python-chess

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CONTENTS

1 Introduction **3**

2 Installing **5**

3 Documentation **7**

4 Features **9**

5 Selected projects **13**

6 Acknowledgements **15**

7 License **17**

8 Contents **19**

8.1 Core 19
8.2 PGN parsing and writing 35
8.3 Polyglot opening book reading 43
8.4 Gaviota endgame tablebase probing 44
8.5 Syzygy endgame tablebase probing 46
8.6 UCI/XBoard engine communication 48
8.7 SVG rendering 60
8.8 Variants 61
8.9 Changelog for python-chess 64

9 Indices and tables **67**

Index **69**

CHAPTER

ONE

INTRODUCTION

python-chess is a pure Python chess library with move generation, move validation and support for common formats. This is the Scholar's mate in python-chess:

```
>>> import chess

>>> board = chess.Board()

>>> board.legal_moves
<LegalMoveGenerator at ... (Nh3, Nf3, Nc3, Na3, h3, g3, f3, e3, d3, c3, ...)>
>>> chess.Move.from_uci("a8a1") in board.legal_moves
False

>>> board.push_san("e4")
Move.from_uci('e2e4')
>>> board.push_san("e5")
Move.from_uci('e7e5')
>>> board.push_san("Qh5")
Move.from_uci('d1h5')
>>> board.push_san("Nc6")
Move.from_uci('b8c6')
>>> board.push_san("Bc4")
Move.from_uci('f1c4')
>>> board.push_san("Nf6")
Move.from_uci('g8f6')
>>> board.push_san("Qxf7")
Move.from_uci('h5f7')

>>> board.is_checkmate()
True

>>> board
Board('r1bqkb1r/pppp1Qpp/2n2n2/4p3/2B1P3/8/PPPP1PPP/RNB1K1NR b KQkq - 0 4')
```

CHAPTER

TWO

INSTALLING

Download and install the latest release:

```
pip install chess
```

`ModuleNotFoundError: No module named 'chess'` after upgrading from old python-chess versions? `pip install --force-reinstall chess` (due to #680)

CHAPTER

THREE

DOCUMENTATION

- Core
- PGN parsing and writing
- Polyglot opening book reading
- Gaviota endgame tablebase probing
- Syzygy endgame tablebase probing
- UCI/XBoard engine communication
- Variants
- Changelog

CHAPTER

FOUR

FEATURES

- Supports Python 3.7+. Includes mypy typings.
- IPython/Jupyter Notebook integration. SVG rendering docs.

```
>>> board
```



- Chess variants: Standard, Chess960, Suicide, Giveaway, Atomic, King of the Hill, Racing Kings, Horde, Three-check, Crazyhouse. Variant docs.
- Make and unmake moves.

```
>>> Nf3 = chess.Move.from_uci("g1f3")
>>> board.push(Nf3)  # Make the move

>>> board.pop()  # Unmake the last move
Move.from_uci('g1f3')
```

- Show a simple ASCII board.

```
>>> board = chess.Board("r1bqkb1r/pppp1Qpp/2n2n2/4p3/2B1P3/8/PPPP1PPP/RNB1K1NR b␣
↪KQkq - 0 4")
>>> print(board)
r . b q k b . r
p p p p . Q p p
. . n . . n . .
. . . . p . . .
. . B . P . . .
. . . . . . . .
P P P P . P P P
R N B . K . N R
```

- Detects checkmates, stalemates and draws by insufficient material.

```
>>> board.is_stalemate()
False
>>> board.is_insufficient_material()
False
>>> board.is_game_over()
True
```

- Detects repetitions. Has a half-move clock.

```
>>> board.can_claim_threefold_repetition()
False
>>> board.halfmove_clock
0
>>> board.can_claim_fifty_moves()
False
>>> board.can_claim_draw()
False
```

With the new rules from July 2014, a game ends as a draw (even without a claim) once a fivefold repetition occurs or if there are 75 moves without a pawn push or capture. Other ways of ending a game take precedence.

```
>>> board.is_fivefold_repetition()
False
>>> board.is_seventyfive_moves()
False
```

- Detects checks and attacks.

```
>>> board.is_check()
True
>>> board.is_attacked_by(chess.WHITE, chess.E8)
True

>>> attackers = board.attackers(chess.WHITE, chess.F3)
>>> attackers
```

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```
SquareSet(0x0000_0000_0000_4040)
>>> chess.G2 in attackers
True
>>> print(attackers)
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . 1 .
. . . . . 1 .
```

- Parses and creates SAN representation of moves.

```
>>> board = chess.Board()
>>> board.san(chess.Move(chess.E2, chess.E4))
'e4'
>>> board.parse_san('Nf3')
Move.from_uci('g1f3')
>>> board.variation_san([chess.Move.from_uci(m) for m in ["e2e4", "e7e5", "g1f3
↪"]])
'1. e4 e5 2. Nf3'
```

- Parses and creates FENs, extended FENs and Shredder FENs.

```
>>> board.fen()
'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - 0 1'
>>> board.shredder_fen()
'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w HAha - 0 1'
>>> board = chess.Board("8/8/8/2k5/4K3/8/8/8 w - - 4 45")
>>> board.piece_at(chess.C5)
Piece.from_symbol('k')
```

- Parses and creates EPDs.

```
>>> board = chess.Board()
>>> board.epd(bm=board.parse_uci("d2d4"))
'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - bm d4;'

>>> ops = board.set_epd("1k1r4/pp1b1R2/3q2pp/4p3/2B5/4Q3/PPP2B2/2K5 b - - bm Qd1+;
↪ id \"BK.01\";")
>>> ops == {'bm': [chess.Move.from_uci('d6d1')], 'id': 'BK.01'}
True
```

- Detects absolute pins and their directions.
- Reads Polyglot opening books. Docs.

```
>>> import chess.polyglot

>>> book = chess.polyglot.open_reader("data/polyglot/performance.bin")

>>> board = chess.Board()
>>> main_entry = book.find(board)
>>> main_entry.move
Move.from_uci('e2e4')
```

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```
>>> main_entry.weight
1

>>> book.close()
```

- Reads and writes PGNs. Supports headers, comments, NAGs and a tree of variations. Docs.

```
>>> import chess.pgn

>>> with open("data/pgn/molinari-bordais-1979.pgn") as pgn:
...     first_game = chess.pgn.read_game(pgn)

>>> first_game.headers["White"]
'Molinari'
>>> first_game.headers["Black"]
'Bordais'

>>> first_game.mainline()
<Mainline at ... (1. e4 c5 2. c4 Nc6 3. Ne2 Nf6 4. Nbc3 Nb4 5. g3 Nd3#)>

>>> first_game.headers["Result"]
'0-1'
```

- Probe Gaviota endgame tablebases (DTM, WDL). Docs.
- Probe Syzygy endgame tablebases (DTZ, WDL). Docs.

```
>>> import chess.syzygy

>>> tablebase = chess.syzygy.open_tablebase("data/syzygy/regular")

>>> # Black to move is losing in 53 half moves (distance to zero) in this
>>> # KNBvK endgame.
>>> board = chess.Board("8/2K5/4B3/3N4/8/8/4k3/8 b - - 0 1")
>>> tablebase.probe_dtz(board)
-53

>>> tablebase.close()
```

- Communicate with UCI/XBoard engines. Based on `asyncio`. Docs.

```
>>> import chess.engine

>>> engine = chess.engine.SimpleEngine.popen_uci("stockfish")

>>> board = chess.Board("1k1r4/pp1b1R2/3q2pp/4p3/2B5/4Q3/PPP2B2/2K5 b - - 0 1")
>>> limit = chess.engine.Limit(time=2.0)
>>> engine.play(board, limit)
<PlayResult at ... (move=d6d1, ponder=c1d1, info={...}, draw_offered=False,␣
↪resigned=False)>

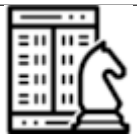
>>> engine.quit()
```

CHAPTER

FIVE

SELECTED PROJECTS

If you like, share interesting things you are using python-chess for, for example:

	https://syzygy-tables.info/ A website to probe Syzygy endgame tablebases
	https://maiachess.com/ A human-like neural network chess engine
	clente/chess Oppinionated wrapper to use python-chess from the R programming language
	https://crazyara.org/ Deep learning for Crazyhouse
	http://johncheetham.com A GUI to play against UCI chess engines
	https://www.pettingzoo.ml A multi-agent reinforcement learning environment

- a stand-alone chess computer based on DGT board – http://www.picochess.org/
- a bridge between Lichess API and chess engines – https://github.com/careless25/lichess-bot
- a command-line PGN annotator – https://github.com/rpdelaney/python-chess-annotator
- an HTTP microservice to render board images – https://github.com/niklasf/web-boardimage

- a JIT compiled chess engine – https://github.com/SamRagusa/Batch-First
- teaching Cognitive Science – https://jupyter.brynmawr.edu
- an Alexa skill to play blindfold chess – https://github.com/laynr/blindfold-chess
- a chessboard widget for PySide2 – https://github.com/H-a-y-k/hichesslib
- Django Rest Framework API for multiplayer chess – https://github.com/WorkShoft/capablanca-api

CHAPTER

SIX

ACKNOWLEDGEMENTS

Thanks to the Stockfish authors and thanks to Sam Tannous for publishing his approach to avoid rotated bitboards with direct lookup (PDF) alongside his GPL2+ engine Shatranj. Some move generation ideas are taken from these sources.

Thanks to Ronald de Man for his Syzygy endgame tablebases. The probing code in python-chess is very directly ported from his C probing code.

Thanks to Kristian Glass for transferring the namespace `chess` on PyPI.

CHAPTER

SEVEN

LICENSE

python-chess is licensed under the GPL 3 (or any later version at your option). Check out LICENSE.txt for the full text.

CHAPTER

EIGHT

CONTENTS

8.1 Core

8.1.1 Colors

Constants for the side to move or the color of a piece.

chess.**WHITE: chess.Color = True**

chess.**BLACK: chess.Color = False**

You can get the opposite *color* using `not color`.

8.1.2 Piece types

chess.**PAWN: chess.PieceType = 1**

chess.**KNIGHT: chess.PieceType = 2**

chess.**BISHOP: chess.PieceType = 3**

chess.**ROOK: chess.PieceType = 4**

chess.**QUEEN: chess.PieceType = 5**

chess.**KING: chess.PieceType = 6**

chess.**piece_symbol**(*piece_type: chess.PieceType*) → str

chess.**piece_name**(*piece_type: chess.PieceType*) → str

8.1.3 Squares

chess.**A1: chess.Square = 0**

chess.**B1: chess.Square = 1**

and so on to

chess.**G8: chess.Square = 62**

chess.**H8: chess.Square = 63**

chess.**SQUARES = [chess.A1, chess.B1, ..., chess.G8, chess.H8]**

chess.**SQUARE_NAMES = ['a1', 'b1', ..., 'g8', 'h8']**

chess.**FILE_NAMES = ['a', 'b', ..., 'g', 'h']**

chess.**RANK_NAMES = ['1', '2', ..., '7', '8']**

chess.**parse_square**(*name: str*) → chess.Square
Gets the square index for the given square *name* (e.g., `a1` returns `0`).

Raises `ValueError` if the square name is invalid.

chess.**square_name**(*square: chess.Square*) → str
Gets the name of the square, like `a3`.

chess.**square**(*file_index: int*, *rank_index: int*) → chess.Square
Gets a square number by file and rank index.

chess.**square_file**(*square: chess.Square*) → int
Gets the file index of the square where `0` is the a-file.

chess.**square_rank**(*square: chess.Square*) → int
Gets the rank index of the square where `0` is the first rank.

chess.**square_distance**(*a: chess.Square*, *b: chess.Square*) → int
Gets the distance (i.e., the number of king steps) from square *a* to *b*.

chess.**square_mirror**(*square: chess.Square*) → chess.Square
Mirrors the square vertically.

