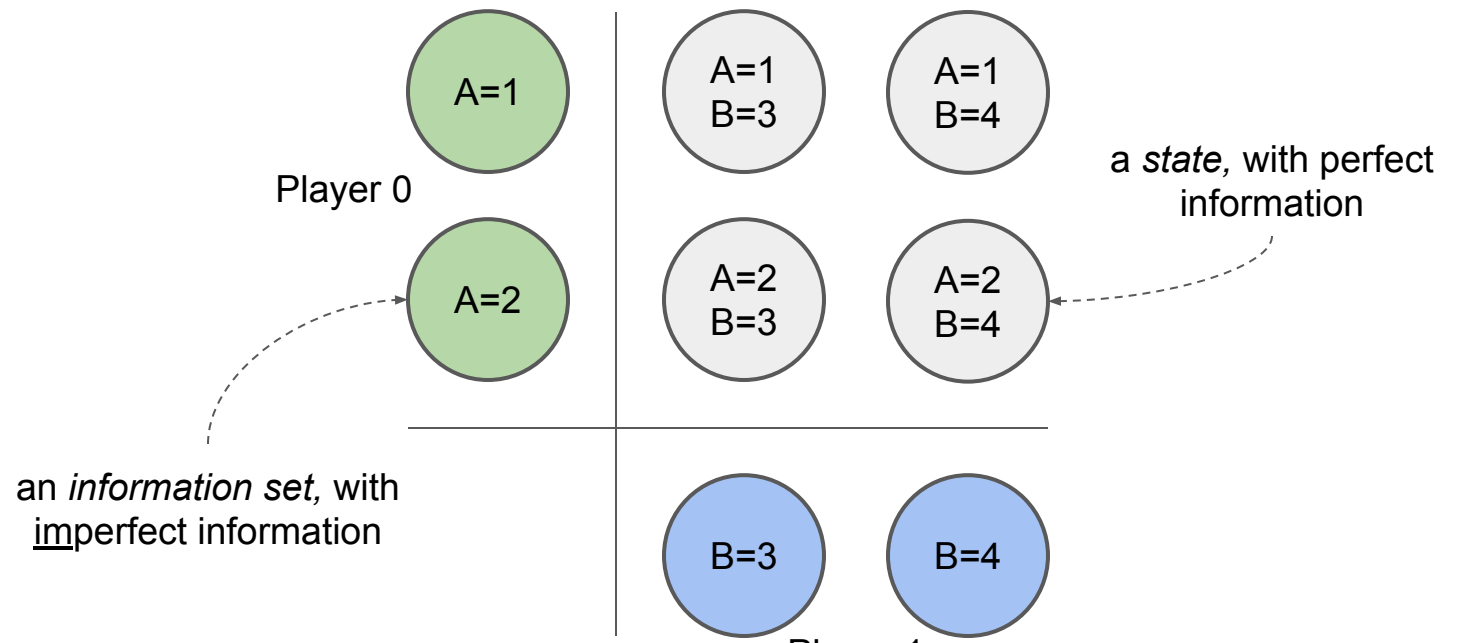
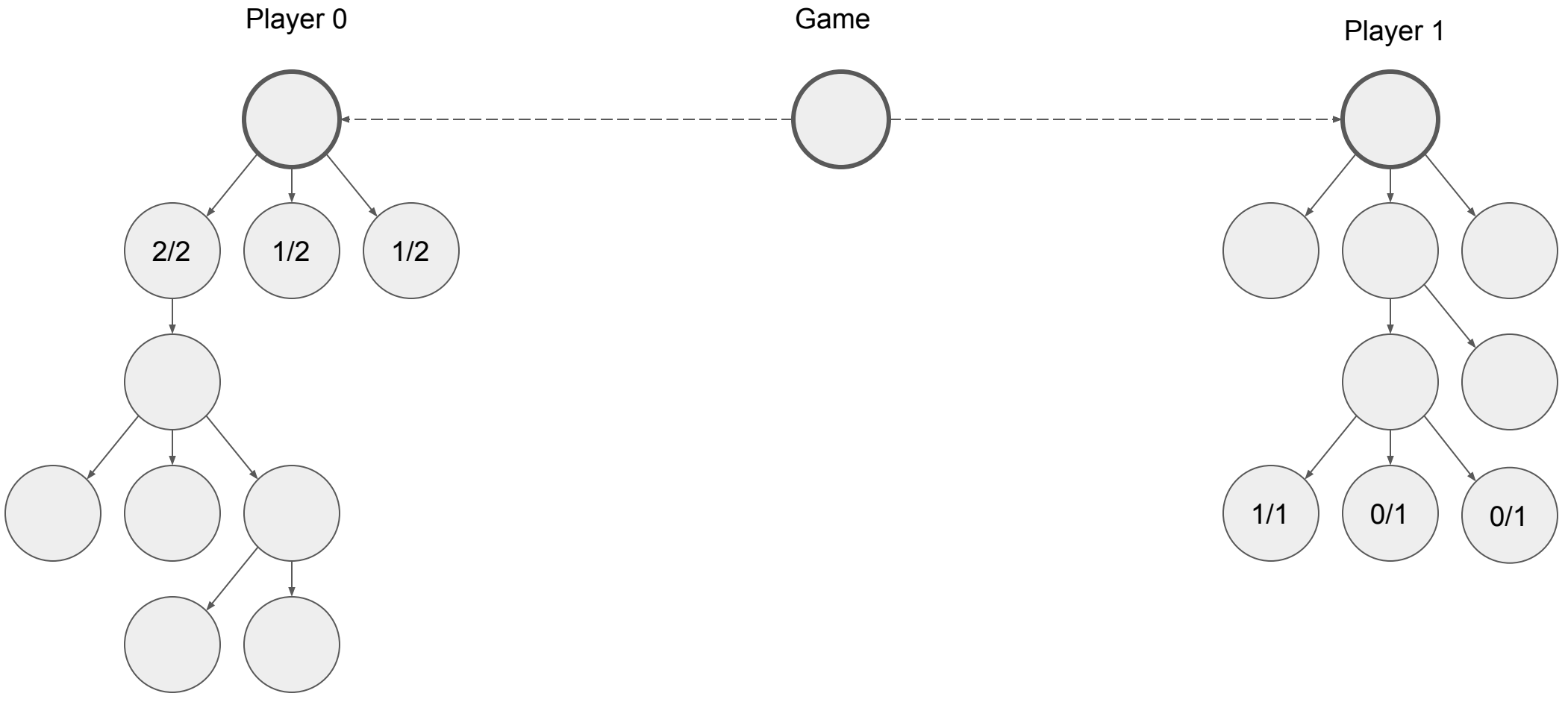
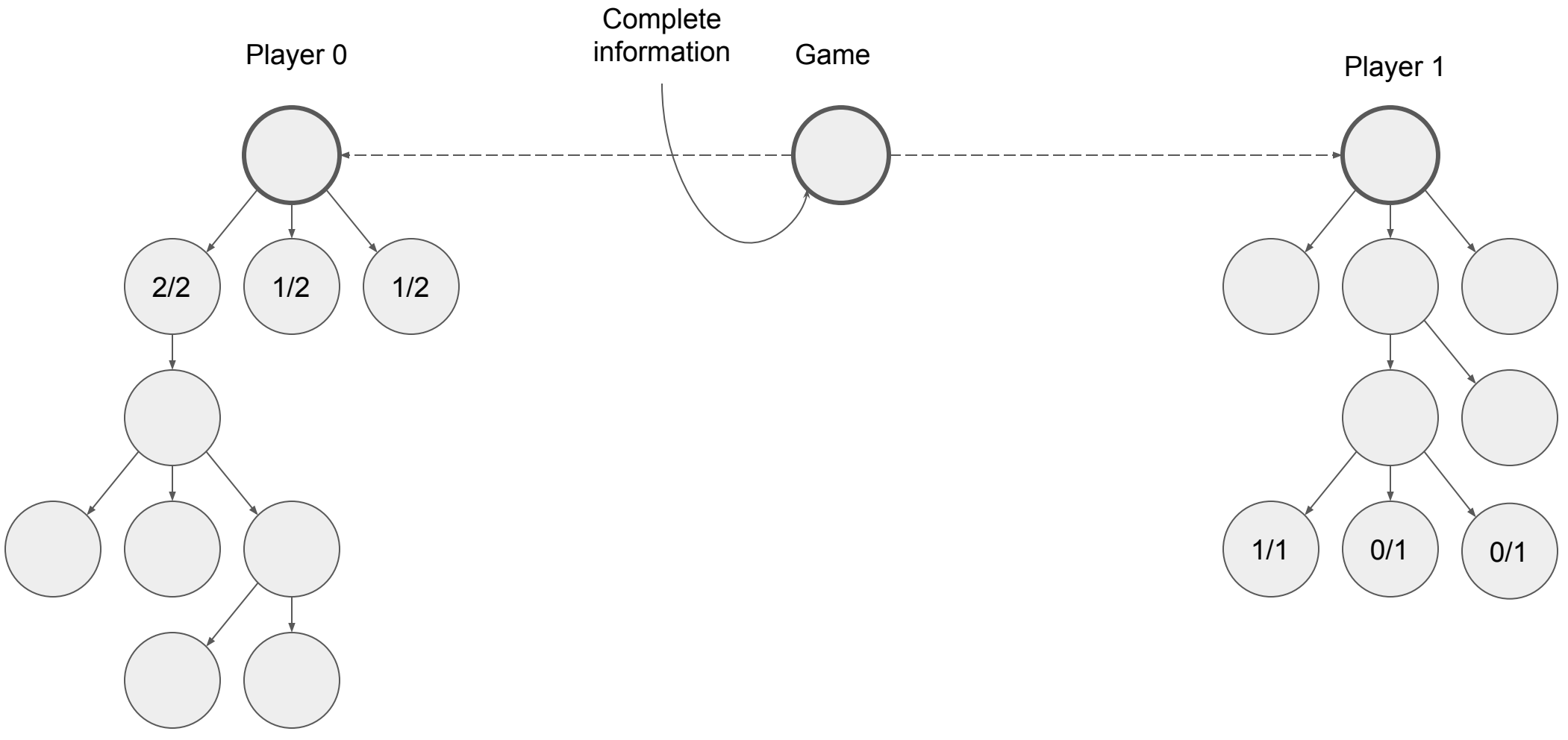
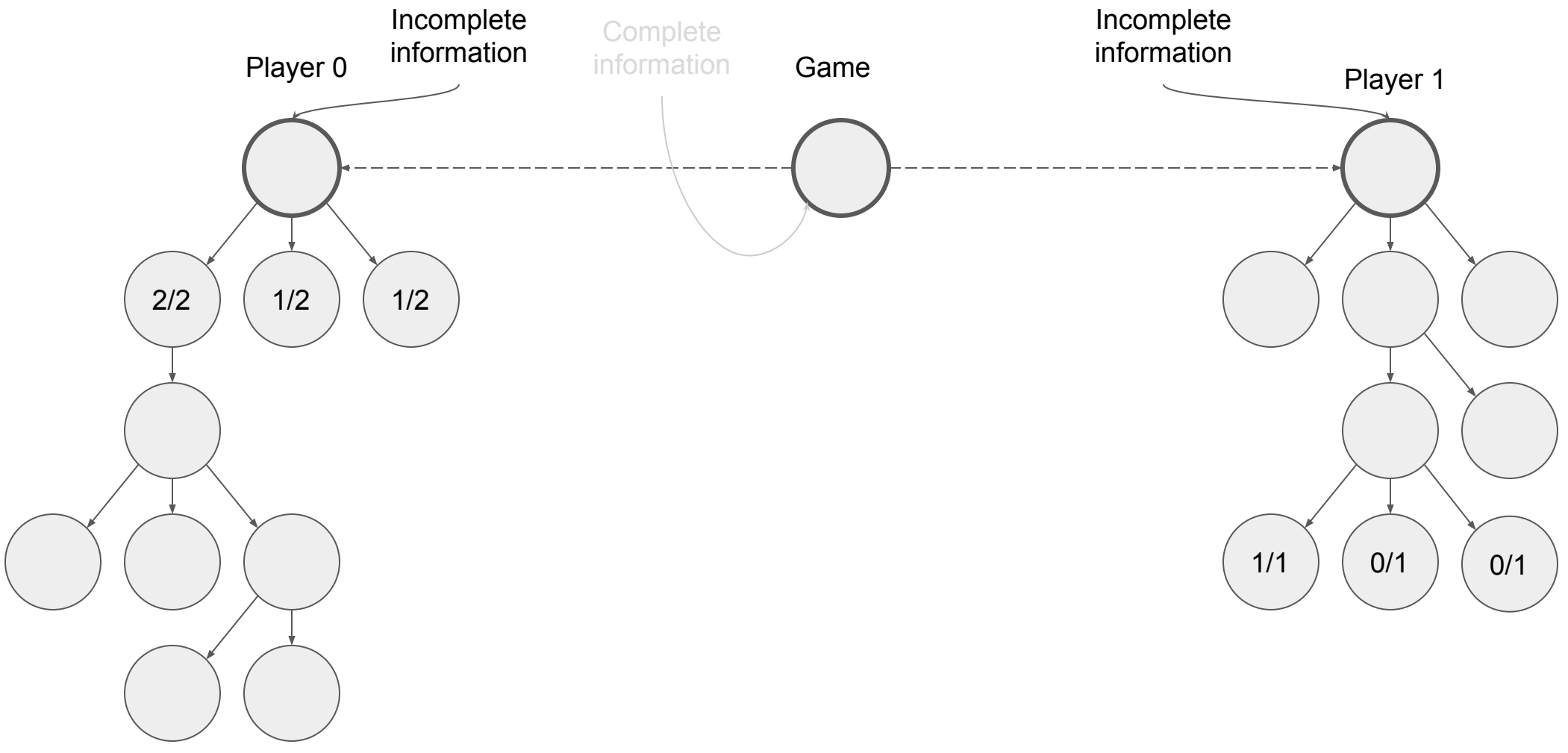

A=1
A=1
B=3
A=1
B=4
Player 0
a *state,* with perfect information
A=2
A=2
B=3
A=2
B=4
an *information set,* with imperfect information
B=3
B=4
Player 1



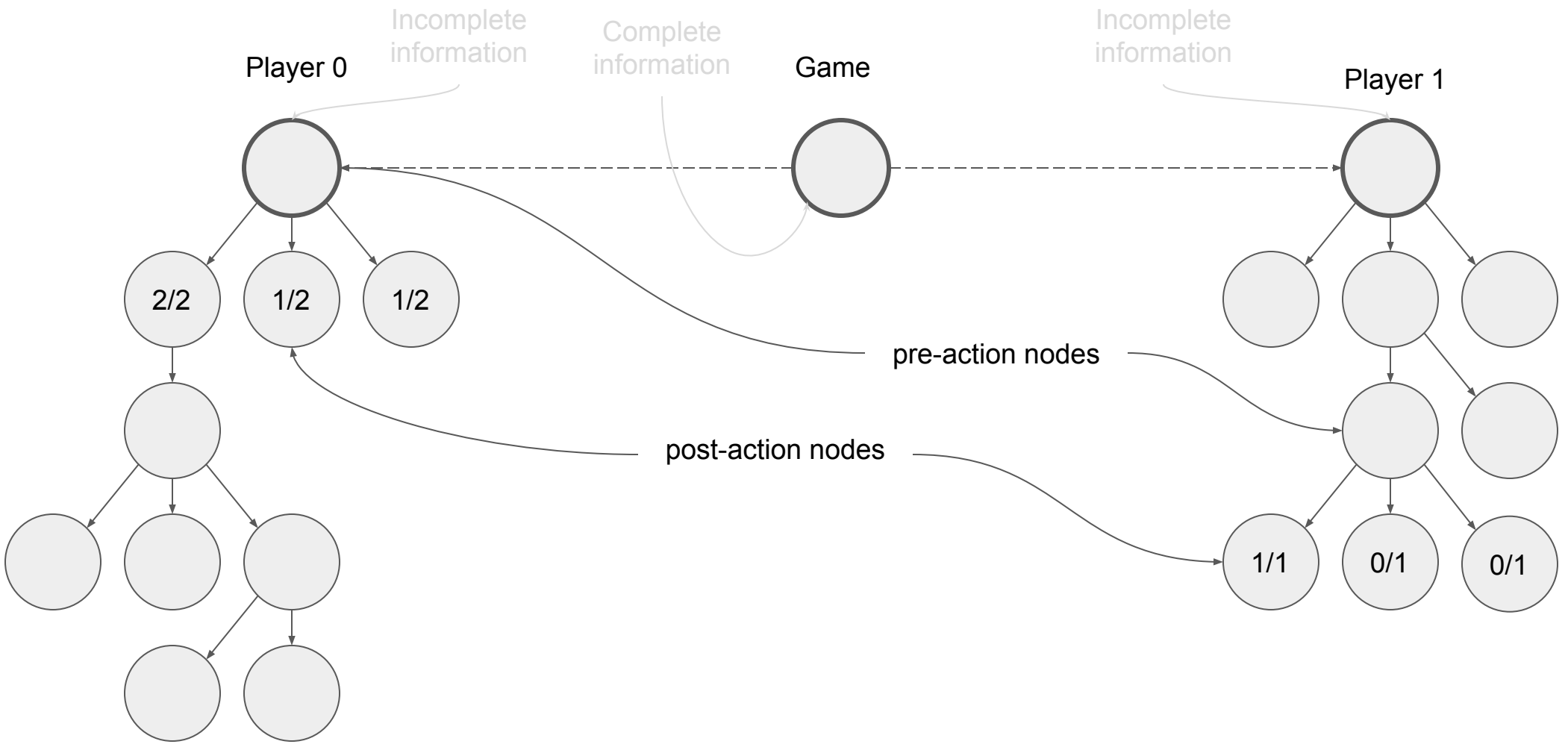
Each player has a separate tree



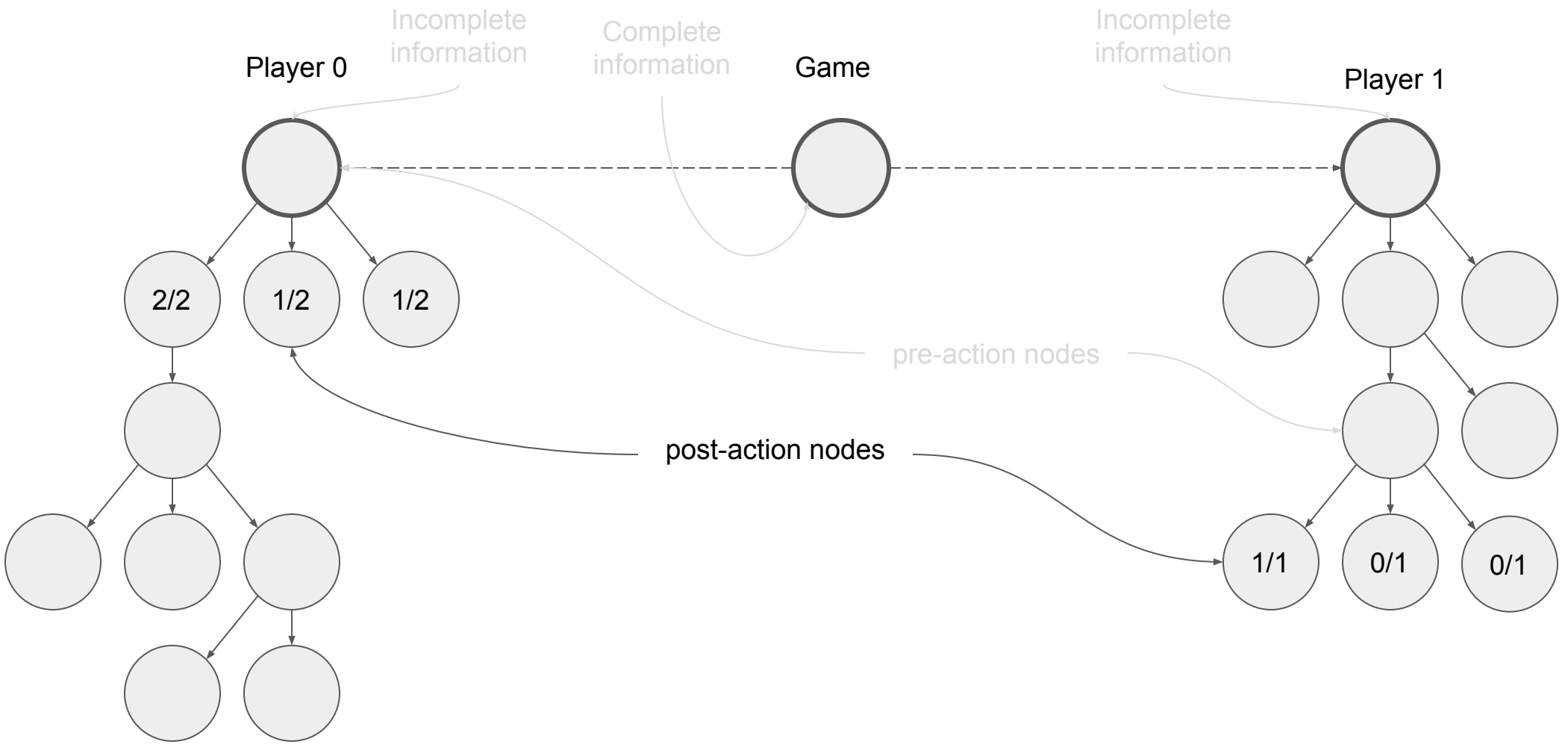
We simulate a game (the game itself has perfect information)



Each player can only observe their part of the game

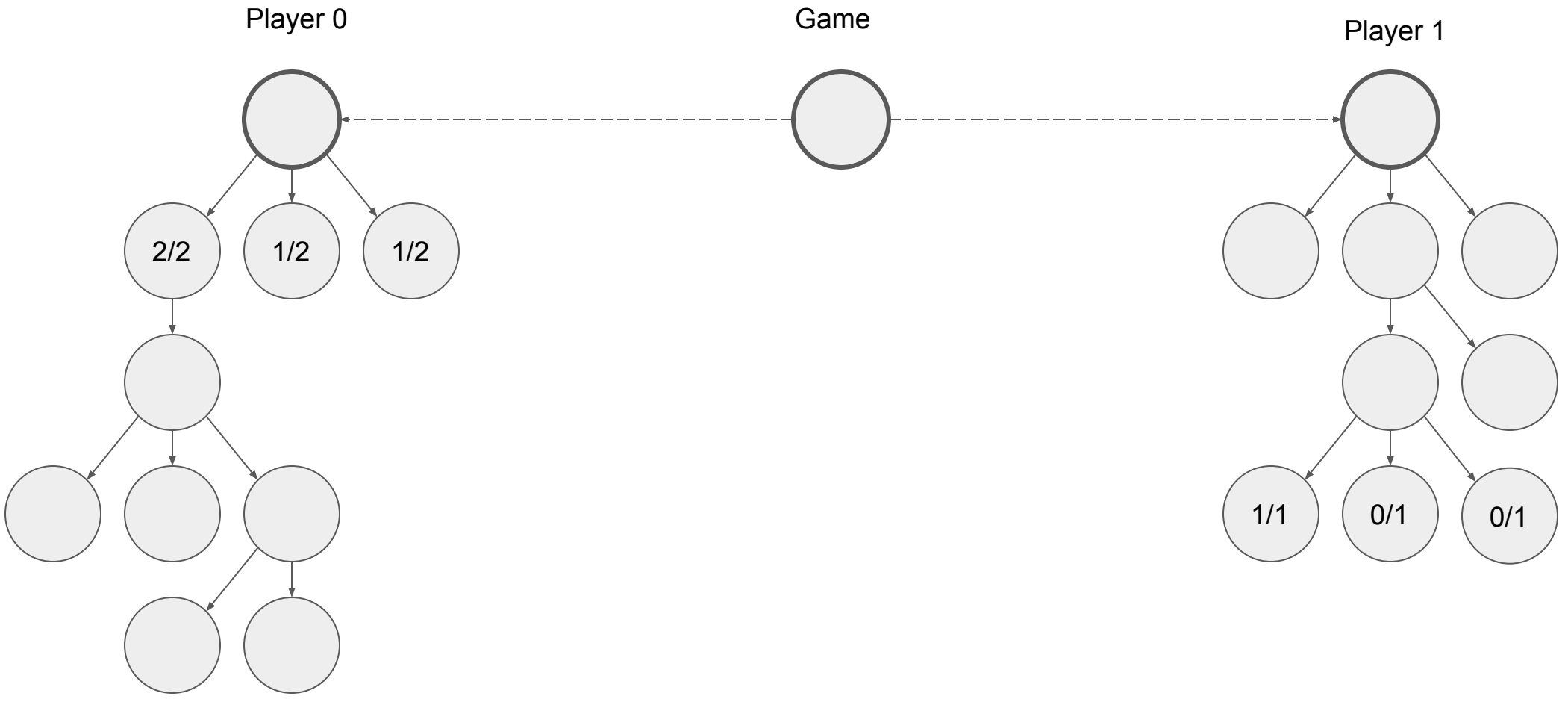


The tree distinguishes between pre-action-nodes and post-action-nodes

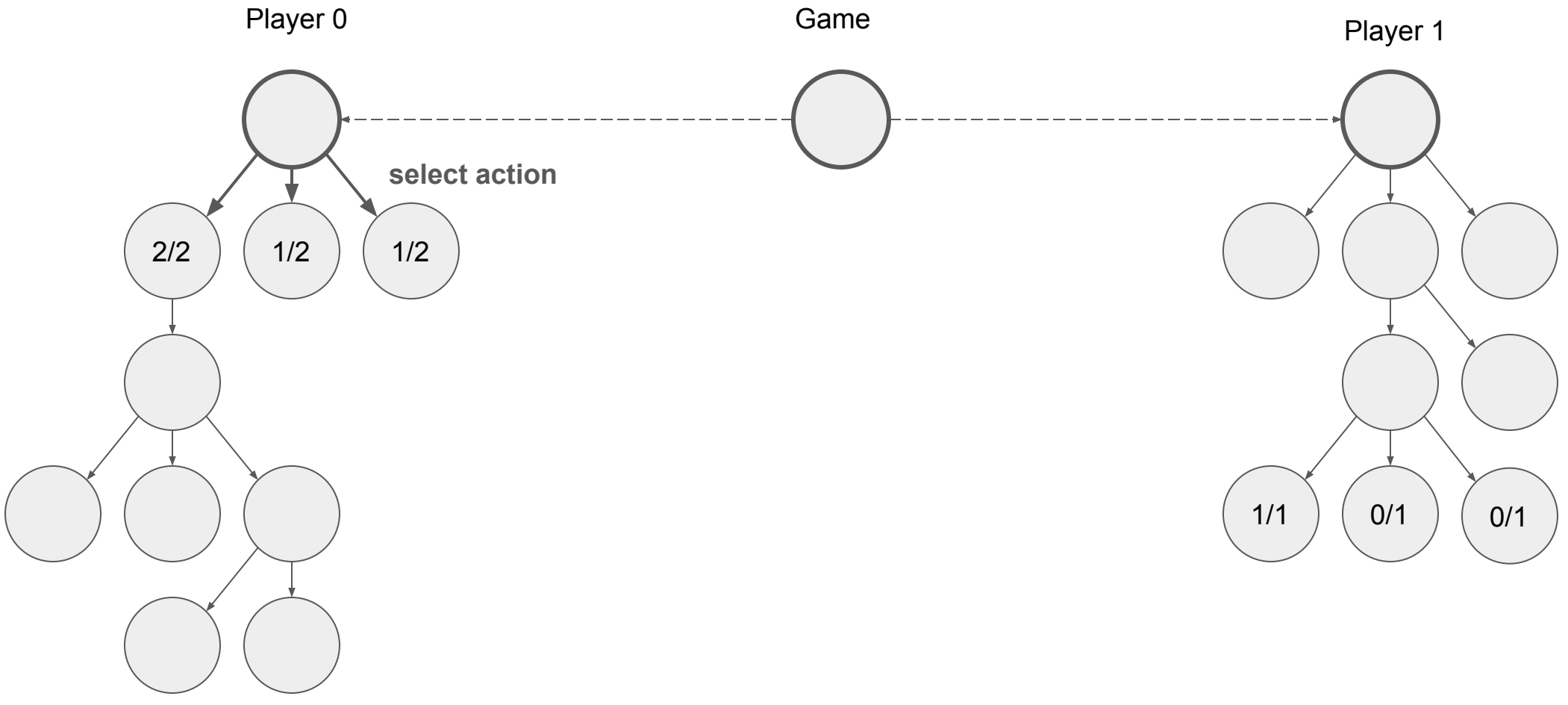


We only need to keep track of win statistics for post-action nodes.

