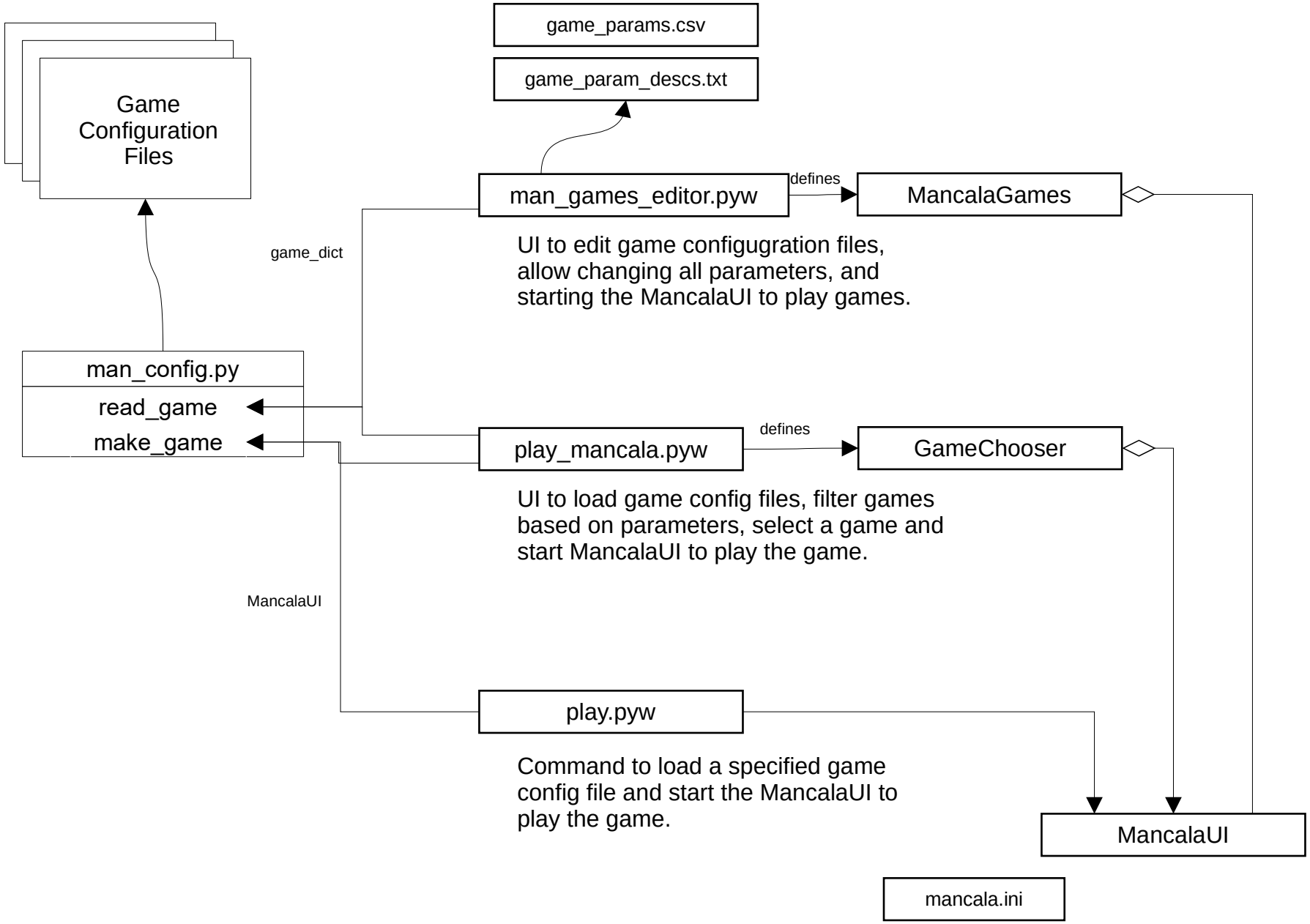
Mancala Games

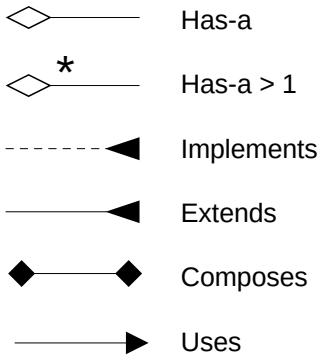


Notation Conventions

Class Diagram Conventions

Abstract Base Class

Primarily Data



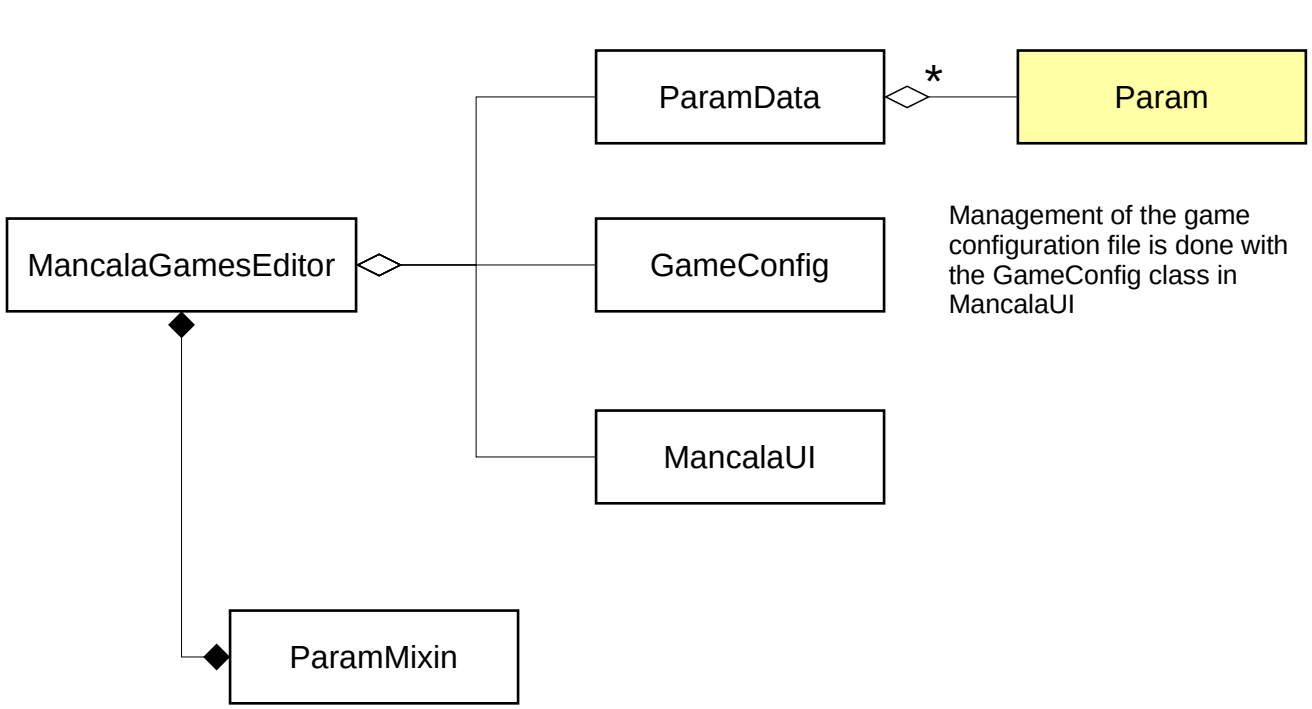
Deco Chain Conventions

- One path down the deco chain is used.
- Intersecting arrows are decision points.
- Shown in **call order** from start dot ● (constructed in reverse order).
- Calls down the deco chain maybe at any point in each deco's processing.
- Some deco's do not call down the deco chain even if there is a follow-on deco.
- All paths shown might not be possible (see ginfo_rules).

Optional deco

Deco Chain in Seperate Diagram

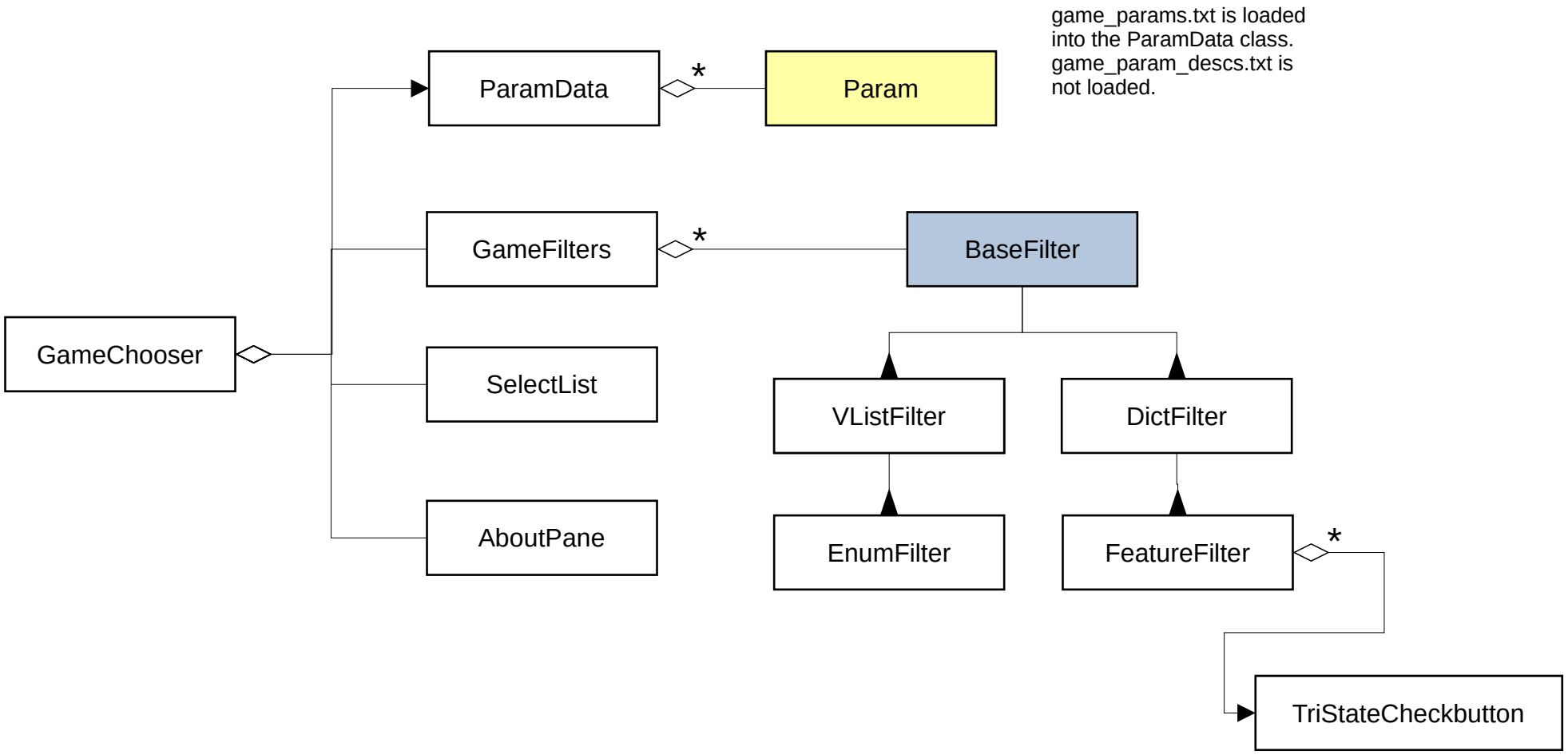
MancalaGamesEditor
man_games_editor.pyw



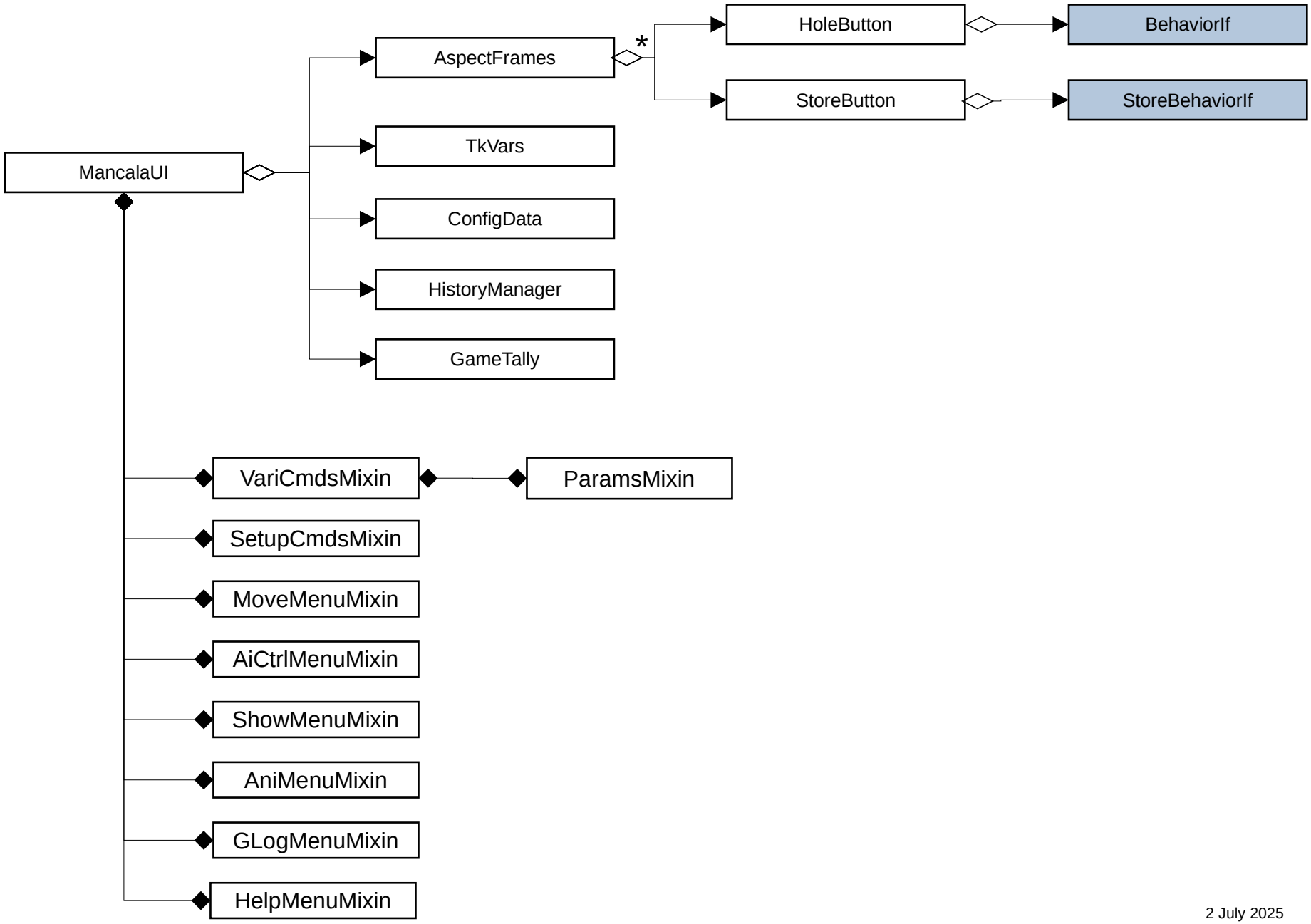
game_params.txt and game_param_descs.txt are loaded into the ParamData class.