8.1.4 Pieces

class chess.**Piece**(*piece_type: chess.PieceType*, *color: chess.Color*)
A piece with type and color.

piece_type: chess.PieceType
The piece type.

color: chess.Color
The piece color.

symbol() → str
Gets the symbol `P`, `N`, `B`, `R`, `Q` or `K` for white pieces or the lower-case variants for the black pieces.

unicode_symbol(*, *invert_color: bool = False*) → str
Gets the Unicode character for the piece.

classmethod from_symbol(*symbol: str*) → *chess.Piece*
Creates a `Piece` instance from a piece symbol.

Raises `ValueError` if the symbol is invalid.

8.1.5 Moves

class chess.**Move**(*from_square: chess.Square*, *to_square: chess.Square*, *promotion: Optional[chess.PieceType] = None*, *drop: Optional[chess.PieceType] = None*)
Represents a move from a square to a square and possibly the promotion piece type.

Drops and null moves are supported.

from_square: chess.Square
The source square.

to_square: chess.Square
The target square.

promotion: Optional[chess.PieceType] = None
The promotion piece type or `None`.

drop: Optional[chess.PieceType] = None
The drop piece type or `None`.

uci() → str
Gets a UCI string for the move.

For example, a move from a7 to a8 would be `a7a8` or `a7a8q` (if the latter is a promotion to a queen).

The UCI representation of a null move is `0000`.

classmethod from_uci(*uci: str*) → *chess.Move*
Parses a UCI string.

Raises `ValueError` if the UCI string is invalid.

classmethod null() → *chess.Move*
Gets a null move.

A null move just passes the turn to the other side (and possibly forfeits en passant capturing). Null moves evaluate to `False` in boolean contexts.

```
>>> import chess
>>>
>>> bool(chess.Move.null())
False
```

8.1.6 Board

chess.**STARTING_FEN = 'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - 0 1'**
The FEN for the standard chess starting position.

chess.**STARTING_BOARD_FEN = 'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR'**
The board part of the FEN for the standard chess starting position.

class chess.**Board**(*fen: Optional[str] = 'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - 0 1'*, *, *chess960: bool = False*)
A *BaseBoard*, additional information representing a chess position, and a *move stack*.

Provides *move generation*, validation, *parsing*, attack generation, *game end detection*, and the capability to *make* and *unmake* moves.

The board is initialized to the standard chess starting position, unless otherwise specified in the optional *fen* argument. If *fen* is `None`, an empty board is created.

Optionally supports *chess960*. In Chess960, castling moves are encoded by a king move to the corresponding rook square. Use *chess.Board.from_chess960_pos()* to create a board with one of the Chess960 starting positions.

It's safe to set *turn*, *castling_rights*, *ep_square*, *halfmove_clock* and *fullmove_number* directly.

Warning: It is possible to set up and work with invalid positions. In this case, *Board* implements a kind of "pseudo-chess" (useful to gracefully handle errors or to implement chess variants). Use *is_valid()* to detect invalid positions.

turn: chess.Color
The side to move (`chess.WHITE` or `chess.BLACK`).

castling_rights: chess.Bitboard
Bitmask of the rooks with castling rights.

To test for specific squares:

```
>>> import chess
>>>
>>> board = chess.Board()
>>> bool(board.castling_rights & chess.BB_H1)  # White can castle with the h1␣
↪rook
True
```

To add a specific square:

```
>>> board.castling_rights |= chess.BB_A1
```

Use *set_castling_fen()* to set multiple castling rights. Also see *has_castling_rights()*, *has_kingside_castling_rights()*, *has_queenside_castling_rights()*, *has_chess960_castling_rights()*, *clean_castling_rights()*.

fullmove_number: int
Counts move pairs. Starts at *1* and is incremented after every move of the black side.

halfmove_clock: int
The number of half-moves since the last capture or pawn move.

promoted: chess.Bitboard
A bitmask of pieces that have been promoted.

chess960: bool
Whether the board is in Chess960 mode. In Chess960 castling moves are represented as king moves to the corresponding rook square.

ep_square: Optional[chess.Square]
The potential en passant square on the third or sixth rank or `None`.

Use *has_legal_en_passant()* to test if en passant capturing would actually be possible on the next move.

move_stack: List[*chess.Move*]
The move stack. Use *Board.push()*, *Board.pop()*, *Board.peek()* and *Board.clear_stack()* for manipulation.

property legal_moves
A dynamic list of legal moves.

```
>>> import chess
>>>
>>> board = chess.Board()
>>> board.legal_moves.count()
20
>>> bool(board.legal_moves)
True
>>> move = chess.Move.from_uci("g1f3")
>>> move in board.legal_moves
True
```

Wraps `generate_legal_moves()` and `is_legal()`.

property pseudo_legal_moves
A dynamic list of pseudo-legal moves, much like the legal move list.

Pseudo-legal moves might leave or put the king in check, but are otherwise valid. Null moves are not pseudo-legal. Castling moves are only included if they are completely legal.

Wraps `generate_pseudo_legal_moves()` and `is_pseudo_legal()`.

reset() → None
Restores the starting position.

reset_board() → None
Resets only pieces to the starting position. Use *reset()* to fully restore the starting position (including turn, castling rights, etc.).

clear() → None
Clears the board.

Resets move stack and move counters. The side to move is white. There are no rooks or kings, so castling rights are removed.

In order to be in a valid *status()*, at least kings need to be put on the board.

clear_board() → None
Clears the board.

clear_stack() → None
Clears the move stack.

root() → BoardT
Returns a copy of the root position.

ply() → int
Returns the number of half-moves since the start of the game, as indicated by *fullmove_number* and *turn*.

If moves have been pushed from the beginning, this is usually equal to `len(board.move_stack)`. But note that a board can be set up with arbitrary starting positions, and the stack can be cleared.

remove_piece_at(*square: chess.Square*) → Optional[*chess.Piece*]
Removes the piece from the given square. Returns the *Piece* or `None` if the square was already empty.

set_piece_at(*square: chess.Square*, *piece: Optional[*chess.Piece*]*, *promoted: bool = False*) → None
Sets a piece at the given square.

An existing piece is replaced. Setting *piece* to `None` is equivalent to *remove_piece_at()*.

checkers() → *chess.SquareSet*
Gets the pieces currently giving check.

Returns a *set of squares*.

is_check() → bool
Tests if the current side to move is in check.

gives_check(*move:* chess.Move) → bool
Probes if the given move would put the opponent in check. The move must be at least pseudo-legal.

is_variant_end() → bool
Checks if the game is over due to a special variant end condition.

Note, for example, that stalemate is not considered a variant-specific end condition (this method will return `False`), yet it can have a special **result** in suicide chess (any of *is_variant_loss()*, *is_variant_win()*, *is_variant_draw()* might return `True`).

is_variant_loss() → bool
Checks if the current side to move lost due to a variant-specific condition.

is_variant_win() → bool
Checks if the current side to move won due to a variant-specific condition.

is_variant_draw() → bool
Checks if a variant-specific drawing condition is fulfilled.

is_game_over(*, *claim_draw: bool = False*) → bool
Checks if the game is over due to *checkmate*, *stalemate*, *insufficient material*, the *seventyfive-move rule*, *fivefold repetition* or a *variant end condition*.

The game is not considered to be over by the *fifty-move rule* or *threefold repetition*, unless *claim_draw* is given. Note that checking the latter can be slow.

result(*, *claim_draw: bool = False*) → str
Gets the game result.

`1-0`, `0-1` or `1/2-1/2` if the *game is over*. Otherwise, the result is undetermined: `*`.

is_checkmate() → bool
Checks if the current position is a checkmate.

is_stalemate() → bool
Checks if the current position is a stalemate.

is_insufficient_material() → bool
Checks if neither side has sufficient winning material (*has_insufficient_material()*).

has_insufficient_material(*color: chess.Color*) → bool
Checks if *color* has insufficient winning material.

This is guaranteed to return `False` if *color* can still win the game.

The converse does not necessarily hold: The implementation only looks at the material, including the colors of bishops, but not considering piece positions. So fortress positions or positions with forced lines may return `False`, even though there is no possible winning line.

is_seventyfive_moves() → bool
Since the 1st of July 2014, a game is automatically drawn (without a claim by one of the players) if the half-move clock since a capture or pawn move is equal to or greater than 150. Other means to end a game take precedence.

is_fivefold_repetition() → bool
Since the 1st of July 2014 a game is automatically drawn (without a claim by one of the players) if a position occurs for the fifth time. Originally this had to occur on consecutive alternating moves, but this has since been revised.

can_claim_draw() → bool
Checks if the player to move can claim a draw by the fifty-move rule or by threefold repetition.

Note that checking the latter can be slow.

can_claim_fifty_moves() → bool
Checks if the player to move can claim a draw by the fifty-move rule.

Draw by the fifty-move rule can be claimed once the clock of halfmoves since the last capture or pawn move becomes equal or greater to 100, or if there is a legal move that achieves this. Other means of ending the game take precedence.

can_claim_threefold_repetition() → bool
Checks if the player to move can claim a draw by threefold repetition.

Draw by threefold repetition can be claimed if the position on the board occured for the third time or if such a repetition is reached with one of the possible legal moves.

Note that checking this can be slow: In the worst case scenario, every legal move has to be tested and the entire game has to be replayed because there is no incremental transposition table.

is_repetition(*count: int = 3*) → bool
Checks if the current position has repeated 3 (or a given number of) times.

Unlike *can_claim_threefold_repetition()*, this does not consider a repetition that can be played on the next move.

Note that checking this can be slow: In the worst case, the entire game has to be replayed because there is no incremental transposition table.

push(*move:* chess.Move) → None
Updates the position with the given *move* and puts it onto the move stack.

```
>>> import chess
>>>
>>> board = chess.Board()
>>>
>>> Nf3 = chess.Move.from_uci("g1f3")
>>> board.push(Nf3)  # Make the move
```

```
>>> board.pop()  # Unmake the last move
Move.from_uci('g1f3')
```

Null moves just increment the move counters, switch turns and forfeit en passant capturing.

> **Warning:** Moves are not checked for legality. It is the caller's responsibility to ensure that the move is at least pseudo-legal or a null move.

pop() → *chess.Move*
Restores the previous position and returns the last move from the stack.

Raises IndexError if the move stack is empty.

peek() → *chess.Move*
Gets the last move from the move stack.

Raises IndexError if the move stack is empty.

find_move(*from_square: chess.Square*, *to_square: chess.Square*, *promotion: Optional[chess.PieceType] = None*) → *chess.Move*
Finds a matching legal move for an origin square, a target square, and an optional promotion piece type.

For pawn moves to the backrank, the promotion piece type defaults to *chess.QUEEN*, unless otherwise specified.

Castling moves are normalized to king moves by two steps, except in Chess960.

Raises ValueError if no matching legal move is found.

has_pseudo_legal_en_passant() → bool
Checks if there is a pseudo-legal en passant capture.

has_legal_en_passant() → bool
Checks if there is a legal en passant capture.

fen(*, *shredder: bool = False*, *en_passant: Literal[legal, fen, xfen] = 'legal'*, *promoted: Optional[bool] = None*) → str
Gets a FEN representation of the position.

A FEN string (e.g., `rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - 0 1`) consists of the board part `board_fen()`, the *turn*, the castling part (*castling_rights*), the en passant square (*ep_square*), the *halfmove_clock* and the *fullmove_number*.

Parameters

- **shredder** – Use `castling_shredder_fen()` and encode castling rights by the file of the rook (like `HAha`) instead of the default `castling_xfen()` (like `KQkq`).
- **en_passant** – By default, only fully legal en passant squares are included (*has_legal_en_passant()*). Pass `fen` to strictly follow the FEN specification (always include the en passant square after a two-step pawn move) or `xfen` to follow the X-FEN specification (*has_pseudo_legal_en_passant()*).
- **promoted** – Mark promoted pieces like `Q~`. By default, this is only enabled in chess variants where this is relevant.

set_fen(*fen: str*) → None
Parses a FEN and sets the position from it.