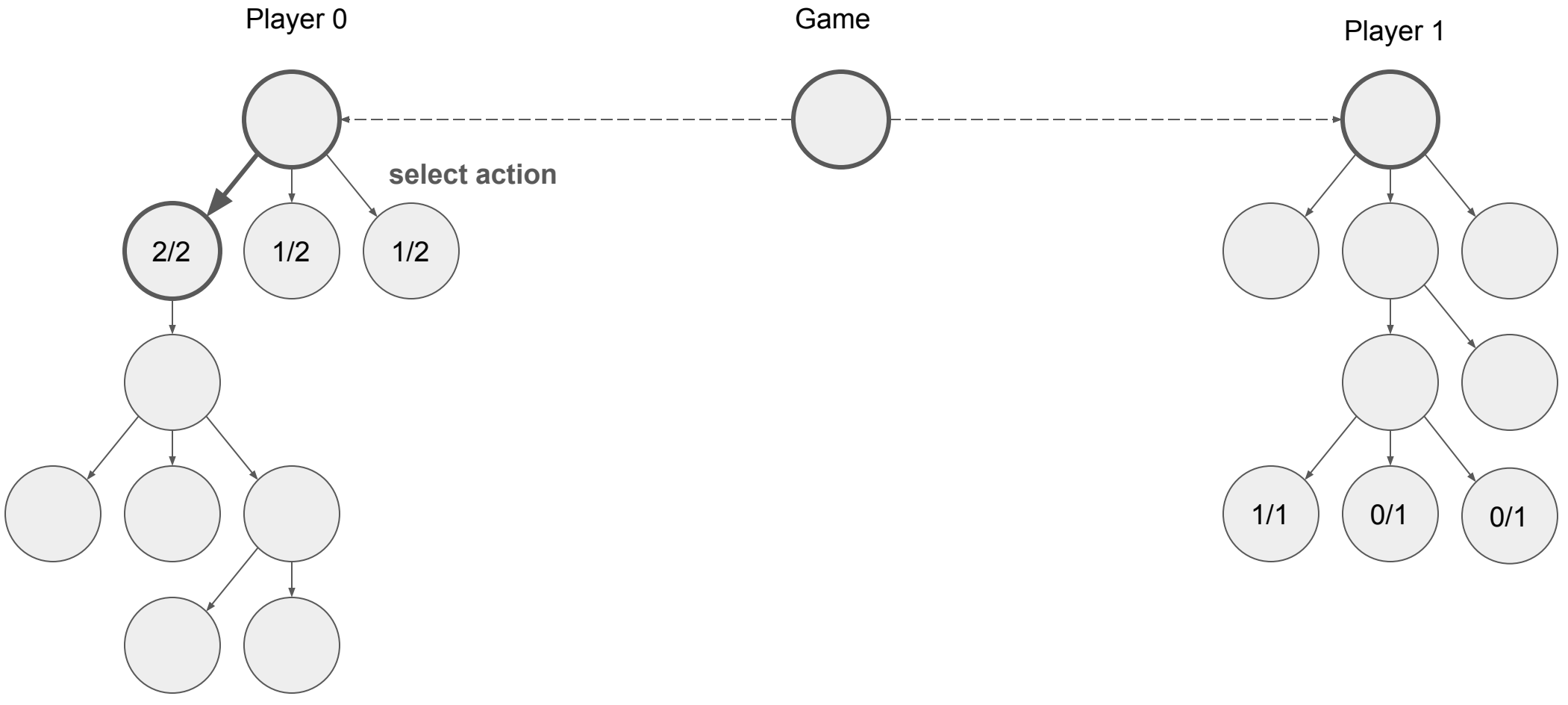
(at pre-action nodes, actions are selected based on the UCB of the child post-action-nodes, UCB requires win statistics)



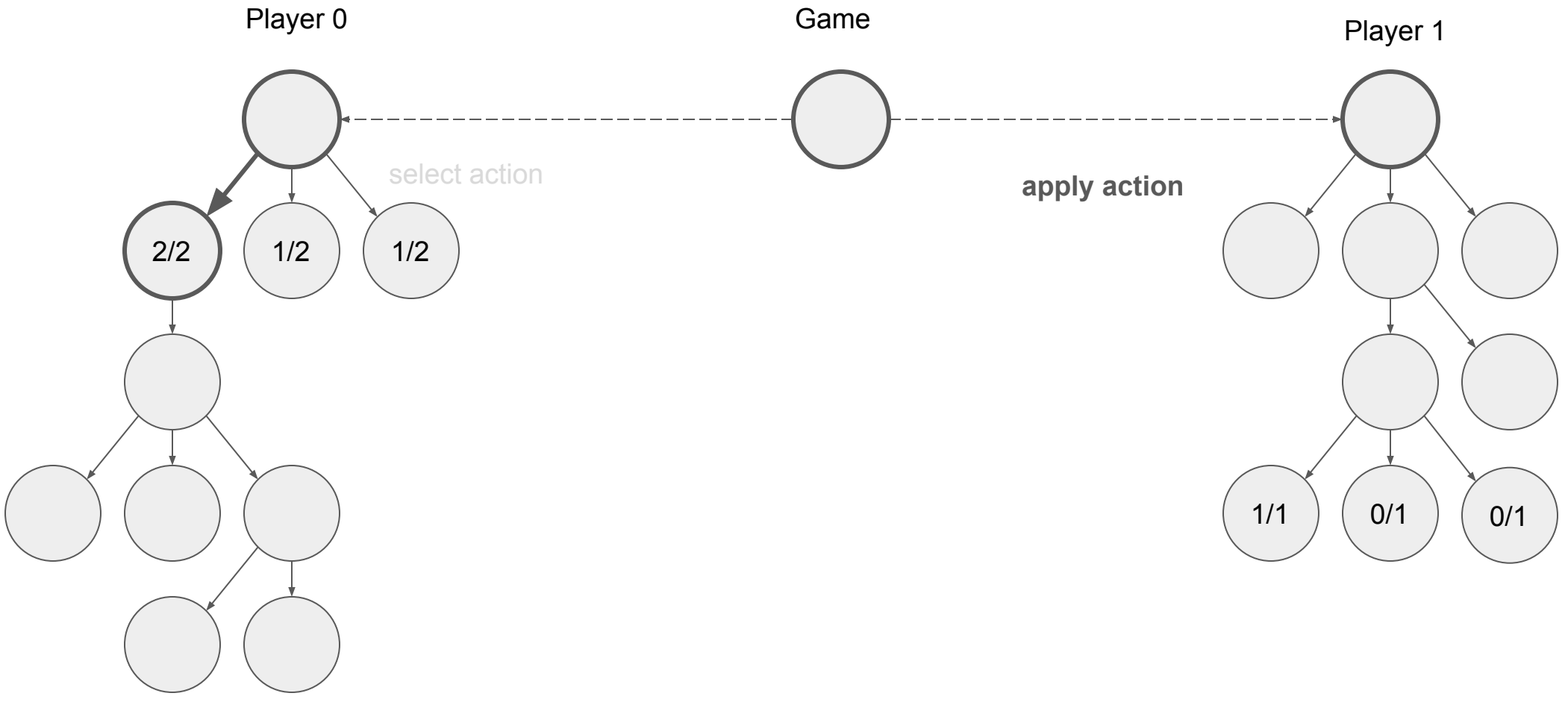
Start the game!



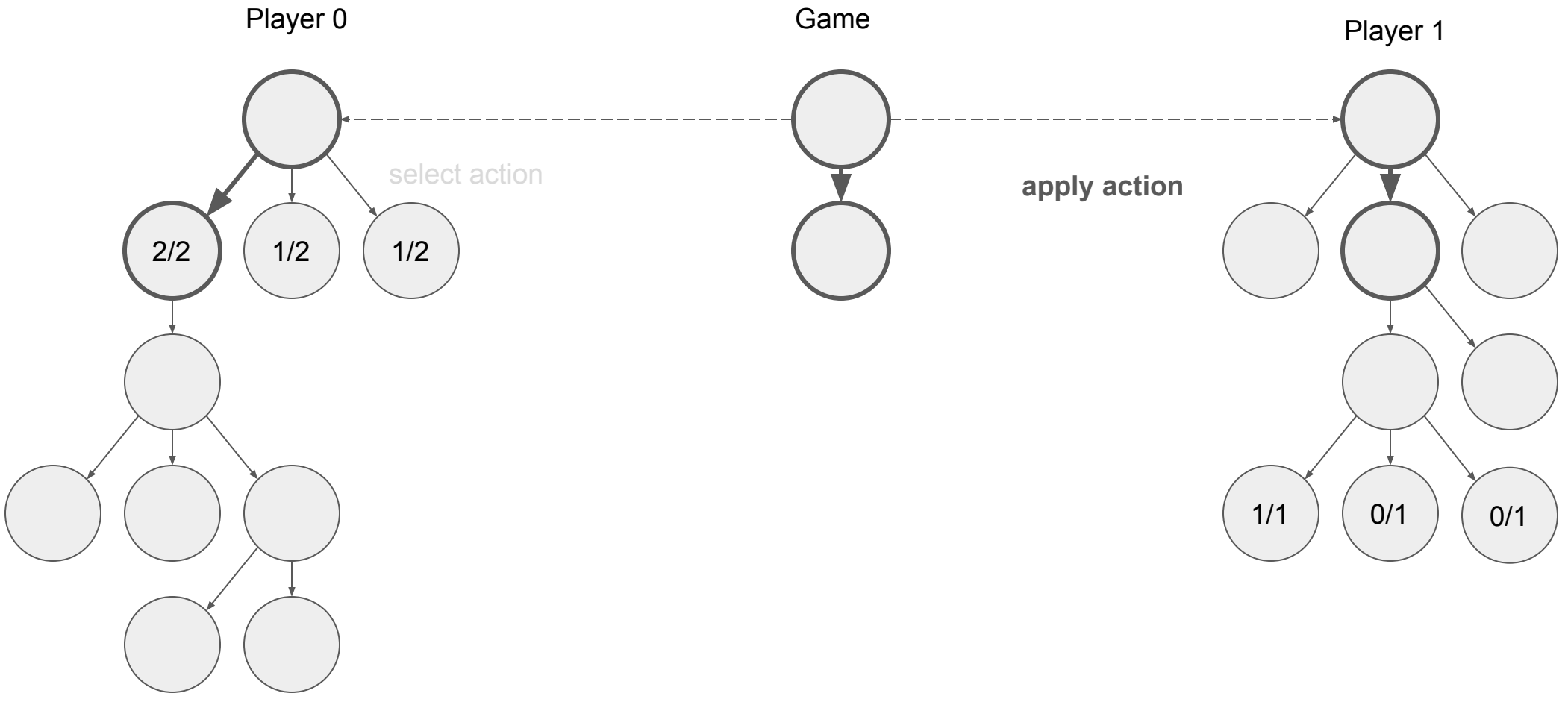
Player 0 selects the action with the highest UCB



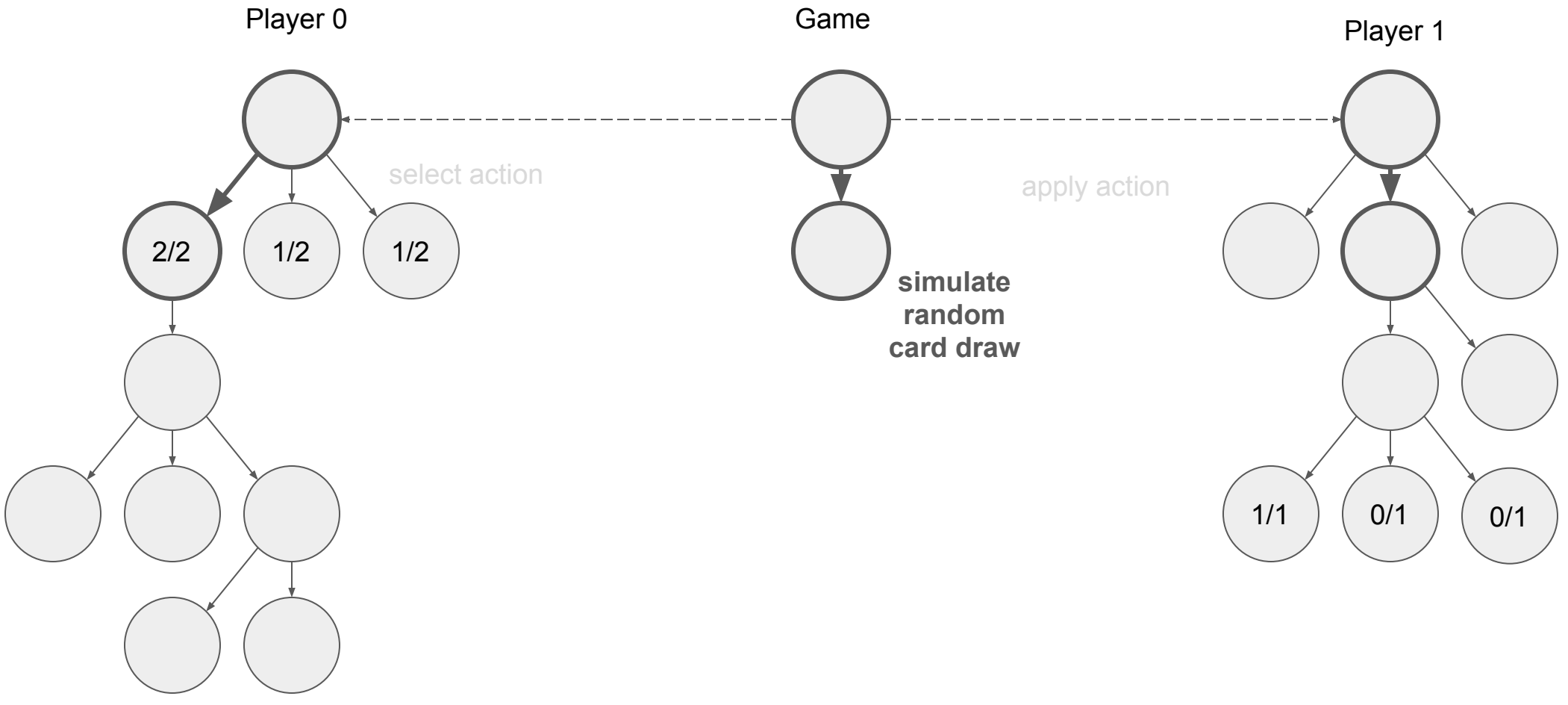
Player 0 selects the action with the highest UCB



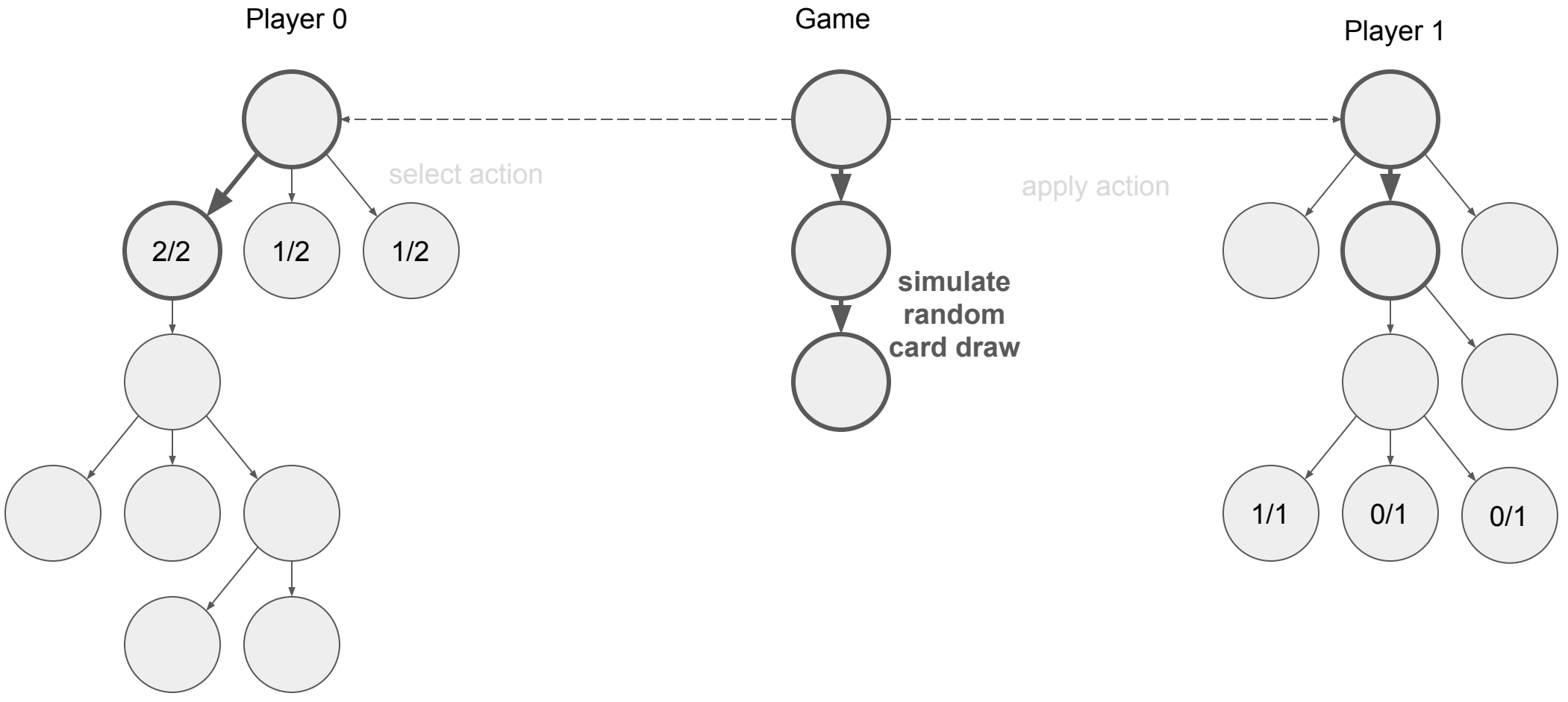
Apply Player 0’s action to the simulation of the game and the tree of Player 1



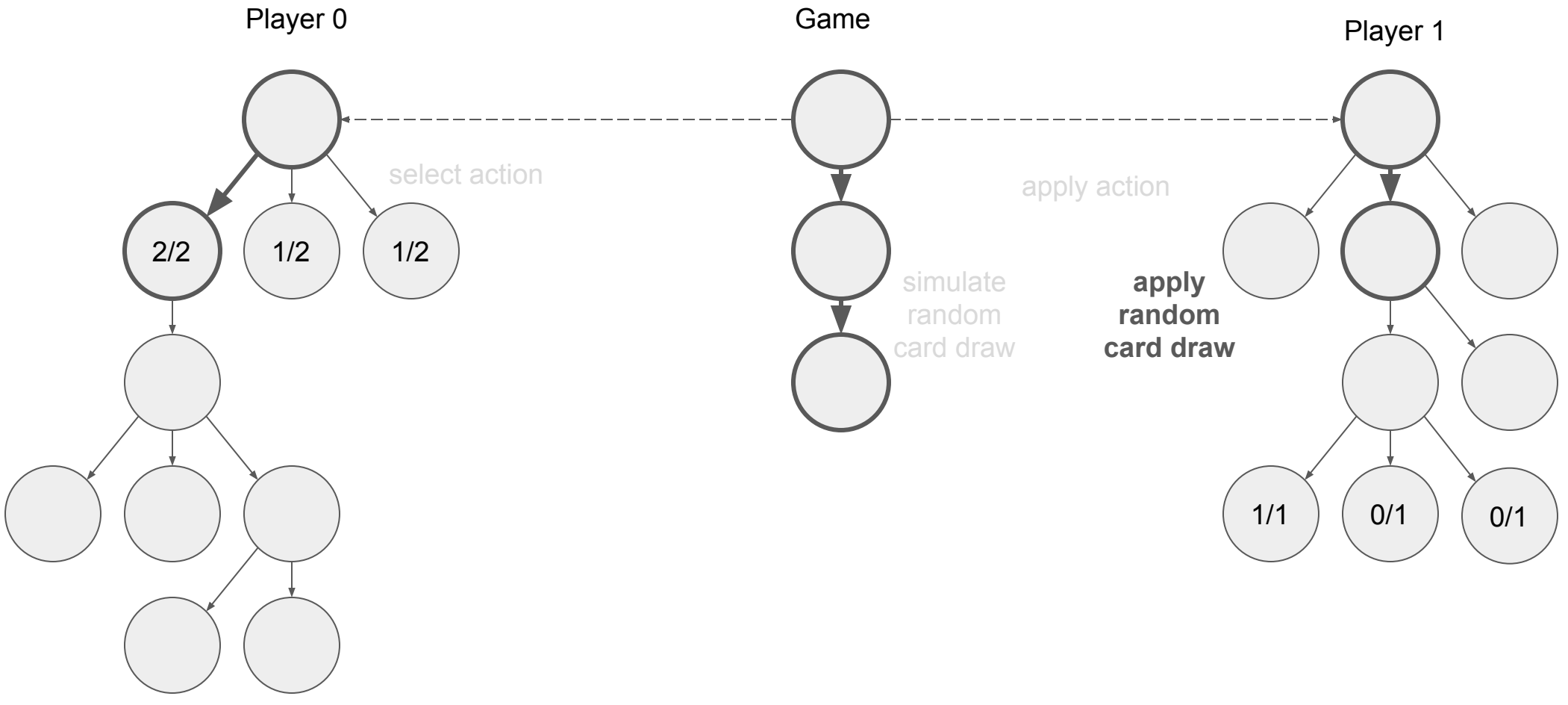
Apply Player 0’s action to the simulation of the game and the tree of Player 1