Management of the game configuration file is done with the GameConfig class in MancalaUI

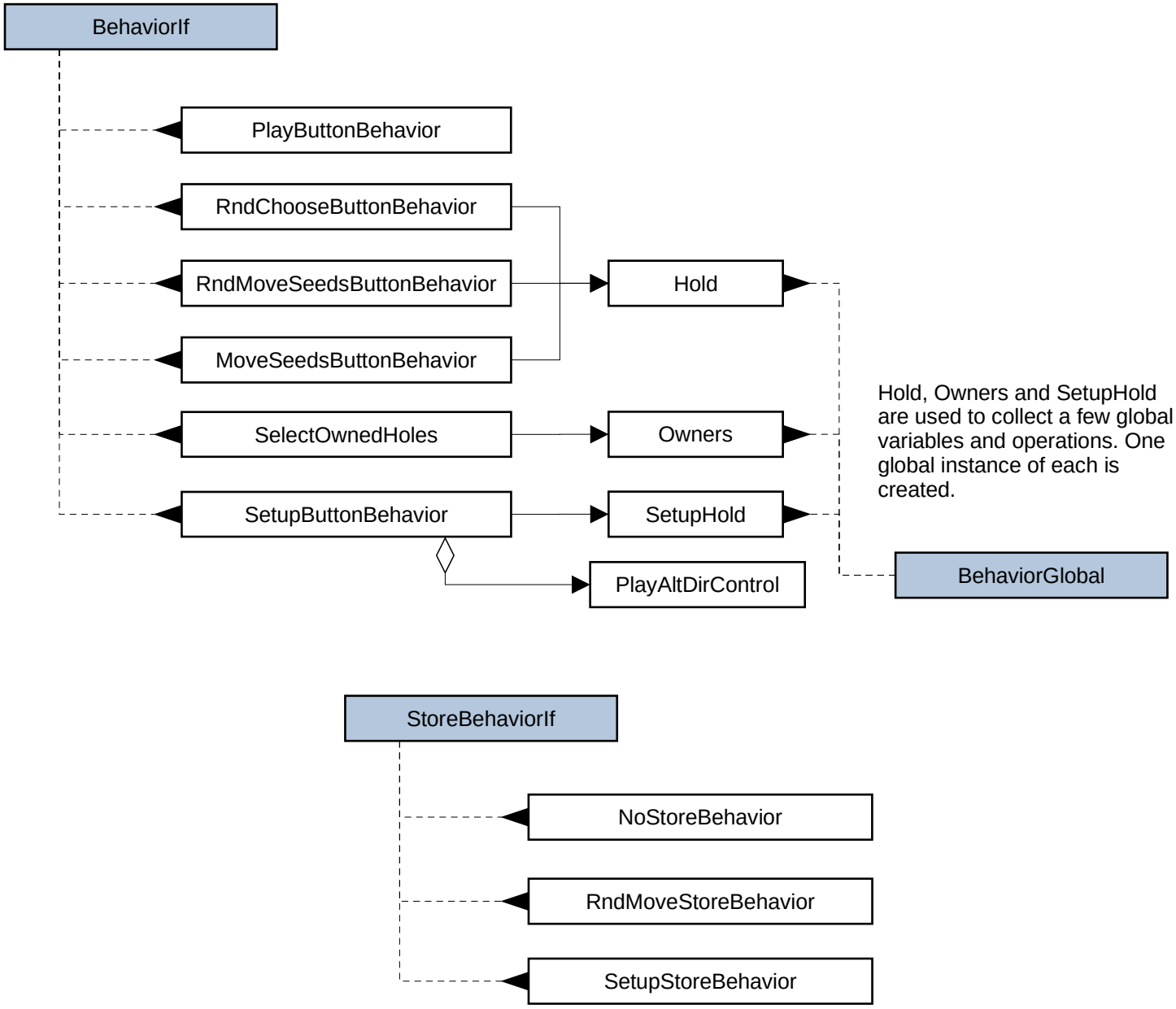
GameChooser
play_mancala.pyw



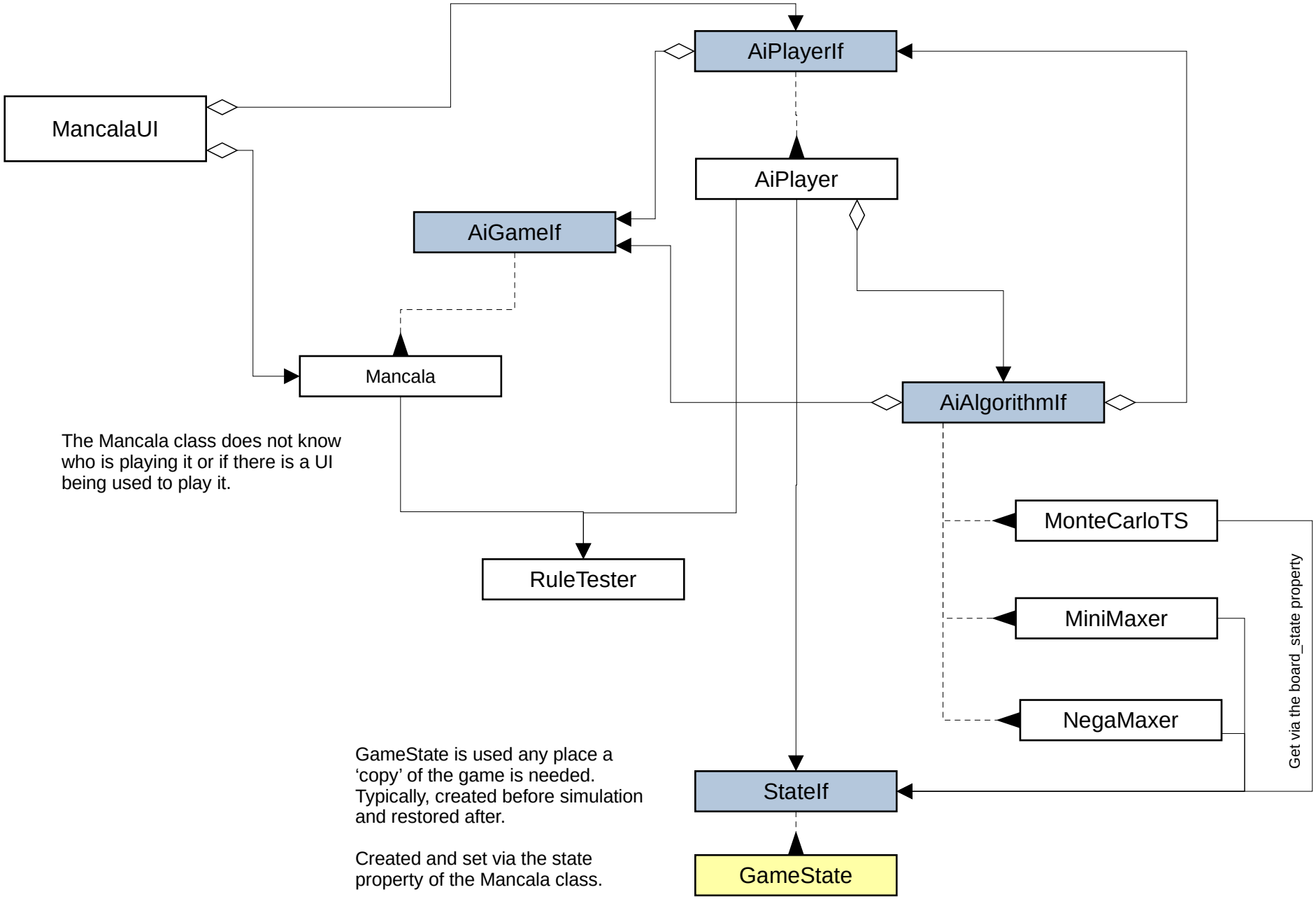
MancalaUI Classes
mancala_ui.py



Behavior Classes for MancalaUI



AIPlayer and AIAlgorithm Integration

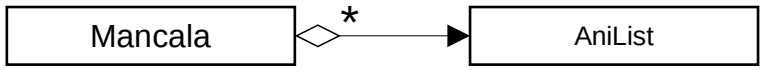


The Mancala class does not know who is playing it or if there is a UI being used to play it.

GameState is used any place a 'copy' of the game is needed. Typically, created before simulation and restored after.

Created and set via the state property of the Mancala class.

