

Specification

1. Types of maze cells and states associated with each cell

There are 7 types of cells in our capture the flag game: floor, wall, home, jail, player, shovel, and flag. The home, flag, player and jail cells are associated with either Team 1 or Team 2. Each cell has the following attributes:

- Type – an integer that determines whether the cell is a floor, wall, home, or jail.
- Team – an integer that tells which team the cell is associated with or if the cell has an association
- Occupied – an integer that tells if the cell is occupied
- X and Y – integers that give the x and y coordinates of the cell in the maze
- obj1 and obj2 – integers that give information about shovels and flags

1. States and attributes associated with each player

Each player has three states they can be in: jailed, safe, or free. A player is jailed if they have been tagged by an opposing player and are currently stuck in the opposing team's jail; when a player is jailed, they are unable to move. A player is safe if they are in their team's home. When a player is either jailed or safe, they cannot be tagged by the opposing team. When a player is free, they are neither jailed nor in their team's base, but moving freely on the map. Each player also has three attributes associated with them: their position, their team, and whether they are carrying an object. Their position is an x and y coordinate of where they are on the map currently, and their team indicates whether they're on team 1 or team 2. The player is also carrying a shovel, a flag, or nothing.

2. Player actions and rules

Each player can move, pick up objects, tag opposing players, get their teammates out of jail, and dig through walls. A player can move to any floor cell, including both their team's and the opposing team's home and jail cells. A player can also 'dig' through wall cells, which will turn the wall cell into a floor cell. To pick up objects, the player simply needs to move into a cell where there is an object. In order for a player to 'dig', the player must be carrying a shovel. Players can also tag opposing players by requesting a move into a cell occupied by an opposing player who isn't in their home. Once a player is tagged, they are transported to the opposing team's jail, where they must wait until a teammate bails them out. To bail a teammate out of jail, the player must go into the jail and tag the jailed player.

3. Conditions and rules of winning the game

In order for a team to win the game, they must have all their players in their team's home, one player must be carrying the opposing team's flag, and their team's flag must also be in their home.

4. Semantics and rules for flags, bases, and jails and player interactions with each

A player's move request will be granted if the cell that the player wants to move to is

unoccupied or occupied by a shovel, flag or opposing player. If the desired cell contains a wall or a player on the same team, then the move request will be denied. If the cell is occupied by either a flag or a shovel, the player will pick it up. If the player is already holding a shovel or flag and attempts to pick up another shovel, the request will be denied.

- Flags
 - If a player carrying a shovel attempts to pick up a flag, the player will drop the shovel and carry the flag. The shovel will return to the designated shovel cell.
 - If a player carrying a flag is tagged, then the player will become jailed and the flag will return to the opposing team's base.
 - A player cannot pick up his own team's flag.
- Bases
 - When a player moves into his team's home base, his state is set to safe. While safe, the player cannot be tagged by opposing players, but he can tag opposing players in his base.
- Jails
 - When a player is tagged they will be transported to the jail, their state will be set to jailed, and they will be unable to move.
 - To free a player from jail, a free teammate must move into the jail. Upon the teammate moving into the jail, every player in the jail's state will be set to free, allowing them to move again.
 - A player cannot tag another player who's state is jailed.