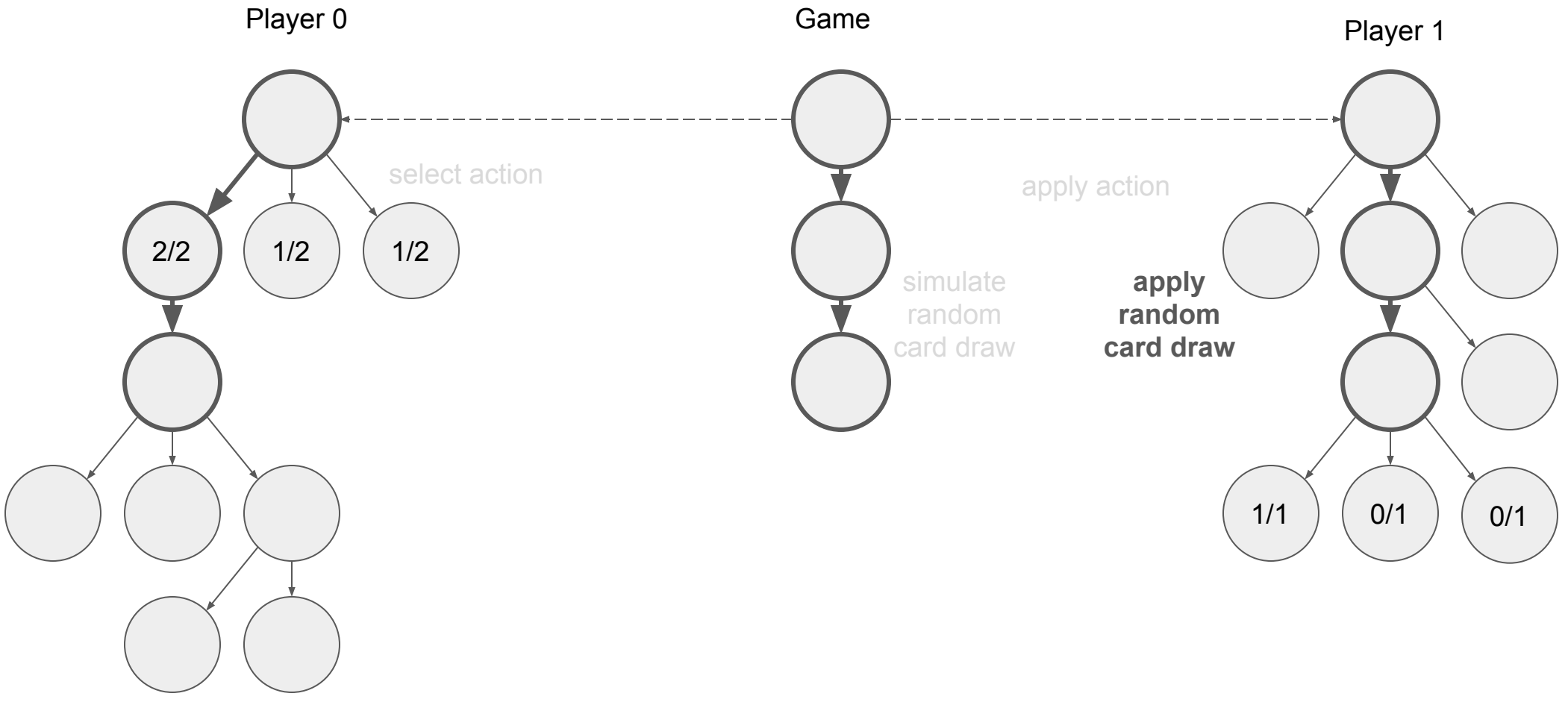
Randomly draw a card for player 1



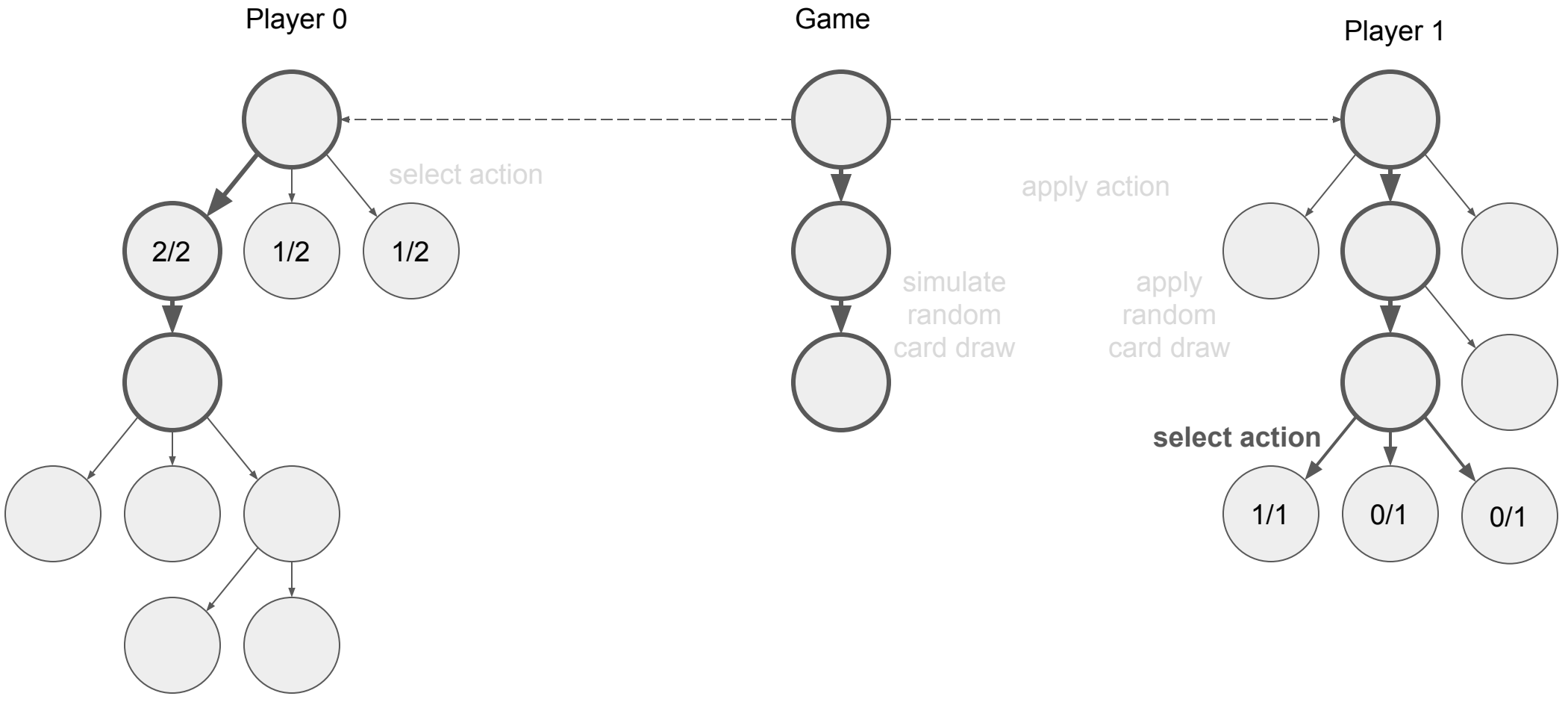
Randomly draw a card for player 1



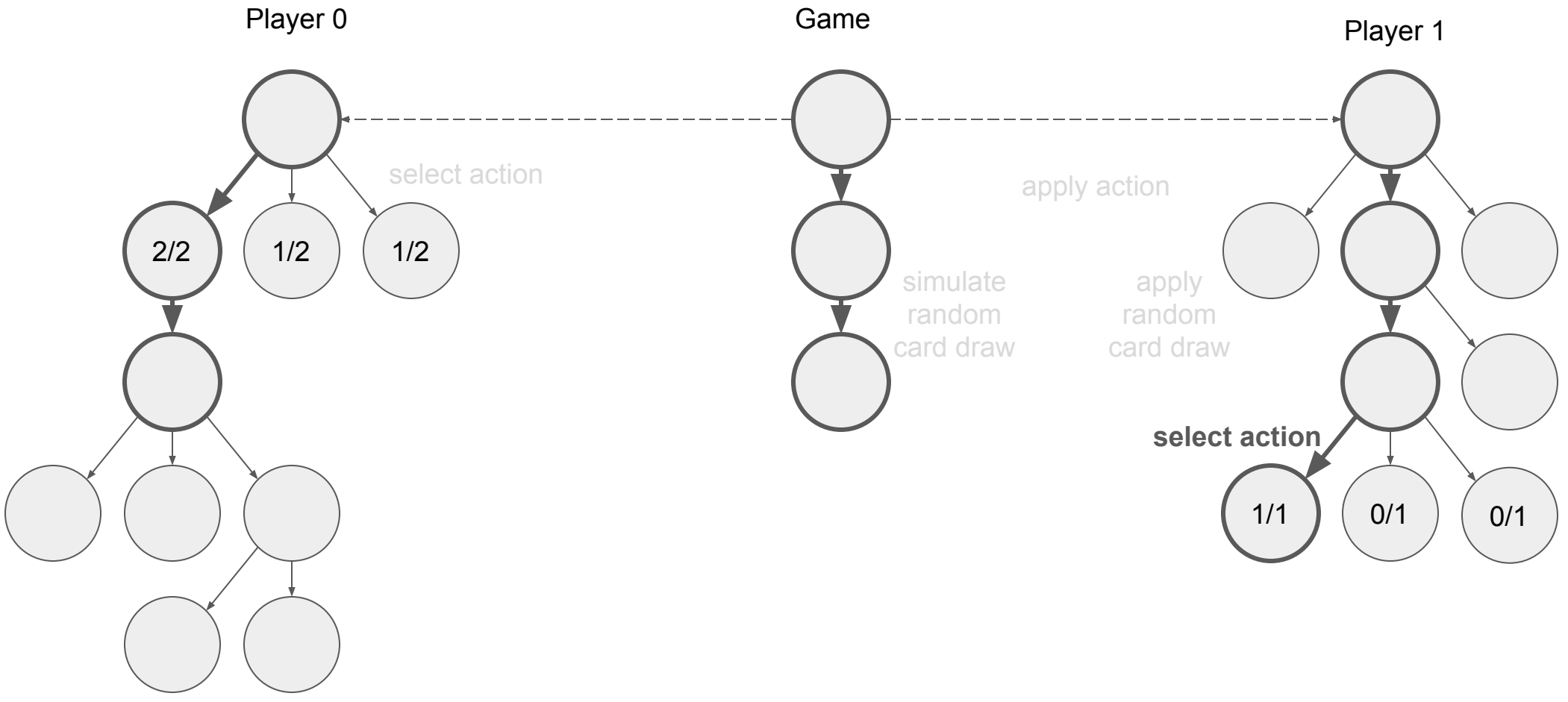
Traverse to the next node based on the newly drawn card for Player 1



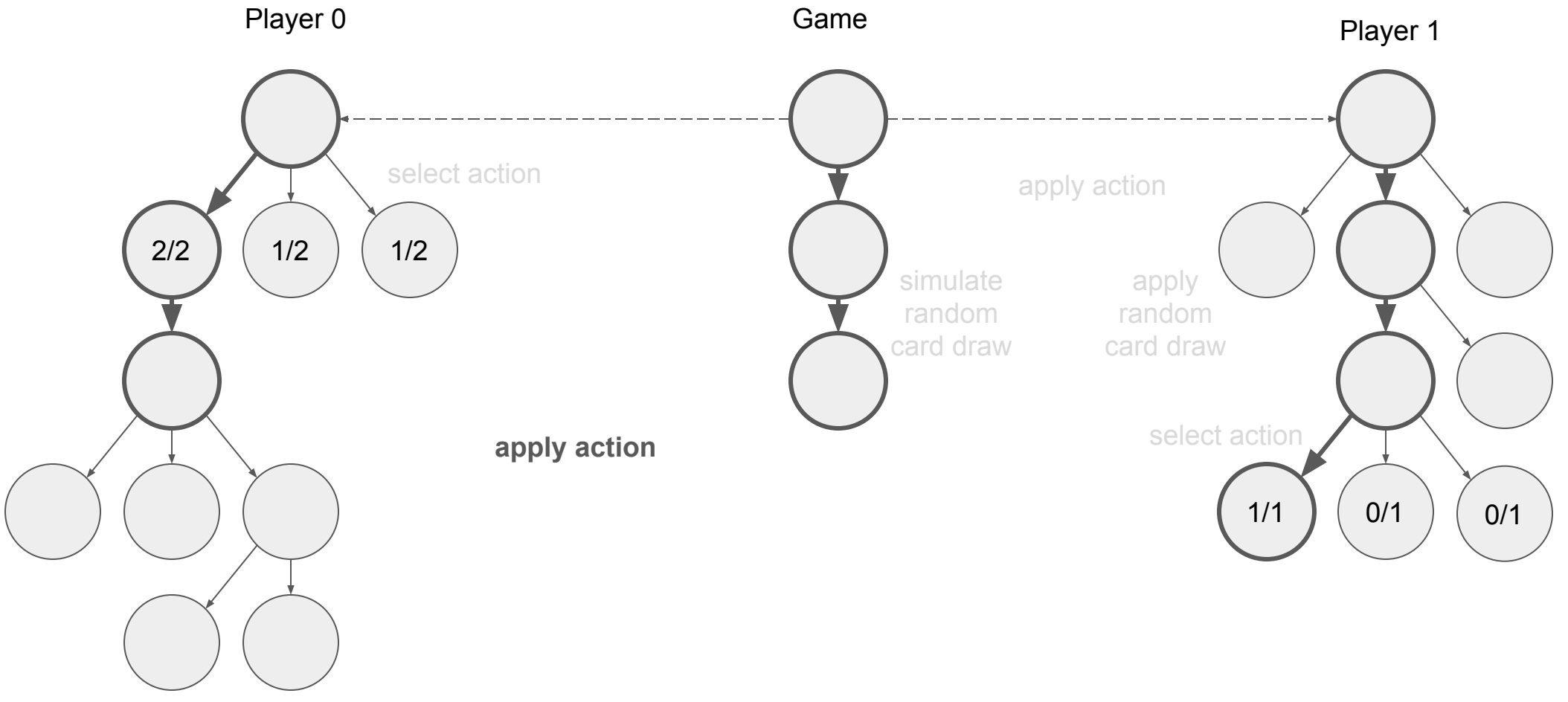
Traverse to the next node based on the newly drawn card for Player 1



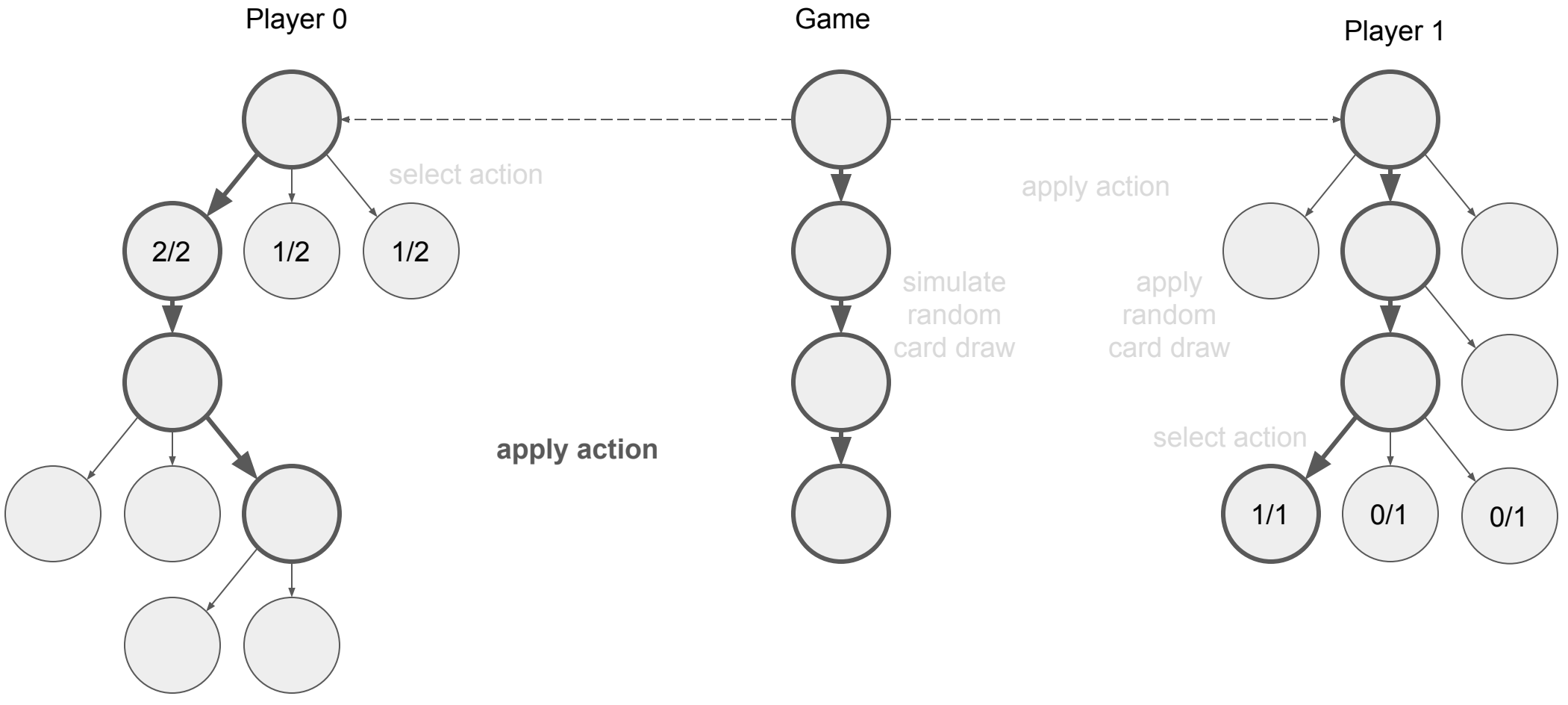
Player 1 selects the action with the highest UCB



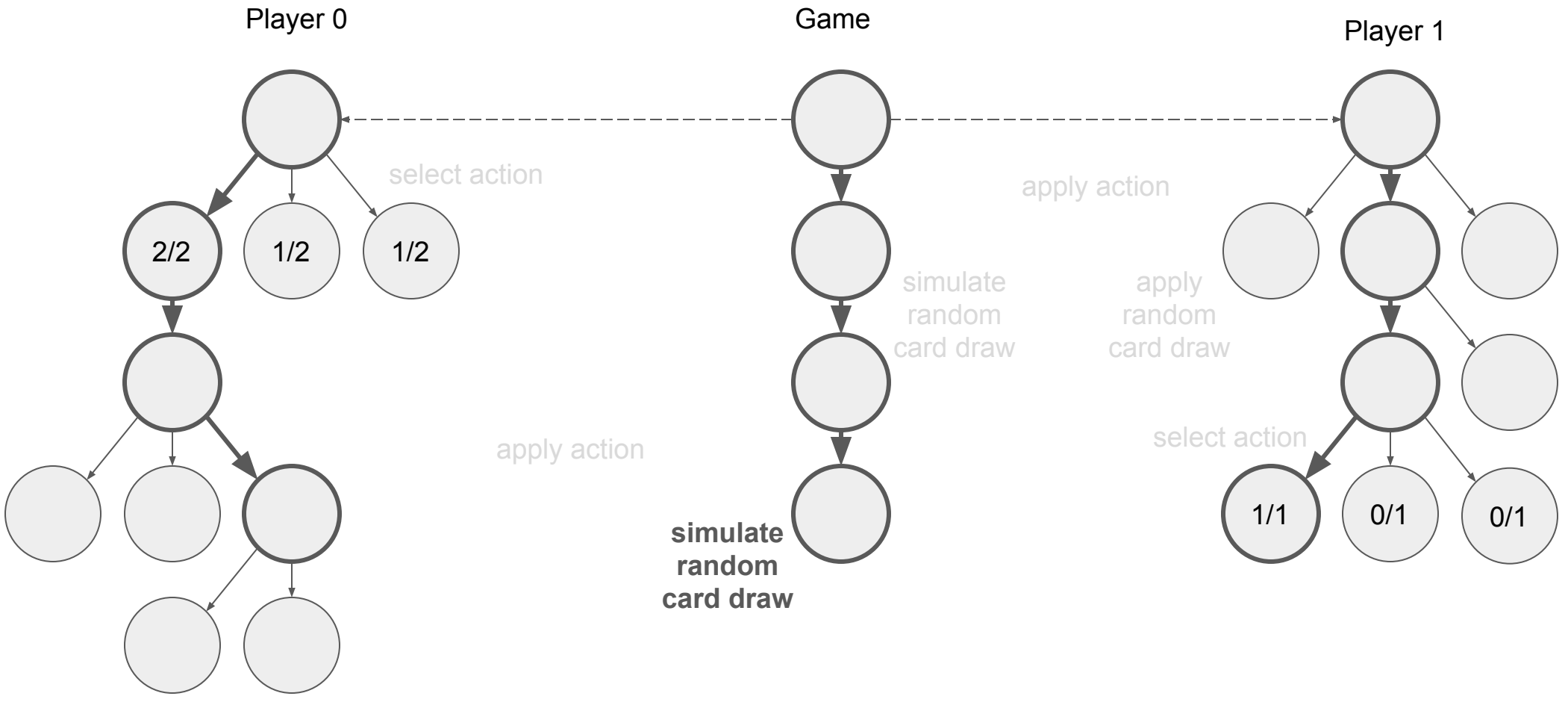
Player 1 selects the action with the highest UCB



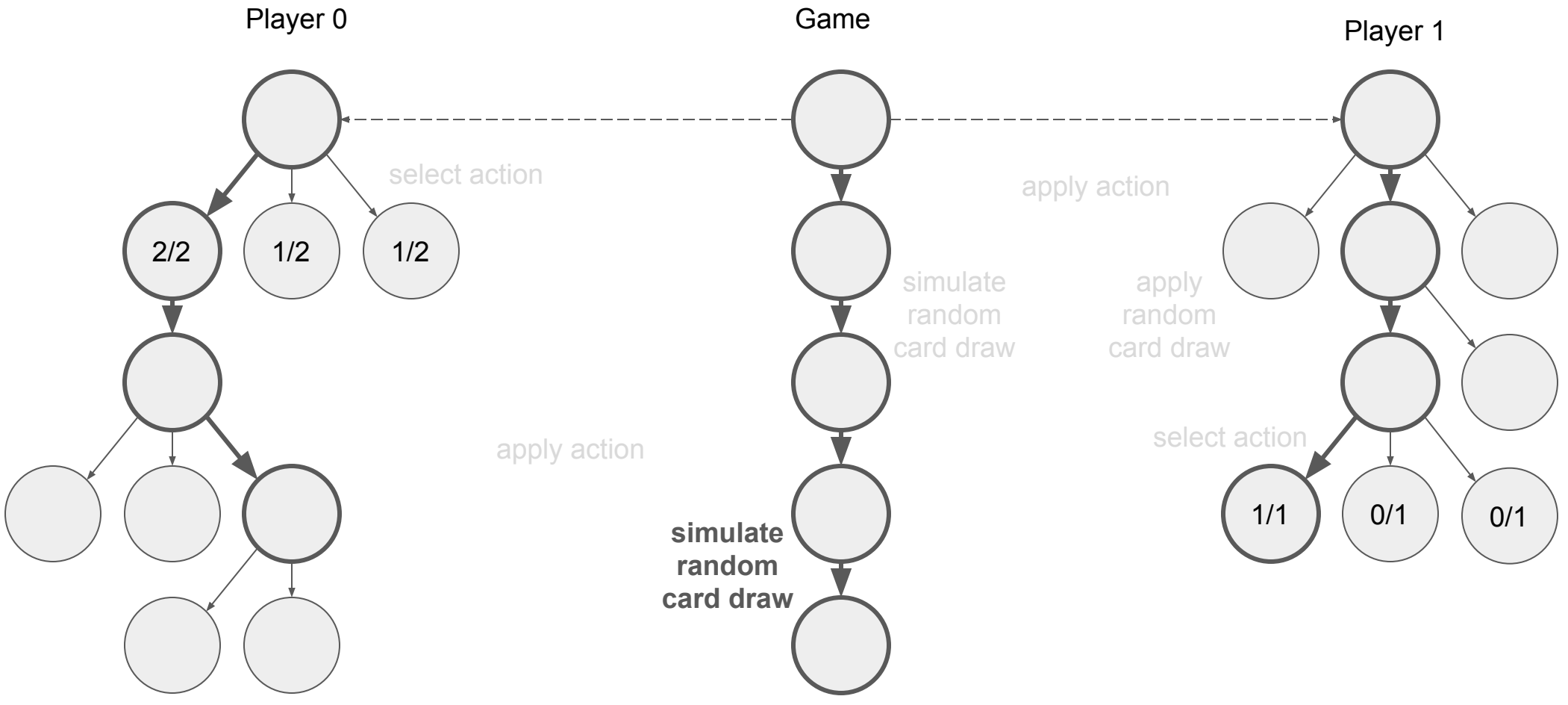
Apply Player 1’s action to the simulation of the game and the tree of Player 0



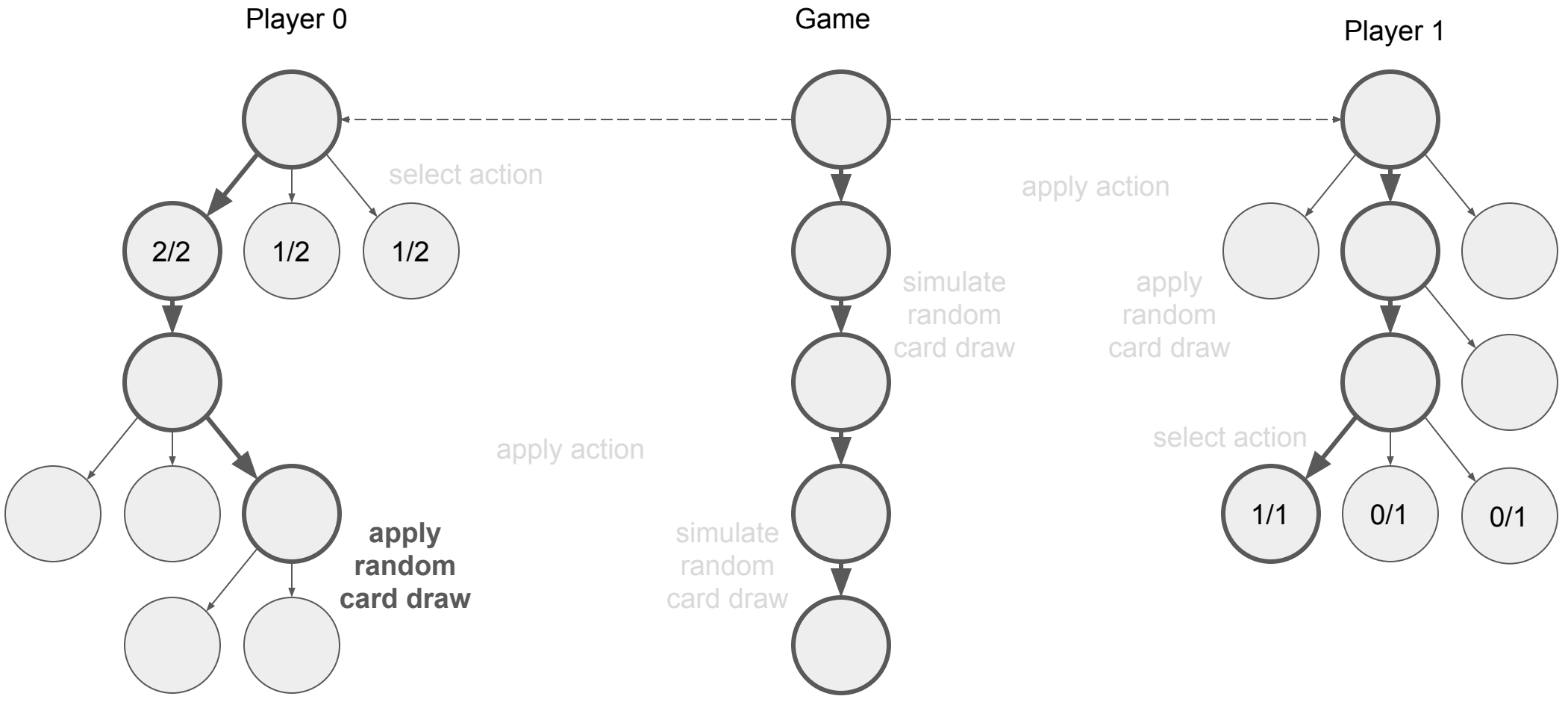
Apply Player 1’s action to the simulation of the game and the tree of Player 0