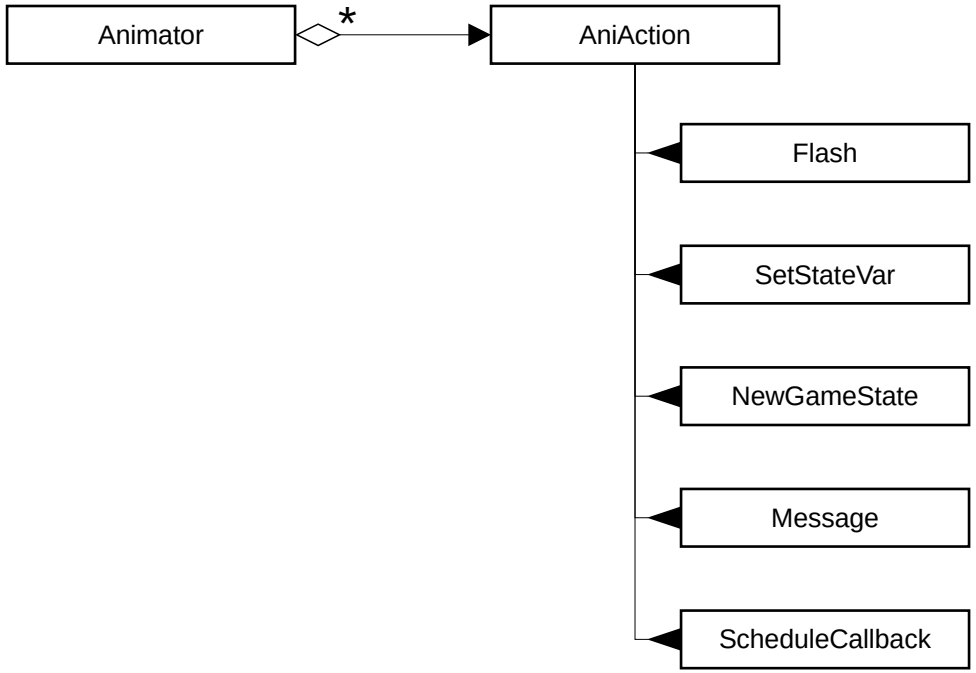
Animator Classes



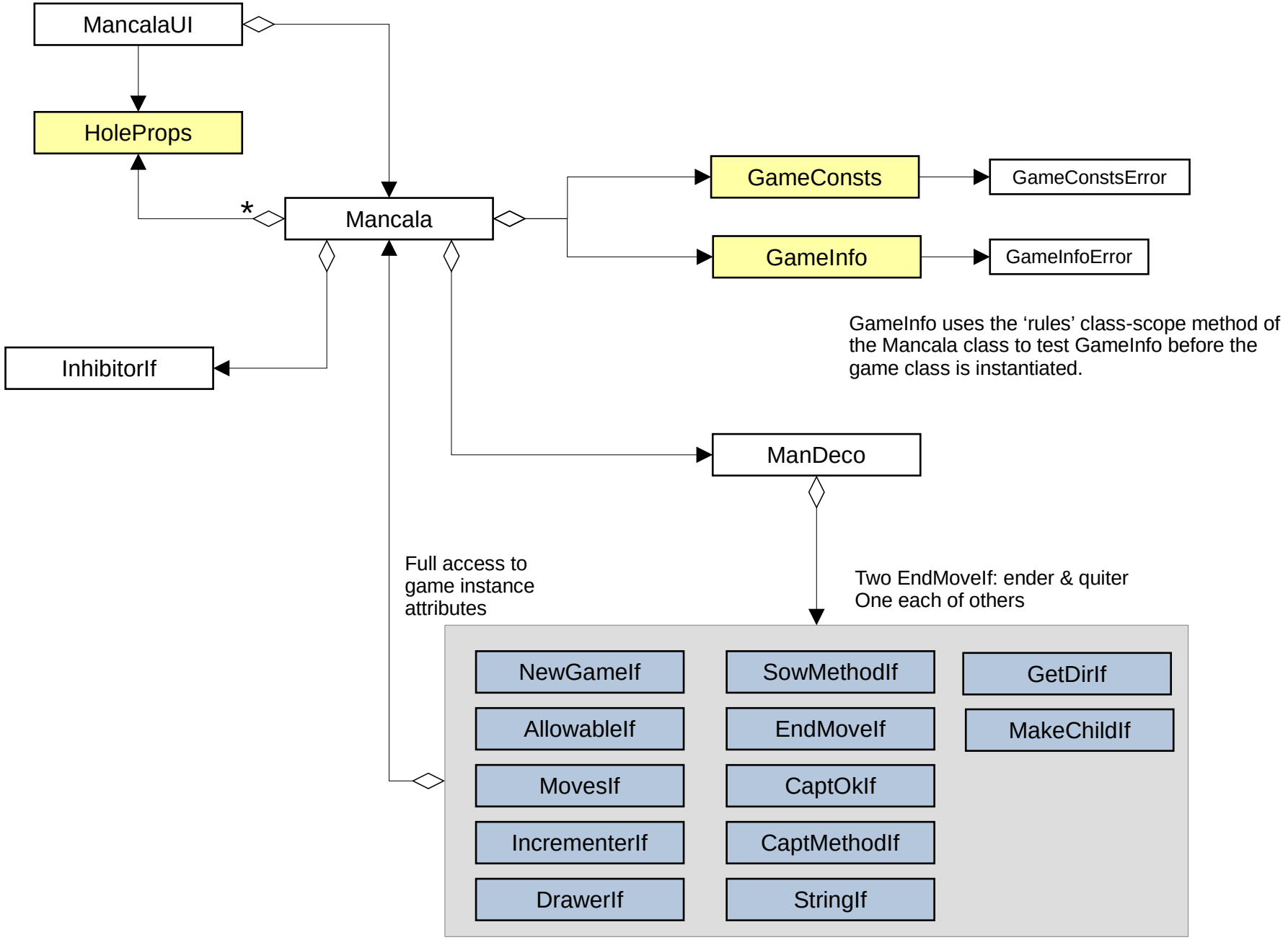
Assignments to an AniList generate SetStateVar animations.

These animator hooks are used for 5 state variable and only when they are configured for use in a game.

These hooks are not included if animator.ENABLED is set False.

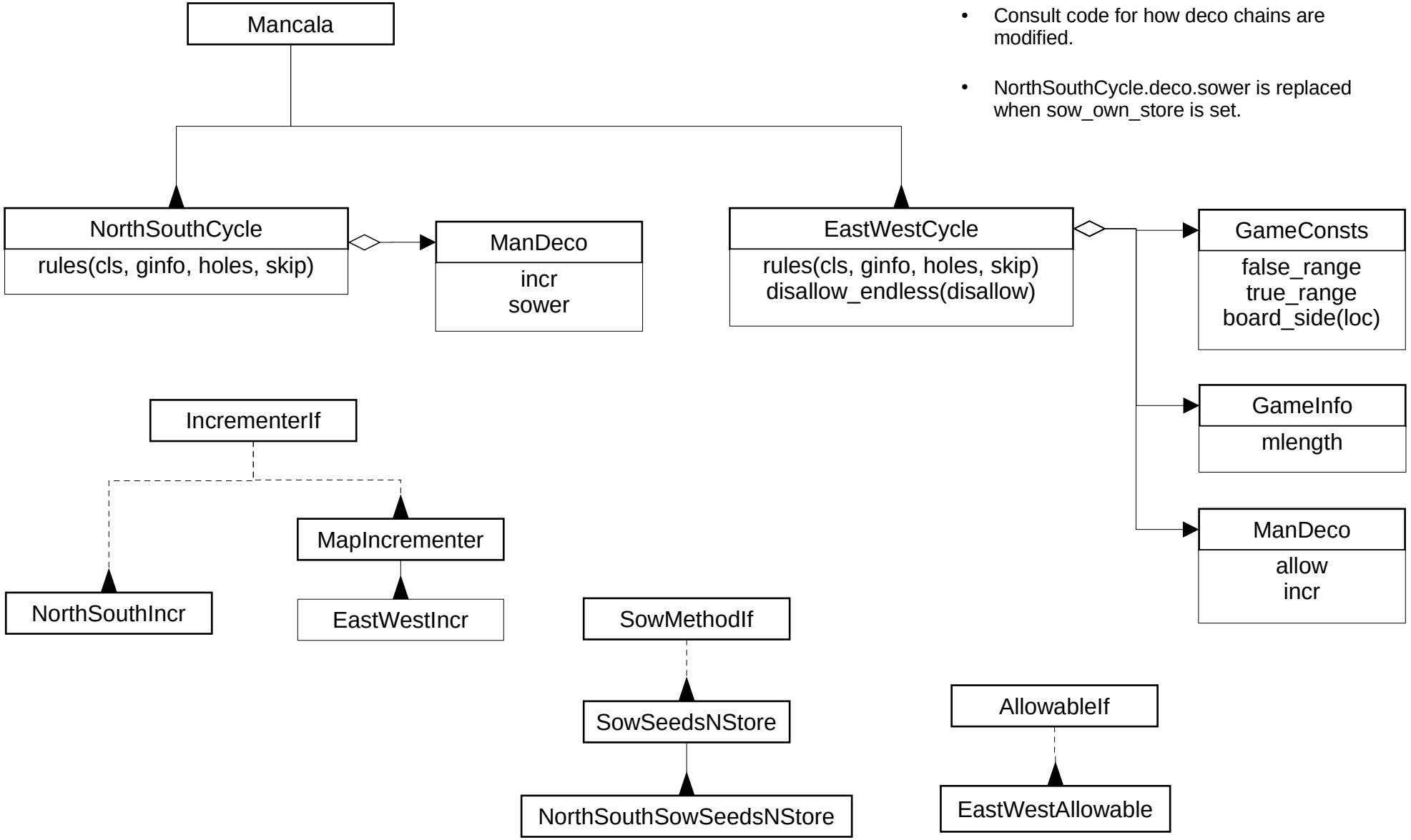


Mancala Classes

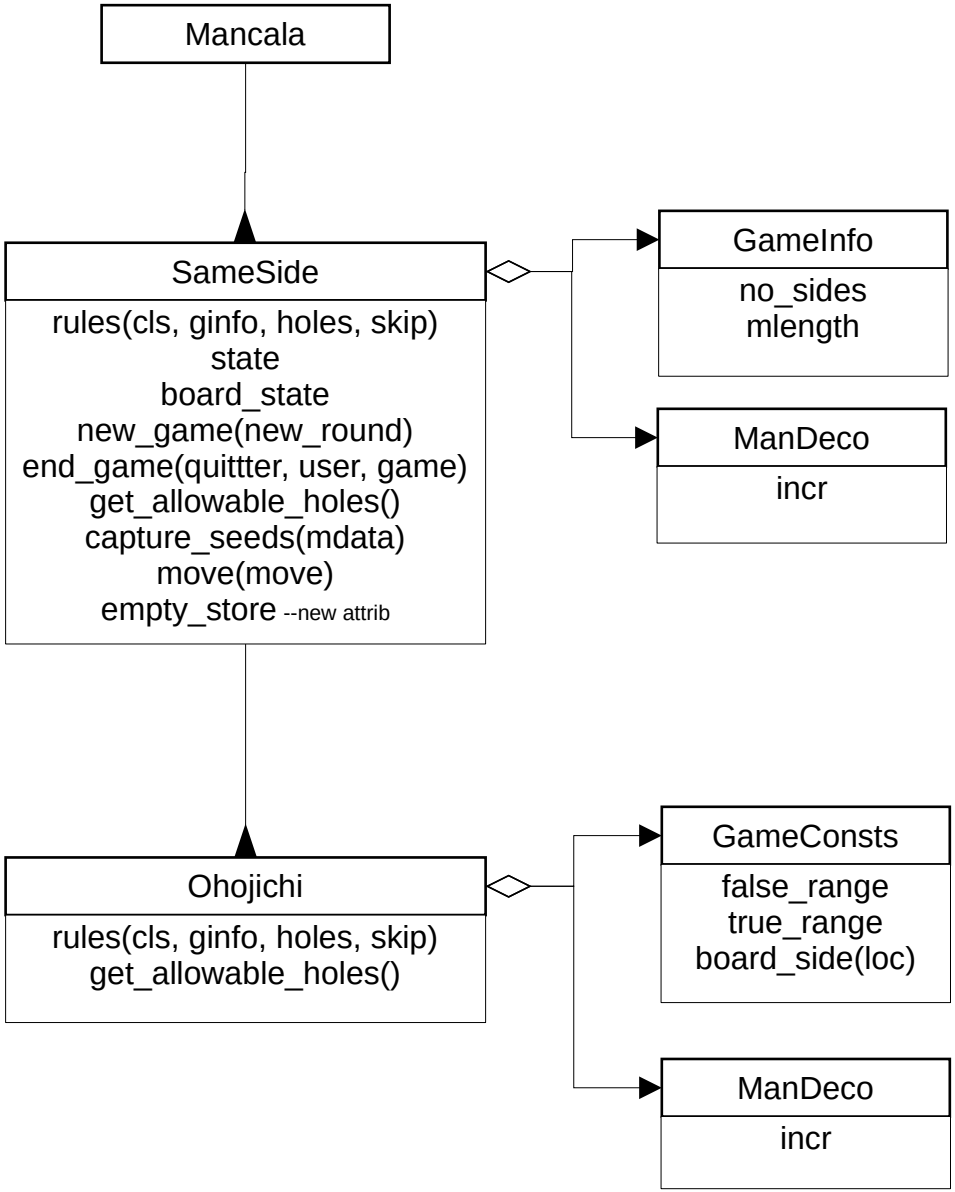


Two Cycle Game Classes

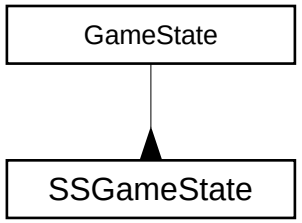
- Attributes and methods shown are over-ridden, reassigned or reconfigured.
- Consult code for how deco chains are modified.
- NorthSouthCycle.deco.sower is replaced when sow_own_store is set.



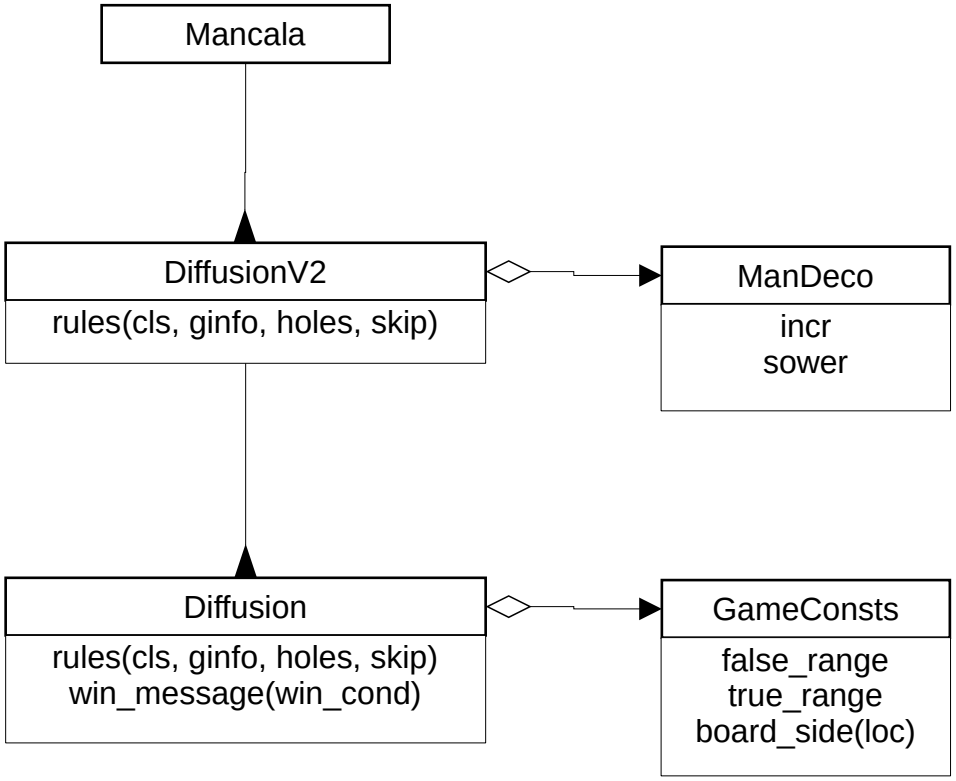
SameSide and Ohojichi Game Classes



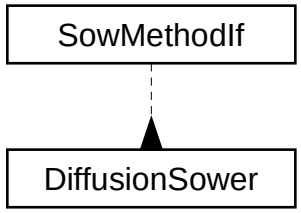
- Attributes and methods shown are over-ridden, reassigned or reconfigured.
- Each game class uses the appropriate two_cycle incrementer as the base incrementer.
- Ohojichi only calls the allow deco chain when on the first part of turns, not on the place seeds opposite part.



