Actors: Internal call to penalty update

Open Issues: Balance penalty severity.

Use Case: Alien (Moving Enemy) Chases Astronaut

Primary Actor: Alien (system-controlled)

Goal in Context: Move one cell per tick to minimize distance to the astronaut.

Preconditions: At least one alien active; valid paths exist.

Trigger: Game tick occurs.

Scenario: 1) System computes possible moves.(2) System selects move that reduces distance.(3) Checks target validity.(4) Moves one cell.(5) If contact → Lose by Capture.

Exceptions: All moves blocked → Alien stays still.

Priority: High

Channel to Actor: Alien pathfinding loop

Secondary Actor: Player

Channels to Secondary Actors: Position tracking

Open Issues: Tune Alien speed.

Use Case: Defense Turret Interaction

Primary Actor: Player

Goal in Context: Avoid turret penalties; suffer penalty on entry or when hit.

Preconditions: Turret cells placed on board.

Trigger: An astronaut enters a turret cell or line-of-fire.

Scenario: 1) System detects turret.(2) Apply penalty.(3) If score < 0 → Lose by Negative Score.

Exceptions: The player has a shield → No penalty.

Priority: Medium

Channel to Actor: Keyboard input / collision event

Secondary Actor: Scoring System

Channels to Secondary Actors: Internal call to penalty handler

Open Issues: Add turret aiming animation.

Use Case: Open Teleporter (Exit Unlock)

Primary Actor: Player

Goal in Context: Unlock the exit once all crystals are collected (and key found if required).

Preconditions: All crystals collected; key obtained if needed.

Trigger: Last crystal collected.

Scenario: 1) System checks remaining crystals.(2) If all collected and key present, teleporter unlocks.(3) Exit door opens; message displayed.

Exceptions: Key not collected → Door remains locked.

Priority: High

Channel to Actor: Game loop event

Secondary Actor: None

Channels to Secondary Actors: N/A

Open Issues: Optional key requirement toggle.

Use Case: Win by Teleport

Primary Actor: Player

Goal in Context: Finish level by entering teleporter after requirements met.

Preconditions: Exit unlocked.

Trigger: Astronaut moves onto teleporter cell.

Scenario: 1) System validates exit unlocked.(2) Stops timer; calculates score.(3) Displays Victory screen.

Exceptions: Exit locked → Show message to collect all crystals.

Priority: High

Channel to Actor: Keyboard input (movement)

Secondary Actor: Scoring System

Channels to Secondary Actors: Score calculation module

Open Issues: Add leaderboard submission.

Use Case: Lose by Capture

Primary Actor: Alien

Goal in Context: End game when alien reaches astronaut's cell.

Preconditions: Alien movement resulted in collision.

Trigger: Alien enters astronaut's cell.

Scenario: 1) System detects overlap.(2) Stops game loop.(3) Shows Game Over screen.

Exceptions: None.

Priority: High

Channel to Actor: Alien tick event

Secondary Actor: Player

Channels to Secondary Actors: Position update

Open Issues: Add capture animation.

Use Case: Lose by Time Expiry

Primary Actor: Timer

Goal in Context: End game when timer reaches zero.

Preconditions: Timer running.

Trigger: Countdown hits zero.

Scenario: 1) System detects time = 0.(2) Stops game loop.(3) Displays Game Over screen.

Exceptions: Time bonus collected at final tick → Continue game.

Priority: Medium

Channel to Actor: Timer module

Secondary Actor: Player

Channels to Secondary Actors: Event callback

Open Issues: Decide time bonus magnitude.

Use Case: Lose by Negative Score

Primary Actor: Scoring System

Goal in Context: End game when total score < 0 .

Preconditions: Score tracking active.

Trigger: Any penalty reduces score below zero.

Scenario: 1) System applies penalty.(2) Score drops below zero.(3) Game Over triggered.

Exceptions: None.

Priority: Medium

Channel to Actor: Internal score update

Secondary Actor: Player

Channels to Secondary Actors: Score variable

Open Issues: Adjust penalty-to-score ratio.

Use Case: Progress to Next Level

Primary Actor: Player

Goal in Context: Load next level with increased difficulty.

Preconditions: Player has won current level.

Trigger: Player selects Next Level.

Scenario: 1) System loads next level configuration.(2) Difficulty increases.(3) New level begins.

Exceptions: No more levels → Show credits.

Priority: Medium

Channel to Actor: Keyboard / menu selection

Secondary Actor: None

Channels to Secondary Actors: N/A

Open Issues: Determine scaling for difficulty.