Raises `ValueError` if syntactically invalid. Use *is_valid()* to detect invalid positions.

set_castling_fen(*castling_fen: str*) → None
Sets castling rights from a string in FEN notation like `Qqk`.

Raises `ValueError` if the castling FEN is syntactically invalid.

set_board_fen(*fen: str*) → None
Parses *fen* and sets up the board, where *fen* is the board part of a FEN.

Raises `ValueError` if syntactically invalid.

set_piece_map(*pieces: Mapping[chess.Square, chess.Piece]*) → None
Sets up the board from a dictionary of *pieces* by square index.

set_chess960_pos(*scharnagl: int*) → None
Sets up a Chess960 starting position given its index between 0 and 959. Also see *from_chess960_pos()*.

chess960_pos(*, *ignore_turn: bool = False*, *ignore_castling: bool = False*, *ignore_counters: bool = True*) → Optional[int]
Gets the Chess960 starting position index between 0 and 956, or `None` if the current position is not a Chess960 starting position.

By default, white to move (**ignore_turn**) and full castling rights (**ignore_castling**) are required, but move counters (**ignore_counters**) are ignored.

epd(*, *shredder: bool = False*, *en_passant: Literal[legal, fen, xfen] = 'legal'*, *promoted: Optional[bool] = None*, ***operations: Union[None, str, int, float, chess.Move, Iterable[chess.Move]]*) → str
Gets an EPD representation of the current position.

See *fen()* for FEN formatting options (*shredder*, *ep_square* and *promoted*).

EPD operations can be given as keyword arguments. Supported operands are strings, integers, finite floats, legal moves and `None`. Additionally, the operation `pv` accepts a legal variation as a list of moves. The operations `am` and `bm` accept a list of legal moves in the current position.

The name of the field cannot be a lone dash and cannot contain spaces, newlines, carriage returns or tabs.

hmvc and *fmvn* are not included by default. You can use:

```
>>> import chess
>>>
>>> board = chess.Board()
>>> board.epd(hmvc=board.halfmove_clock, fmvn=board.fullmove_number)
'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - hmvc 0; fmvn 1;'
```

set_epd(*epd: str*) → Dict[str, Union[None, str, int, float, *chess.Move*, List[*chess.Move*]]]
Parses the given EPD string and uses it to set the position.

If present, `hmvc` and `fmvn` are used to set the half-move clock and the full-move number. Otherwise, `0` and `1` are used.

Returns a dictionary of parsed operations. Values can be strings, integers, floats, move objects, or lists of moves.

Raises `ValueError` if the EPD string is invalid.

san(*move:* chess.Move) → str
Gets the standard algebraic notation of the given move in the context of the current position.

lan(*move:* chess.Move) → str
Gets the long algebraic notation of the given move in the context of the current position.

variation_san(*variation: Iterable[*chess.Move*]*) → str
Given a sequence of moves, returns a string representing the sequence in standard algebraic notation (e.g., `1. e4 e5 2. Nf3 Nc6` or `37...Bg6 38. fxg6`).

The board will not be modified as a result of calling this.

Raises `ValueError` if any moves in the sequence are illegal.

parse_san(*san: str*) → *chess.Move*
Uses the current position as the context to parse a move in standard algebraic notation and returns the corresponding move object.

Ambiguous moves are rejected. Overspecified moves (including long algebraic notation) are accepted.

The returned move is guaranteed to be either legal or a null move.

Raises `ValueError` if the SAN is invalid, illegal or ambiguous.

push_san(*san: str*) → *chess.Move*
Parses a move in standard algebraic notation, makes the move and puts it onto the move stack.

Returns the move.

Raises `ValueError` if neither legal nor a null move.

uci(*move:* chess.Move, *, *chess960: Optional[bool] = None*) → str
Gets the UCI notation of the move.

chess960 defaults to the mode of the board. Pass `True` to force Chess960 mode.

parse_uci(*uci: str*) → *chess.Move*
Parses the given move in UCI notation.

Supports both Chess960 and standard UCI notation.

The returned move is guaranteed to be either legal or a null move.

Raises `ValueError` if the move is invalid or illegal in the current position (but not a null move).

push_uci(*uci: str*) → *chess.Move*
Parses a move in UCI notation and puts it on the move stack.

Returns the move.

Raises `ValueError` if the move is invalid or illegal in the current position (but not a null move).

push_xboard(*san: str*) → *chess.Move*
Parses a move in standard algebraic notation, makes the move and puts it onto the move stack.

Returns the move.

Raises `ValueError` if neither legal nor a null move.

is_en_passant(*move:* chess.Move) → bool
Checks if the given pseudo-legal move is an en passant capture.

is_capture(*move:* chess.Move) → bool
Checks if the given pseudo-legal move is a capture.

is_zeroing(*move:* chess.Move) → bool
Checks if the given pseudo-legal move is a capture or pawn move.

is_irreversible(*move:* chess.Move) → bool
Checks if the given pseudo-legal move is irreversible.

In standard chess, pawn moves, captures, moves that destroy castling rights and moves that cede en passant are irreversible.

This method has false-negatives with forced lines. For example, a check that will force the king to lose castling rights is not considered irreversible. Only the actual king move is.

is_castling(*move:* chess.Move) → bool
Checks if the given pseudo-legal move is a castling move.

is_kingside_castling(*move:* chess.Move) → bool
Checks if the given pseudo-legal move is a kingside castling move.

is_queenside_castling(*move:* chess.Move) → bool
Checks if the given pseudo-legal move is a queenside castling move.

clean_castling_rights() → chess.Bitboard
Returns valid castling rights filtered from *castling_rights*.

has_castling_rights(*color: chess.Color*) → bool
Checks if the given side has castling rights.

has_kingside_castling_rights(*color: chess.Color*) → bool
Checks if the given side has kingside (that is h-side in Chess960) castling rights.

has_queenside_castling_rights(*color: chess.Color*) → bool
Checks if the given side has queenside (that is a-side in Chess960) castling rights.

has_chess960_castling_rights() → bool
Checks if there are castling rights that are only possible in Chess960.

status() → chess.Status
Gets a bitmask of possible problems with the position.

`STATUS_VALID` if all basic validity requirements are met. This does not imply that the position is actually reachable with a series of legal moves from the starting position.

Otherwise, bitwise combinations of: `STATUS_NO_WHITE_KING`, `STATUS_NO_BLACK_KING`, `STATUS_TOO_MANY_KINGS`, `STATUS_TOO_MANY_WHITE_PAWNS`,

STATUS_TOO_MANY_BLACK_PAWNS, STATUS_PAWNS_ON_BACKRANK, STATUS_TOO_MANY_WHITE_PIECES, STATUS_TOO_MANY_BLACK_PIECES, STATUS_BAD_CASTLING_RIGHTS, STATUS_INVALID_EP_SQUARE, STATUS_OPPOSITE_CHECK, STATUS_EMPTY, STATUS_RACE_CHECK, STATUS_RACE_OVER, STATUS_RACE_MATERIAL, STATUS_TOO_MANY_CHECKERS, STATUS_IMPOSSIBLE_CHECK.

is_valid() → bool
Checks some basic validity requirements.

See *status()* for details.

transform(*f: Callable[[chess.Bitboard], chess.Bitboard]*) → BoardT
Returns a transformed copy of the board by applying a bitboard transformation function.

Available transformations include `chess.flip_vertical()`, `chess.flip_horizontal()`, `chess.flip_diagonal()`, `chess.flip_anti_diagonal()`, `chess.shift_down()`, `chess.shift_up()`, `chess.shift_left()`, and `chess.shift_right()`.

Alternatively, `apply_transform()` can be used to apply the transformation on the board.

mirror() → BoardT
Returns a mirrored copy of the board.

The board is mirrored vertically and piece colors are swapped, so that the position is equivalent modulo color. Also swap the "en passant" square, castling rights and turn.

Alternatively, `apply_mirror()` can be used to mirror the board.

copy(*, *stack: Union[bool, int] = True*) → BoardT
Creates a copy of the board.

Defaults to copying the entire move stack. Alternatively, *stack* can be `False`, or an integer to copy a limited number of moves.

classmethod empty(*, *chess960: bool = False*) → BoardT
Creates a new empty board. Also see *clear()*.

classmethod from_epd(*epd: str*, *, *chess960: bool = False*) → Tuple[BoardT, Dict[str, Union[None, str, int, float, *chess.Move*, List[*chess.Move*]]]]
Creates a new board from an EPD string. See *set_epd()*.

Returns the board and the dictionary of parsed operations as a tuple.

classmethod from_chess960_pos(*scharnagl: int*) → BoardT
Creates a new board, initialized with a Chess960 starting position.

```
>>> import chess
>>> import random
>>>
>>> board = chess.Board.from_chess960_pos(random.randint(0, 959))
```

class chess.**BaseBoard**(*board_fen: Optional[str] = 'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR'*)
A board representing the position of chess pieces. See *Board* for a full board with move generation.

The board is initialized with the standard chess starting position, unless otherwise specified in the optional *board_fen* argument. If *board_fen* is `None`, an empty board is created.

reset_board() → None
Resets pieces to the starting position.

clear_board() → None
Clears the board.

pieces(*piece_type: chess.PieceType*, *color: chess.Color*) → *chess.SquareSet*
Gets pieces of the given type and color.

Returns a *set of squares*.

piece_at(*square: chess.Square*) → Optional[*chess.Piece*]
Gets the *piece* at the given square.

piece_type_at(*square: chess.Square*) → Optional[chess.PieceType]
Gets the piece type at the given square.

color_at(*square: chess.Square*) → Optional[chess.Color]
Gets the color of the piece at the given square.

king(*color: chess.Color*) → Optional[chess.Square]
Finds the king square of the given side. Returns `None` if there is no king of that color.

In variants with king promotions, only non-promoted kings are considered.

attacks(*square: chess.Square*) → *chess.SquareSet*
Gets the set of attacked squares from the given square.

There will be no attacks if the square is empty. Pinned pieces are still attacking other squares.

Returns a *set of squares*.

is_attacked_by(*color: chess.Color*, *square: chess.Square*) → bool
Checks if the given side attacks the given square.

Pinned pieces still count as attackers. Pawns that can be captured en passant are **not** considered attacked.

attackers(*color: chess.Color*, *square: chess.Square*) → *chess.SquareSet*
Gets the set of attackers of the given color for the given square.

Pinned pieces still count as attackers.

Returns a *set of squares*.

pin(*color: chess.Color*, *square: chess.Square*) → *chess.SquareSet*
Detects an absolute pin (and its direction) of the given square to the king of the given color.

```
>>> import chess
>>>
>>> board = chess.Board("rnb1k2r/ppp2ppp/5n2/3q4/1b1P4/2N5/PP3PPP/R1BQKBNR w␣
↪KQkq - 3 7")
>>> board.is_pinned(chess.WHITE, chess.C3)
True
>>> direction = board.pin(chess.WHITE, chess.C3)
>>> direction
SquareSet(0x0000_0001_0204_0810)
>>> print(direction)
. . . . . . . .
. . . . . . . .
. . . . . . . .
1 . . . . . . .
. 1 . . . . . .
. . 1 . . . . .
. . . 1 . . . .
. . . . 1 . . .
```

Returns a *set of squares* that mask the rank, file or diagonal of the pin. If there is no pin, then a mask of the entire board is returned.

is_pinned(*color: chess.Color*, *square: chess.Square*) → bool
Detects if the given square is pinned to the king of the given color.

remove_piece_at(*square: chess.Square*) → Optional[*chess.Piece*]
Removes the piece from the given square. Returns the *Piece* or None if the square was already empty.

set_piece_at(*square: chess.Square*, *piece: Optional[*chess.Piece*]*, *promoted: bool = False*) → None
Sets a piece at the given square.

An existing piece is replaced. Setting *piece* to None is equivalent to *remove_piece_at()*.

board_fen(*, *promoted: Optional[bool] = False*) → str
Gets the board FEN (e.g., rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR).

set_board_fen(*fen: str*) → None
Parses *fen* and sets up the board, where *fen* is the board part of a FEN.