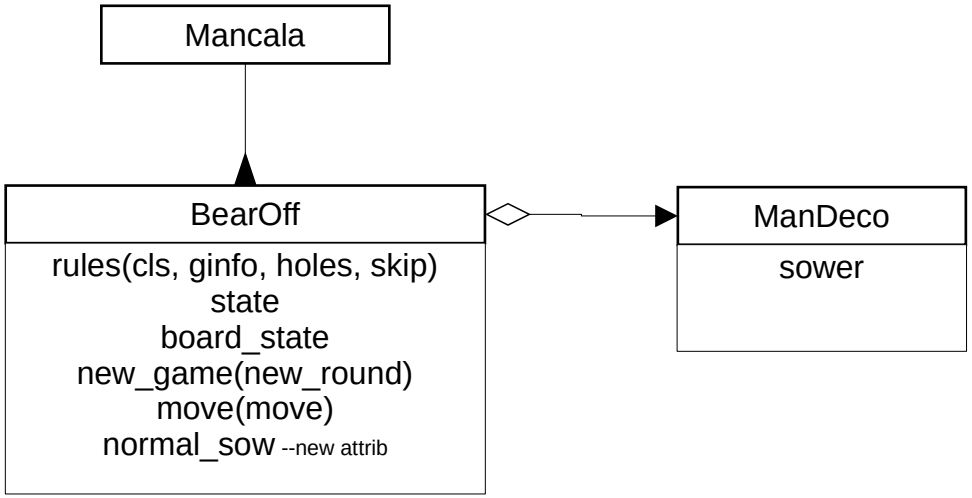
Diffusion and DiffusionV2 Game Classes



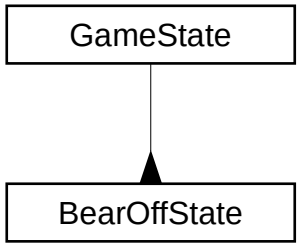
- Attributes and methods shown are over-ridden, reassigned or reconfigured.
- The incr deco chain is cleared because it should not be used: the sower is completely replaced and the capturer deco is CaptNone.
- Both game classes use the DiffusionSower.

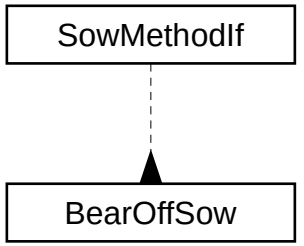


Bear Off Game Class



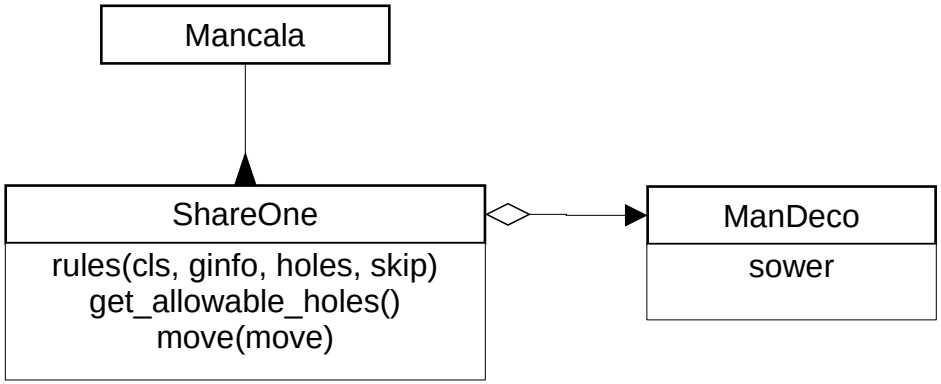
- Attributes and methods shown are over-ridden, reassigned or reconfigured.
- The BearOff sower is inserted in the deco chain before the single sower. The BearOffSower either does the bear off style sowing or calls down the deco chain to the original single sower.

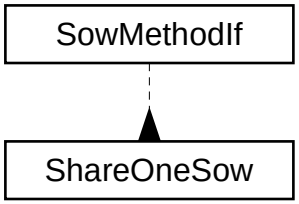




animation msg

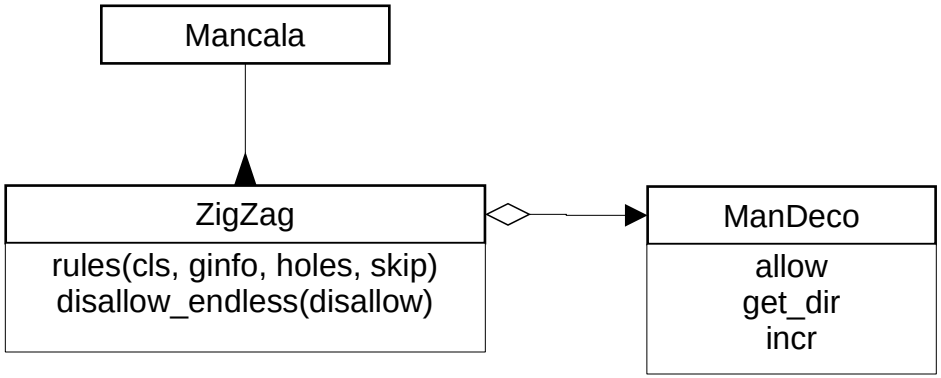
ShareOne Game Class



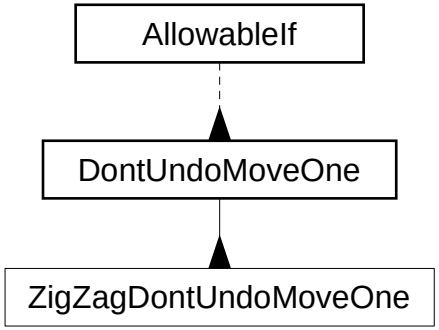


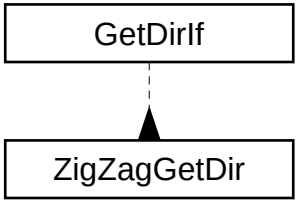
- Attributes and methods shown are over-ridden, reassigned or reconfigured.
- If the move will be a share one move, only holes that are not children with 2 or more seeds are allowable (the allow deco is not used); otherwise, the deco chain is used.
- If the next move is to share one seed and the animator is active, a message is popped up via the move method override.
- ShareOneSow wraps the existing deco chain and performs an alternate sow to share the one seed.

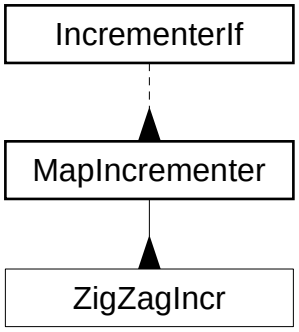
ZigZag Game Class



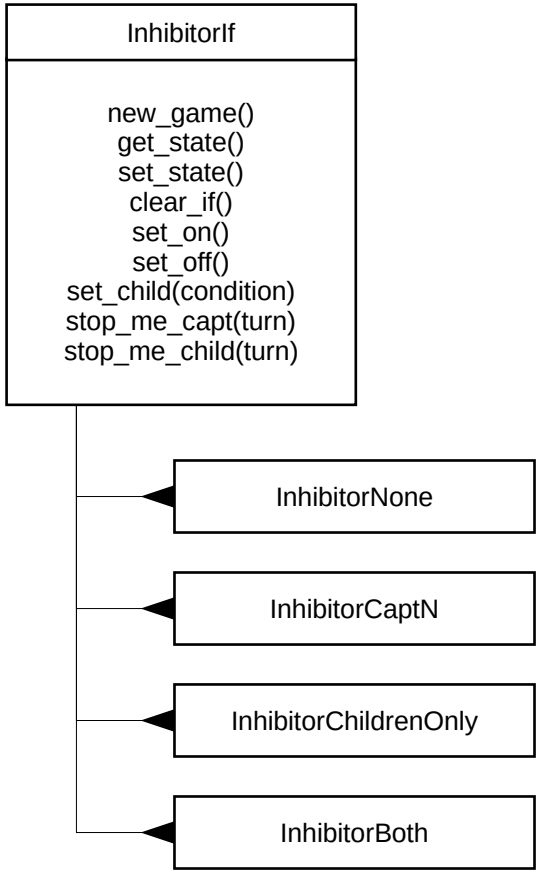
- Attributes and methods shown are over-ridden, reassigned or reconfigured.
- ZigZag Cycle:
  - The ZigZag cycle is similar to the normal cycle in that each hole is visited once before any hole is visited a second time.
  - The cycle is generated as though sowing from South's Leftmost hole (loc 0) throught the board to North's Rightmost hole.
  - The sow direction describes which way through this cycle and the incrementer should move.
- Consult code for how deco chains are modified.







Important Classes for Moves



The decorator chains and button behaviors use and control the inhibitor.

MoveTpl

Moves are one of (based on game parameters):

1. position
2. (position, direction)
3. (row, position, direction)

MoveTpl prints the moves nicely.

Row is in terms of the UI, that is Top/True is 0 and Bottom/False is 1. This is the “not” of the game.turn.

Moves are created when initializing the HoleButtons for the human players and via the get_moves deco chain for the AI player.

MoveData

MoveData is used to communicate information about each move between the deco chains and individual decorators.

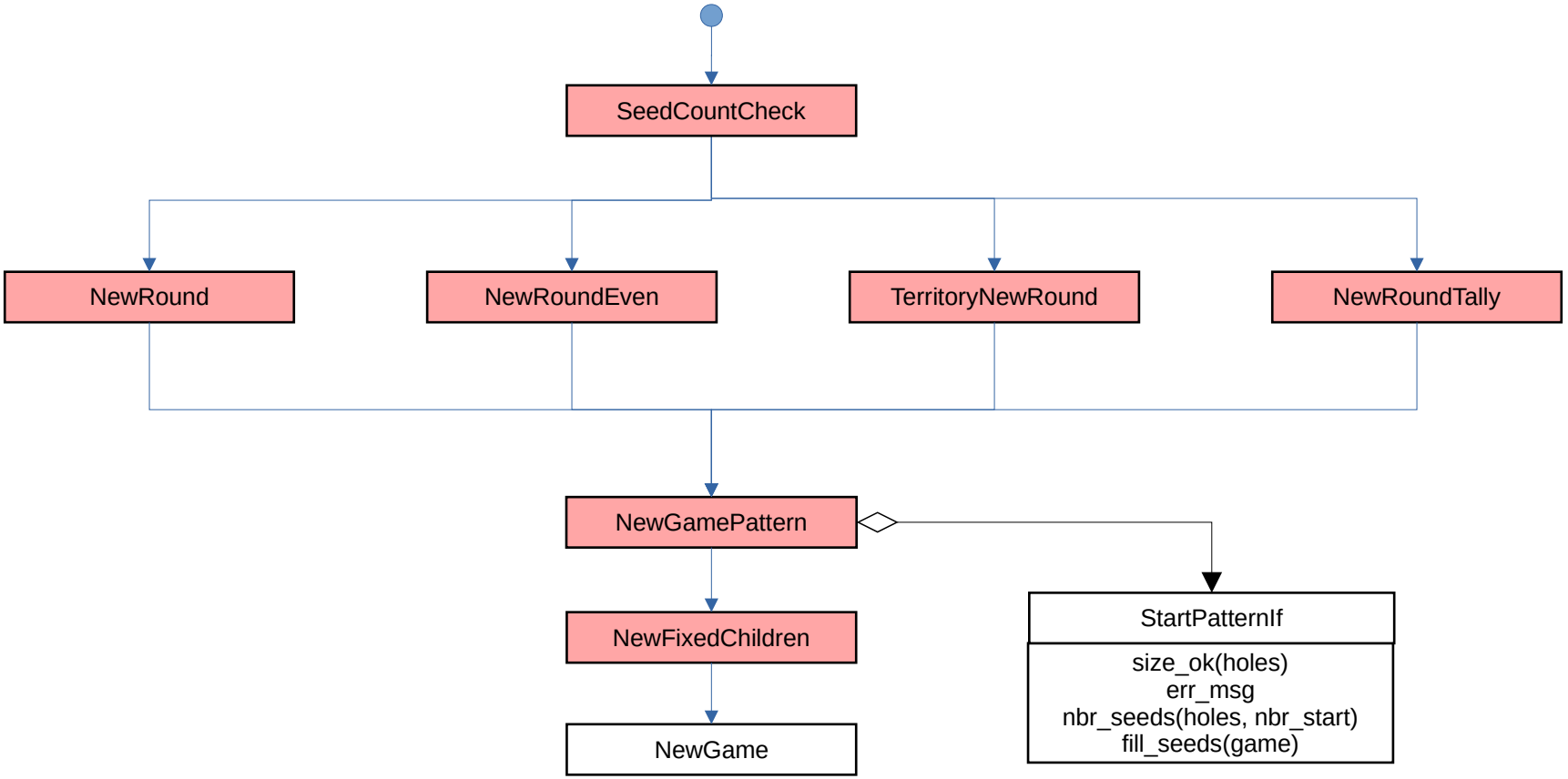
See class comment for where each field is set and/or updated.

The current move’s mdata is stored in Mancala, but anything stored directly into that could mess up the Monte Carlo Tree Search (it’s node dictionary uses a limited version of game state, which does not include Mancala.mdata).

Decorator Usage

Game Op/Step	Primary Decorator	Other Classes & Decorators Used	Description
New Game	new_game	StartPattern, inhibitor	Setups the game for initial play. Applies any prescribed moves.
Determine Drawable Holes	allow		Return a list of holes that are playable.
Collect Moves	get_moves		Return a list of possible moves.
Draw seeds to start a move	drawer		Parse the move, determine number of seeds to sow, possibly leave one seed
Determine sow direction	get_direction		Convert the move & location into an actual sowable direction: clockwise or counter-clockwise.
Sow	sower	MoveData, incr, make_child, inhibitor	Drop the seeds into the board holes.
Capture seeds	capturer & capt_ok	MoveData, incr, make_child, inhibitor	Perform any captures.
Evaluate end of game	ender	MoveData	At the end of each move determine if the game is over: game has been won, no more moves, game outcome can’t change, etc.
Logging	get_string		Creates an ASCII string for the game.
Force end of game	quitter	MoveData	The game needs to end either because of endless sow or user selection. If not configured to do something else, unclaimed seeds are divvied between the players.