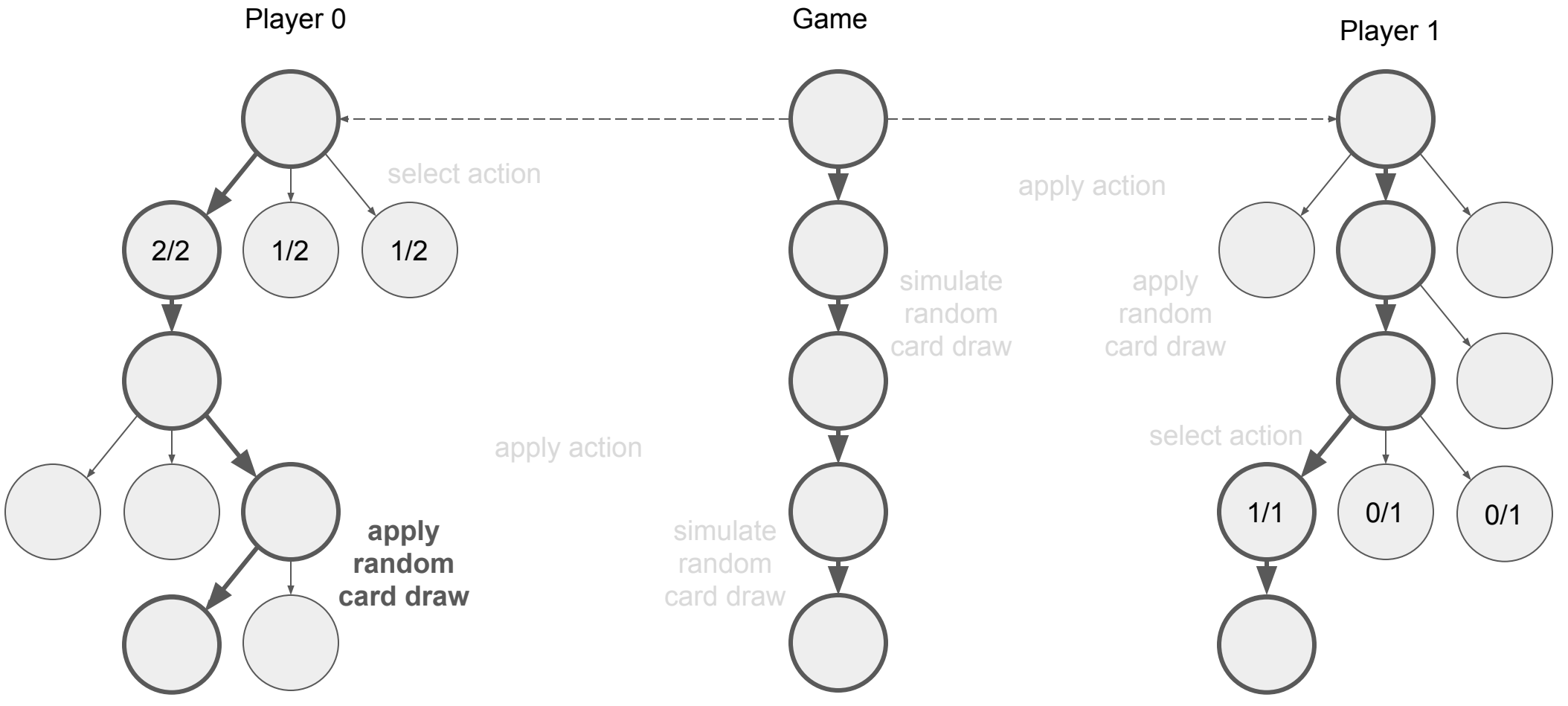
Randomly draw a card for player 0



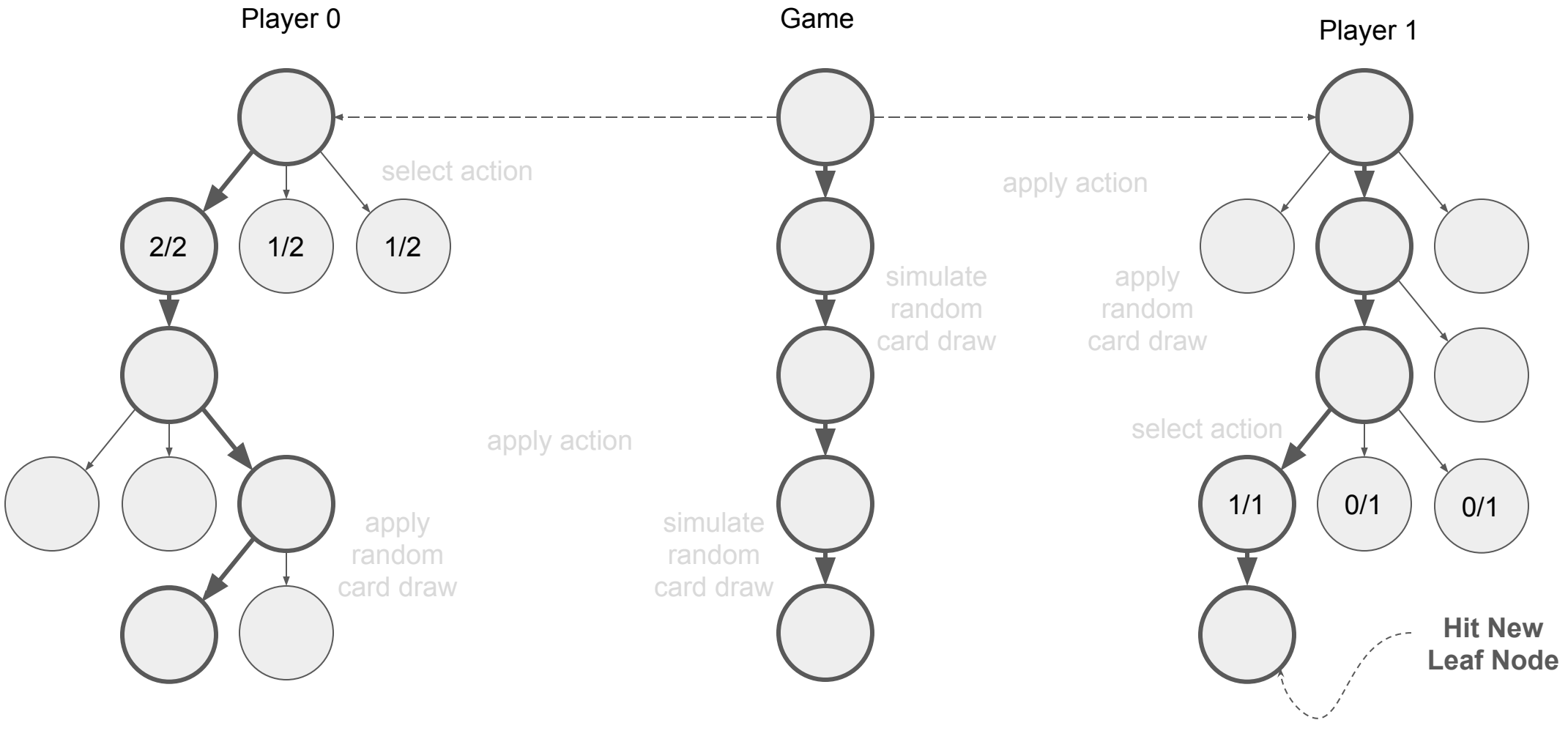
Randomly draw a card for player 0



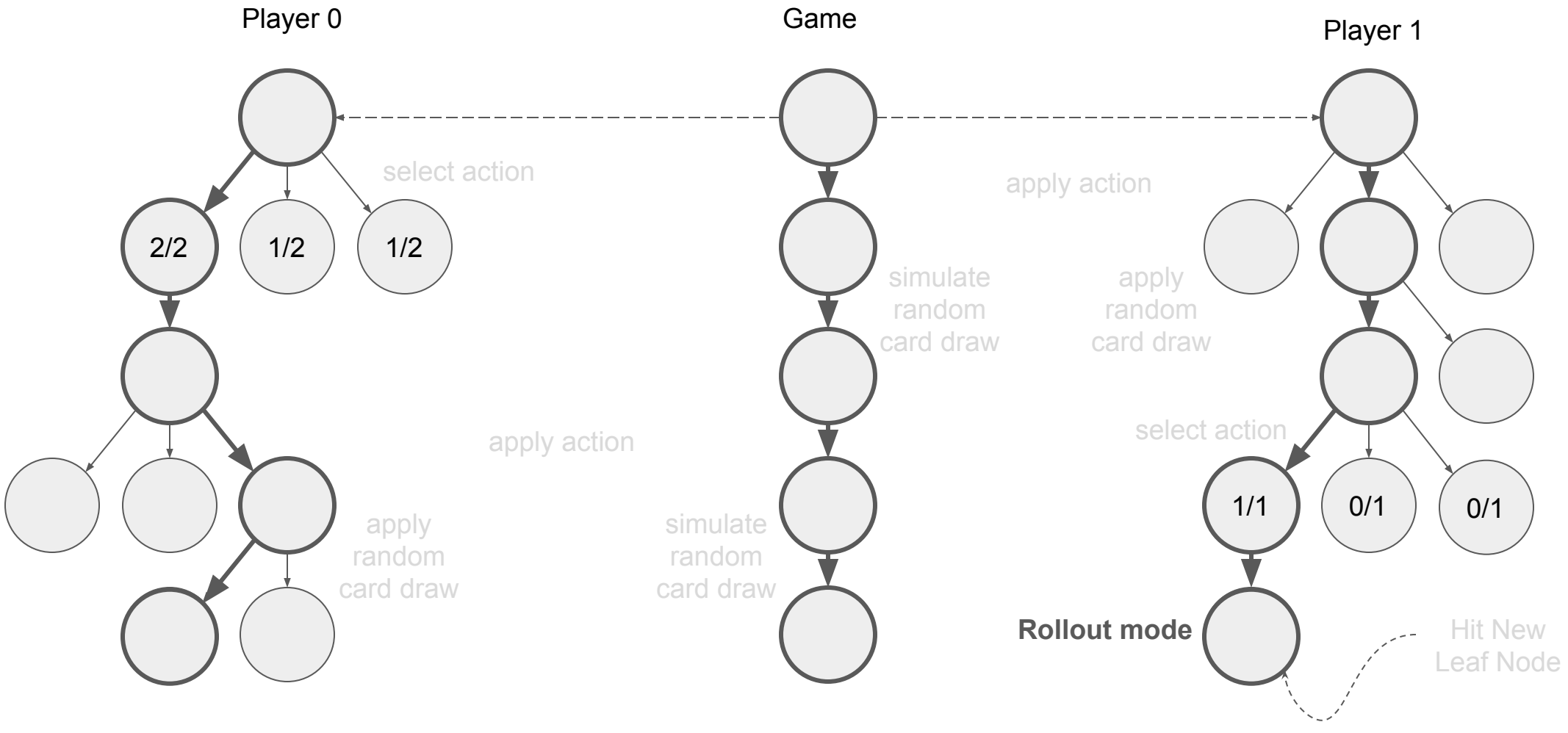
Traverse to the next node based on the newly drawn card for Player 0



Traverse to the next node based on the newly drawn card for Player 0



When a new leaf node is sprouted (not a pre-action-node), the tree is set to ‘rollout mode’.
Pick random actions
Don’t sprout new nodes



When a new leaf node is sprouted (not a pre-action-node), the tree is set to ‘rollout mode’.
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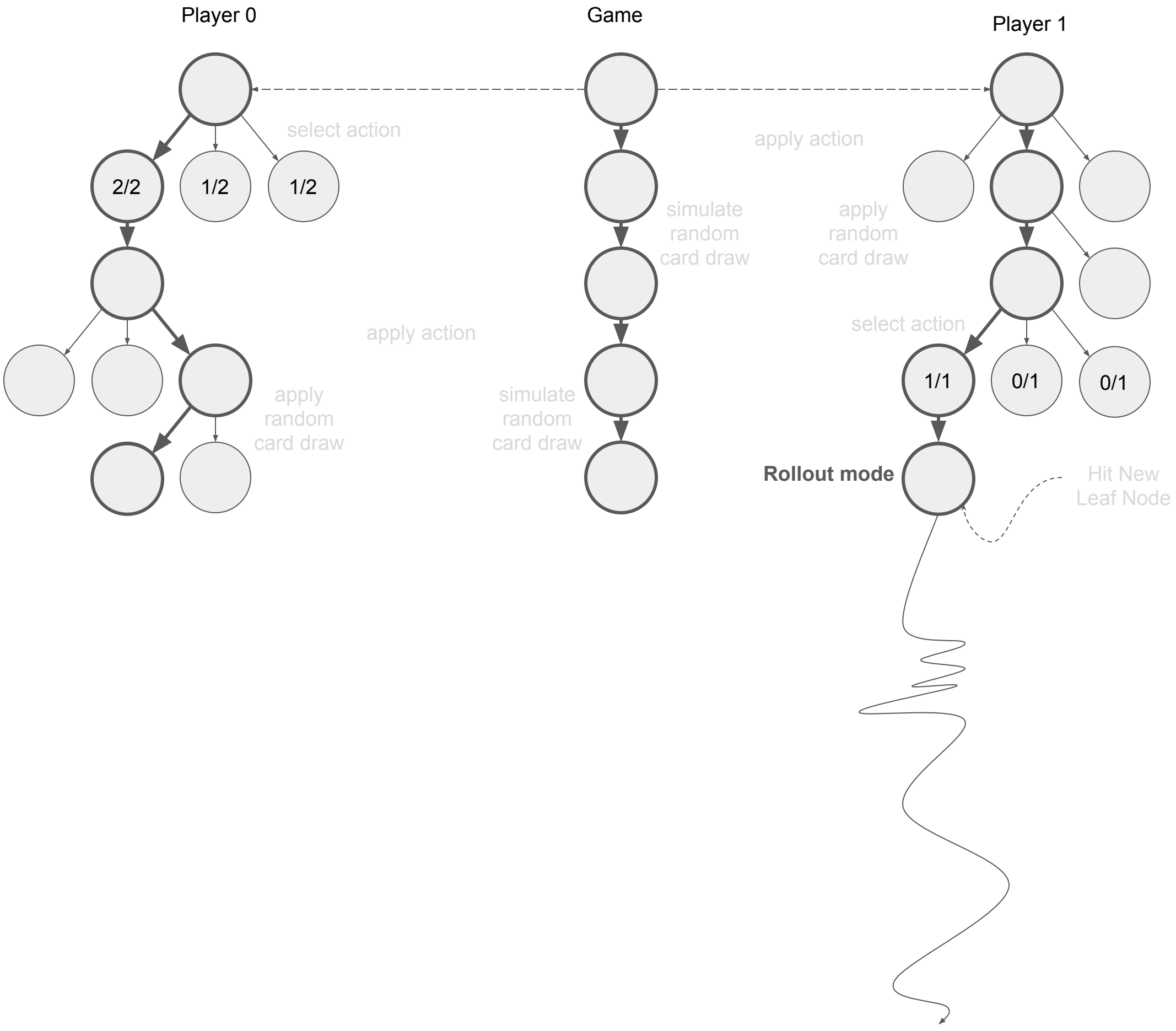
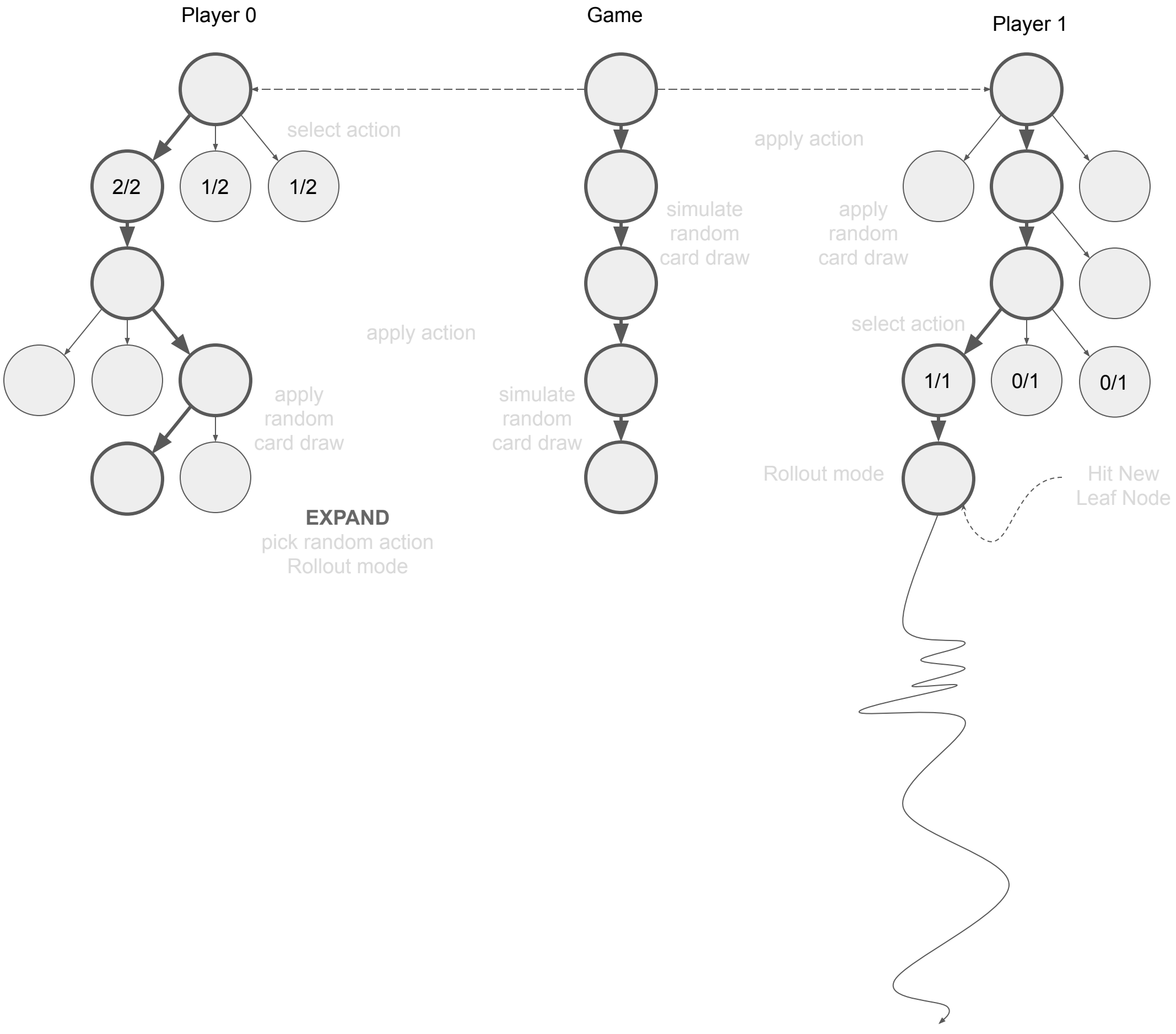
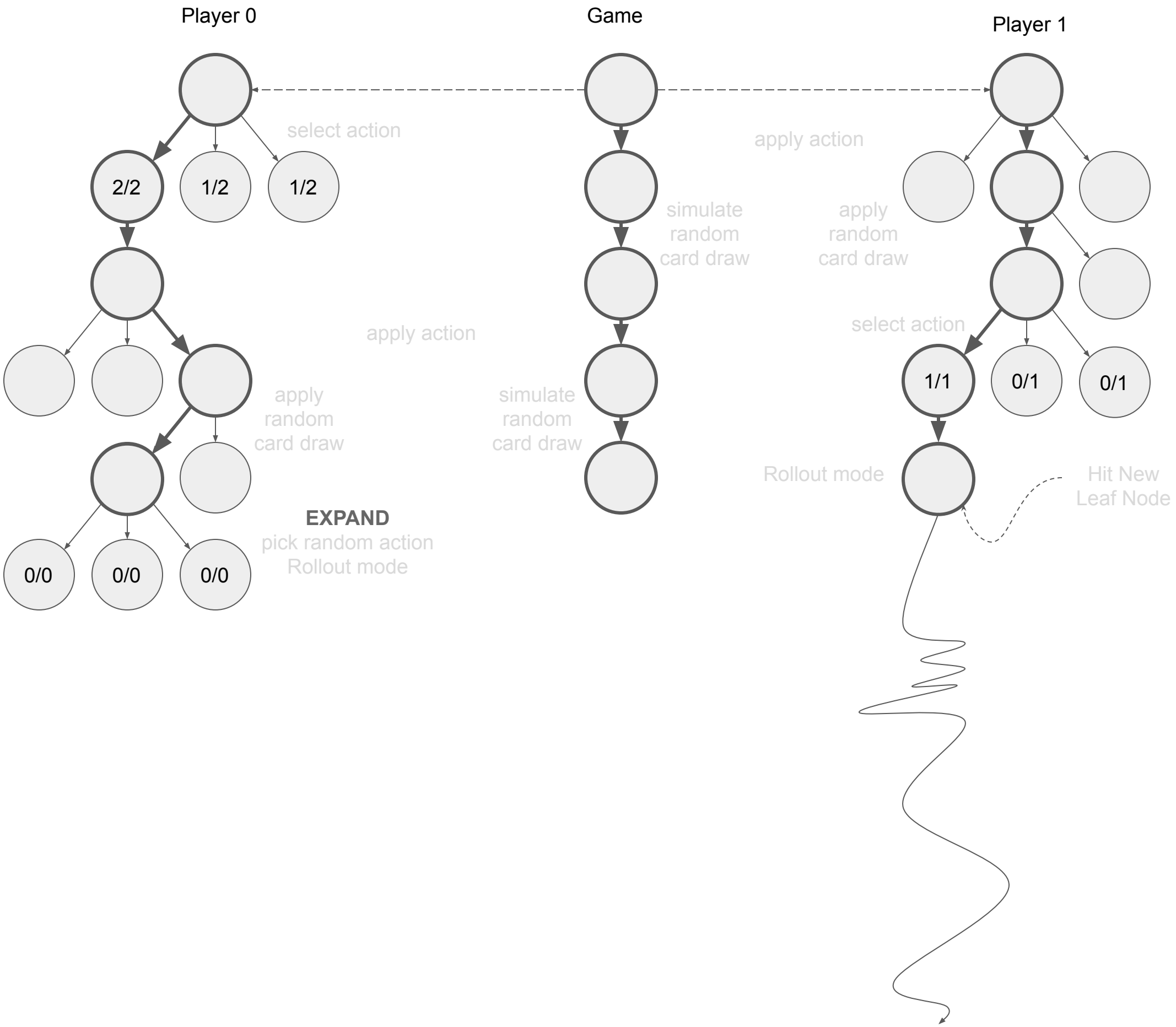
Don’t sprout new nodes



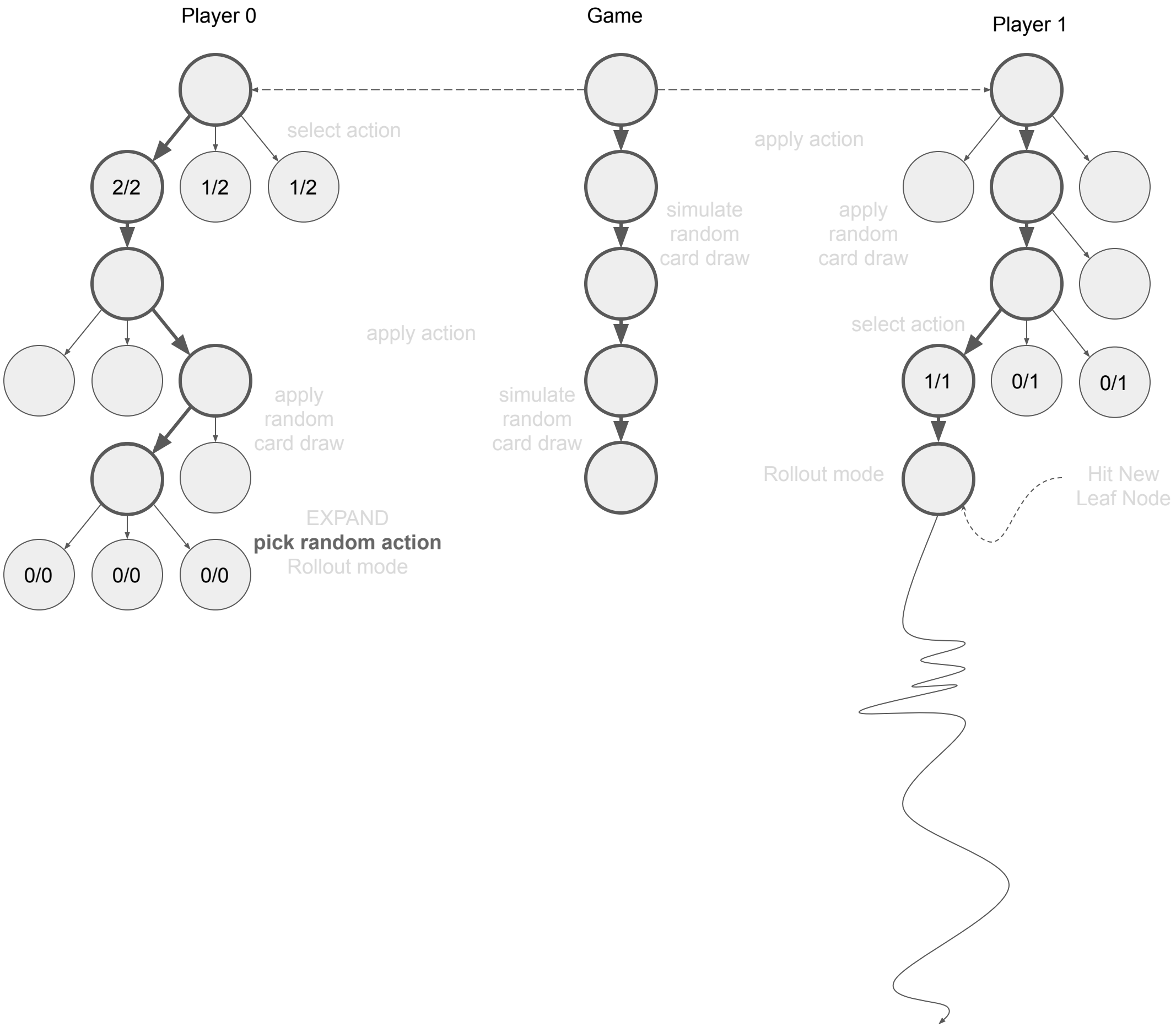
When a new leaf node is sprouted (not a pre-action-node), the tree is set to ‘rollout mode’.
Pick random actions
Don’t sprout new nodes