Raises ValueError if syntactically invalid.

piece_map() → Dict[chess.Square, *chess.Piece*]
Gets a dictionary of *pieces* by square index.

set_piece_map(*pieces: Mapping[chess.Square,* chess.Piece*]*) → None
Sets up the board from a dictionary of *pieces* by square index.

set_chess960_pos(*scharnagl: int*) → None
Sets up a Chess960 starting position given its index between 0 and 959. Also see *from_chess960_pos()*.

chess960_pos() → Optional[int]
Gets the Chess960 starting position index between 0 and 959, or None.

unicode(*, *invert_color: bool = False*, *borders: bool = False*, *empty_square: str = ''*) → str
Returns a string representation of the board with Unicode pieces. Useful for pretty-printing to a terminal.

Parameters

- **invert_color** – Invert color of the Unicode pieces.
- **borders** – Show borders and a coordinate margin.

transform(*f: Callable[[chess.Bitboard], chess.Bitboard]*) → BaseBoardT
Returns a transformed copy of the board by applying a bitboard transformation function.

Available transformations include chess.flip_vertical(), chess.flip_horizontal(), chess.flip_diagonal(), chess.flip_anti_diagonal(), chess.shift_down(), chess.shift_up(), chess.shift_left(), and chess.shift_right().

Alternatively, apply_transform() can be used to apply the transformation on the board.

mirror() → BaseBoardT
Returns a mirrored copy of the board.

The board is mirrored vertically and piece colors are swapped, so that the position is equivalent modulo color.

Alternatively, apply_mirror() can be used to mirror the board.

copy() → BaseBoardT
Creates a copy of the board.

classmethod empty() → BaseBoardT
Creates a new empty board. Also see *clear_board()*.

classmethod from_chess960_pos(*scharnagl: int*) → BaseBoardT
Creates a new board, initialized with a Chess960 starting position.

```
>>> import chess
>>> import random
>>>
>>> board = chess.Board.from_chess960_pos(random.randint(0, 959))
```

8.1.7 Square sets

class chess.**SquareSet**(*squares: chess.IntoSquareSet = 0*)
A set of squares.

```
>>> import chess
>>>
>>> squares = chess.SquareSet([chess.A8, chess.A1])
>>> squares
SquareSet(0x0100_0000_0000_0001)
```

```
>>> squares = chess.SquareSet(chess.BB_A8 | chess.BB_RANK_1)
>>> squares
SquareSet(0x0100_0000_0000_00ff)
```

```
>>> print(squares)
1 . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
1 1 1 1 1 1 1 1
```

```
>>> len(squares)
9
```

```
>>> bool(squares)
True
```

```
>>> chess.B1 in squares
True
```

```
>>> for square in squares:
...     # 0 -- chess.A1
...     # 1 -- chess.B1
...     # 2 -- chess.C1
...     # 3 -- chess.D1
...     # 4 -- chess.E1
...     # 5 -- chess.F1
...     # 6 -- chess.G1
...     # 7 -- chess.H1
...     # 56 -- chess.A8
...     print(square)
...
```

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```
0
1
2
3
4
5
6
7
56
```

```
>>> list(squares)
[0, 1, 2, 3, 4, 5, 6, 7, 56]
```

Square sets are internally represented by 64-bit integer masks of the included squares. Bitwise operations can be used to compute unions, intersections and shifts.

```
>>> int(squares)
72057594037928191
```

Also supports common set operations like *issubset()*, *issuperset()*, `union()`, `intersection()`, `difference()`, `symmetric_difference()` and `copy()` as well as `update()`, `intersection_update()`, `difference_update()`, `symmetric_difference_update()` and *clear()*.

add(*square: chess.Square*) → None
Adds a square to the set.

discard(*square: chess.Square*) → None
Discards a square from the set.

isdisjoint(*other: chess.IntoSquareSet*) → bool
Tests if the square sets are disjoint.

issubset(*other: chess.IntoSquareSet*) → bool
Tests if this square set is a subset of another.

issuperset(*other: chess.IntoSquareSet*) → bool
Tests if this square set is a superset of another.

remove(*square: chess.Square*) → None
Removes a square from the set.

Raises `KeyError` if the given *square* was not in the set.

pop() → chess.Square
Removes and returns a square from the set.

Raises `KeyError` if the set is empty.

clear() → None
Removes all elements from this set.

carry_rippler() → Iterator[chess.Bitboard]
Iterator over the subsets of this set.

mirror() → *chess.SquareSet*
Returns a vertically mirrored copy of this square set.

tolist() → List[bool]
Converts the set to a list of 64 bools.

classmethod ray(*a: chess.Square*, *b: chess.Square*) → *chess.SquareSet*

All squares on the rank, file or diagonal with the two squares, if they are aligned.

```
>>> import chess
>>>
>>> print(chess.SquareSet.ray(chess.E2, chess.B5))
. . . . . . . .
. . . . . . . .
1 . . . . . . .
. 1 . . . . . .
. . 1 . . . . .
. . . 1 . . . .
. . . . 1 . . .
. . . . . 1 . .
```

classmethod between(*a: chess.Square*, *b: chess.Square*) → *chess.SquareSet*

All squares on the rank, file or diagonal between the two squares (bounds not included), if they are aligned.

```
>>> import chess
>>>
>>> print(chess.SquareSet.between(chess.E2, chess.B5))
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . . . . . . .
. . 1 . . . . .
. . . 1 . . . .
. . . . . . . .
. . . . . . . .
```

classmethod from_square(*square: chess.Square*) → *chess.SquareSet*

Creates a *SquareSet* from a single square.

```
>>> import chess
>>>
>>> chess.SquareSet.from_square(chess.A1) == chess.BB_A1
True
```

Common integer masks are:

chess.**BB_EMPTY: chess.Bitboard = 0**

chess.**BB_ALL: chess.Bitboard = 0xFFFF_FFFF_FFFF_FFFF**

Single squares:

chess.**BB_SQUARES = [chess.BB_A1, chess.BB_B1, ..., chess.BB_G8, chess.BB_H8]**

Ranks and files:

chess.**BB_RANKS = [chess.BB_RANK_1, ..., chess.BB_RANK_8]**

chess.**BB_FILES = [chess.BB_FILE_A, ..., chess.BB_FILE_H]**

Other masks:

chess.**BB_LIGHT_SQUARES: chess.Bitboard = 0x55AA_55AA_55AA_55AA**

chess.**BB_DARK_SQUARES: chess.Bitboard = 0xAA55_AA55_AA55_AA55**

chess.**BB_BACKRANKS = chess.BB_RANK_1 | chess.BB_RANK_8**

chess.**BB_CORNERS = chess.BB_A1 | chess.BB_H1 | chess.BB_A8 | chess.BB_H8**

chess.**BB_CENTER = chess.BB_D4 | chess.BB_E4 | chess.BB_D5 | chess.BB_E5**

8.2 PGN parsing and writing

8.2.1 Parsing

chess.pgn.**read_game**(*handle: TextIO*) → Optional[*chess.pgn.Game*]
chess.pgn.**read_game**(*handle: TextIO*, *, *Visitor: Callable[]*, chess.pgn.BaseVisitor*[ResultT]*]) → Optional[ResultT]

Reads a game from a file opened in text mode.

```
>>> import chess.pgn
>>>
>>> pgn = open("data/pgn/kasparov-deep-blue-1997.pgn")
>>>
>>> first_game = chess.pgn.read_game(pgn)
>>> second_game = chess.pgn.read_game(pgn)
>>>
>>> first_game.headers["Event"]
'IBM Man-Machine, New York USA'
>>>
>>> # Iterate through all moves and play them on a board.
>>> board = first_game.board()
>>> for move in first_game.mainline_moves():
...     board.push(move)
...
>>> board
Board('4r3/6P1/2p2P1k/1p6/pP2p1R1/P1B5/2P2K2/3r4 b - - 0 45')
```

By using text mode, the parser does not need to handle encodings. It is the caller's responsibility to open the file with the correct encoding. PGN files are usually ASCII or UTF-8 encoded, sometimes with BOM (which this parser automatically ignores).

```
>>> pgn = open("data/pgn/kasparov-deep-blue-1997.pgn", encoding="utf-8")
```

Use `StringIO` to parse games from a string.

```
>>> import io
>>>
>>> pgn = io.StringIO("1. e4 e5 2. Nf3 *")
>>> game = chess.pgn.read_game(pgn)
```

The end of a game is determined by a completely blank line or the end of the file. (Of course, blank lines in comments are possible).

According to the PGN standard, at least the usual seven header tags are required for a valid game. This parser also handles games without any headers just fine.

The parser is relatively forgiving when it comes to errors. It skips over tokens it can not parse. By default, any exceptions are logged and collected in *Game.errors*. This behavior can be *overridden*.

Returns the parsed game or `None` if the end of file is reached.

8.2.2 Writing

If you want to export your game with all headers, comments and variations, you can do it like this:

```
>>> import chess
>>> import chess.pgn
>>>
>>> game = chess.pgn.Game()
>>> game.headers["Event"] = "Example"
>>> node = game.add_variation(chess.Move.from_uci("e2e4"))
>>> node = node.add_variation(chess.Move.from_uci("e7e5"))
>>> node.comment = "Comment"
>>>
>>> print(game)
[Event "Example"]
[Site "?"]
[Date "????.??.??"]
[Round "?"]
[White "?"]
[Black "?"]
[Result "*"]

1. e4 e5 { Comment } *
```

Remember that games in files should be separated with extra blank lines.