New Game Decorators and Chain

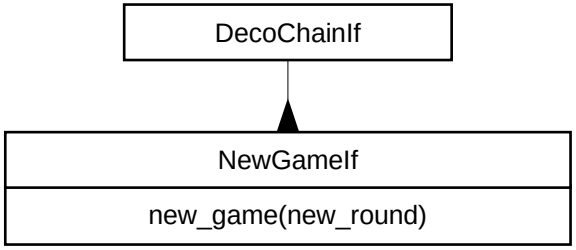


State variables changed:

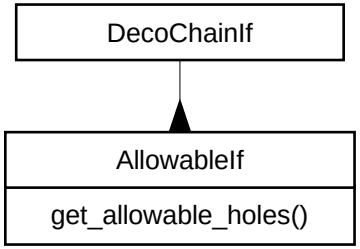
- blocked
- board
- owner
- starter
- store
- turn

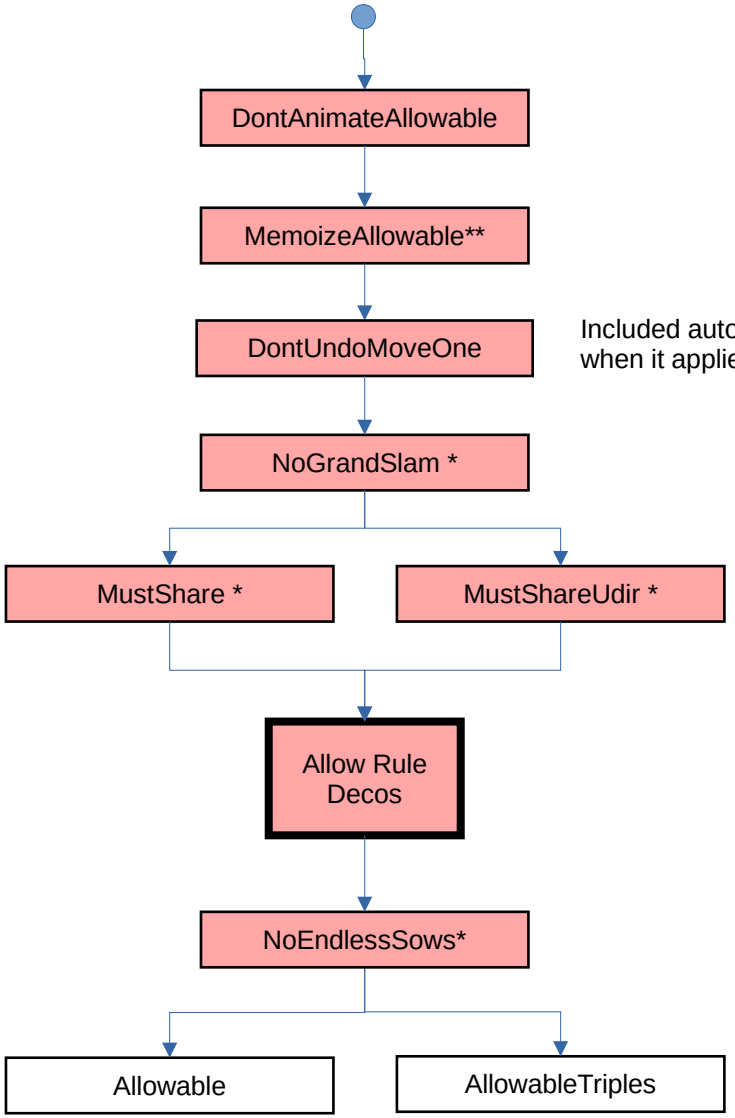
Parameters:

- blocks
- goal
- min_move
- round_starter
- round_fill
- rounds
- start_pattern



Allowables Decorators and Chain





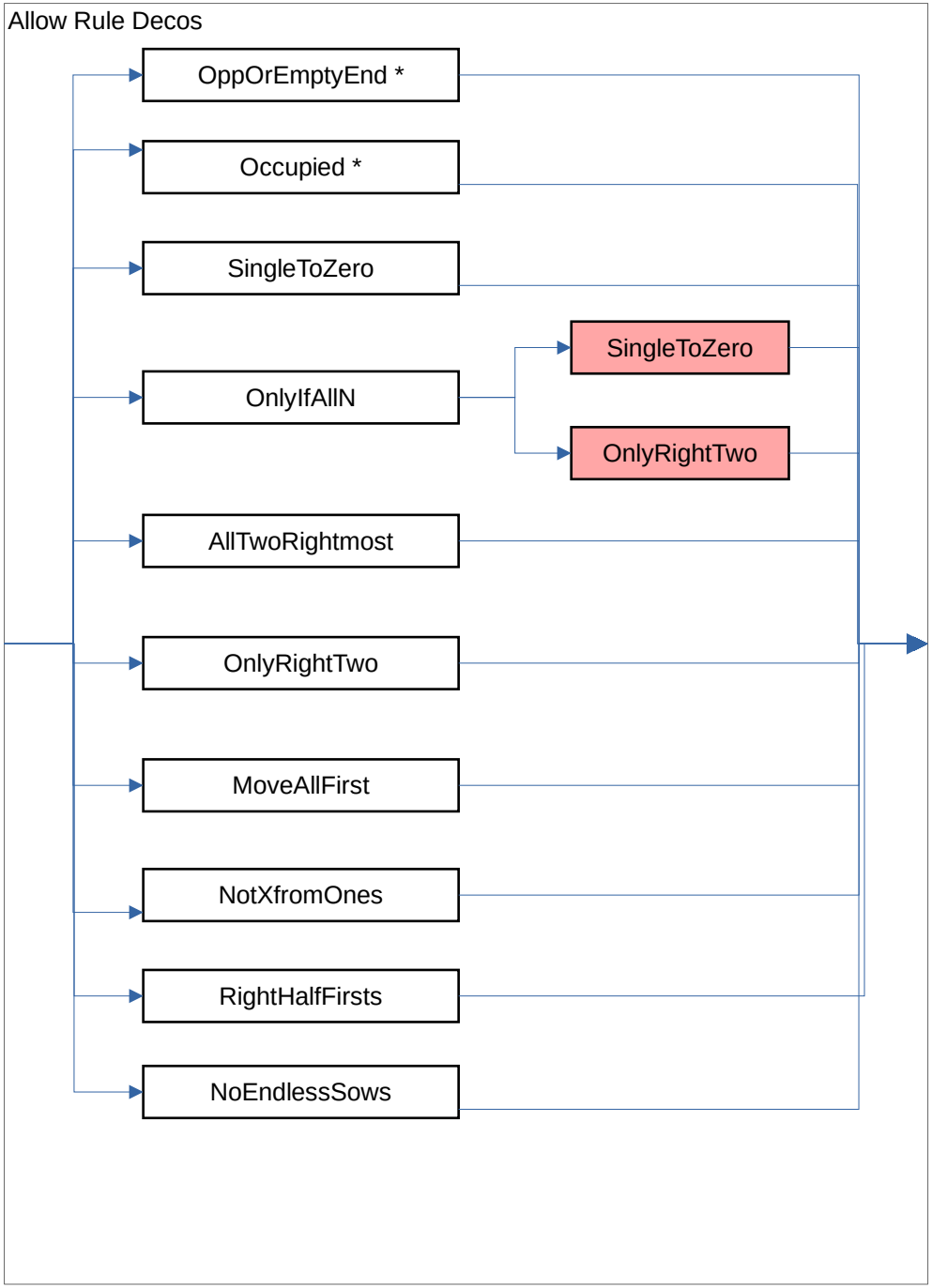
Included automatically when it applies.

State variables read:
- turn
- board
- store
- blocked
- owner
- child
- mcount

Parameters:
- min_move
- allow_rule
- mlength
- mustshare
- grandslam
- udir_holes

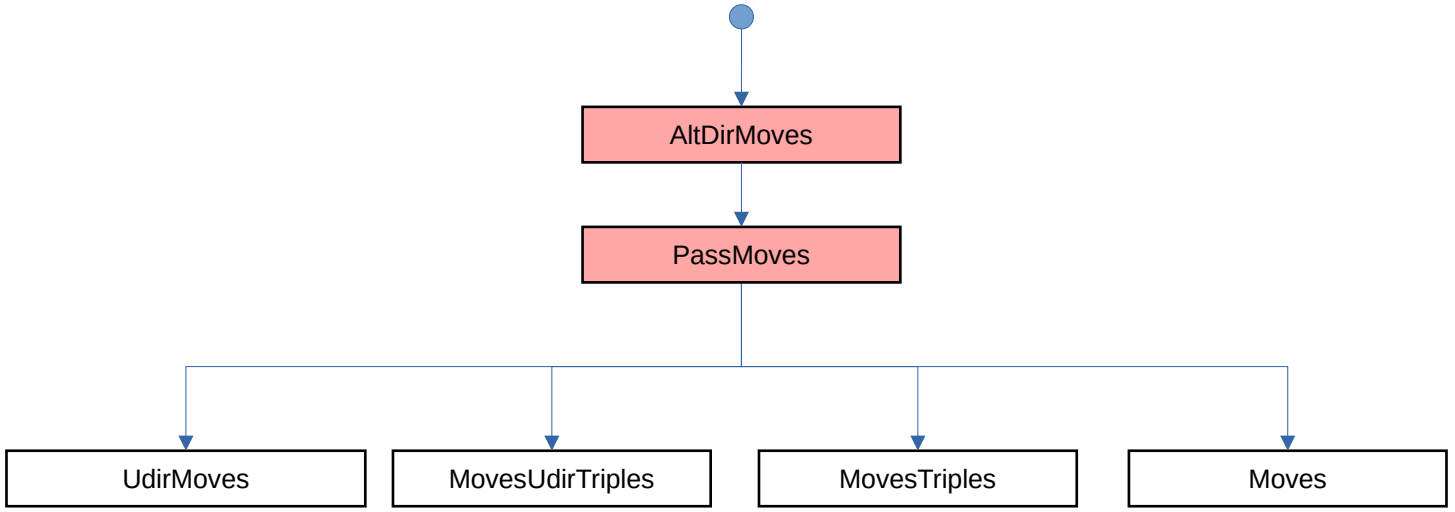
Notes:
* Simulates some portion of moves to determine allowables
** MemoizeAllowable is used for deco's that simulate moves

Allow Rule Decos



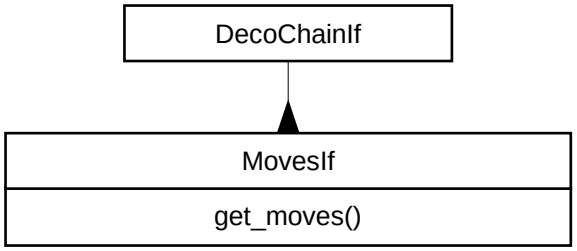
Notes:
Some allow rule decos are shown more than once for clarity.
* Simulates some portion of moves to determine allowables