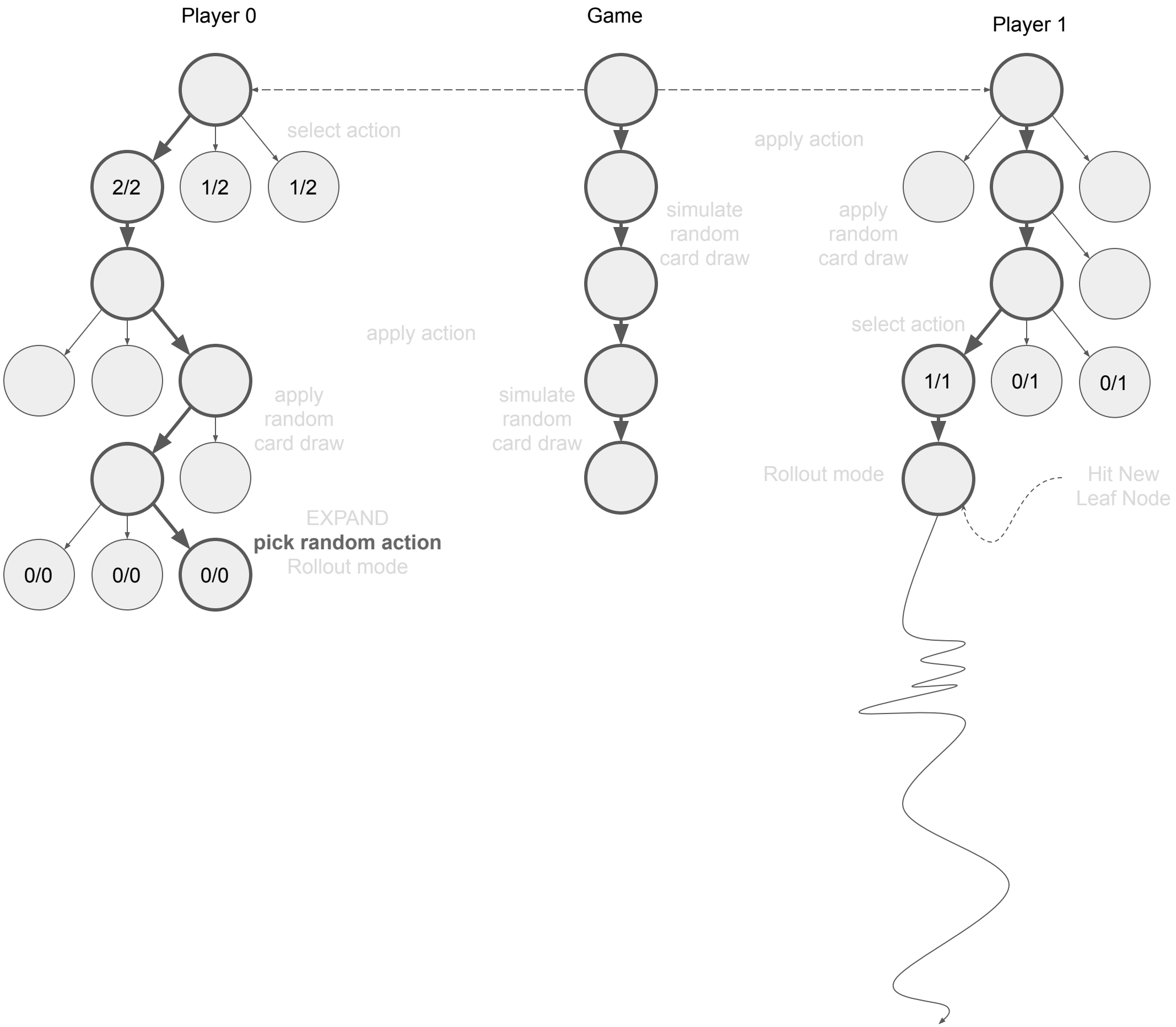
When a leaf pre-action-node is selected;
expand the node
pick random action
put tree to ‘rollout mode’



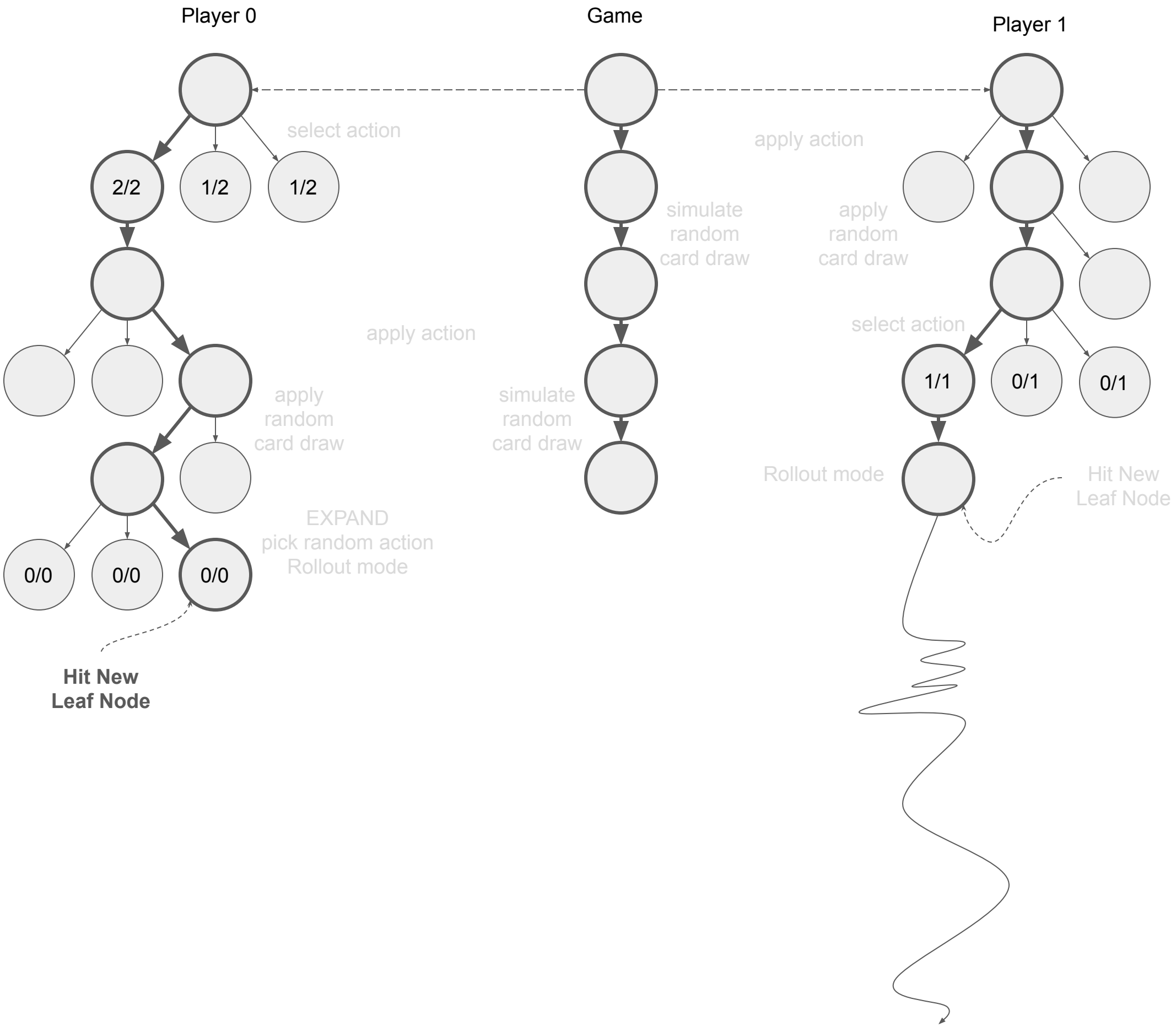
When a leaf pre-action-node is selected;
expand the node
pick random action
put tree to ‘rollout mode’



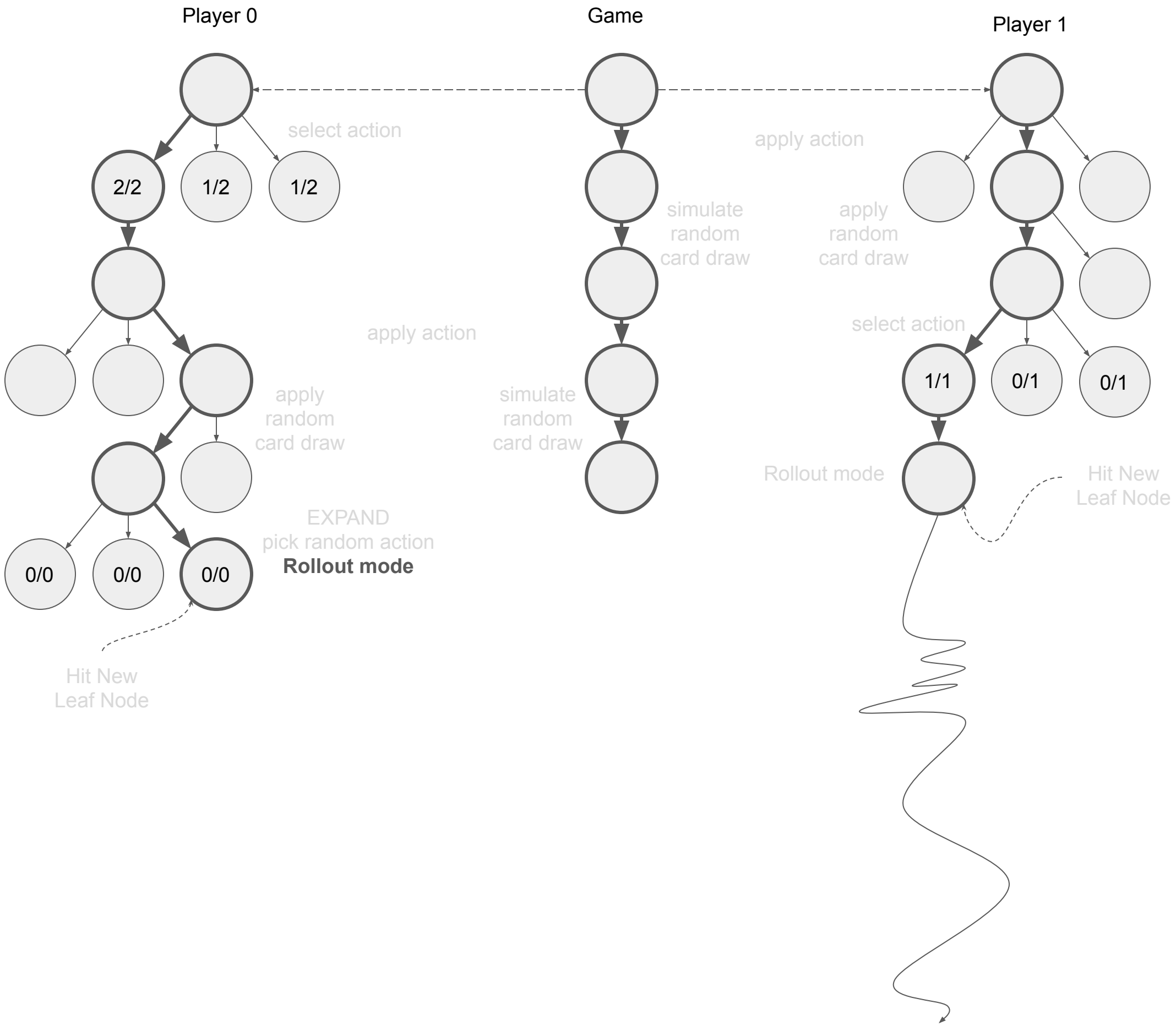
When a leaf pre-action-node is selected;
expand the node
pick random action
put tree to ‘rollout mode’



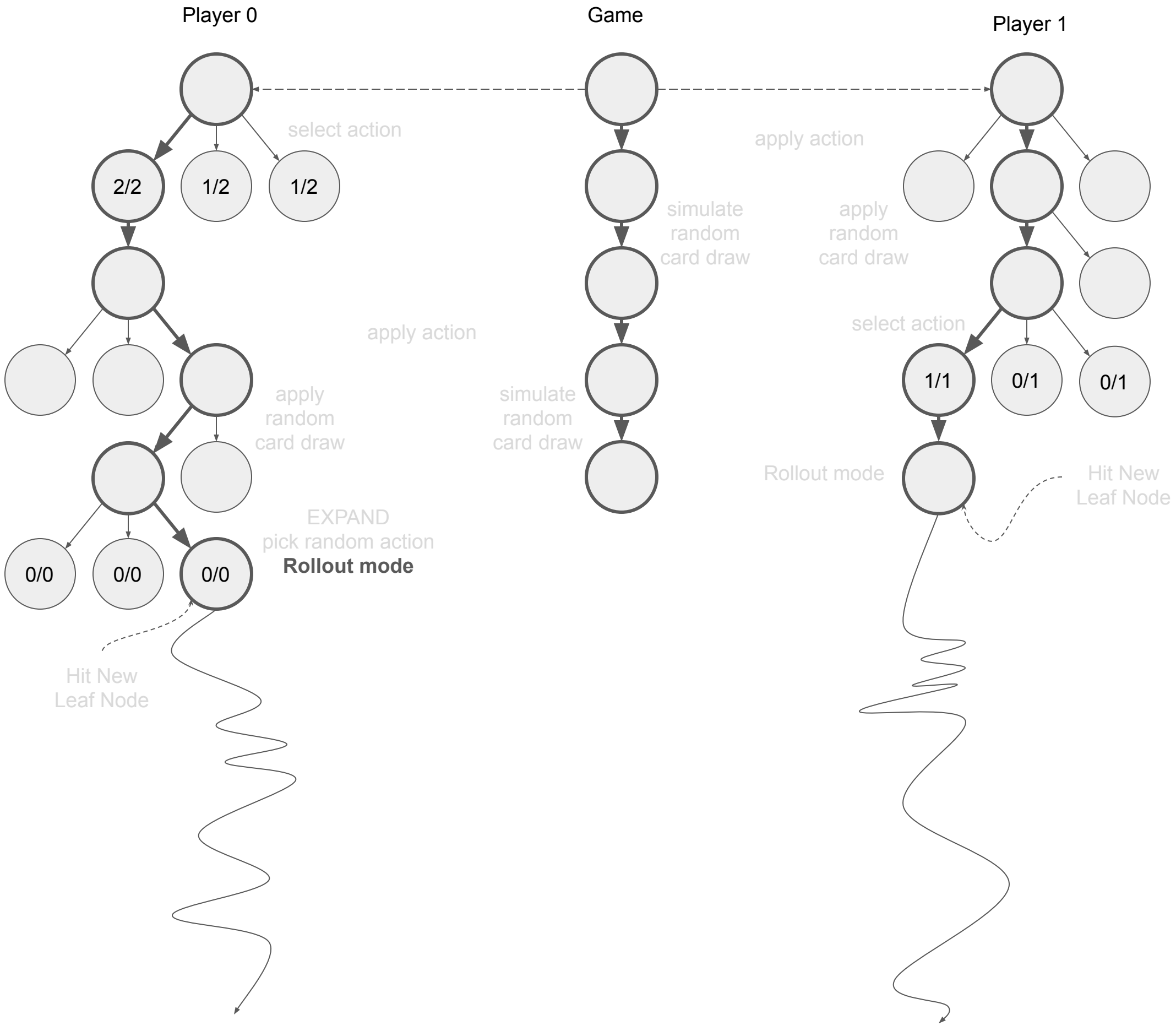
When a leaf pre-action-node is selected;
expand the node
pick random action
put tree to ‘rollout mode’



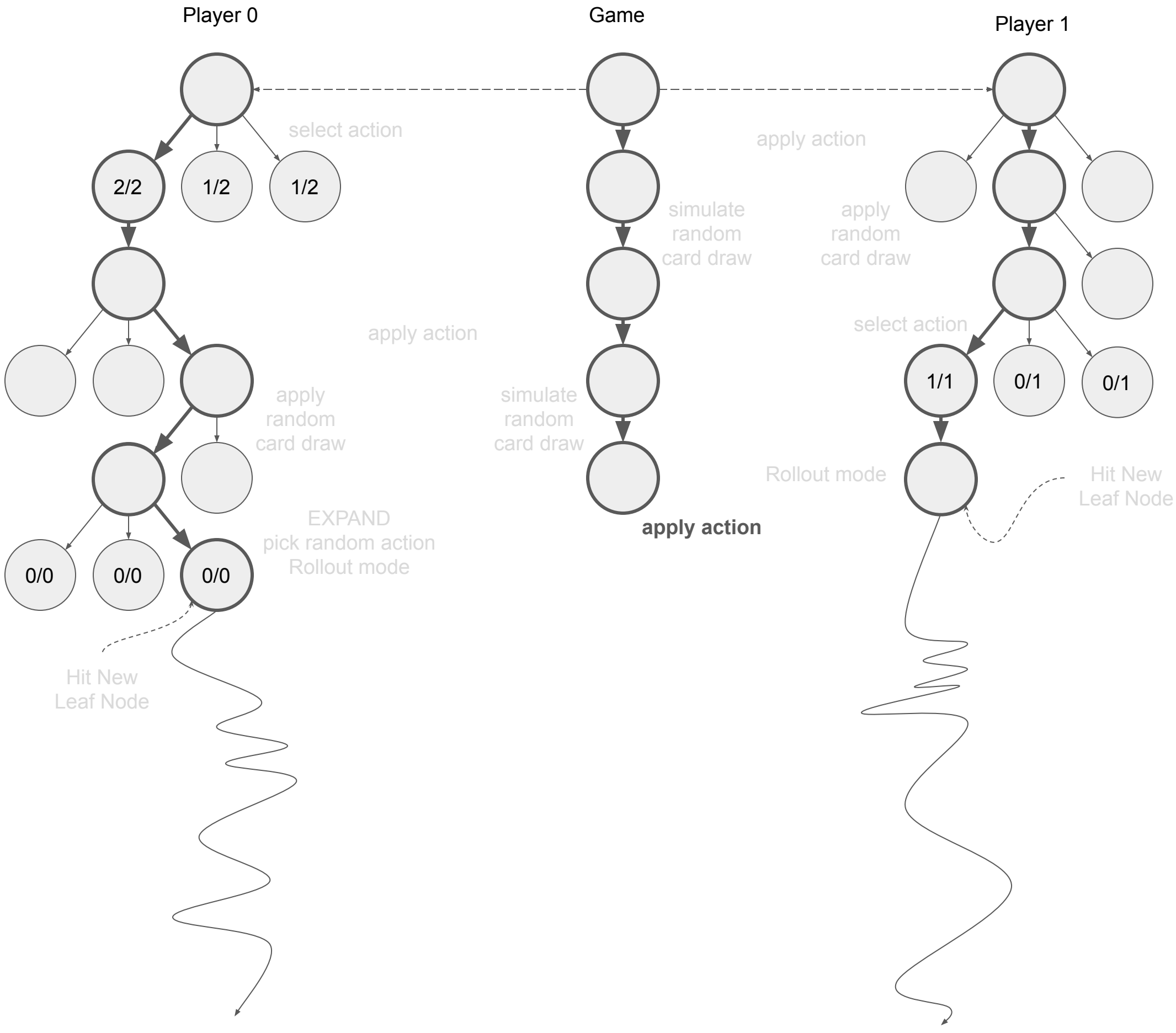
When a leaf pre-action-node is selected;
expand the node
pick random action
put tree to ‘rollout mode’



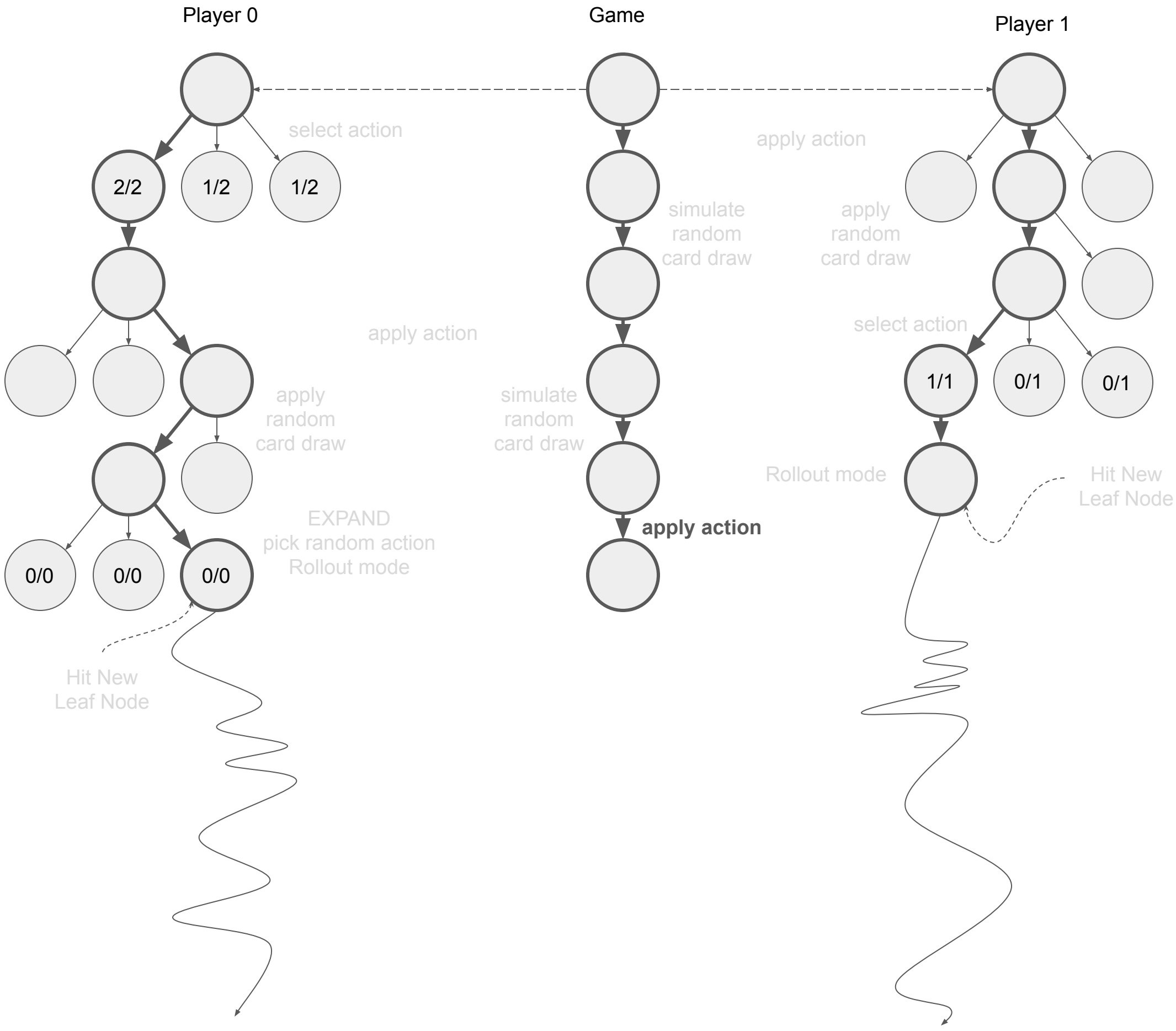
Put tree to ‘rollout mode’
Pick random actions
Don’t sprout new nodes



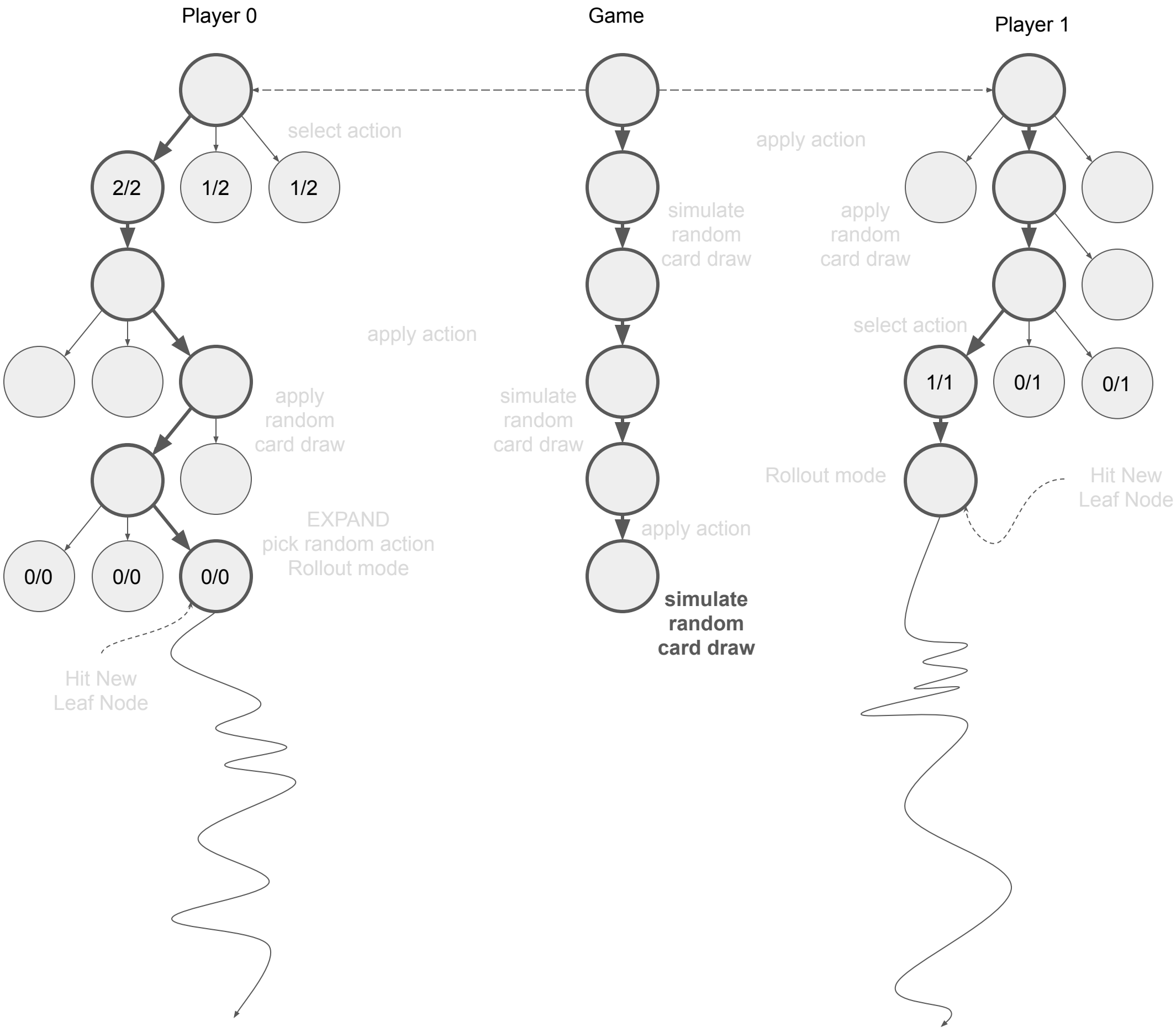
Put tree to ‘rollout mode’
Pick random actions
Don’t sprout new nodes