```
>>> print(game, file=open("/dev/null", "w"), end="\n\n")
```

Use the *StringExporter()* or *FileExporter()* visitors if you need more control.

8.2.3 Game model

Games are represented as a tree of moves. Conceptually each node represents a position of the game. The tree consists of one root node (*Game*, also holding game headers) and many child nodes (*ChildNode*). Both extend *GameNode*.

class chess.pgn.**GameNode**(*, *comment: str = ''*)

parent: Optional[*chess.pgn.GameNode*]
The parent node or `None` if this is the root node of the game.

move: Optional[*chess.Move*]
The move leading to this node or `None` if this is the root node of the game.

variations: List[*chess.pgn.ChildNode*]
A list of child nodes.

comment: str
A comment that goes behind the move leading to this node. Comments that occur before any moves are assigned to the root node.

abstract board() → *chess.Board*
Gets a board with the position of the node.

For the root node, this is the default starting position (for the `Variant`) unless the `FEN` header tag is set.

It's a copy, so modifying the board will not alter the game.

abstract ply() → int
Returns the number of half-moves up to this node, as indicated by fullmove number and turn of the position. See *chess.Board.ply()*.

Usually this is equal to the number of parent nodes, but it may be more if the game was started from a custom position.

turn() → chess.Color
Gets the color to move at this node. See *chess.Board.turn*.

game() → *chess.pgn.Game*
Gets the root node, i.e., the game.

end() → *chess.pgn.GameNode*
Follows the main variation to the end and returns the last node.

is_end() → bool
Checks if this node is the last node in the current variation.

starts_variation() → bool
Checks if this node starts a variation (and can thus have a starting comment). The root node does not start a variation and can have no starting comment.

For example, in `1. e4 e5 (1... c5 2. Nf3) 2. Nf3`, the node holding 1... c5 starts a variation.

is_mainline() → bool
Checks if the node is in the mainline of the game.

is_main_variation() → bool
Checks if this node is the first variation from the point of view of its parent. The root node is also in the main variation.

variation(*move: Union[int,* chess.Move*,* chess.pgn.GameNode*]*) → *chess.pgn.ChildNode*
Gets a child node by either the move or the variation index.

has_variation(*move: Union[int,* chess.Move*,* chess.pgn.GameNode*]*) → bool
Checks if this node has the given variation.

promote_to_main(*move: Union[int,* chess.Move*,* chess.pgn.GameNode*]*) → None
Promotes the given *move* to the main variation.

promote(*move: Union[int,* chess.Move*,* chess.pgn.GameNode*]*) → None
Moves a variation one up in the list of variations.

demote(*move: Union[int,* chess.Move*,* chess.pgn.GameNode*]*) → None
Moves a variation one down in the list of variations.

remove_variation(*move: Union[int,* chess.Move*,* chess.pgn.GameNode*]*) → None
Removes a variation.

add_variation(*move:* chess.Move*, *, comment: str = '', starting_comment: str = '', nags: Iterable[int] = []*) → *chess.pgn.ChildNode*
Creates a child node with the given attributes.

add_main_variation(*move:* chess.Move*, *, comment: str = '', nags: Iterable[int] = []*) → *chess.pgn.ChildNode*
Creates a child node with the given attributes and promotes it to the main variation.

next() → Optional[*chess.pgn.ChildNode*]
Returns the first node of the mainline after this node, or `None` if this node does not have any children.

mainline() → chess.pgn.Mainline[*chess.pgn.ChildNode*]
Returns an iterable over the mainline starting after this node.

mainline_moves() → chess.pgn.Mainline[*chess.Move*]
Returns an iterable over the main moves after this node.

add_line(*moves: Iterable[*chess.Move*]*, *, *comment: str = ''*, *starting_comment: str = ''*, *nags: Iterable[int] = []*) → *chess.pgn.GameNode*
Creates a sequence of child nodes for the given list of moves. Adds *comment* and *nags* to the last node of the line and returns it.

eval() → Optional[*chess.engine.PovScore*]
Parses the first valid `[%eval ...]` annotation in the comment of this node, if any.

set_eval(*score: Optional[*chess.engine.PovScore*]*) → None
Replaces the first valid `[%eval ...]` annotation in the comment of this node or adds a new one.

arrows() → List[*chess.svg.Arrow*]
Parses all `[%csl ...]` and `[%cal ...]` annotations in the comment of this node.

Returns a list of *arrows*.

set_arrows(*arrows: Iterable[Union[*chess.svg.Arrow*, Tuple[chess.Square, chess.Square]]]*) → None
Replaces all valid `[%csl ...]` and `[%cal ...]` annotations in the comment of this node or adds new ones.

clock() → Optional[float]
Parses the first valid `[%clk ...]` annotation in the comment of this node, if any.

Returns the player's remaining time to the next time control after this move, in seconds.

set_clock(*seconds: Optional[float]*) → None
Replaces the first valid `[%clk ...]` annotation in the comment of this node or adds a new one.

abstract accept(*visitor:* chess.pgn.BaseVisitor*[ResultT]*) → ResultT
Traverses game nodes in PGN order using the given *visitor*. Starts with the move leading to this node. Returns the *visitor* result.

accept_subgame(*visitor:* chess.pgn.BaseVisitor*[ResultT]*) → ResultT
Traverses headers and game nodes in PGN order, as if the game was starting after this node. Returns the *visitor* result.

class chess.pgn.**Game**(*headers: Optional[Union[Mapping[str, str], Iterable[Tuple[str, str]]]] = None*)
The root node of a game with extra information such as headers and the starting position. Extends *GameNode*.

headers: chess.pgn.Headers
A mapping of headers. By default, the following 7 headers are provided (Seven Tag Roster):

```
>>> import chess.pgn
>>>
>>> game = chess.pgn.Game()
>>> game.headers
Headers(Event='?', Site='?', Date='????.??.??', Round='?', White='?', Black='?
↪', Result='*')
```

errors: List[Exception]
A list of errors (such as illegal or ambiguous moves) encountered while parsing the game.

setup(*board: Union[*chess.Board*, str]*) → None
Sets up a specific starting position. This sets (or resets) the `FEN`, `SetUp`, and `Variant` header tags.

accept(*visitor:* chess.pgn.BaseVisitor*[ResultT]*) → ResultT
Traverses the game in PGN order using the given *visitor*. Returns the *visitor* result.

class chess.pgn.**ChildNode**(*parent:* chess.pgn.GameNode, *move:* chess.Move, *, *comment: str = ''*, *starting_comment: str = ''*, *nags: Iterable[int] = []*)

A child node of a game, with the move leading to it. Extends *GameNode*.

nags: Set[int]

A set of NAGs as integers. NAGs always go behind a move, so the root node of the game will never have NAGs.

parent: ***chess.pgn.GameNode***

The parent node.

move: ***chess.Move***

The move leading to this node.

starting_comment: str

A comment for the start of a variation. Only nodes that actually start a variation (*starts_variation()* checks this) can have a starting comment. The root node can not have a starting comment.

san() → str

Gets the standard algebraic notation of the move leading to this node. See *chess.Board.san()*.

Do not call this on the root node.

uci(*, *chess960: Optional[bool] = None*) → str

Gets the UCI notation of the move leading to this node. See *chess.Board.uci()*.

Do not call this on the root node.

end() → *chess.pgn.ChildNode*

Follows the main variation to the end and returns the last node.

8.2.4 Visitors

Visitors are an advanced concept for game tree traversal.

class chess.pgn.**BaseVisitor**(**args*, ***kwds*)

Base class for visitors.

Use with *chess.pgn.Game.accept()* or *chess.pgn.GameNode.accept()* or *chess.pgn.read_game()*.

The methods are called in PGN order.

begin_game() → Optional[chess.pgn.SkipType]

Called at the start of a game.

begin_headers() → Optional[chess.pgn.Headers]

Called before visiting game headers.

visit_header(*tagname: str*, *tagvalue: str*) → None

Called for each game header.

end_headers() → Optional[chess.pgn.SkipType]

Called after visiting game headers.

parse_san(*board:* chess.Board, *san: str*) → *chess.Move*

When the visitor is used by a parser, this is called to parse a move in standard algebraic notation.

You can override the default implementation to work around specific quirks of your input format.

Deprecated since version 1.1: This method is very limited, because it is only called on moves that the parser recognizes in the first place. Instead of adding workarounds here, please report common quirks so that they can be handled for everyone.

visit_move(*board:* chess.Board, *move:* chess.Move) → None
Called for each move.

board is the board state before the move. The board state must be restored before the traversal continues.

visit_board(*board:* chess.Board) → None
Called for the starting position of the game and after each move.

The board state must be restored before the traversal continues.

visit_comment(*comment: str*) → None
Called for each comment.

visit_nag(*nag: int*) → None
Called for each NAG.

begin_variation() → Optional[chess.pgn.SkipType]
Called at the start of a new variation. It is not called for the mainline of the game.

end_variation() → None
Concludes a variation.

visit_result(*result: str*) → None
Called at the end of a game with the value from the `Result` header.

end_game() → None
Called at the end of a game.

abstract result() → ResultT
Called to get the result of the visitor.

handle_error(*error: Exception*) → None
Called for encountered errors. Defaults to raising an exception.

The following visitors are readily available.

class chess.pgn.**GameBuilder**(**args*, ***kwds*)
Creates a game model. Default visitor for *read_game()*.

handle_error(*error: Exception*) → None
Populates *chess.pgn.Game.errors* with encountered errors and logs them.

You can silence the log and handle errors yourself after parsing:

```
>>> import chess.pgn
>>> import logging
>>>
>>> logging.getLogger("chess.pgn").setLevel(logging.CRITICAL)
>>>
>>> pgn = open("data/pgn/kasparov-deep-blue-1997.pgn")
>>>
>>> game = chess.pgn.read_game(pgn)
>>> game.errors  # List of exceptions
[]
```

You can also override this method to hook into error handling:

```
>>> import chess.pgn
>>>
>>> class MyGameBuilder(chess.pgn.GameBuilder):
>>>     def handle_error(self, error: Exception) -> None:
>>>         pass  # Ignore error
>>>
>>> pgn = open("data/pgn/kasparov-deep-blue-1997.pgn")
>>>
>>> game = chess.pgn.read_game(pgn, Visitor=MyGameBuilder)
```

result() → GameT
Returns the visited *Game()*.

class chess.pgn.**HeadersBuilder**(**args*, ***kwds*)
Collects headers into a dictionary.

class chess.pgn.**BoardBuilder**(**args*, ***kwds*)
Returns the final position of the game. The mainline of the game is on the move stack.

class chess.pgn.**SkipVisitor**(**args*, ***kwds*)
Skips a game.

class chess.pgn.**StringExporter**(**args*, ***kwds*)
Allows exporting a game as a string.

```
>>> import chess.pgn
>>>
>>> game = chess.pgn.Game()
>>>
>>> exporter = chess.pgn.StringExporter(headers=True, variations=True,␣
↪comments=True)
>>> pgn_string = game.accept(exporter)
```

Only *columns* characters are written per line. If *columns* is `None`, then the entire movetext will be on a single line. This does not affect header tags and comments.

There will be no newline characters at the end of the string.

class chess.pgn.**FileExporter**(**args*, ***kwds*)
Acts like a *StringExporter*, but games are written directly into a text file.

There will always be a blank line after each game. Handling encodings is up to the caller.

```
>>> import chess.pgn
>>>
>>> game = chess.pgn.Game()
>>>
>>> new_pgn = open("/dev/null", "w", encoding="utf-8")
>>> exporter = chess.pgn.FileExporter(new_pgn)
>>> game.accept(exporter)
```

8.2.5 NAGs

Numeric anotation glyphs describe moves and positions using standardized codes that are understood by many chess programs. During PGN parsing, annotations like `!`, `?`, `!!`, etc., are also converted to NAGs.

`chess.pgn.`**`NAG_GOOD_MOVE = 1`**
A good move. Can also be indicated by `!` in PGN notation.

`chess.pgn.`**`NAG_MISTAKE = 2`**
A mistake. Can also be indicated by `?` in PGN notation.

`chess.pgn.`**`NAG_BRILLIANT_MOVE = 3`**
A brilliant move. Can also be indicated by `!!` in PGN notation.

`chess.pgn.`**`NAG_BLUNDER = 4`**
A blunder. Can also be indicated by `??` in PGN notation.

`chess.pgn.`**`NAG_SPECULATIVE_MOVE = 5`**
A speculative move. Can also be indicated by `!?` in PGN notation.

`chess.pgn.`**`NAG_DUBIOUS_MOVE = 6`**
A dubious move. Can also be indicated by `?!` in PGN notation.

8.2.6 Skimming

These functions allow for quickly skimming games without fully parsing them.

`chess.pgn.`**`read_headers`**(*handle: TextIO*) → Optional[chess.pgn.Headers]
Reads game headers from a PGN file opened in text mode. Skips the rest of the game.

Since actually parsing many games from a big file is relatively expensive, this is a better way to look only for specific games and then seek and parse them later.

This example scans for the first game with Kasparov as the white player.

```
>>> import chess.pgn
>>>
>>> pgn = open("data/pgn/kasparov-deep-blue-1997.pgn")
>>>
>>> kasparov_offsets = []
>>>
>>> while True:
...     offset = pgn.tell()
...
...     headers = chess.pgn.read_headers(pgn)
...     if headers is None:
...         break
...
...     if "Kasparov" in headers.get("White", "?"):
...         kasparov_offsets.append(offset)
```

Then it can later be seeked and parsed.

```
>>> for offset in kasparov_offsets:
...     pgn.seek(offset)
...     chess.pgn.read_game(pgn)
0
<Game at ... ('Garry Kasparov' vs. 'Deep Blue (Computer)', 1997.??.??)>
1436
```

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```
<Game at ... ('Garry Kasparov' vs. 'Deep Blue (Computer)', 1997.??.??)>
3067
<Game at ... ('Garry Kasparov' vs. 'Deep Blue (Computer)', 1997.??.??)>
```

chess.pgn.**skip_game**(*handle: TextIO*) → bool
Skips a game. Returns `True` if a game was found and skipped.

8.3 Polyglot opening book reading

chess.polyglot.**open_reader**(*path: Union[str, bytes, os.PathLike]*) → *chess.polyglot.MemoryMappedReader*
Creates a reader for the file at the given path.