Get Moves Decorators and Chain

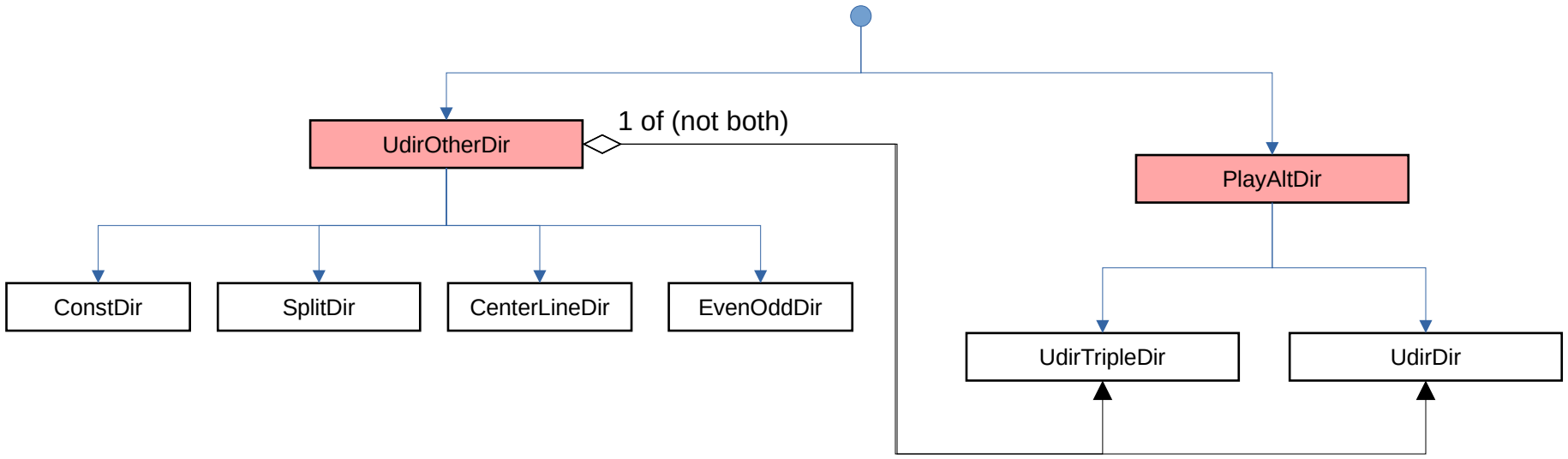


State variables read:
- blocked
- board
- owner
- starter
- store
- turn

Parameters:
- mlength
- mustpass
- sow_direct
- udir_holes
- udirect

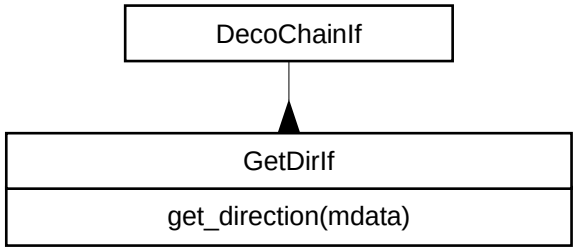


Get Direction Decorators and Chain

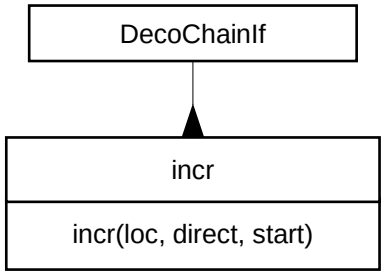


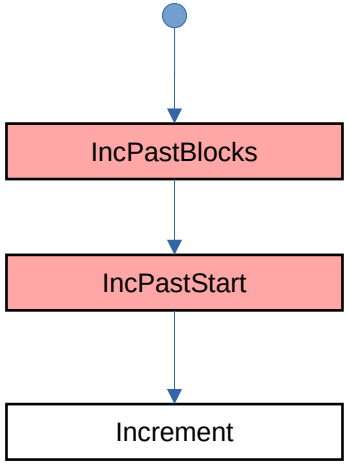
State variables read:
- mcount
- turn

Parameters:
- no_sides
- sow_direct
- udir_holes
- udirect



Incrementer Decorators and Chains





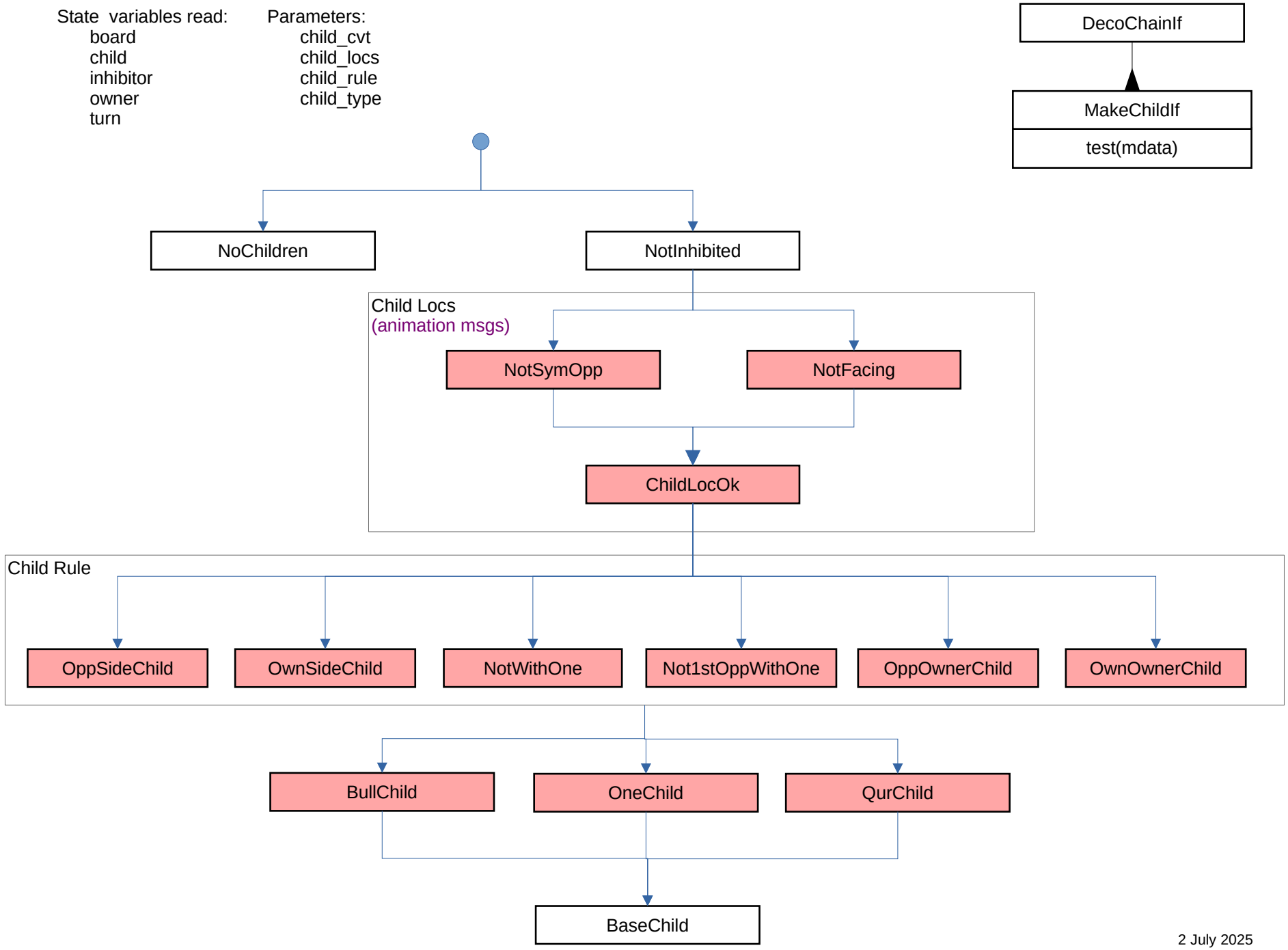
State variables read:
blocked

Parameters:
blocks
skip_start

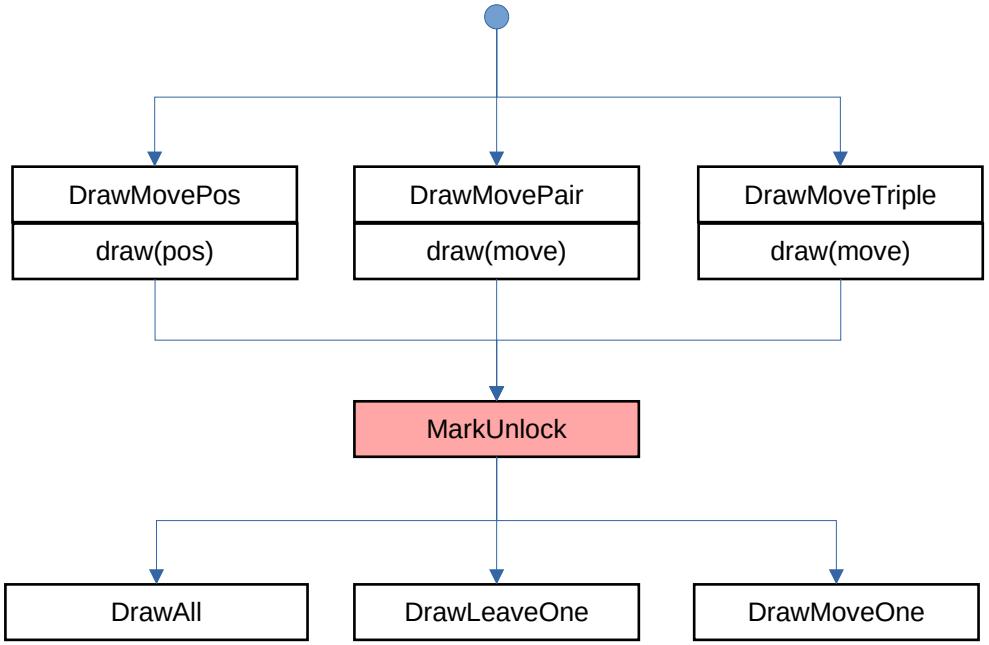
MakeChild Decorator and Chain

State variables read:
- board
- child
- inhibitor
- owner
- turn

Parameters:
- child_cvt
- child_locs
- child_rule
- child_type



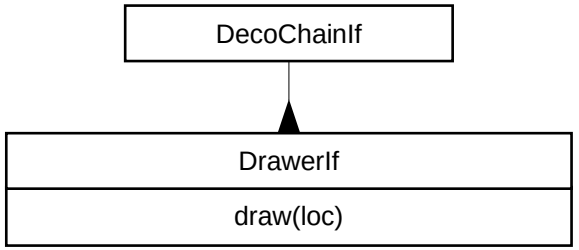
Draw Decorators and Chain



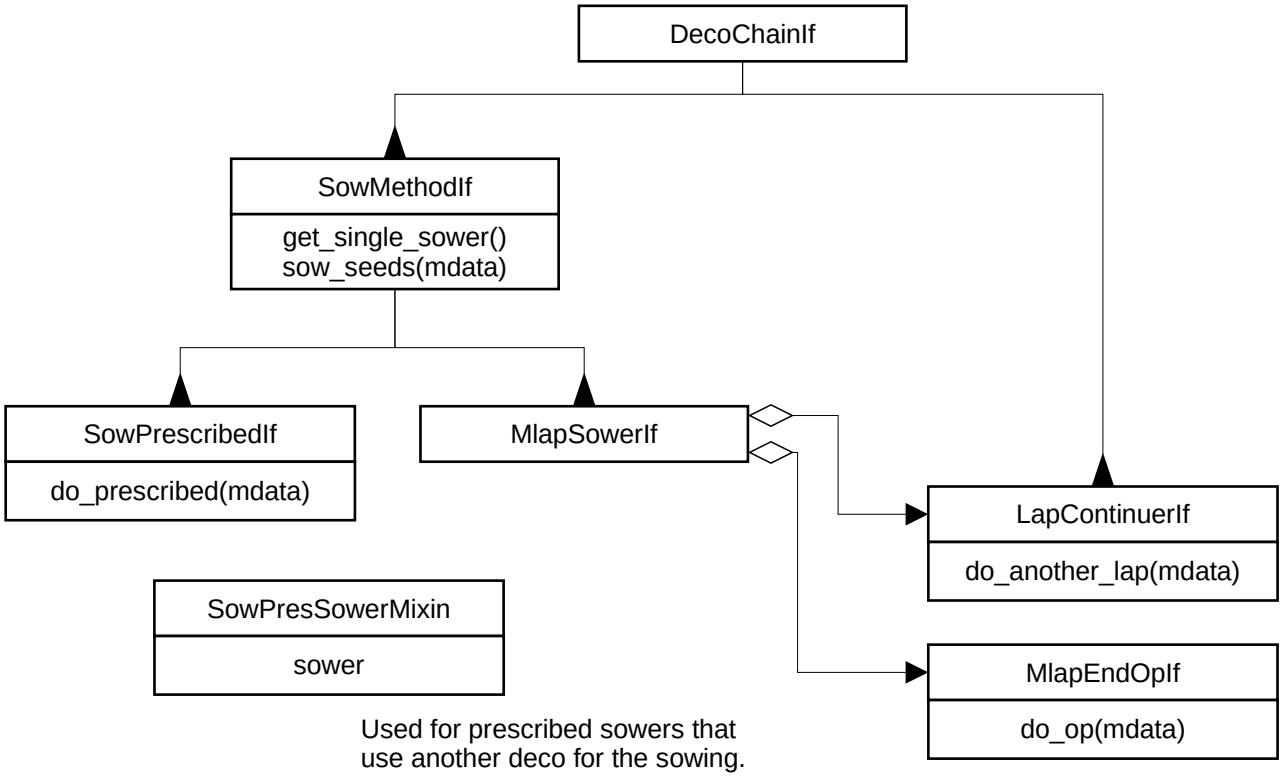
The first drawer converts the move into board location.

State variables:
- Read:
  - turn
- Changed:
  - board
  - unlocked

Parameters:
- allow_rule
- mlength
- move_one
- moveunlock
- sow_start



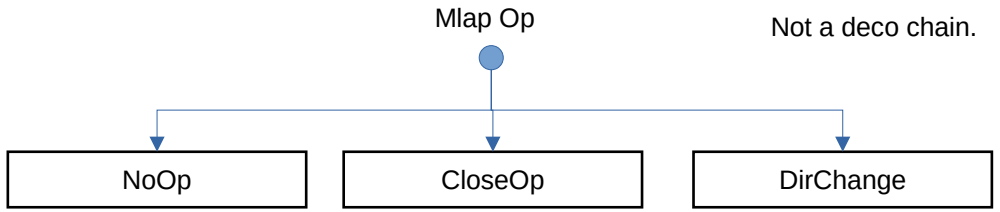
Sower Decorators



Used for prescribed sowers that use another deco for the sowing.