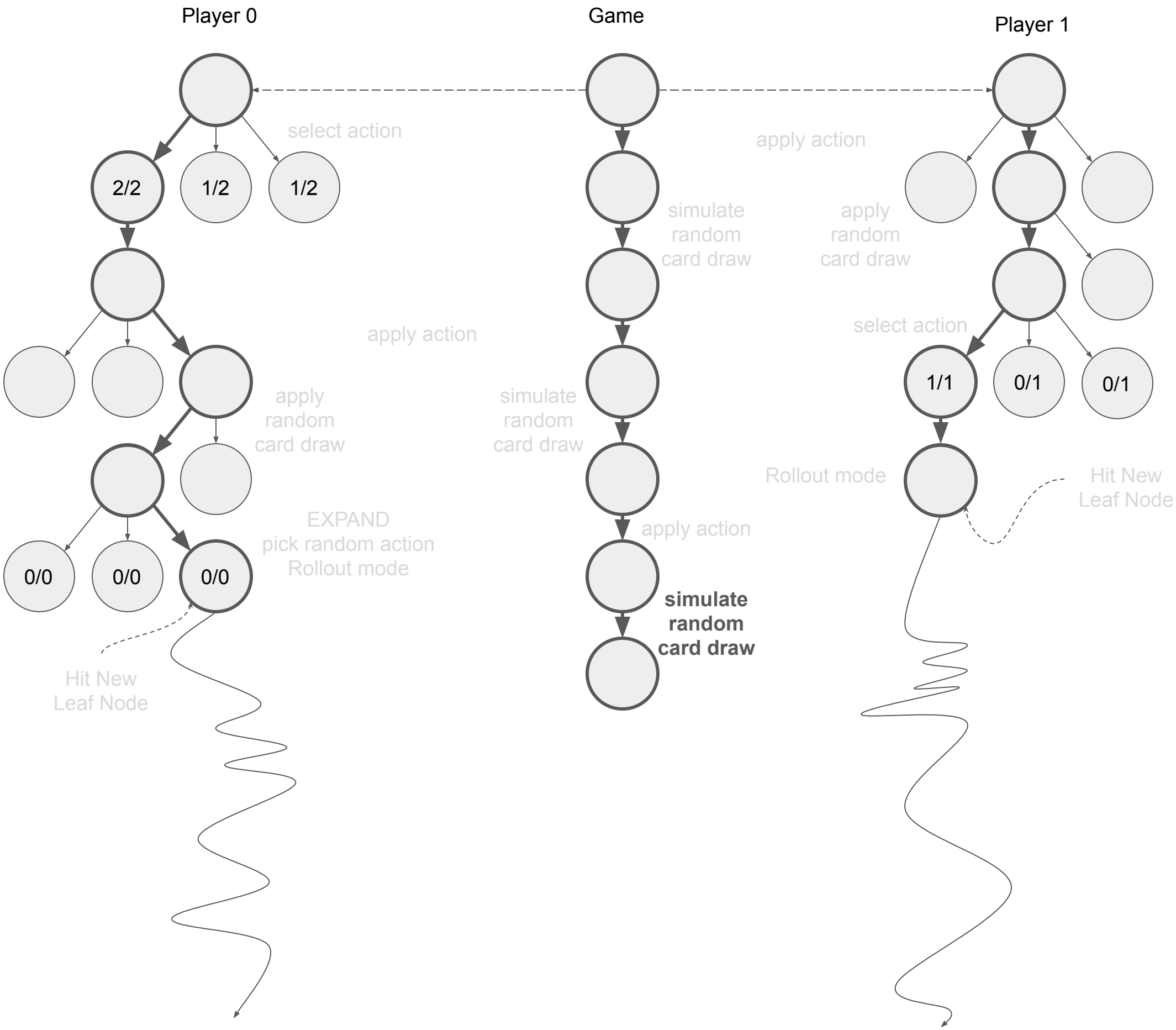
Apply Player 0’s random action to the simulated game



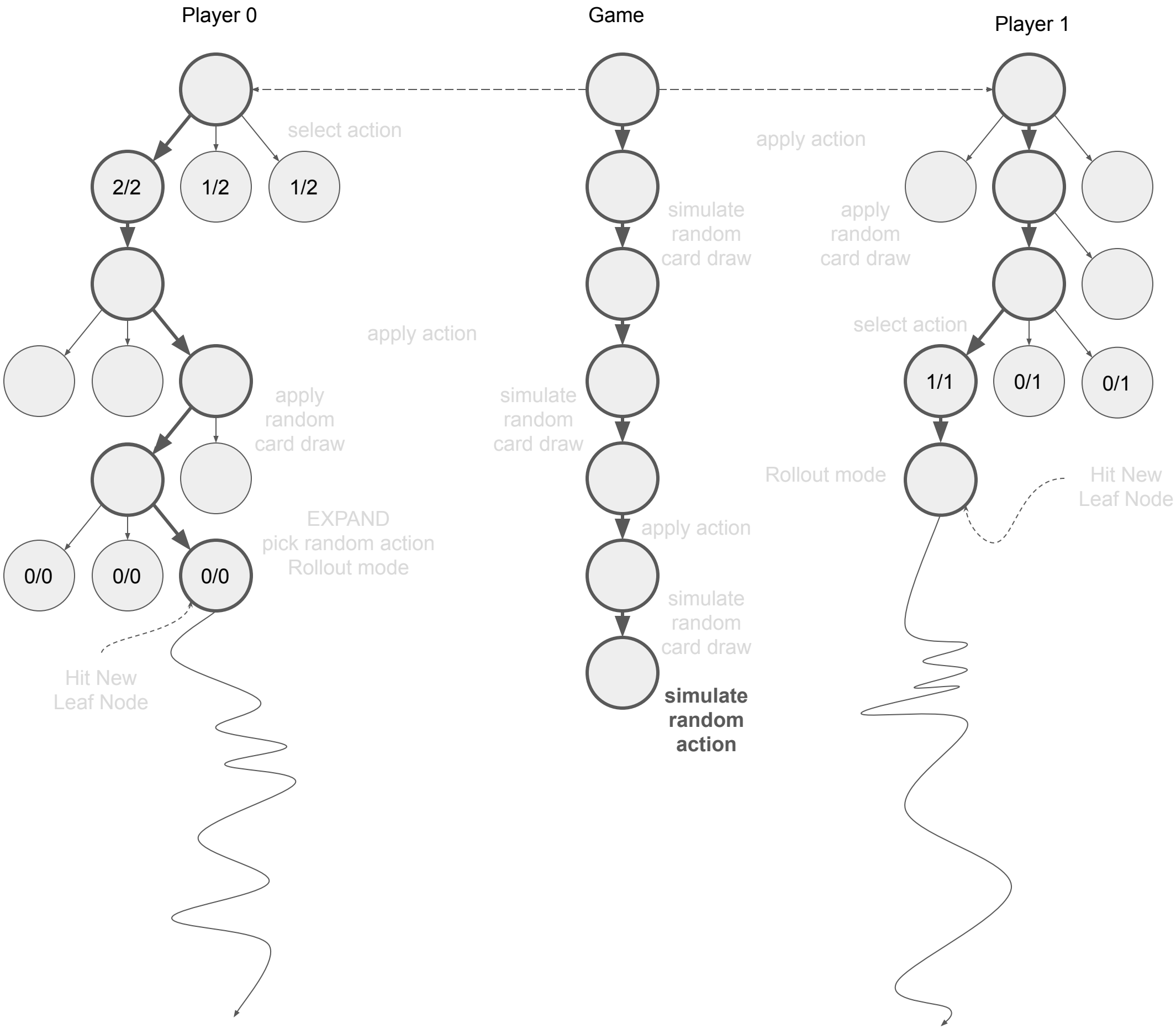
Apply Player 0’s random action to the simulated game