The following example opens a book to find all entries for the start position:

```
>>> import chess
>>> import chess.polyglot
>>>
>>> board = chess.Board()
>>>
>>> with chess.polyglot.open_reader("data/polyglot/performance.bin") as reader:
...     for entry in reader.find_all(board):
...         print(entry.move, entry.weight, entry.learn)
e2e4 1 0
d2d4 1 0
c2c4 1 0
```

class chess.polyglot.**Entry**(*key: int*, *raw_move: int*, *weight: int*, *learn: int*, *move:* chess.Move)
An entry from a Polyglot opening book.

key: int
The Zobrist hash of the position.

raw_move: int
The raw binary representation of the move. Use *move* instead.

weight: int
An integer value that can be used as the weight for this entry.

learn: int
Another integer value that can be used for extra information.

move: *chess.Move*
The *Move*.

class chess.polyglot.**MemoryMappedReader**(*filename: Union[str, bytes, os.PathLike]*)
Maps a Polyglot opening book to memory.

find_all(*board: Union[*chess.Board*, int]*, ***, *minimum_weight: int = 1*, *exclude_moves: Container[*chess.Move*] = []*) → Iterator[*chess.polyglot.Entry*]
Seeks a specific position and yields corresponding entries.

find(*board: Union[*chess.Board*, int]*, ***, *minimum_weight: int = 1*, *exclude_moves: Container[*chess.Move*] = []*) → *chess.polyglot.Entry*
Finds the main entry for the given position or Zobrist hash.

The main entry is the (first) entry with the highest weight.

By default, entries with weight `0` are excluded. This is a common way to delete entries from an opening book without compacting it. Pass *minimum_weight* `0` to select all entries.

Raises `IndexError` if no entries are found. Use `get()` if you prefer to get `None` instead of an exception.

choice(*board: Union[chess.Board, int]*, *, *minimum_weight: int = 1*, *exclude_moves: Container[chess.Move] = []*, *random: Optional[random.Random] = None*) → *chess.polyglot.Entry*

Uniformly selects a random entry for the given position.

Raises `IndexError` if no entries are found.

weighted_choice(*board: Union[chess.Board, int]*, *, *exclude_moves: Container[chess.Move] = []*, *random: Optional[random.Random] = None*) → *chess.polyglot.Entry*

Selects a random entry for the given position, distributed by the weights of the entries.

Raises `IndexError` if no entries are found.

close() → None

Closes the reader.

chess.polyglot.**POLYGLOT_RANDOM_ARRAY = [0x9D39247E33776D41, ..., 0xF8D626AAAF278509]**

Array of 781 polyglot compatible pseudo random values for Zobrist hashing.

chess.polyglot.**zobrist_hash**(*board: chess.Board*, *, *_hasher: Callable[[chess.Board], int] = <chess.polyglot.ZobristHasher object>*) → int

Calculates the Polyglot Zobrist hash of the position.

A Zobrist hash is an XOR of pseudo-random values picked from an array. Which values are picked is decided by features of the position, such as piece positions, castling rights and en passant squares.

8.4 Gaviota endgame tablebase probing

Gaviota tablebases provide **WDL** (win/draw/loss) and **DTM** (depth to mate) information for all endgame positions with up to 5 pieces. Positions with castling rights are not included.

Warning: Ensure tablebase files match the known checksums. Maliciously crafted tablebase files may cause denial of service with *PythonTablebase* and memory unsafety with *NativeTablebase*.

chess.gaviota.**open_tablebase**(*directory: str*, *, *libgtb: Optional[str] = None*, *LibraryLoader: ctypes.LibraryLoader[ctypes.CDLL] = <ctypes.LibraryLoader object>*) → Union[NativeTablebase, PythonTablebase]

Opens a collection of tables for probing.

First native access via the shared library libgtb is tried. You can optionally provide a specific library name or a library loader. The shared library has global state and caches, so only one instance can be open at a time.

Second, pure Python probing code is tried.

class chess.gaviota.**PythonTablebase**

Provides access to Gaviota tablebases using pure Python code.

add_directory(*directory: str*) → None

Adds *.gtb.cp4* tables from a directory. The relevant files are lazily opened when the tablebase is actually probed.

probe_dtm(*board:* chess.Board) → int
Probes for depth to mate information.

The absolute value is the number of half-moves until forced mate (or `0` in drawn positions). The value is positive if the side to move is winning, otherwise it is negative.

In the example position, white to move will get mated in 10 half-moves:

```
>>> import chess
>>> import chess.gaviota
>>>
>>> with chess.gaviota.open_tablebase("data/gaviota") as tablebase:
...     board = chess.Board("8/8/8/8/8/8/8/K2kr3 w - - 0 1")
...     print(tablebase.probe_dtm(board))
...
-10
```

Raises `KeyError` (or specifically `chess.gaviota.MissingTableError`) if the probe fails. Use `get_dtm()` if you prefer to get `None` instead of an exception.

Note that probing a corrupted table file is undefined behavior.

probe_wdl(*board:* chess.Board) → int
Probes for win/draw/loss information.

Returns `1` if the side to move is winning, `0` if it is a draw, and `-1` if the side to move is losing.

```
>>> import chess
>>> import chess.gaviota
>>>
>>> with chess.gaviota.open_tablebase("data/gaviota") as tablebase:
...     board = chess.Board("8/4k3/8/B7/8/8/8/4K3 w - - 0 1")
...     print(tablebase.probe_wdl(board))
...
0
```

Raises `KeyError` (or specifically `chess.gaviota.MissingTableError`) if the probe fails. Use `get_wdl()` if you prefer to get `None` instead of an exception.

Note that probing a corrupted table file is undefined behavior.

close() → None
Closes all loaded tables.

8.4.1 libgtb

For faster access you can build and install a shared library. Otherwise the pure Python probing code is used.

```
git clone https://github.com/michiguel/Gaviota-Tablebases.git
cd Gaviota-Tablebases
make
sudo make install
```

chess.gaviota.**open_tablebase_native**(*directory: str*, *, *libgtb: Optional[str] = None*, *LibraryLoader: ctypes.LibraryLoader[ctypes.CDLL] = <ctypes.LibraryLoader object>*) → NativeTablebase
Opens a collection of tables for probing using libgtb.

In most cases *open_tablebase()* should be used. Use this function only if you do not want to downgrade to pure Python tablebase probing.

Raises RuntimeError or OSError when libgtb can not be used.

class chess.gaviota.**NativeTablebase**(*libgtb: ctypes.CDLL*)

Provides access to Gaviota tablebases via the shared library libgtb. Has the same interface as *PythonTablebase*.

8.5 Syzygy endgame tablebase probing

Syzygy tablebases provide **WDL** (win/draw/loss) and **DTZ** (distance to zero) information for all endgame positions with up to 7 pieces. Positions with castling rights are not included.

Warning: Ensure tablebase files match the known checksums. Maliciously crafted tablebase files may cause denial of service.

chess.syzygy.**open_tablebase**(*directory: str*, *, *load_wdl: bool = True*, *load_dtz: bool = True*, *max_fds: Optional[int] = 128*, *VariantBoard: Type[chess.Board] = <class 'chess.Board'>*) → *chess.syzygy.Tablebase*

Opens a collection of tables for probing. See *Tablebase*.

Note: Generally probing requires tablebase files for the specific material composition, **as well as** material compositions transitively reachable by captures and promotions. This is important because 6-piece and 5-piece (let alone 7-piece) files are often distributed separately, but are both required for 6-piece positions. Use *add_directory()* to load tables from additional directories.

class chess.syzygy.**Tablebase**(*, *max_fds: Optional[int] = 128*, *VariantBoard: Type[chess.Board] = <class 'chess.Board'>*)

Manages a collection of tablebase files for probing.

If *max_fds* is not None, will at most use *max_fds* open file descriptors at any given time. The least recently used tables are closed, if nescessary.

add_directory(*directory: str*, *, *load_wdl: bool = True*, *load_dtz: bool = True*) → int

Adds tables from a directory.

By default all available tables with the correct file names (e.g. WDL files like KQvKN.rtbw and DTZ files like KRBvK.rtbz) are added.

The relevant files are lazily opened when the tablebase is actually probed.

Returns the number of table files that were found.

probe_wdl(*board:* chess.Board) → int

Probes WDL tables for win/draw/loss-information.

Probing is thread-safe when done with different *board* objects and if *board* objects are not modified during probing.

Returns 2 if the side to move is winning, 0 if the position is a draw and -2 if the side to move is losing.

Returns 1 in case of a cursed win and -1 in case of a blessed loss. Mate can be forced but the position can be drawn due to the fifty-move rule.

```
>>> import chess
>>> import chess.syzygy
>>>
>>> with chess.syzygy.open_tablebase("data/syzygy/regular") as tablebase:
...     board = chess.Board("8/2K5/4B3/3N4/8/8/4k3/8 b - - 0 1")
...     print(tablebase.probe_wdl(board))
...
-2
```

Raises `KeyError` (or specifically `chess.syzygy.MissingTableError`) if the position could not be found in the tablebase. Use `get_wdl()` if you prefer to get `None` instead of an exception.

Note that probing corrupted table files is undefined behavior.

probe_dtz(*board:* chess.Board) → int

Probes DTZ tables for distance to zero information.

Both DTZ and WDL tables are required in order to probe for DTZ.

Returns a positive value if the side to move is winning, `0` if the position is a draw and a negative value if the side to move is losing. More precisely:

WDL	DTZ	
-2	-100 <= n <= -1	Unconditional loss (assuming 50-move counter is zero), where a zeroing move can be forced in -n plies.
-1	n < -100	Loss, but draw under the 50-move rule. A zeroing move can be forced in -n plies or -n - 100 plies (if a later phase is responsible for the blessed loss).
0	0	Draw.
1	100 < n	Win, but draw under the 50-move rule. A zeroing move can be forced in n plies or n - 100 plies (if a later phase is responsible for the cursed win).
2	1 <= n <= 100	Unconditional win (assuming 50-move counter is zero), where a zeroing move can be forced in n plies.

The return value can be off by one: a return value -n can mean a losing zeroing move in in n + 1 plies and a return value +n can mean a winning zeroing move in n + 1 plies. This is guaranteed not to happen for positions exactly on the edge of the 50-move rule, so that (with some care) this never impacts the result of practical play.

Minmaxing the DTZ values guarantees winning a won position (and drawing a drawn position), because it makes progress keeping the win in hand. However the lines are not always the most straightforward ways to win. Engines like Stockfish calculate themselves, checking with DTZ, but only play according to DTZ if they can not manage on their own.

```
>>> import chess
>>> import chess.syzygy
>>>
>>> with chess.syzygy.open_tablebase("data/syzygy/regular") as tablebase:
...     board = chess.Board("8/2K5/4B3/3N4/8/8/4k3/8 b - - 0 1")
...     print(tablebase.probe_dtz(board))
...
-53
```

Probing is thread-safe when done with different *board* objects and if *board* objects are not modified during probing.

Raises `KeyError` (or specifically `chess.syzygy.MissingTableError`) if the position could not be found in the tablebase. Use `get_dtz()` if you prefer to get `None` instead of an exception.

Note that probing corrupted table files is undefined behavior.

close() → None
Closes all loaded tables.

8.6 UCI/XBoard engine communication

UCI and XBoard are protocols for communicating with chess engines. This module implements an abstraction for playing moves and analysing positions with both kinds of engines.

Warning: Many popular chess engines make no guarantees, not even memory safety, when parameters and positions are not completely *valid*. This module tries to deal with benign misbehaving engines, but ultimately they are executables running on your system.

The preferred way to use the API is with an asyncio event loop. The examples also show a synchronous wrapper *SimpleEngine* that automatically spawns an event loop in the background.