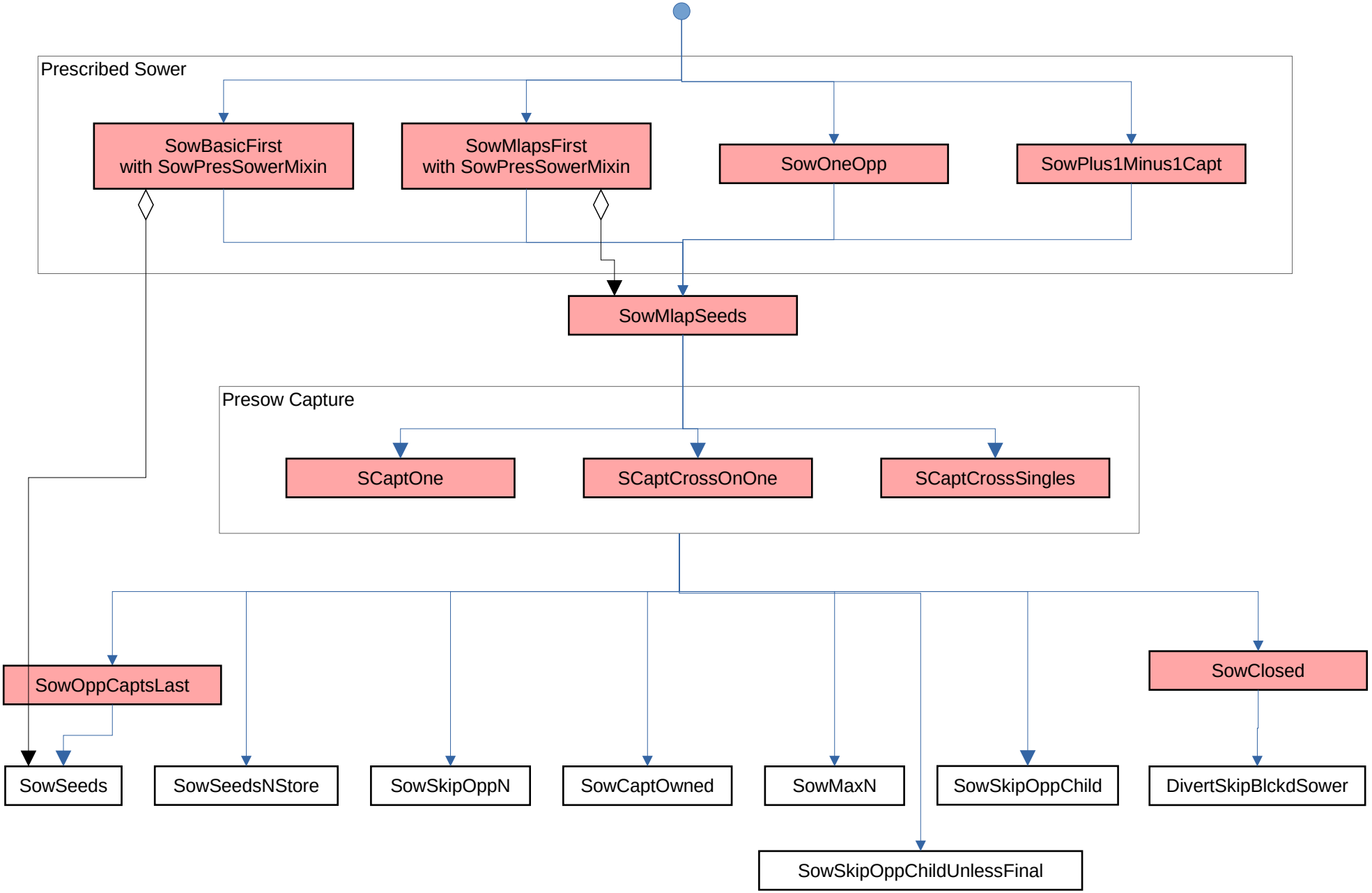
State variables:
- Reads
  - inhibitor
  - turn
  - child
  - mcount
- Changes
  - board
  - store
  - blocked

Parameters:
- capt_max
- capt_min
- capt_on
- child_type
- crosscapt
- evens
- goal
- gparam_one
- mlaps
- prescribed
- presowcapt
- sow_direct
- sow_own_store
- sow_param
- sow_rule
- visit_opp

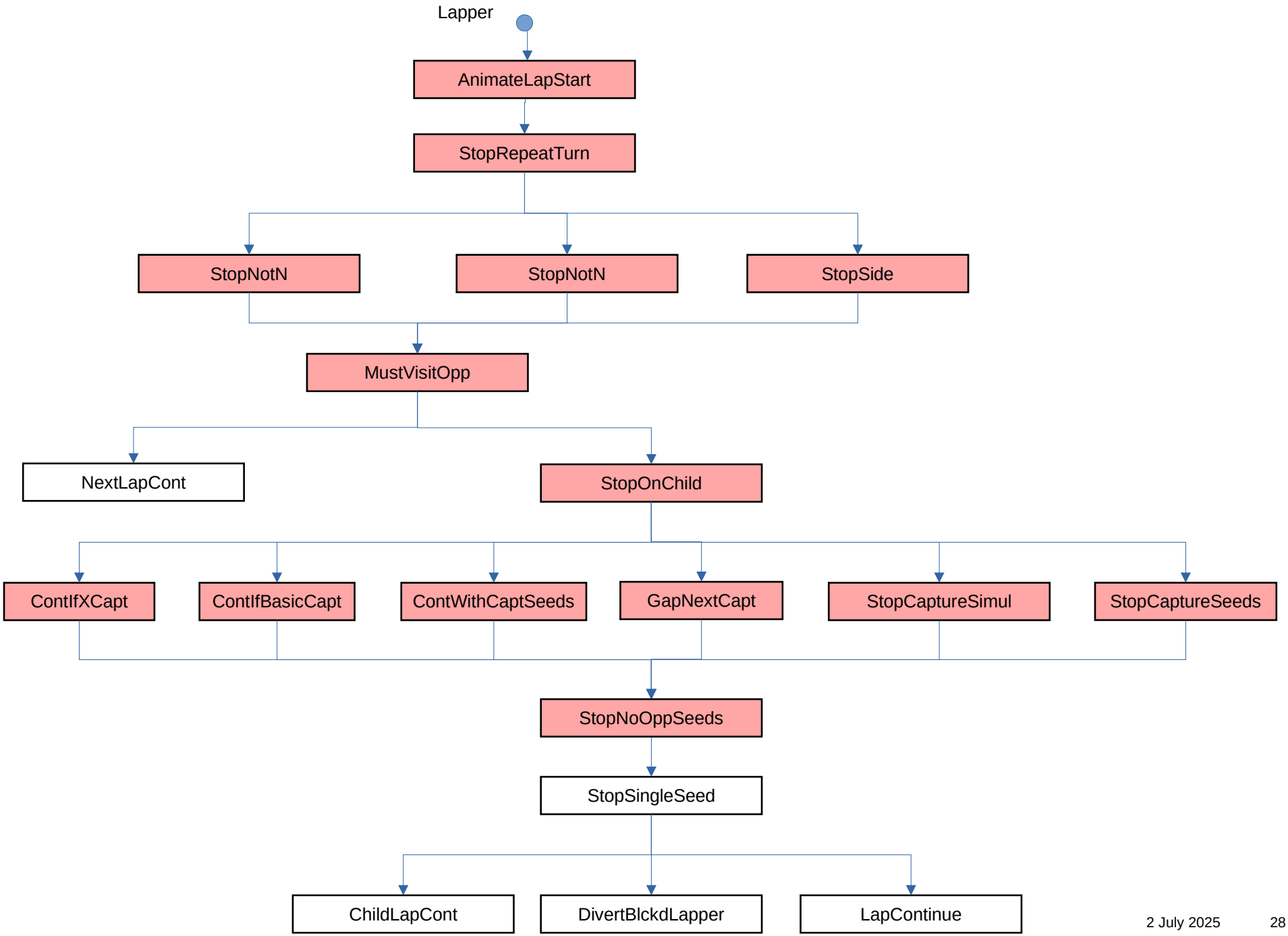


Not a deco chain.

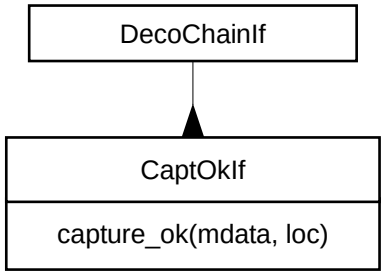
Sower Deco Chain

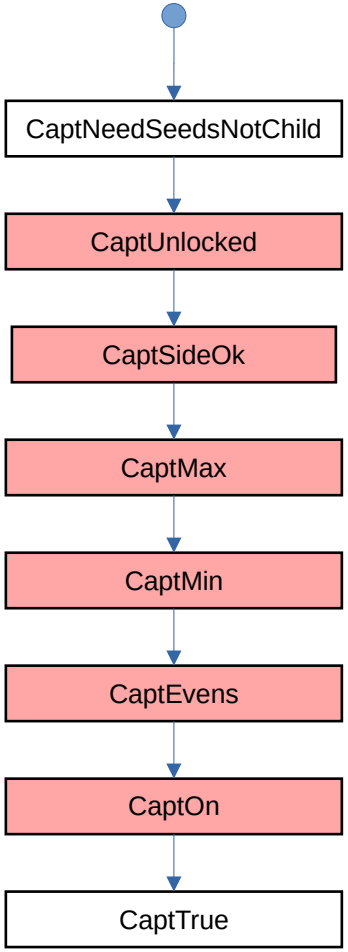


Lap Continuer Deco Chain and Mlap Operation



Capt Ok Decorators and Chains





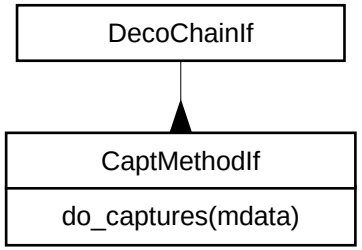
This is the Basic Capture Criteria.

These are effectively ANDed. If any deco condition is false, it returns false, otherwise it calls down the deco chain.

State variables read:
- board
- child
- turn
- unlocked

Parameters:
- capt_max
- capt_min
- capt_on
- capt_side
- moveunlock

Capturer Decorators and Chain

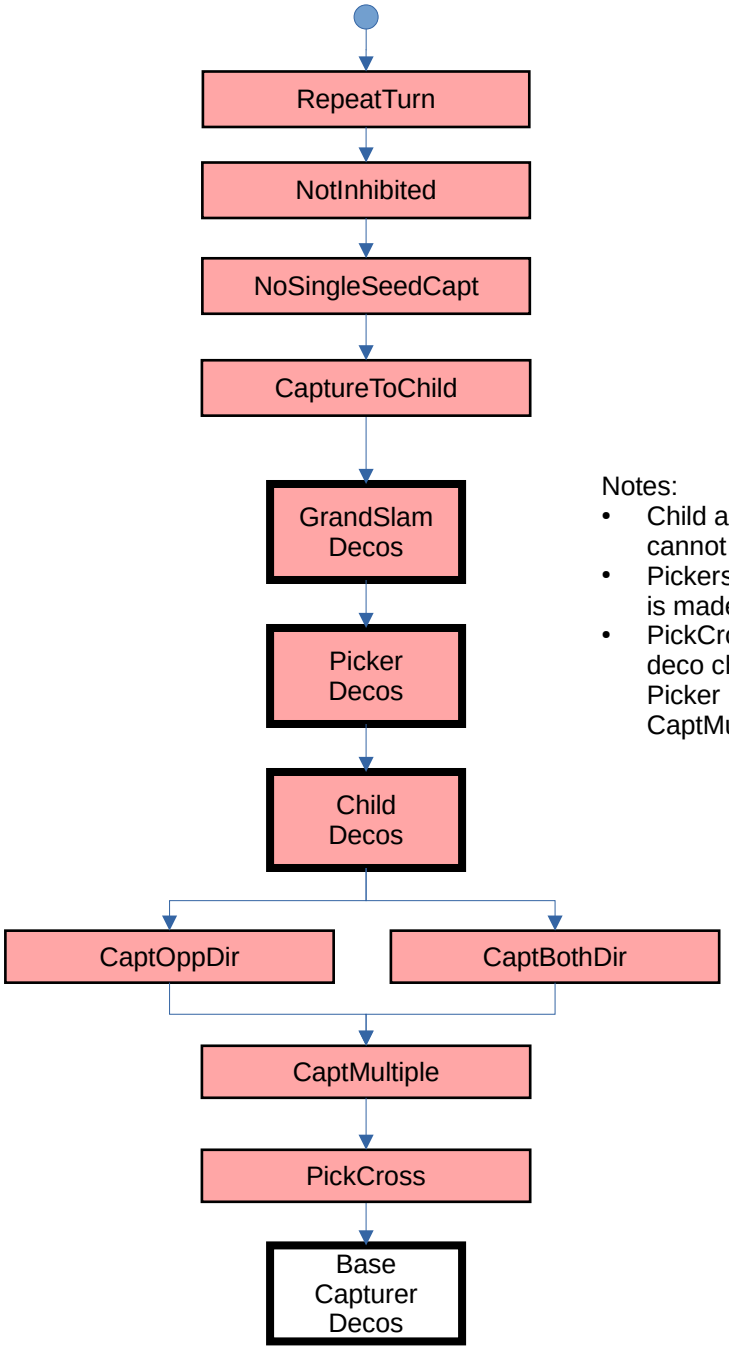


State variables

Reads
- inhibitor
- starter
- turn

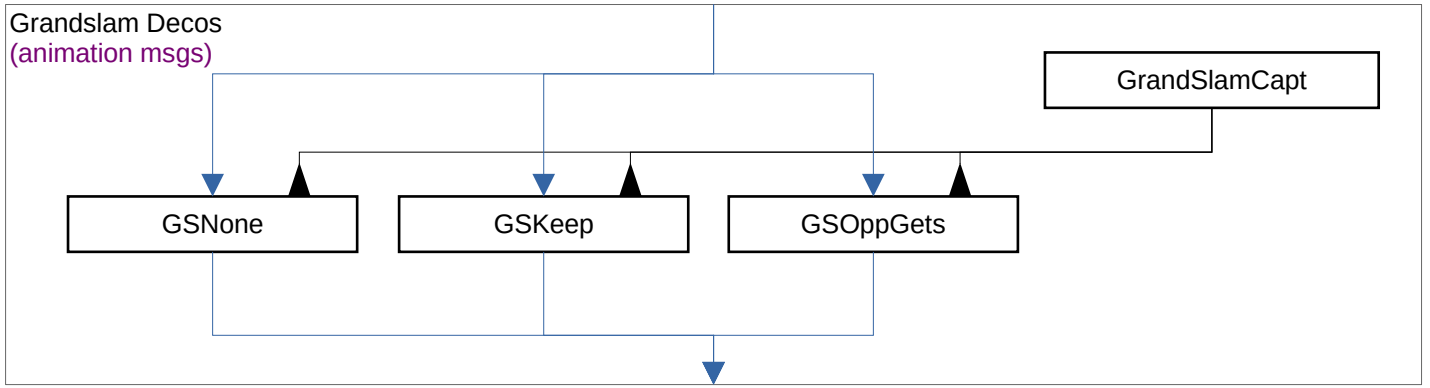
Changes
- board
- child
- store

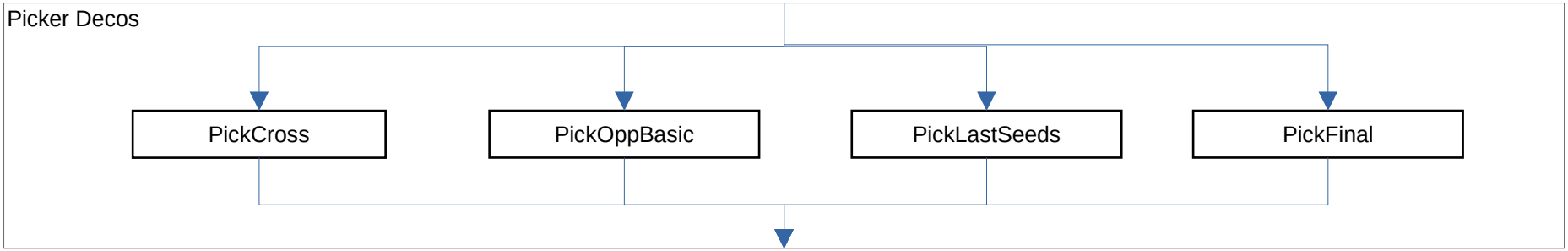
Parameters:
- capsamedir
- capt_max
- capt_min
- capt_on
- capt_rturn
- capt_side
- capt_type
- child_cvt
- child_type
- crosscapt
- evens
- grandslam
- mlaps
- multicapt
- nocaptmoves
- nosinglecapt
- pickextra
- prescribed
- round_fill
- xc_sown
- xcpickown