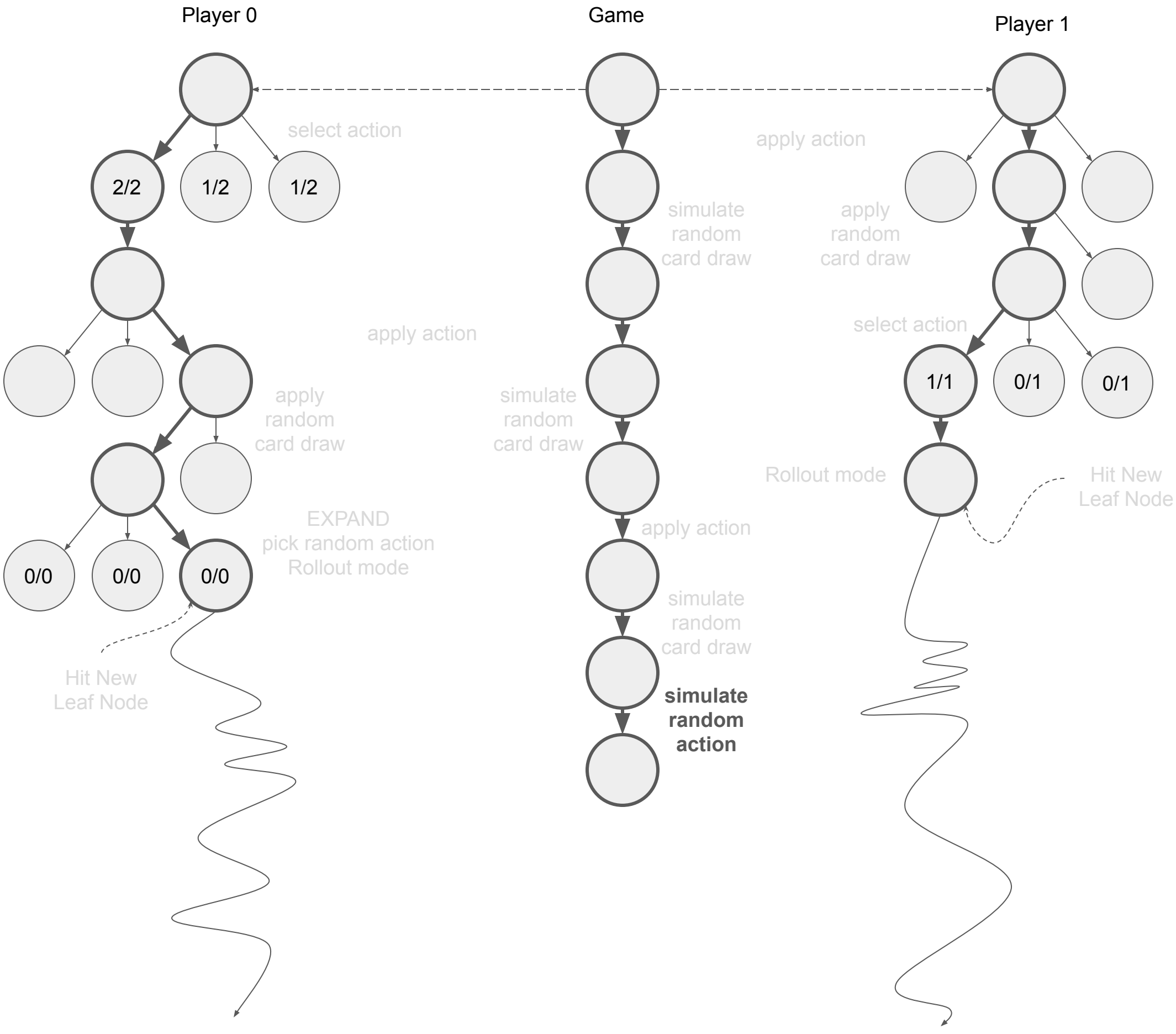
SImulate a random game



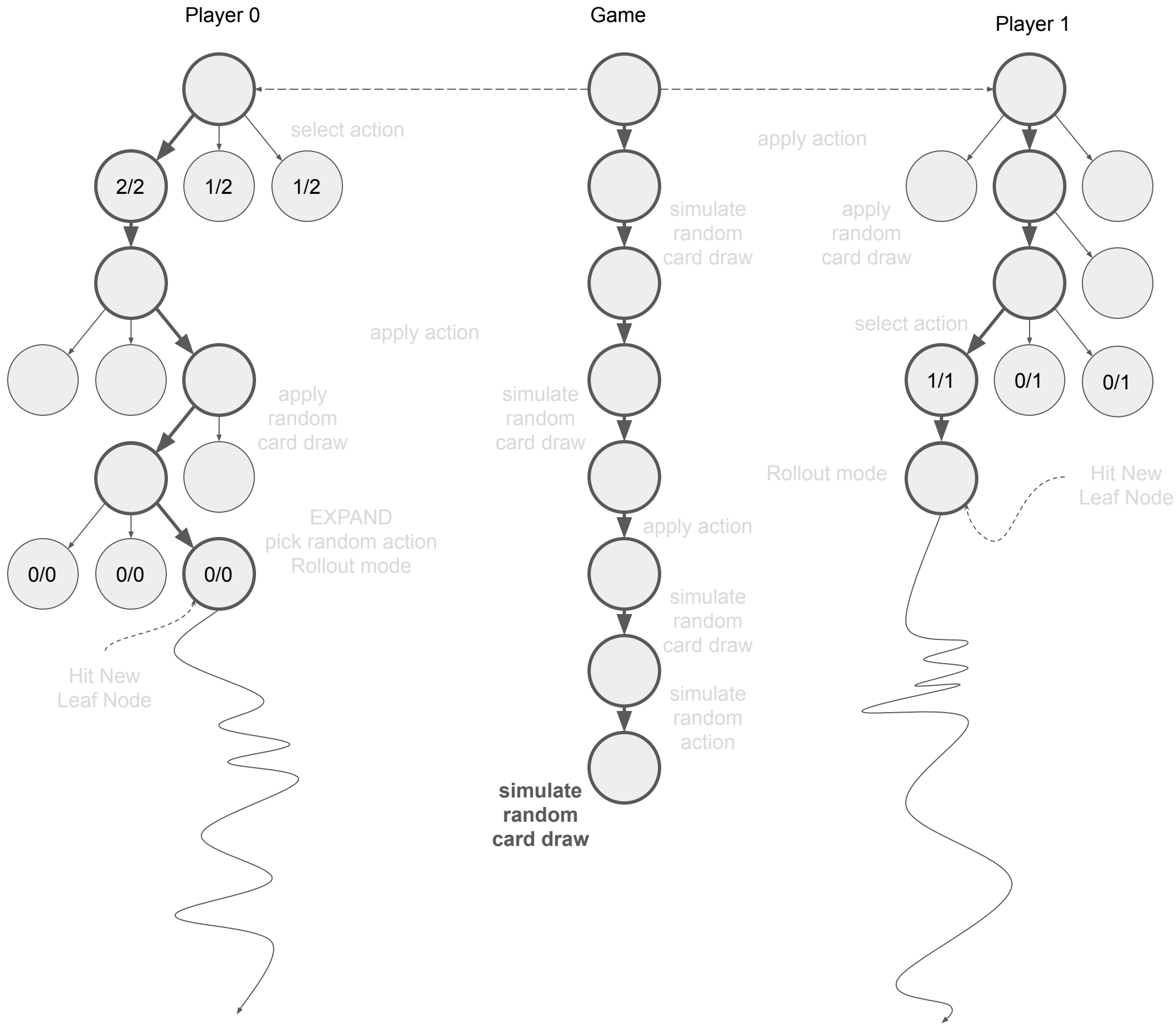
SImulate a random game



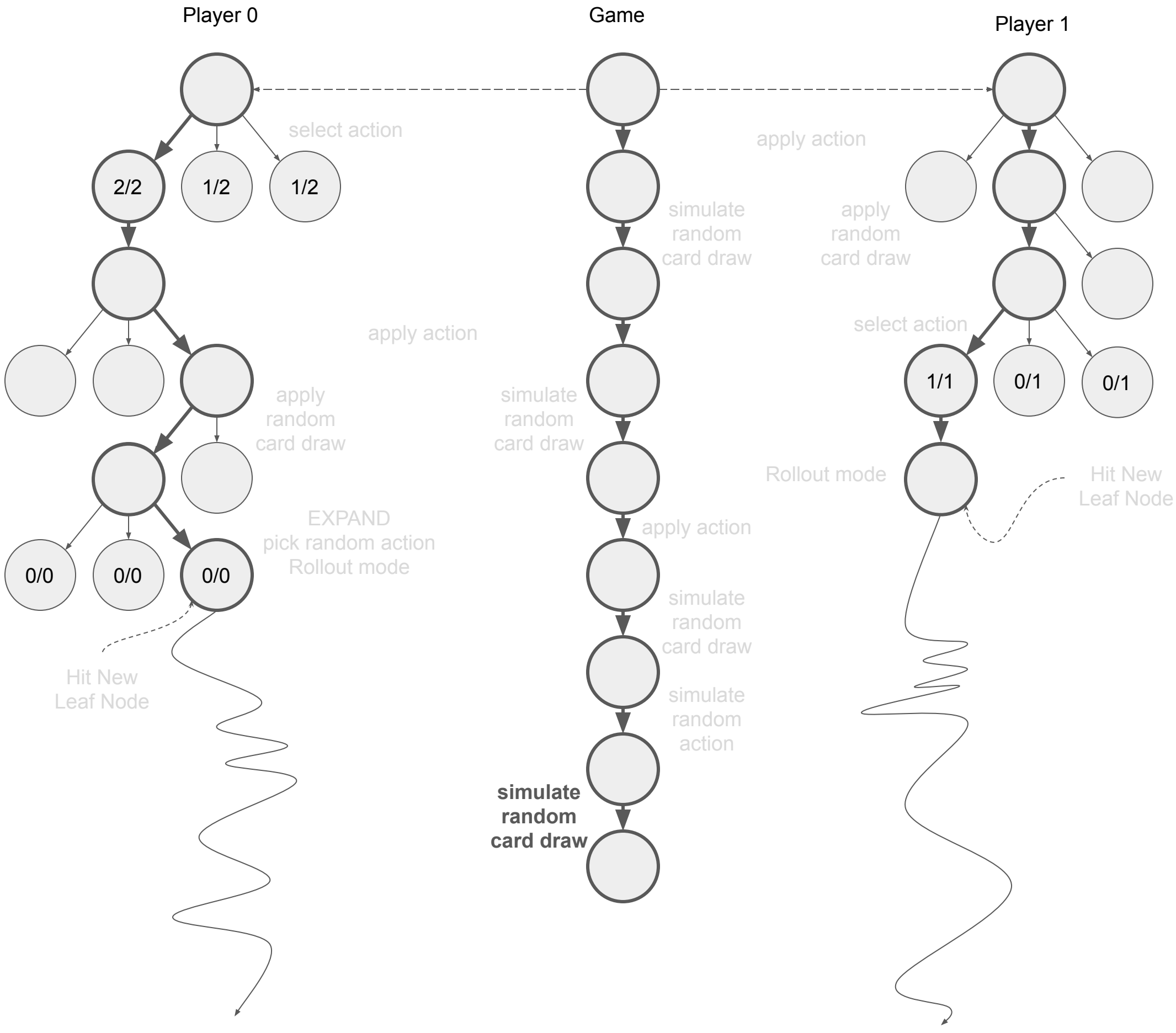
SImulate a random game



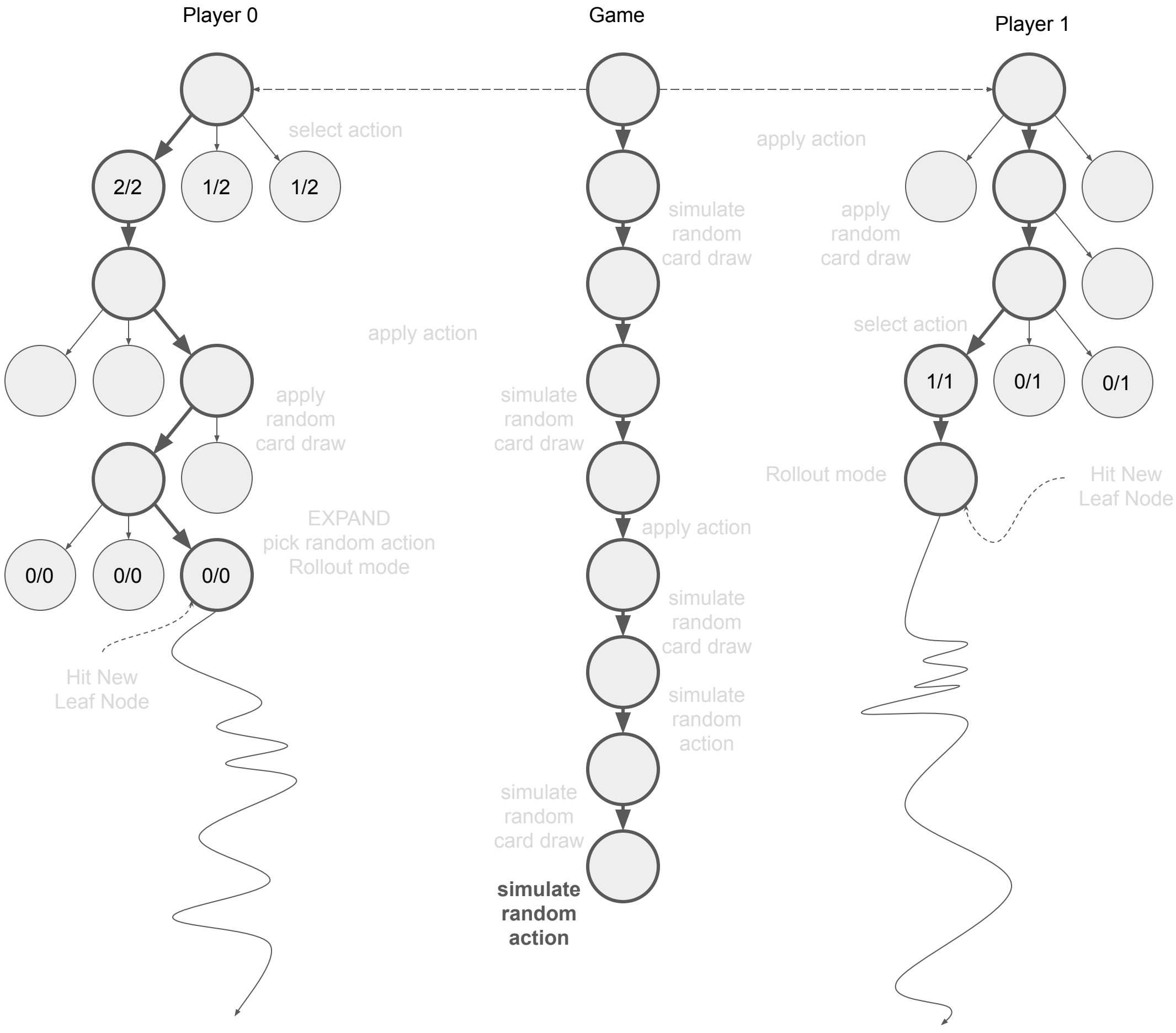
SImulate a random game



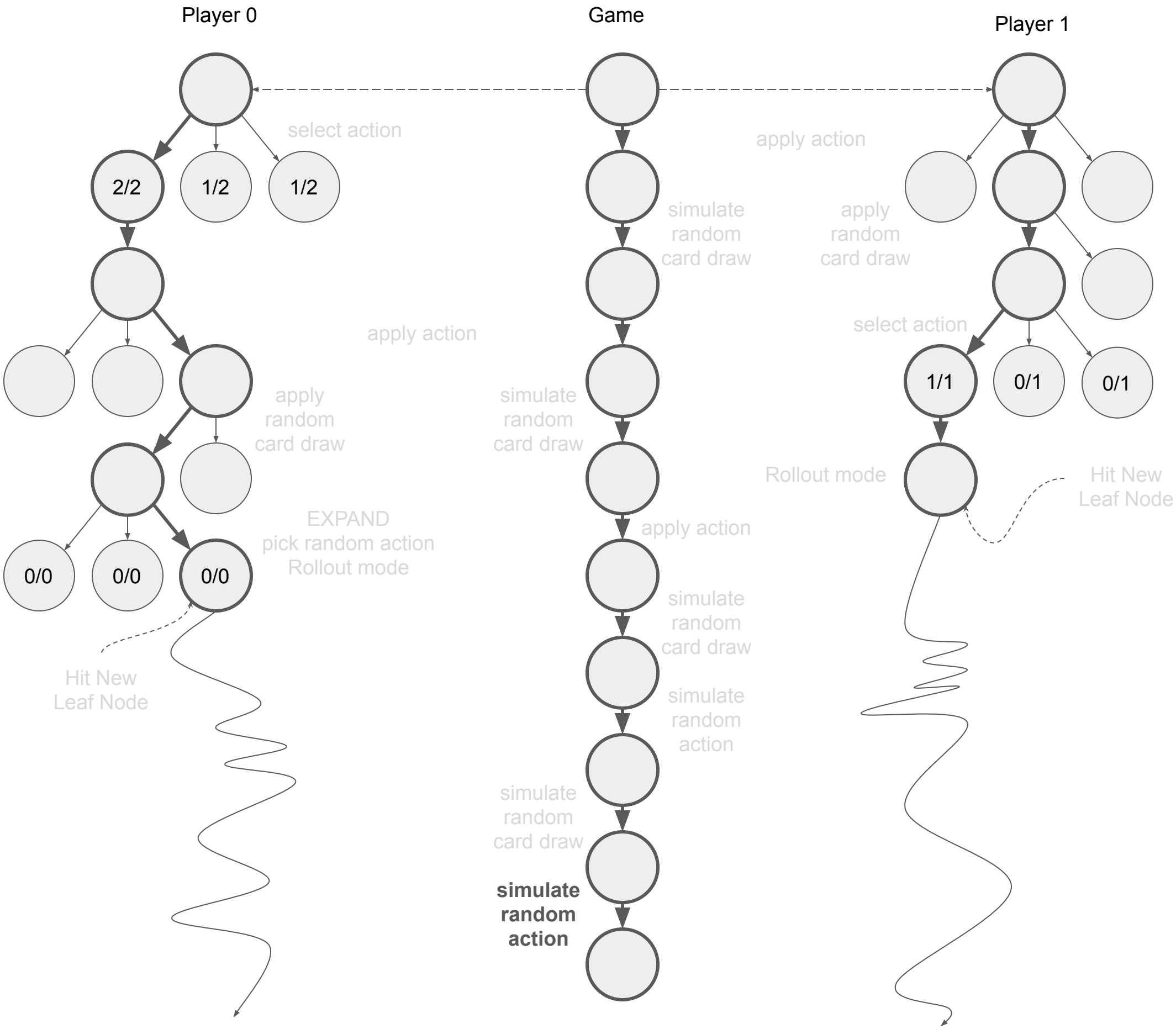
SImulate a random game



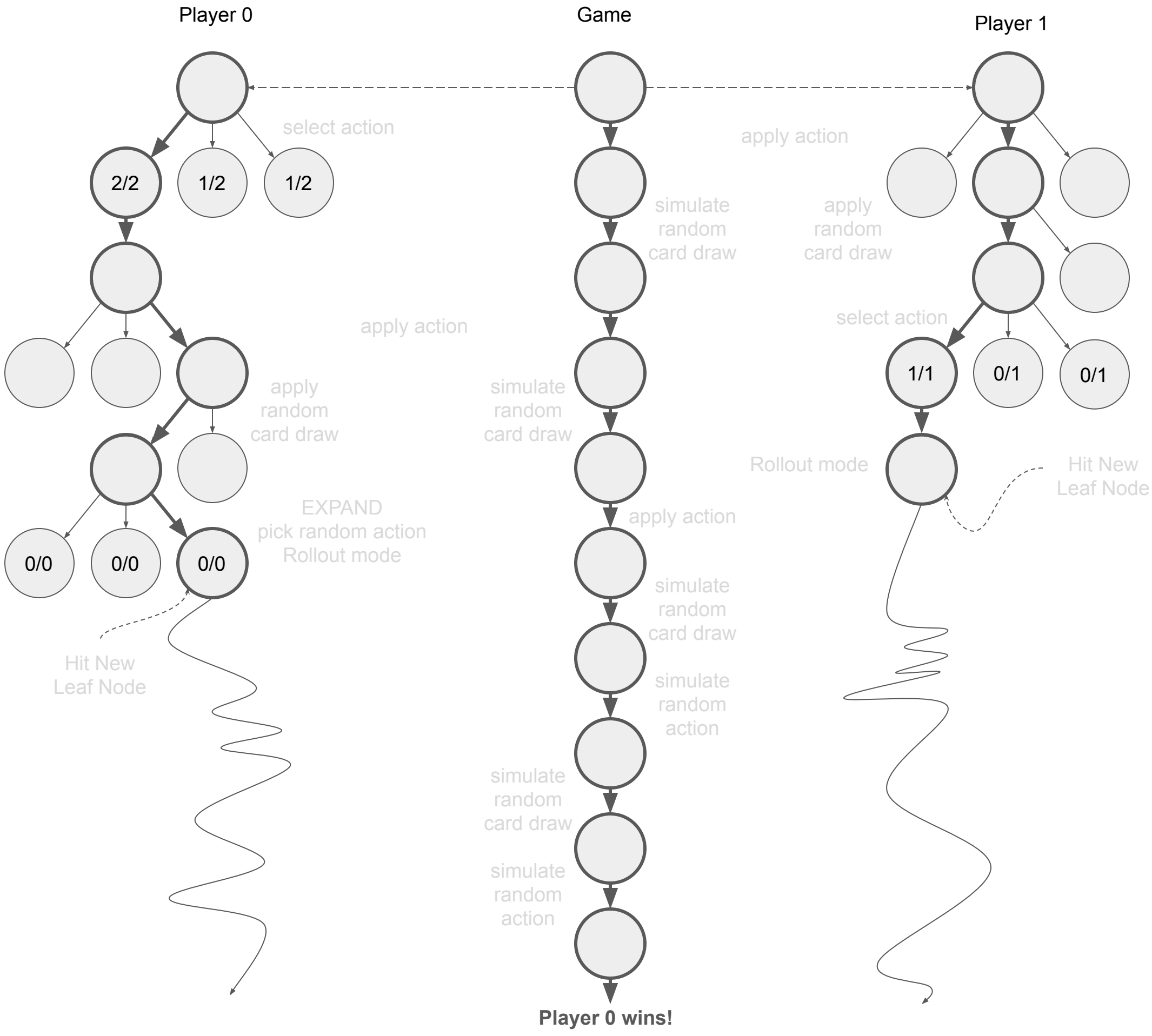
SImulate a random game



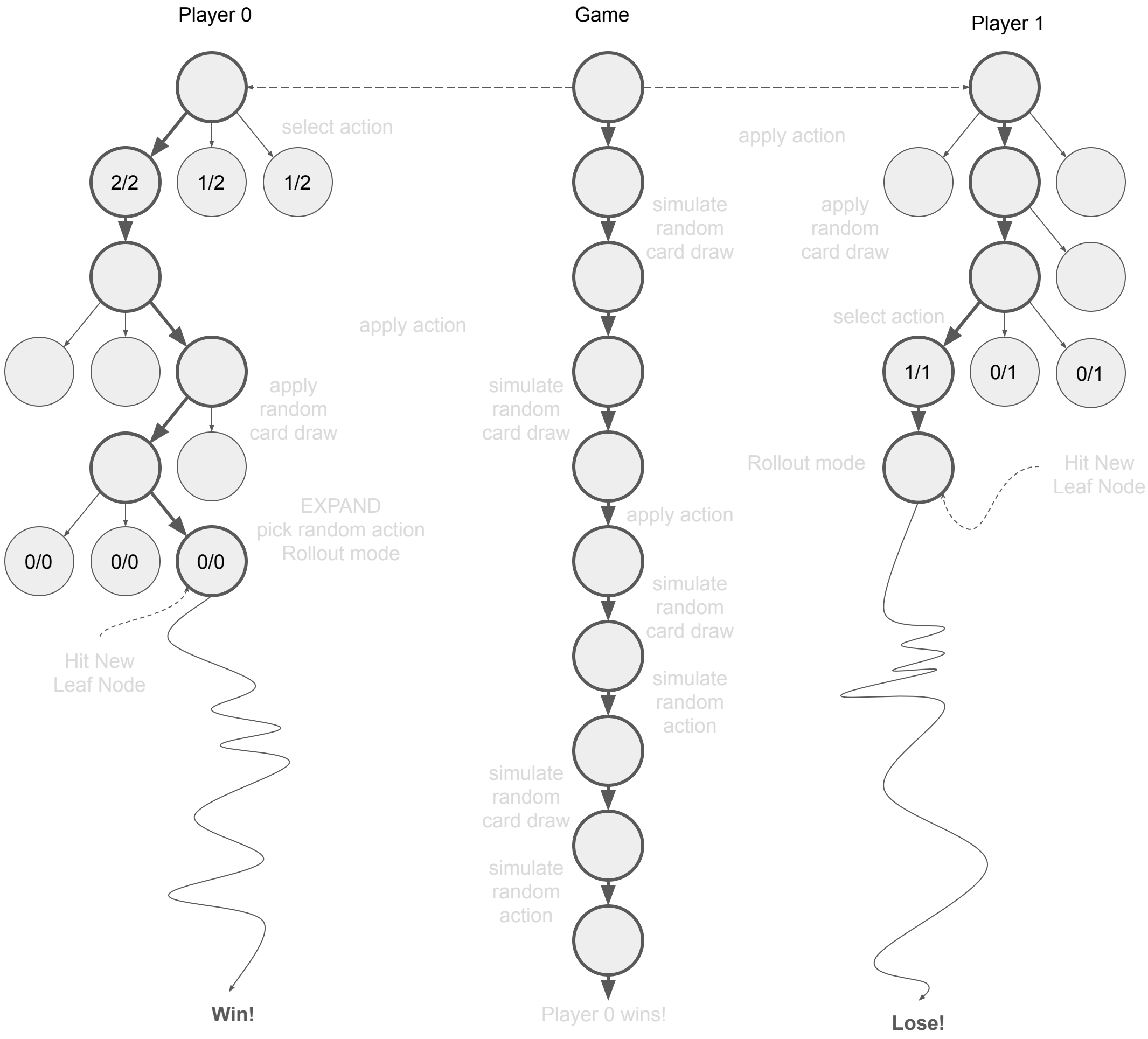
SImulate a random game



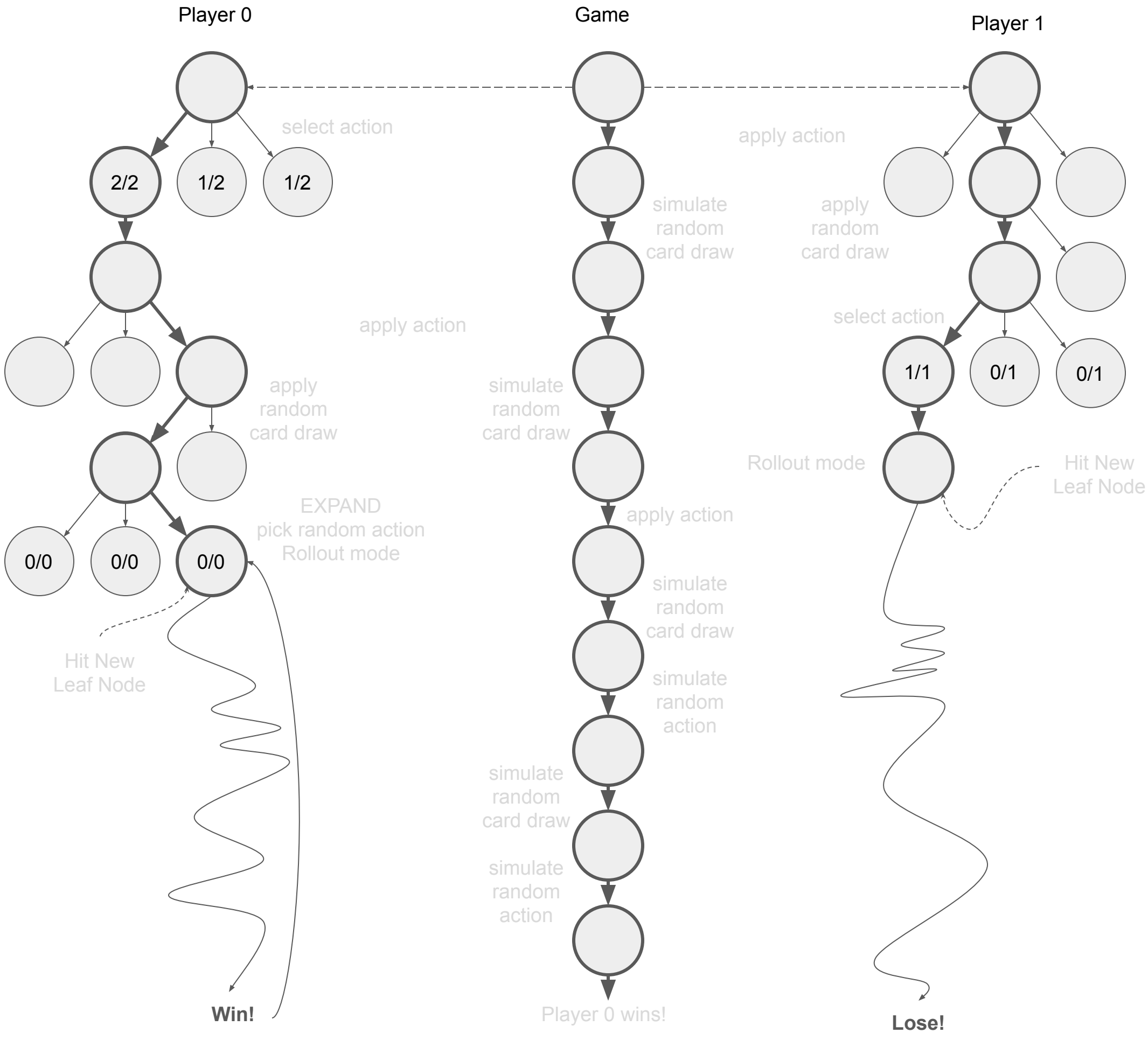
SImulate a random game



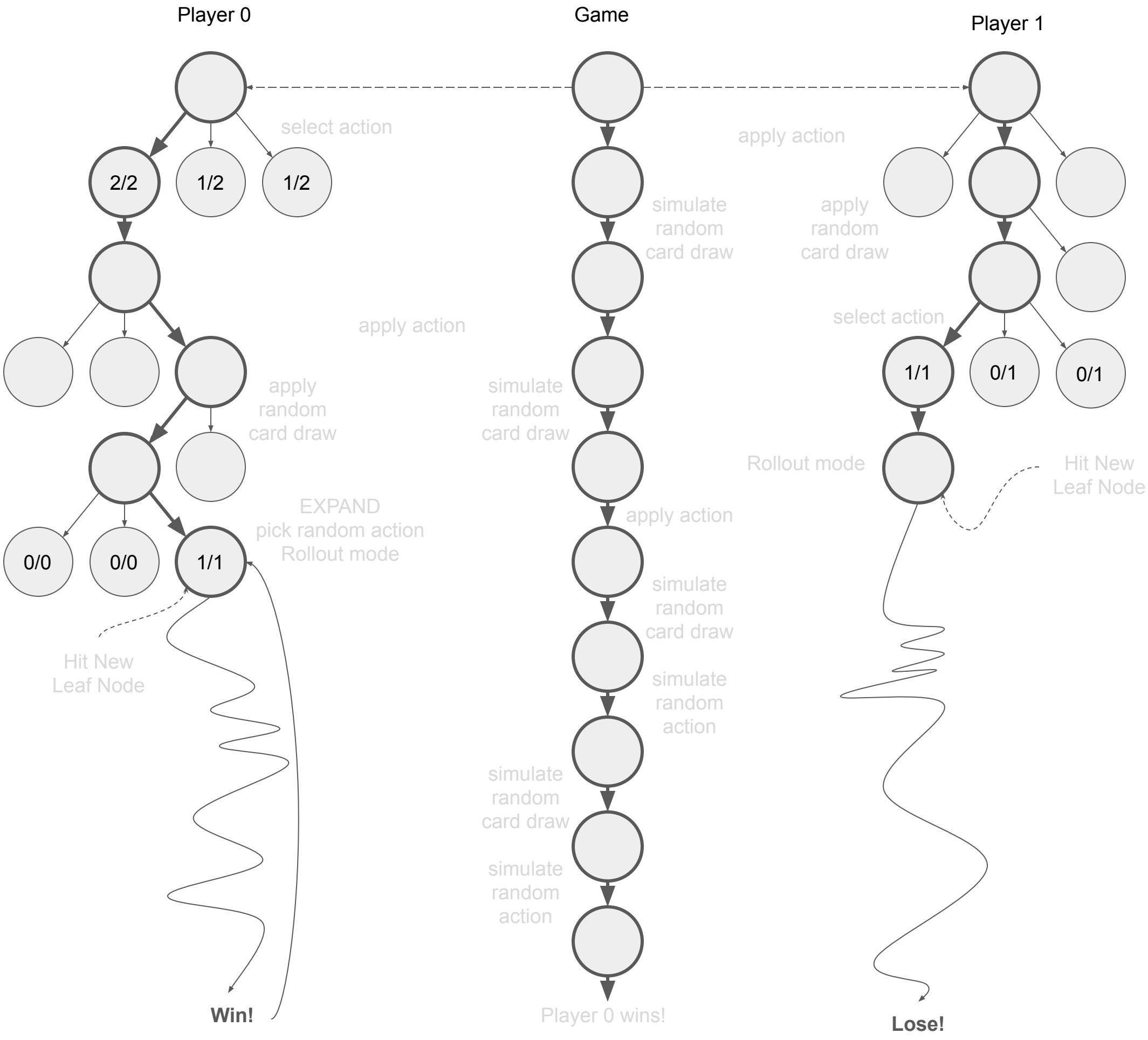
SImulate a random game



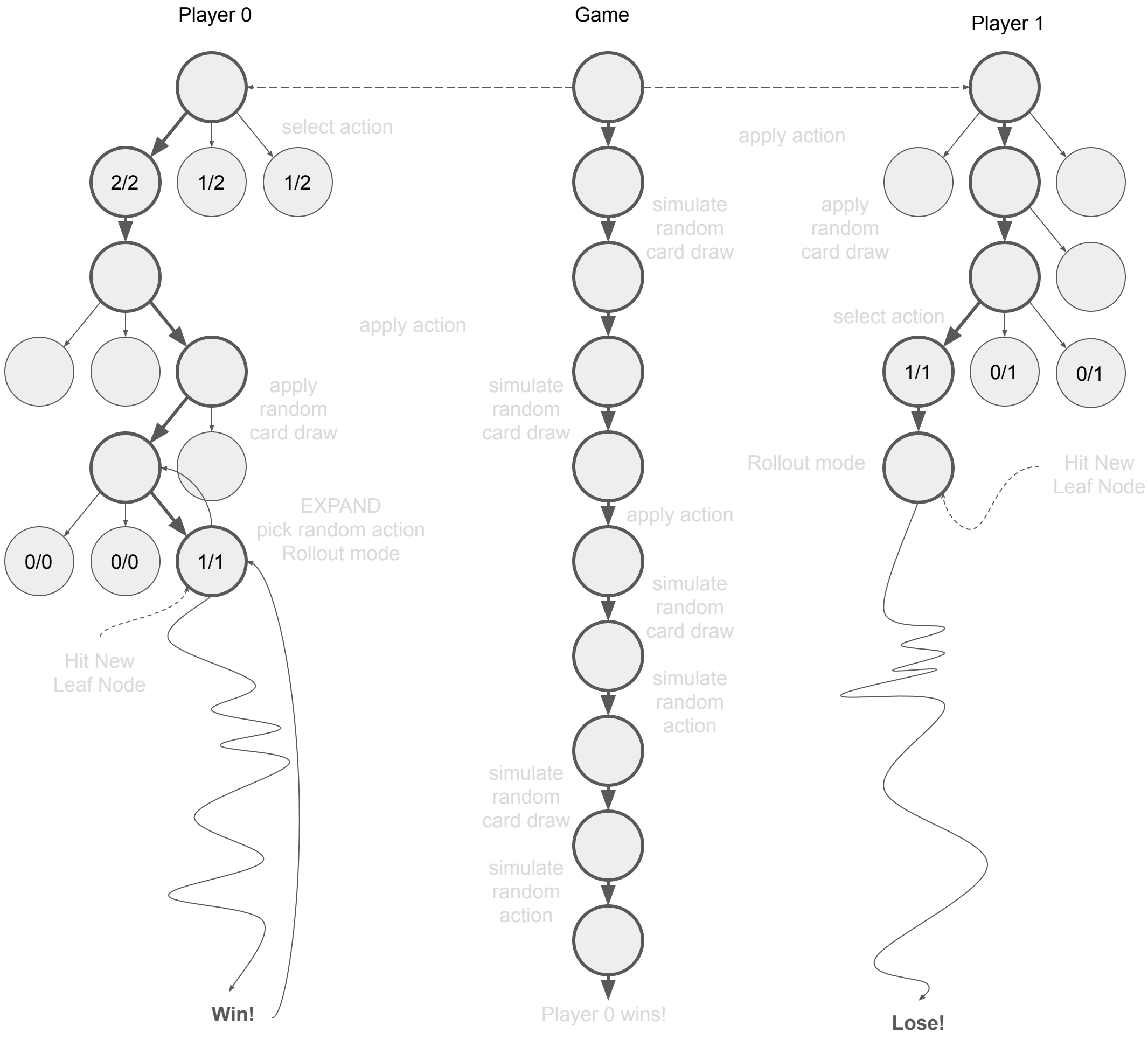
Backpropagate the win to the tree of player 0



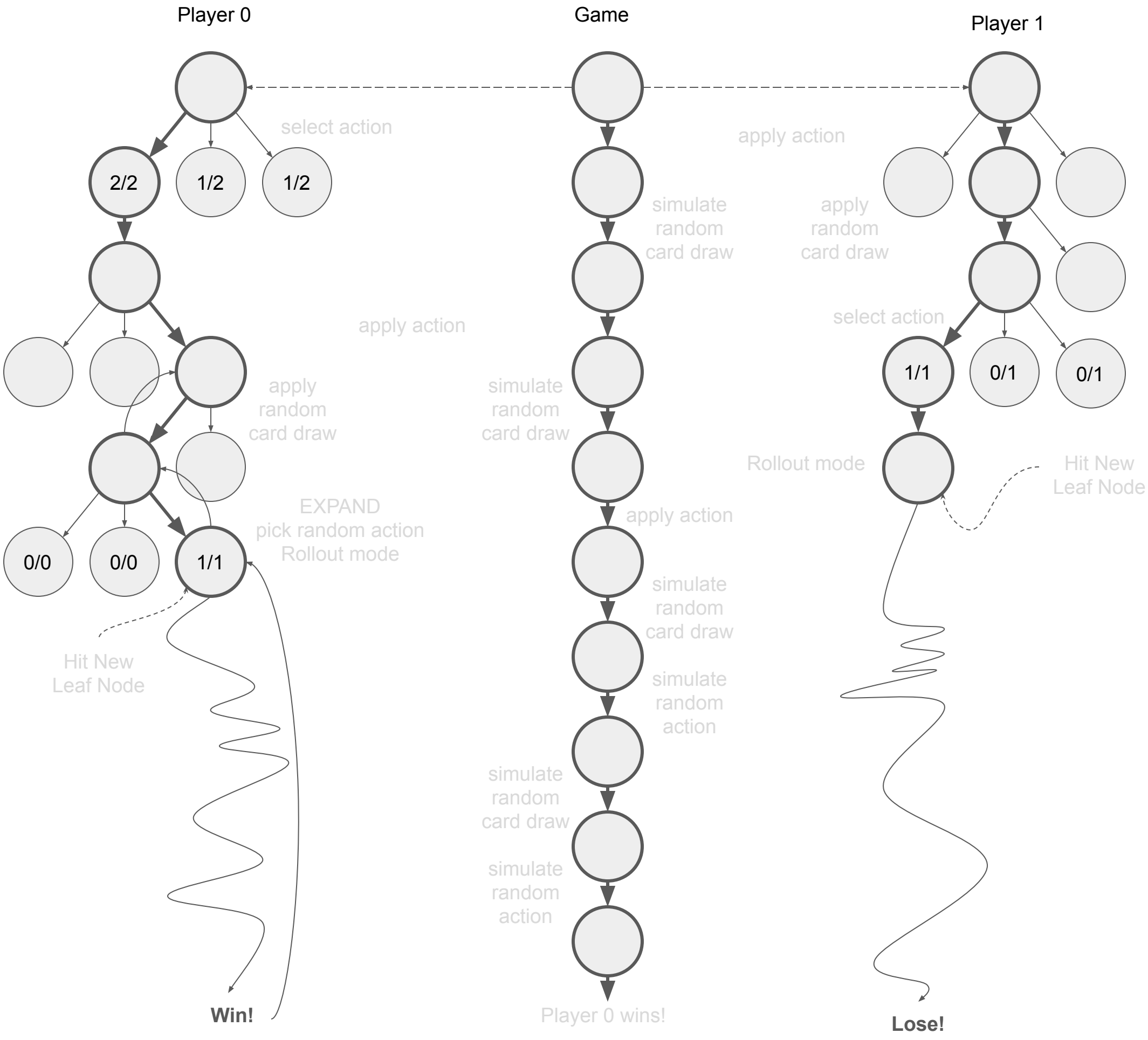
Backpropagate the win to the tree of player 0



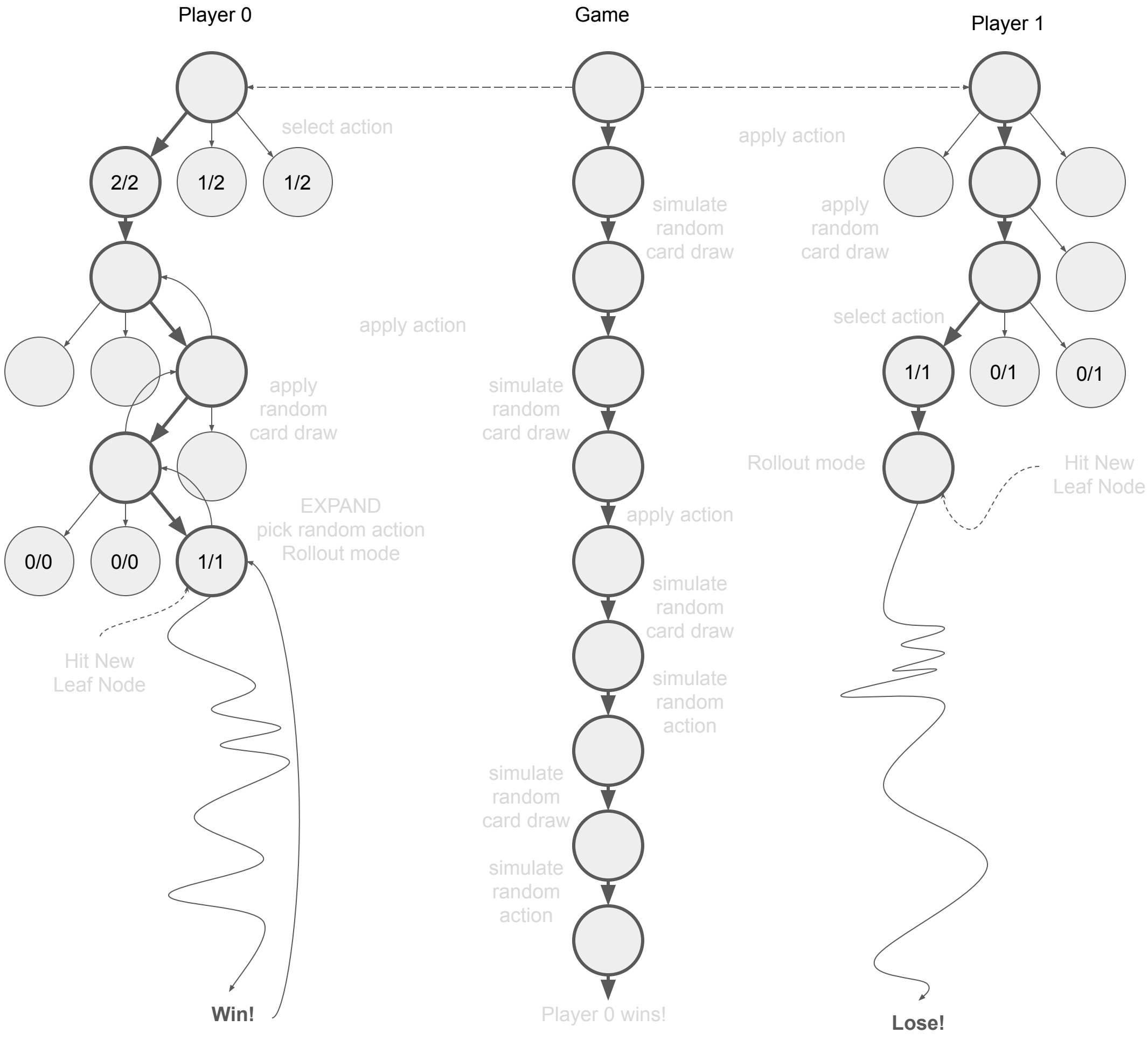
Backpropagate the win to the tree of player 0