8.6.1 Playing

Example: Let Stockfish play against itself, 100 milliseconds per move.

```
import chess
import chess.engine

engine = chess.engine.SimpleEngine.popen_uci("/usr/bin/stockfish")

board = chess.Board()
while not board.is_game_over():
    result = engine.play(board, chess.engine.Limit(time=0.1))
    board.push(result.move)

engine.quit()
```

```
import asyncio
import chess
import chess.engine

async def main() -> None:
    transport, engine = await chess.engine.popen_uci("/usr/bin/stockfish")

    board = chess.Board()
    while not board.is_game_over():
        result = await engine.play(board, chess.engine.Limit(time=0.1))
        board.push(result.move)

    await engine.quit()

asyncio.set_event_loop_policy(chess.engine.EventLoopPolicy())
asyncio.run(main())
```

class chess.engine.**Protocol**

Protocol for communicating with a chess engine process.

abstract async play(*board: chess.Board*, *limit: chess.engine.Limit*, ***, *game: Optional[object] = None*, *info: chess.engine.Info = <Info.NONE: 0>*, *ponder: bool = False*, *root_moves: Optional[Iterable[chess.Move]] = None*, *options: Mapping[str, Optional[Union[str, int, bool]]] = {}*) → *chess.engine.PlayResult*

Plays a position.

Parameters

- **board** – The position. The entire move stack will be sent to the engine.
- **limit** – An instance of *chess.engine.Limit* that determines when to stop thinking.
- **game** – Optional. An arbitrary object that identifies the game. Will automatically inform the engine if the object is not equal to the previous game (e.g., `ucinewgame`, `new`).
- **info** – Selects which additional information to retrieve from the engine. `INFO_NONE`, `INFO_BASE` (basic information that is trivial to obtain), `INFO_SCORE`, `INFO_PV`, `INFO_REFUTATION`, `INFO_CURRLINE`, `INFO_ALL` or any bitwise combination. Some overhead is associated with parsing extra information.
- **ponder** – Whether the engine should keep analysing in the background even after the result has been returned.
- **root_moves** – Optional. Consider only root moves from this list.
- **options** – Optional. A dictionary of engine options for the analysis. The previous configuration will be restored after the analysis is complete. You can permanently apply a configuration with *configure()*.

class chess.engine.**Limit**(*time: Optional[float] = None*, *depth: Optional[int] = None*, *nodes: Optional[int] = None*, *mate: Optional[int] = None*, *white_clock: Optional[float] = None*, *black_clock: Optional[float] = None*, *white_inc: Optional[float] = None*, *black_inc: Optional[float] = None*, *remaining_moves: Optional[int] = None*)

Search-termination condition.

time: Optional[float] = None

Search exactly *time* seconds.

depth: Optional[int] = None

Search *depth* ply only.

nodes: Optional[int] = None

Search only a limited number of *nodes*.

mate: Optional[int] = None

Search for a mate in *mate* moves.

white_clock: Optional[float] = None

Time in seconds remaining for White.

black_clock: Optional[float] = None

Time in seconds remaining for Black.

white_inc: Optional[float] = None

Fisher increment for White, in seconds.

black_inc: Optional[float] = None

Fisher increment for Black, in seconds.

remaining_moves: Optional[int] = None
Number of moves to the next time control. If this is not set, but *white_clock* and *black_clock* are, then it is sudden death.

class chess.engine.**PlayResult**(*move: Optional[chess.Move]*, *ponder: Optional[chess.Move]*, *info: Optional[chess.engine.InfoDict] = None*, ***, *draw_offered: bool = False*, *resigned: bool = False*)
Returned by *chess.engine.Protocol.play()*.

move: Optional[*chess.Move*]
The best move according to the engine, or None.

ponder: Optional[*chess.Move*]
The response that the engine expects after *move*, or None.

info: *chess.engine.InfoDict*
A dictionary of extra *information* sent by the engine, if selected with the *info* argument of *play()*.

draw_offered: bool
Whether the engine offered a draw before moving.

resigned: bool
Whether the engine resigned.

8.6.2 Analysing and evaluating a position

Example:

```
import chess
import chess.engine

engine = chess.engine.SimpleEngine.popen_uci("/usr/bin/stockfish")

board = chess.Board()
info = engine.analyse(board, chess.engine.Limit(time=0.1))
print("Score:", info["score"])
# Score: PovScore(Cp(+20), WHITE)

board = chess.Board("r1bqkbnr/p1pp1ppp/1pn5/4p3/2B1P3/5Q2/PPPP1PPP/RNB1K1NR w KQkq -␣
↪2 4")
info = engine.analyse(board, chess.engine.Limit(depth=20))
print("Score:", info["score"])
# Score: PovScore(Mate(+1), WHITE)

engine.quit()
```

```
import asyncio
import chess
import chess.engine

async def main() -> None:
    transport, engine = await chess.engine.popen_uci("/usr/bin/stockfish")

    board = chess.Board()
    info = await engine.analyse(board, chess.engine.Limit(time=0.1))
    print(info["score"])
    # Score: PovScore(Cp(+20), WHITE)
```

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```
    board = chess.Board("r1bqkbnr/p1pp1ppp/1pn5/4p3/2B1P3/5Q2/PPPP1PPP/RNB1K1NR w␣
↪KQkq - 2 4")
    info = await engine.analyse(board, chess.engine.Limit(depth=20))
    print(info["score"])
    # Score: PovScore(Mate(+1), WHITE)

    await engine.quit()

asyncio.set_event_loop_policy(chess.engine.EventLoopPolicy())
asyncio.run(main())
```

class chess.engine.**Protocol**

Protocol for communicating with a chess engine process.

async analyse(*board:* chess.Board, *limit:* chess.engine.Limit, *, *game: object = 'None'*, *info: chess.engine.Info = 'INFO_ALL'*, *root_moves: Optional[Iterable[*chess.Move*]] = 'None'*, *options: Mapping[str, Optional[Union[str, int, bool]]] = '{}'*) → *chess.engine.InfoDict*

async analyse(*board:* chess.Board, *limit:* chess.engine.Limit, *, *multipv: int*, *game: object = 'None'*, *info: chess.engine.Info = 'INFO_ALL'*, *root_moves: Optional[Iterable[*chess.Move*]] = 'None'*, *options: Mapping[str, Optional[Union[str, int, bool]]] = '{}'*) → List[*chess.engine.InfoDict*]

async analyse(*board:* chess.Board, *limit:* chess.engine.Limit, *, *multipv: Optional[int] = 'None'*, *game: object = 'None'*, *info: chess.engine.Info = 'INFO_ALL'*, *root_moves: Optional[Iterable[*chess.Move*]] = 'None'*, *options: Mapping[str, Optional[Union[str, int, bool]]] = '{}'*) → Union[List[*chess.engine.InfoDict*], *chess.engine.InfoDict*]

Analyses a position and returns a dictionary of *information*.

Parameters

- **board** – The position to analyse. The entire move stack will be sent to the engine.
- **limit** – An instance of *chess.engine.Limit* that determines when to stop the analysis.
- **multipv** – Optional. Analyse multiple root moves. Will return a list of at most *multipv* dictionaries rather than just a single info dictionary.
- **game** – Optional. An arbitrary object that identifies the game. Will automatically inform the engine if the object is not equal to the previous game (e.g., `ucinewgame`, `new`).
- **info** – Selects which information to retrieve from the engine. `INFO_NONE`, `INFO_BASE` (basic information that is trivial to obtain), `INFO_SCORE`, `INFO_PV`, `INFO_REFUTATION`, `INFO_CURRLINE`, `INFO_ALL` or any bitwise combination. Some overhead is associated with parsing extra information.
- **root_moves** – Optional. Limit analysis to a list of root moves.
- **options** – Optional. A dictionary of engine options for the analysis. The previous configuration will be restored after the analysis is complete. You can permanently apply a configuration with *configure()*.

class chess.engine.**InfoDict**(**args*, ***kwargs*)

Dictionary of aggregated information sent by the engine.

Commonly used keys are: `score` (a *PovScore*), `pv` (a list of *Move* objects), `depth`, `seldepth`, `time` (in seconds), `nodes`, `nps`, `multipv` (`1` for the mainline).

Others: `tbhits`, `currmove`, `currmovenumber`, `hashfull`, `cpuload`, `refutation`, `currline`, `ebf` (effective branching factor), `wdl` (a *PovWdl*), and `string`.

class chess.engine.**PovScore**(*relative:* chess.engine.Score, *turn: chess.Color*)

A relative *Score* and the point of view.

relative: ***chess.engine.Score***

The relative *Score*.

turn: **chess.Color**

The point of view (`chess.WHITE` or `chess.BLACK`).

white() → *chess.engine.Score*

Gets the score from White's point of view.

black() → *chess.engine.Score*

Gets the score from Black's point of view.

pov(*color: chess.Color*) → *chess.engine.Score*

Gets the score from the point of view of the given *color*.

is_mate() → bool

Tests if this is a mate score.

wdl(*, *model: Literal[sf12, lichess] = 'sf12'*, *ply: int = 30*) → *chess.engine.PovWdl*

See *wdl()*.

class chess.engine.**Score**

Evaluation of a position.

The score can be `Cp` (centi-pawns), `Mate` or `MateGiven`. A positive value indicates an advantage.

There is a total order defined on centi-pawn and mate scores.

```
>>> from chess.engine import Cp, Mate, MateGiven
>>>
>>> Mate(-0) < Mate(-1) < Cp(-50) < Cp(200) < Mate(4) < Mate(1) < MateGiven
True
```

Scores can be negated to change the point of view:

```
>>> -Cp(20)
Cp(-20)
```

```
>>> -Mate(-4)
Mate(+4)
```

```
>>> -Mate(0)
MateGiven
```

abstract score(*, *mate_score: int*) → int

abstract score(*, *mate_score: Optional[int] = 'None'*) → Optional[int]

Returns the centi-pawn score as an integer or `None`.

You can optionally pass a large value to convert mate scores to centi-pawn scores.

```
>>> Cp(-300).score()
-300
>>> Mate(5).score() is None
True
>>> Mate(5).score(mate_score=100000)
99995
```

abstract mate() → Optional[int]
Returns the number of plies to mate, negative if we are getting mated, or `None`.

> **Warning:** This conflates `Mate(0)` (we lost) and `MateGiven` (we won) to `0`.

is_mate() → bool
Tests if this is a mate score.

abstract wdl(*, *model: Literal[sf12, lichess] = 'sf12'*, *ply: int = 30*) → *chess.engine.Wdl*
Returns statistics for the expected outcome of this game, based on a *model*, given that this score is reached at *ply*.

Scores have a total order, but it makes little sense to compute the difference between two scores. For example, going from `Cp(-100)` to `Cp(+100)` is much more significant than going from `Cp(+300)` to `Cp(+500)`. It is better to compute differences of the expectation values for the outcome of the game (based on winning chances and drawing chances).

```
>>> Cp(100).wdl().expectation() - Cp(-100).wdl().expectation()
0.379...
```

```
>>> Cp(500).wdl().expectation() - Cp(300).wdl().expectation()
0.015...
```

Parameters

- **model** –
  - `sf12`, the WDL model used by Stockfish 12.
  - `lichess`, the win rate model used by Lichess. Does not use *ply*, and does not consider drawing chances.
- **ply** – The number of half-moves played since the starting position. Models may scale scores slightly differently based on this. Defaults to middle game.

class chess.engine.**PovWdl**(*relative:* chess.engine.Wdl, *turn: chess.Color*)
Relative *win/draw/loss statistics* and the point of view.

Deprecated since version 1.2: Behaves like a tuple `(wdl.relative.wins, wdl.relative.draws, wdl.relative.losses)` for backwards compatibility. But it is recommended to use the provided fields and methods instead.

relative: *chess.engine.Wdl*
The relative *Wdl*.

turn: chess.Color
The point of view (`chess.WHITE` or `chess.BLACK`).

white() → *chess.engine.Wdl*
Gets the *Wdl* from White's point of view.

black() → *chess.engine.Wdl*
Gets the *Wdl* from Black's point of view.

pov(*color: chess.Color*) → *chess.engine.Wdl*
Gets the *Wdl* from the point of view of the given *color*.

class chess.engine.**Wdl**(*wins: int*, *draws: int*, *losses: int*)
Win/draw/loss statistics.

wins: int
The number of wins.

draws: int
The number of draws.

losses: int
The number of losses.

total() → int
Returns the total number of games. Usually, `wdl` reported by engines is scaled to 1000 games.

winning_chance() → float
Returns the relative frequency of wins.

drawing_chance() → float
Returns the relative frequency of draws.

losing_chance() → float
Returns the relative frequency of losses.

expectation() → float
Returns the expectation value, where a win is valued 1, a draw is valued 0.5, and a loss is valued 0.

8.6.3 Indefinite or infinite analysis

Example: Stream information from the engine and stop on an arbitrary condition.