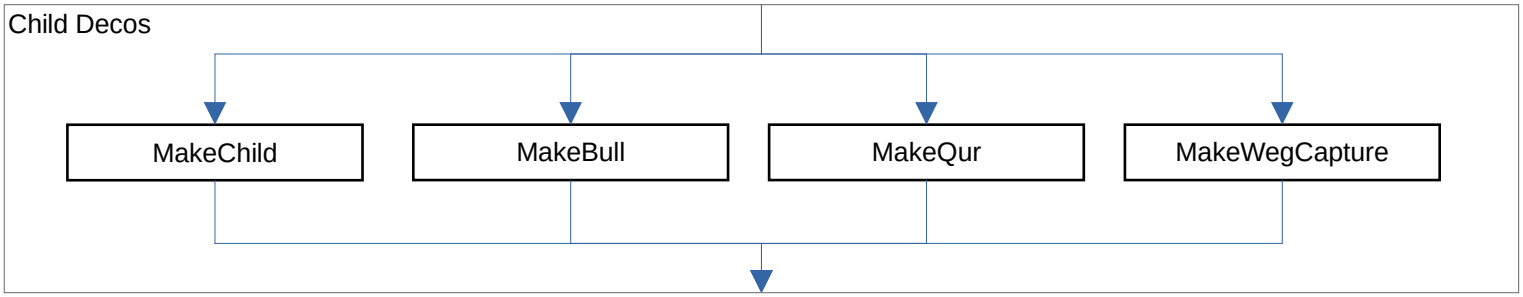


Notes:
- Child and Grand Slam decos cannot occur together.
- Pickers do nothing when a child is made.
- PickCross is only put in the deco chain once, either in Picker Decos or after CaptMultiple.

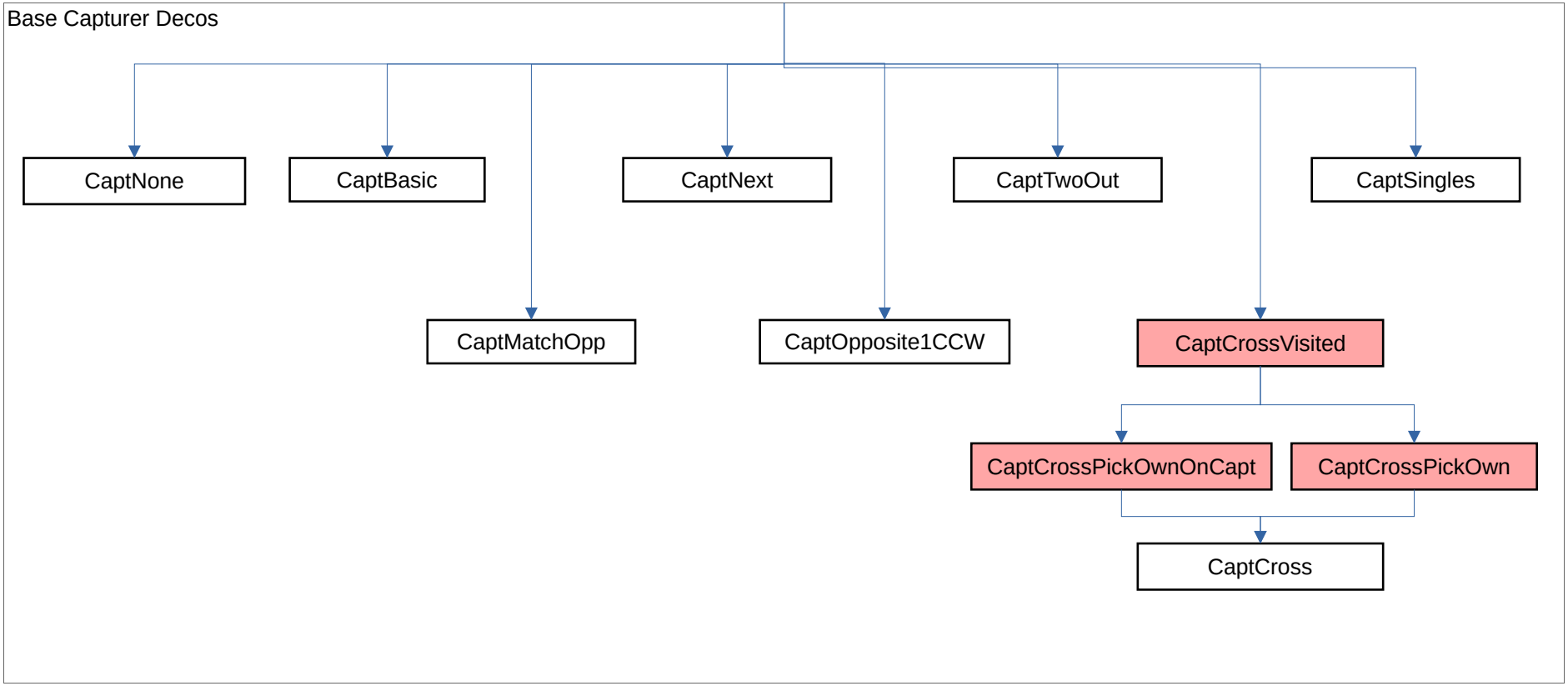
Capturer Deco Chains
(1 of 2)







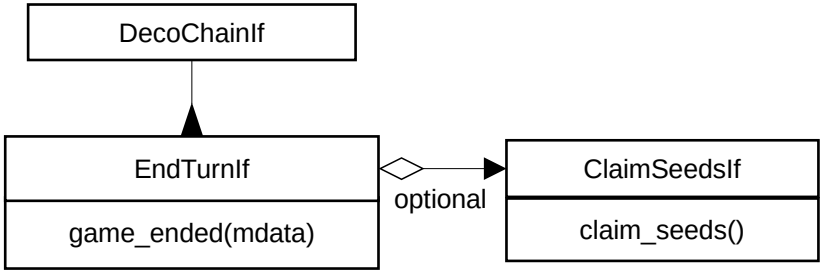
Capturer Deco Chains
(2 of 2)

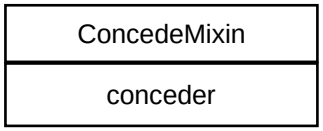


Ender & Quiter Decorators and Chains (1 of 2)

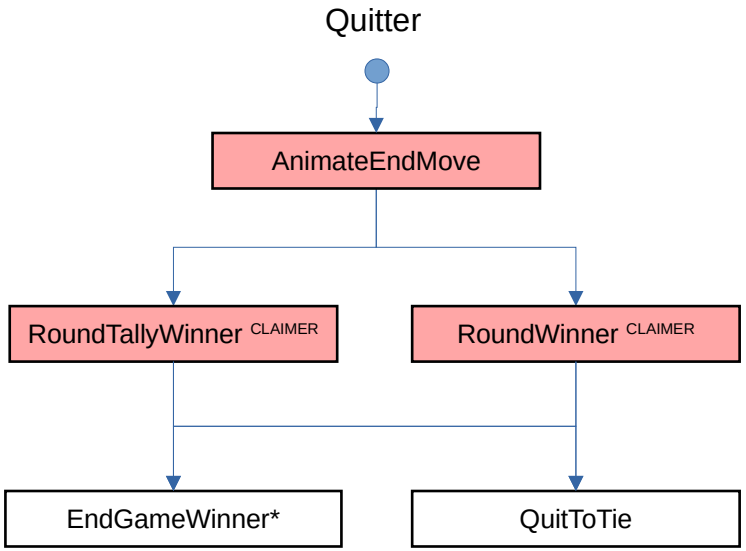
State variables:
- Reads:
  - child
  - owner
  - turn
- Changes:
  - board
  - store

Parameters:
- capt_min
- capt_next
- capt_on
- capttwoout
- child_cvt
- child_type
- crosscapt
- evens
- goal
- gparam_one
- min_move
- mlaps
- mustpass
- mustshare
- no_sides
- round_fill
- rounds
- sow_own_store
- stores
- unclaimed



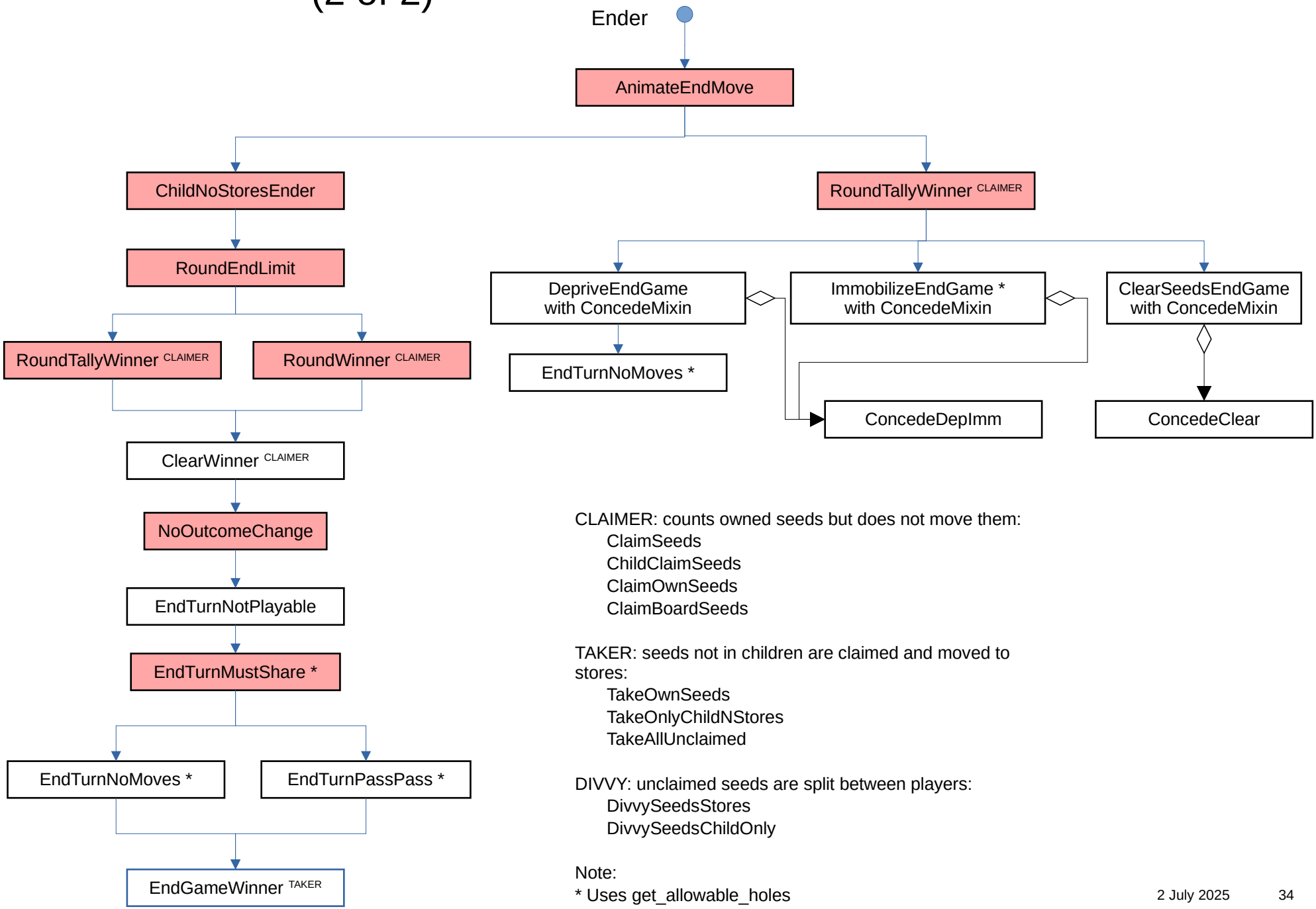


Used for enders that use a different criteria for ending when the user concedes a game.



Note:
* For EndGameWinner in the quitter: a claimer, taker or divvier is selected based on the quitter, child_type and store properties (see next page).

Ender & Quiter Decorators and Chains (2 of 2)



CLAIMER: counts owned seeds but does not move them:
- ClaimSeeds
- ChildClaimSeeds
- ClaimOwnSeeds
- ClaimBoardSeeds

TAKER: seeds not in children are claimed and moved to stores:
- TakeOwnSeeds
- TakeOnlyChildNStores
- TakeAllUnclaimed

DIVVY: unclaimed seeds are split between players:
- DivvySeedsStores
- DivvySeedsChildOnly

Note:
* Uses get_allowable_holes