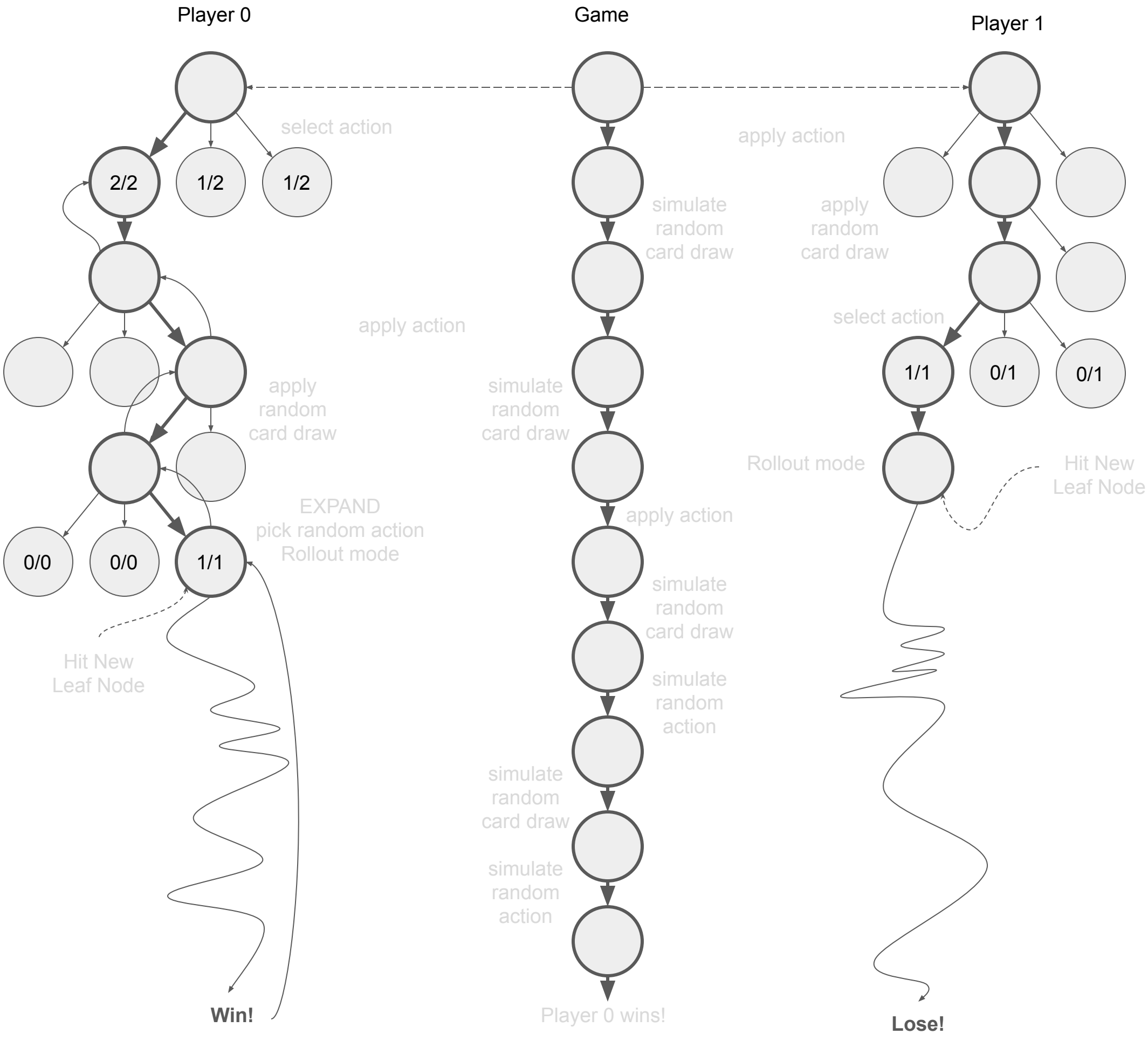
Backpropagate the win to the tree of player 0



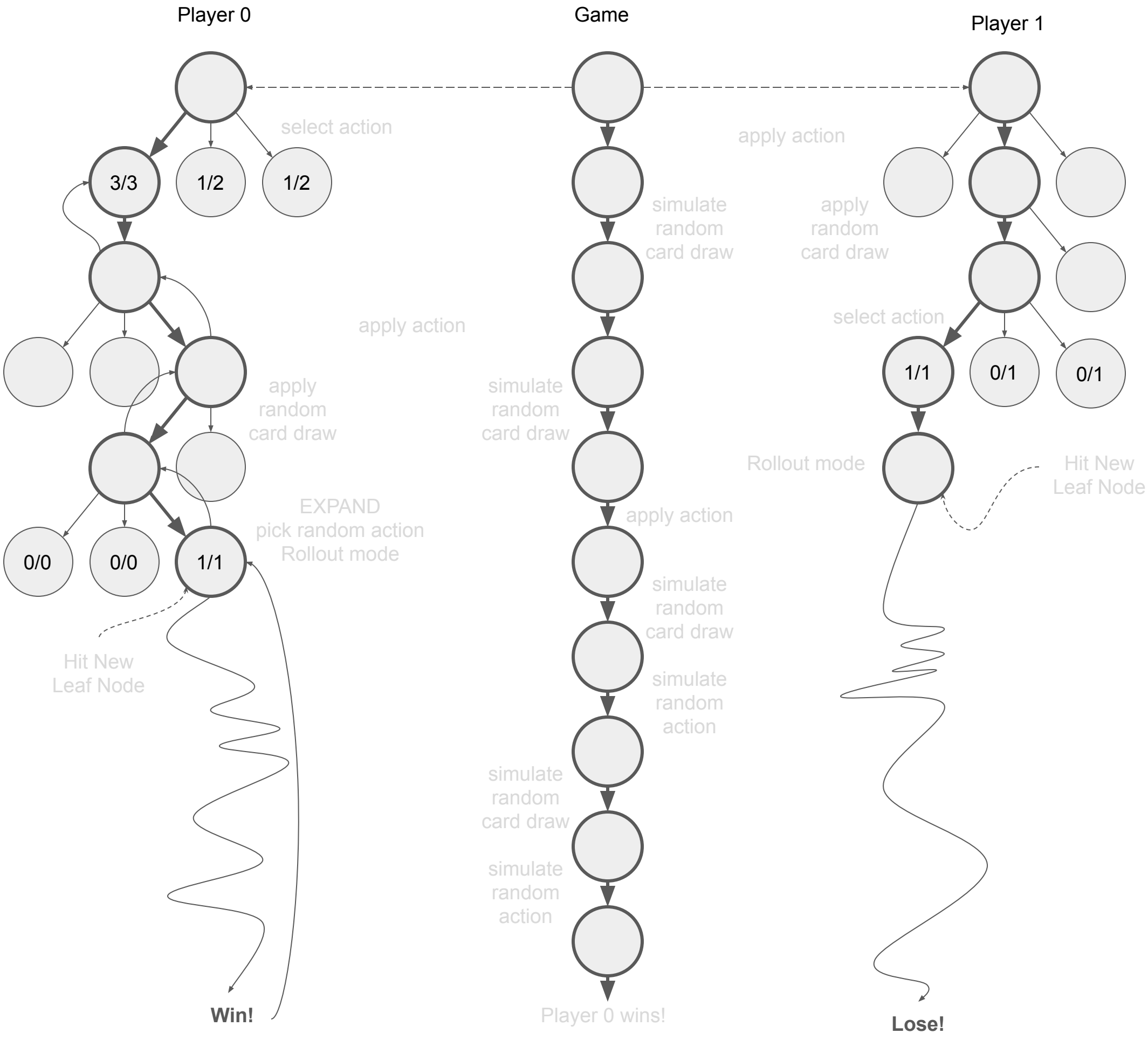
Backpropagate the win to the tree of player 0



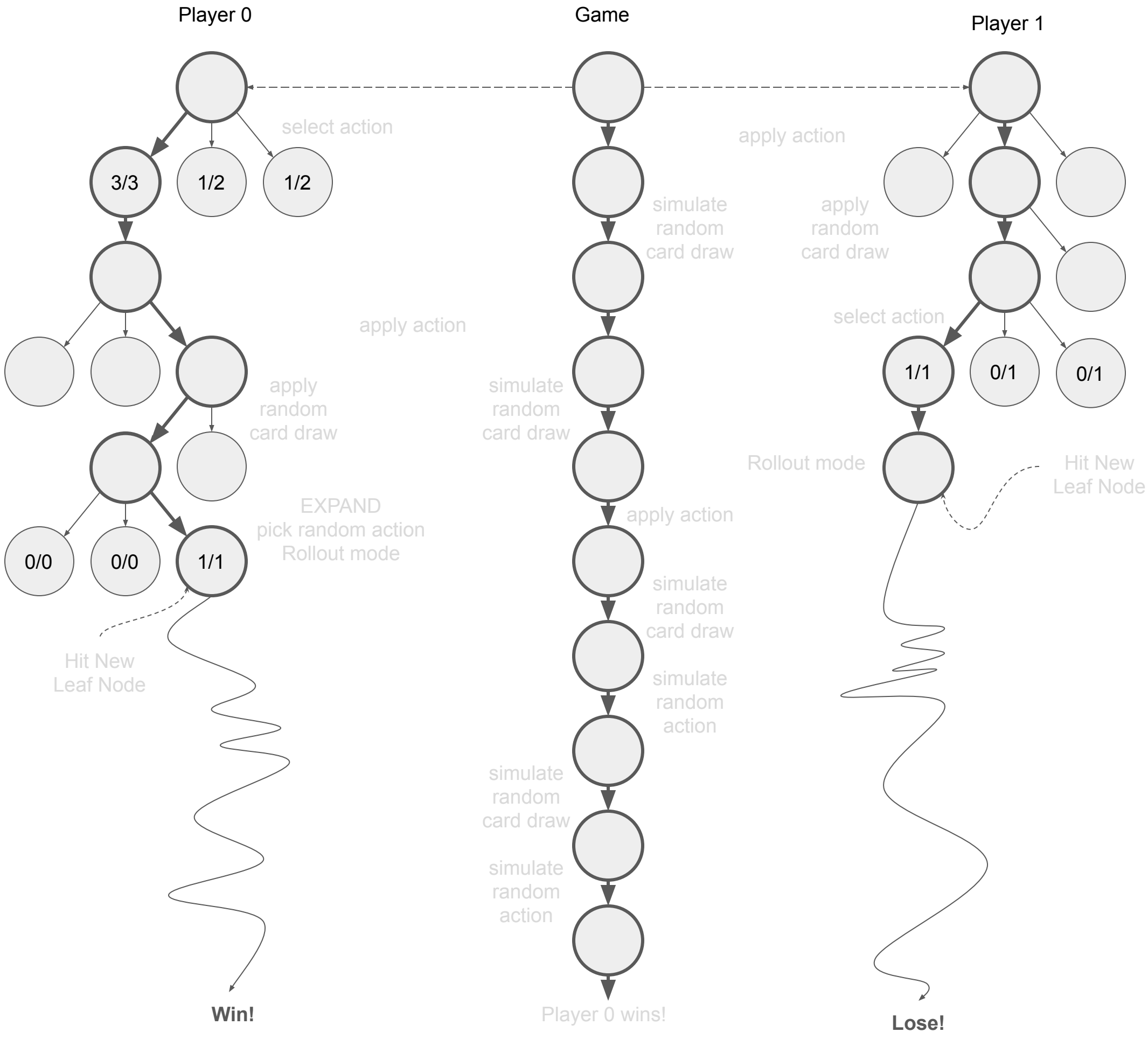
Backpropagate the win to the tree of player 0



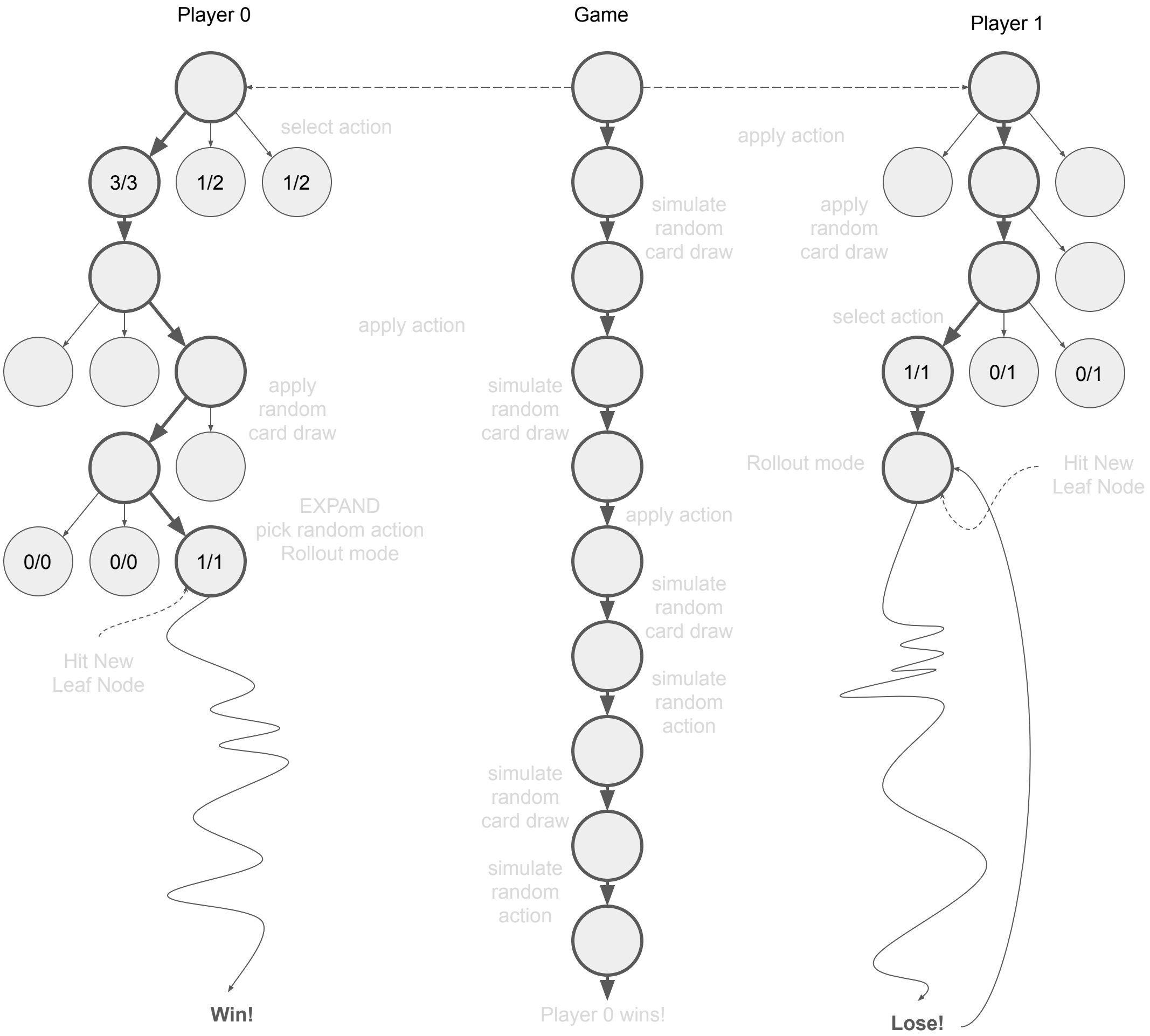
Backpropagate the win to the tree of player 0



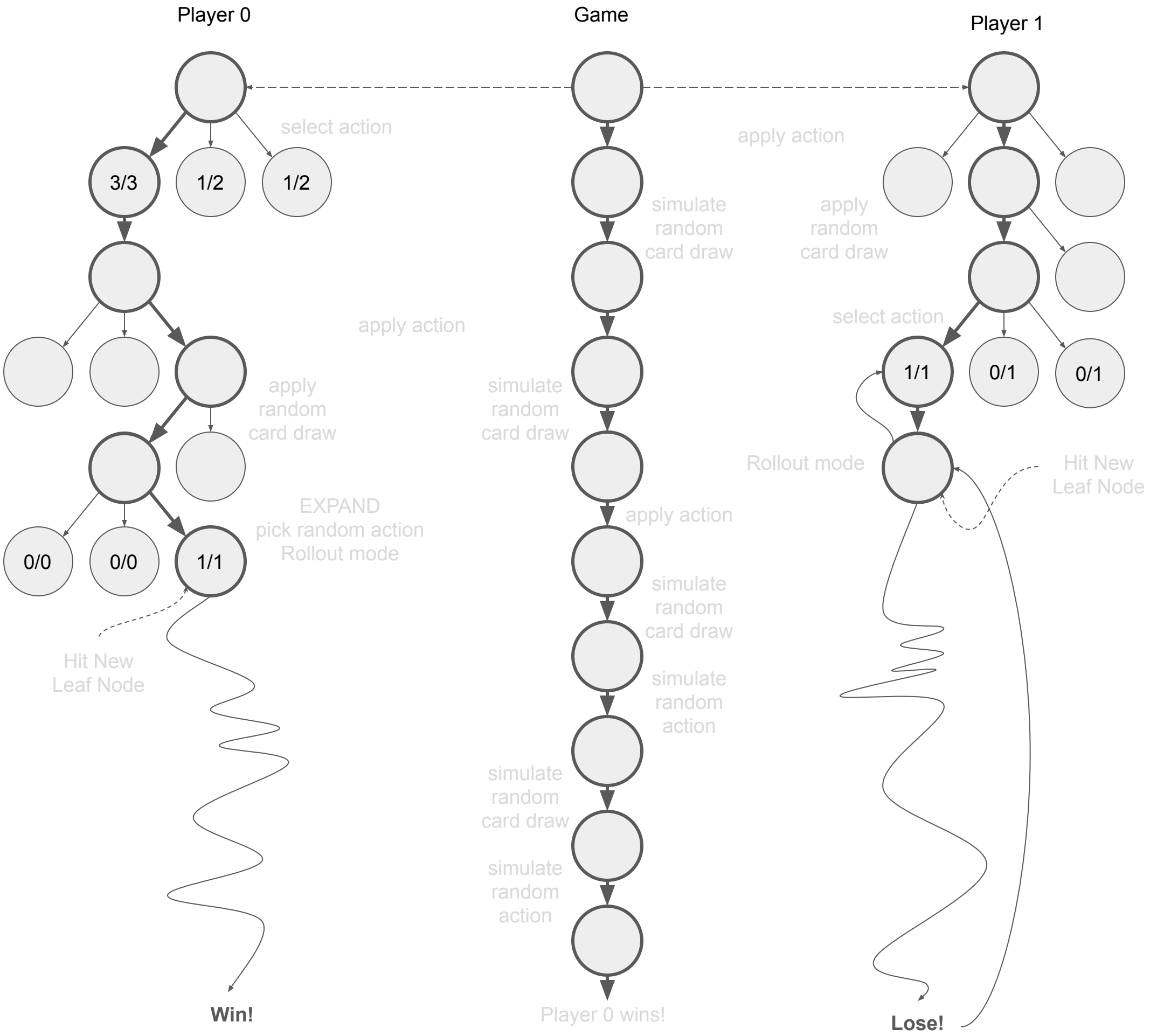
Backpropagate the win to the tree of player 0



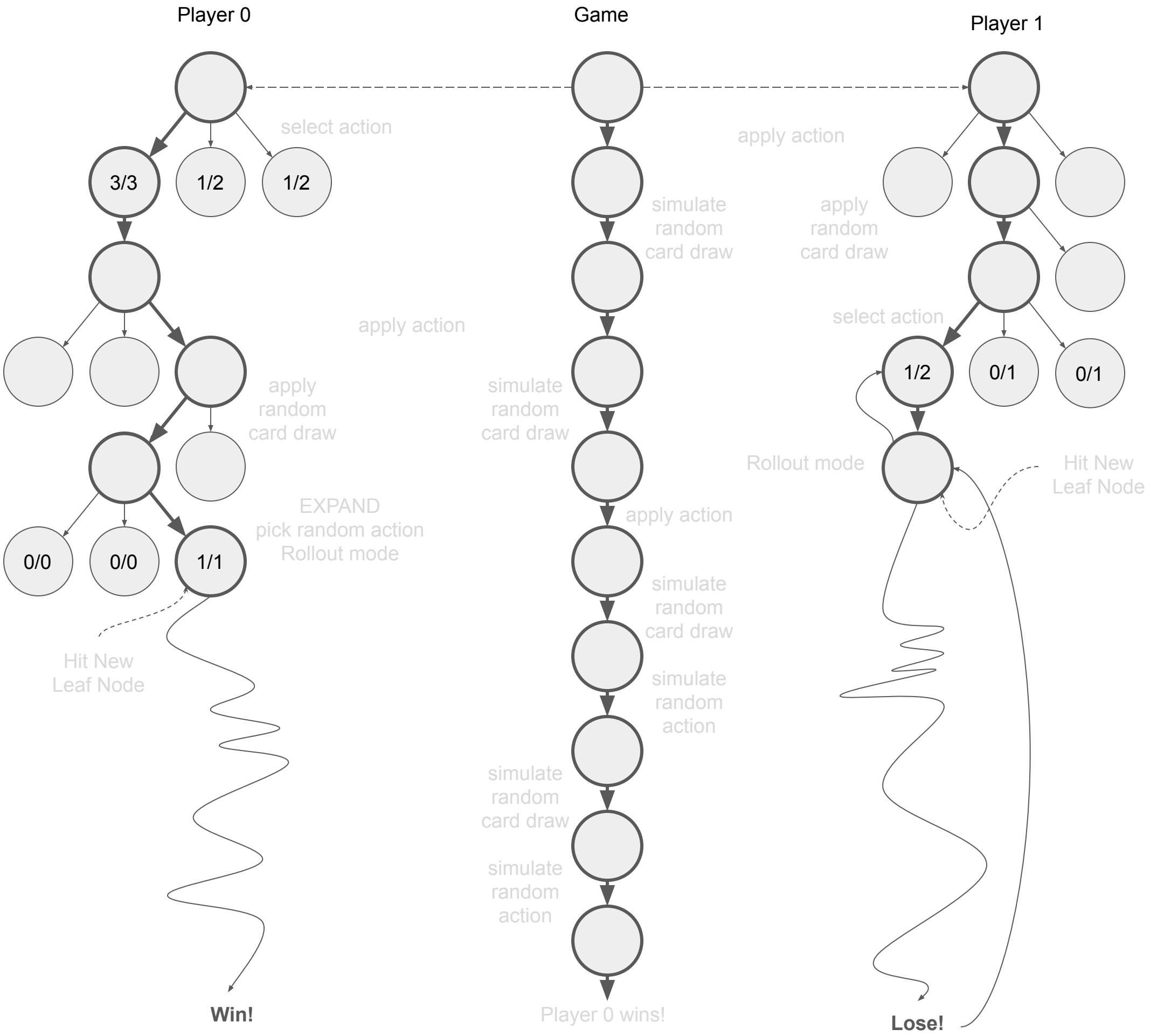
Backpropagate the loss to the tree of player 1



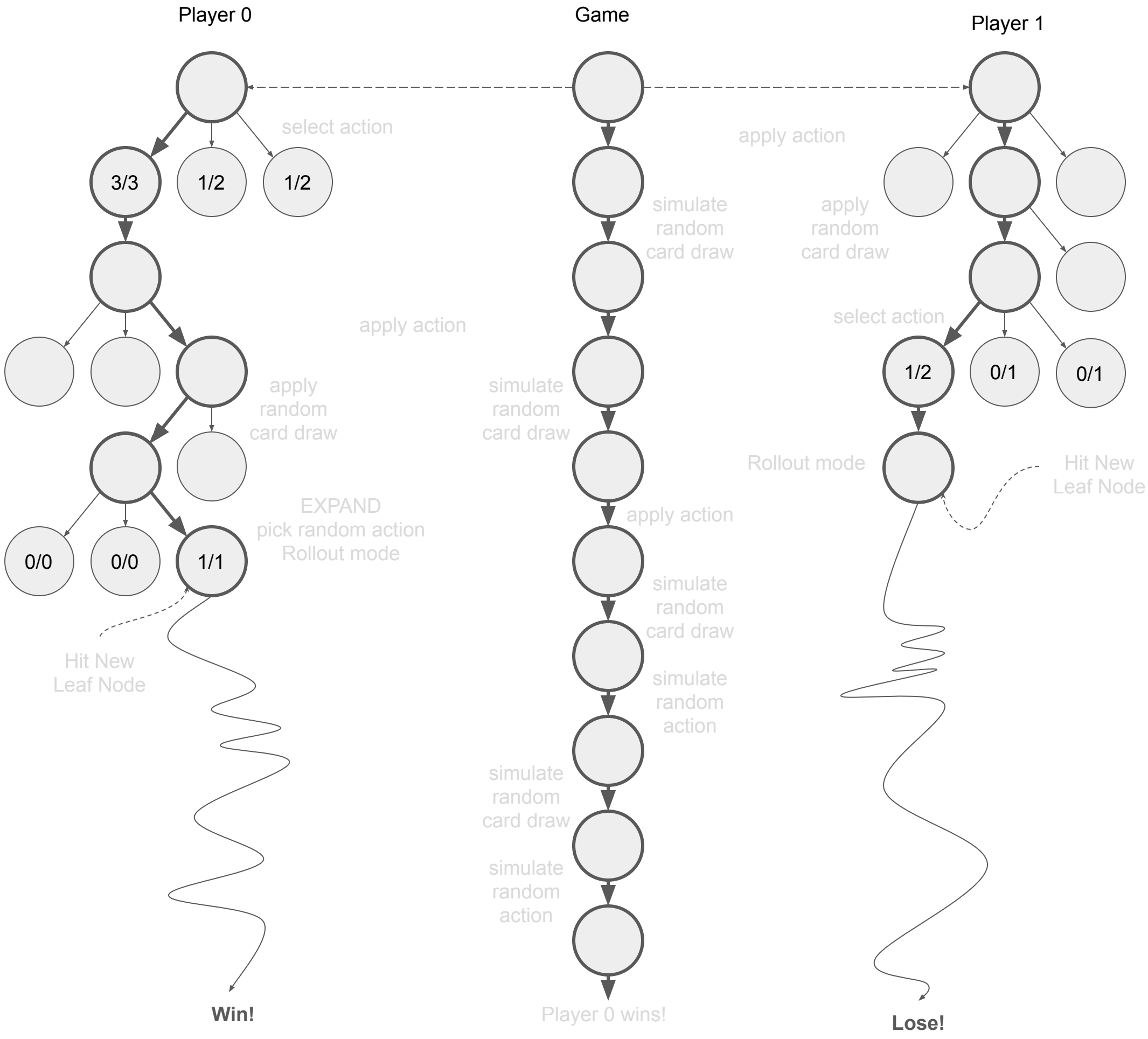
Backpropagate the loss to the tree of player 1



Backpropagate the loss to the tree of player 1



Backpropagate the loss to the tree of player 1


Player 0
Game
Player 1
select action
apply action
apply random card draw
3/3
1/2
1/2
apply action
simulate random card draw
apply random card draw
select action
1/2
0/1
0/1
apply random card draw
EXPAND
pick random action
Rollout mode
Rollout mode
Hit New Leaf Node
0/0
0/0
1/1
apply action
simulate random card draw
simulate random action
Hit New Leaf Node
simulate random card draw
simulate random action
simulate random action
Win!
Player 0 wins!
Lose!

Repeat!