```
import chess
import chess.engine

engine = chess.engine.SimpleEngine.popen_uci("/usr/bin/stockfish")

with engine.analysis(chess.Board()) as analysis:
    for info in analysis:
        print(info.get("score"), info.get("pv"))

        # Arbitrary stop condition.
        if info.get("seldepth", 0) > 20:
            break

engine.quit()
```

```
import asyncio
import chess
import chess.engine

async def main() -> None:
    transport, engine = await chess.engine.popen_uci("/usr/bin/stockfish")

    with await engine.analysis(chess.Board()) as analysis:
        async for info in analysis:
            print(info.get("score"), info.get("pv"))

            # Arbitrary stop condition.
            if info.get("seldepth", 0) > 20:
                break
```

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```
    await engine.quit()

asyncio.set_event_loop_policy(chess.engine.EventLoopPolicy())
asyncio.run(main())
```

class chess.engine.**Protocol**

Protocol for communicating with a chess engine process.

abstract async analysis(*board: chess.Board*, *limit: Optional[chess.engine.Limit] = None*, ***, *multipv: Optional[int] = None*, *game: Optional[object] = None*, *info: chess.engine.Info = <Info.ALL: 31>*, *root_moves: Optional[Iterable[chess.Move]] = None*, *options: Mapping[str, Optional[Union[str, int, bool]]] = {}*) → *chess.engine.AnalysisResult*

Starts analysing a position.

Parameters

- **board** – The position to analyse. The entire move stack will be sent to the engine.
- **limit** – Optional. An instance of *chess.engine.Limit* that determines when to stop the analysis. Analysis is infinite by default.
- **multipv** – Optional. Analyse multiple root moves.
- **game** – Optional. An arbitrary object that identifies the game. Will automatically inform the engine if the object is not equal to the previous game (e.g., `ucinewgame`, `new`).
- **info** – Selects which information to retrieve from the engine. `INFO_NONE`, `INFO_BASE` (basic information that is trivial to obtain), `INFO_SCORE`, `INFO_PV`, `INFO_REFUTATION`, `INFO_CURRLINE`, `INFO_ALL` or any bitwise combination. Some overhead is associated with parsing extra information.
- **root_moves** – Optional. Limit analysis to a list of root moves.
- **options** – Optional. A dictionary of engine options for the analysis. The previous configuration will be restored after the analysis is complete. You can permanently apply a configuration with *configure()*.

Returns *AnalysisResult*, a handle that allows asynchronously iterating over the information sent by the engine and stopping the analysis at any time.

class chess.engine.**AnalysisResult**(*stop: Optional[Callable[], None]] = None*)

Handle to ongoing engine analysis. Returned by *chess.engine.Protocol.analysis()*.

Can be used to asynchronously iterate over information sent by the engine.

Automatically stops the analysis when used as a context manager.

multipv: List[*chess.engine.InfoDict*]

A list of dictionaries with aggregated information sent by the engine. One item for each root move.

property info

A dictionary of aggregated information sent by the engine. This is actually an alias for `multipv[0]`.

stop() → None

Stops the analysis as soon as possible.

async wait() → *chess.engine.BestMove*

Waits until the analysis is complete (or stopped).

async get() → *chess.engine.InfoDict*

Waits for the next dictionary of information from the engine and returns it.

It might be more convenient to use `async for info in analysis: ...`.

Raises *chess.engine.AnalysisComplete* if the analysis is complete (or has been stopped) and all information has been consumed. Use `next()` if you prefer to get `None` instead of an exception.

empty() → bool
Checks if all information has been consumed.

If the queue is empty, but the analysis is still ongoing, then further information can become available in the future.

If the queue is not empty, then the next call to *get()* will return instantly.

class chess.engine.**BestMove**(*move: Optional[*chess.Move*]*, *ponder: Optional[*chess.Move*]*)
Returned by *chess.engine.AnalysisResult.wait()*.

move: Optional[*chess.Move*]
The best move according to the engine, or `None`.

ponder: Optional[*chess.Move*]
The response that the engine expects after *move*, or `None`.

8.6.4 Options

`configure()`, `play()`, `analyse()` and `analysis()` accept a dictionary of options.

```
>>> import chess.engine
>>>
>>> engine = chess.engine.SimpleEngine.popen_uci("/usr/bin/stockfish")
>>>
>>> # Check available options.
>>> engine.options["Hash"]
Option(name='Hash', type='spin', default=16, min=1, max=131072, var=[])
>>>
>>> # Set an option.
>>> engine.configure({"Hash": 32})
>>>
>>> # [...]
```

```
import asyncio
import chess.engine

async def main() -> None:
    transport, engine = await chess.engine.popen_uci("/usr/bin/stockfish")

    # Check available options.
    print(engine.options["Hash"])
    # Option(name='Hash', type='spin', default=16, min=1, max=131072, var=[])

    # Set an option.
    await engine.configure({"Hash": 32})

    # [...]

asyncio.set_event_loop_policy(chess.engine.EventLoopPolicy())
asyncio.run(main())
```

class chess.engine.**Protocol**
Protocol for communicating with a chess engine process.

options: MutableMapping[str, *Option*]
Dictionary of available options.

abstract async configure(*options: Mapping[str, Optional[Union[str, int, bool]]]*) → None
Configures global engine options.

Parameters options – A dictionary of engine options where the keys are names of *options*. Do not set options that are managed automatically (*chess.engine.Option.is_managed()*).

class chess.engine.**Option**(*name: str*, *type: str*, *default: Optional[Union[str, int, bool]]*, *min: Optional[int]*, *max: Optional[int]*, *var: Optional[List[str]]*)
Information about an available engine option.

name: str
The name of the option.

type: str
The type of the option.

type	UCI	CECP	value
check	X	X	`True` or `False`
button	X	X	`None`
reset		X	`None`
save		X	`None`
string	X	X	string without line breaks
file		X	string, interpreted as the path to a file
path		X	string, interpreted as the path to a directory

default: Optional[Union[str, int, bool]]
The default value of the option.

min: Optional[int]
The minimum integer value of a *spin* option.

max: Optional[int]
The maximum integer value of a *spin* option.

var: Optional[List[str]]
A list of allowed string values for a *combo* option.

is_managed() → bool
Some options are managed automatically: `UCI_Chess960`, `UCI_Variant`, `MultiPV`, `Ponder`.

8.6.5 Logging

Communication is logged with debug level on a logger named `chess.engine`. Debug logs are useful while troubleshooting. Please also provide them when submitting bug reports.

```
import logging

# Enable debug logging.
logging.basicConfig(level=logging.DEBUG)
```

8.6.6 AsyncSSH

chess.engine.Protocol can also be used with AsyncSSH (since 1.16.0) to communicate with an engine on a remote computer.

```
import asyncio
import asyncssh
import chess
import chess.engine

async def main() -> None:
    async with asyncssh.connect("localhost") as conn:
        channel, engine = await conn.create_subprocess(chess.engine.UciProtocol, "/
↪usr/bin/stockfish")
        await engine.initialize()

        # Play, analyse, ...
        await engine.ping()

asyncio.run(main())
```

8.6.7 Reference

class chess.engine.**EngineError**
Runtime error caused by a misbehaving engine or incorrect usage.

class chess.engine.**EngineTerminatedError**
The engine process exited unexpectedly.

class chess.engine.**AnalysisComplete**
Raised when analysis is complete, all information has been consumed, but further information was requested.

async chess.engine.**popen_uci**(*command: Union[str, List[str]]*, ***, *setpgrp: bool = False*, ***popen_args: Any*) → Tuple[asyncio.transports.SubprocessTransport, *chess.engine.UciProtocol*]
Spawns and initializes a UCI engine.

Parameters

- **command** – Path of the engine executable, or a list including the path and arguments.
- **setpgrp** – Open the engine process in a new process group. This will stop signals (such as keyboard interrupts) from propagating from the parent process. Defaults to `False`.
- **popen_args** – Additional arguments for popen. Do not set `stdin`, `stdout`, `bufsize` or `universal_newlines`.

Returns a subprocess transport and engine protocol pair.

async chess.engine.**popen_xboard**(*command: Union[str, List[str]]*, ***, *setpgrp: bool = False*, ***popen_args: Any*) → Tuple[asyncio.transports.SubprocessTransport, *chess.engine.XBoardProtocol*]
Spawns and initializes an XBoard engine.

Parameters

- **command** – Path of the engine executable, or a list including the path and arguments.

- **setpgrp** – Open the engine process in a new process group. This will stop signals (such as keyboard interrupts) from propagating from the parent process. Defaults to `False`.
- **popen_args** – Additional arguments for popen. Do not set `stdin`, `stdout`, `bufsize` or `universal_newlines`.

Returns a subprocess transport and engine protocol pair.

class chess.engine.**Protocol**

Protocol for communicating with a chess engine process.

id: Dict[str, str]

Dictionary of information about the engine. Common keys are `name` and `author`.

returncode: asyncio.Future[int]

Future: Exit code of the process.

abstract async initialize() → None

Initializes the engine.

abstract async ping() → None

Pings the engine and waits for a response. Used to ensure the engine is still alive and idle.

abstract async quit() → None

Asks the engine to shut down.

class chess.engine.**UciProtocol**

An implementation of the Universal Chess Interface protocol.

class chess.engine.**XBoardProtocol**

An implementation of the XBoard protocol (CECP).

class chess.engine.**SimpleEngine**(*transport: asyncio.transports.SubprocessTransport*, *protocol:* chess.engine.Protocol, *, *timeout: Optional[float] = 10.0*)

Synchronous wrapper around a transport and engine protocol pair. Provides the same methods and attributes as *chess.engine.Protocol* with blocking functions instead of coroutines.

You may not concurrently modify objects passed to any of the methods. Other than that, *SimpleEngine* is thread-safe. When sending a new command to the engine, any previous running command will be cancelled as soon as possible.

Methods will raise `asyncio.TimeoutError` if an operation takes *timeout* seconds longer than expected (unless *timeout* is `None`).

Automatically closes the transport when used as a context manager.

close() → None

Closes the transport and the background event loop as soon as possible.

classmethod popen_uci(*command: Union[str, List[str]]*, *, *timeout: Optional[float] = 10.0*, *debug: bool = False*, *setpgrp: bool = False*, ***popen_args: Any*) → *chess.engine.SimpleEngine*

Spawns and initializes a UCI engine. Returns a *SimpleEngine* instance.

classmethod popen_xboard(*command: Union[str, List[str]]*, *, *timeout: Optional[float] = 10.0*, *debug: bool = False*, *setpgrp: bool = False*, ***popen_args: Any*) → *chess.engine.SimpleEngine*

Spawns and initializes an XBoard engine. Returns a *SimpleEngine* instance.

class chess.engine.**SimpleAnalysisResult**(*simple_engine:* chess.engine.SimpleEngine, *inner:* chess.engine.AnalysisResult)

Synchronous wrapper around *AnalysisResult*. Returned by `chess.engine.SimpleEngine.analysis()`.

chess.engine.**EventLoopPolicy**() → None

An event loop policy for thread-local event loops and child watchers. Ensures each event loop is capable of spawning and watching subprocesses, even when not running on the main thread.

Windows: Uses `ProactorEventLoop`.

Unix: Uses `SelectorEventLoop`. If available, `PidfdChildWatcher` is used to detect subprocess termination (Python 3.9+ on Linux 5.3+). Otherwise, the default child watcher is used on the main thread and relatively slow eager polling is used on all other threads.

8.7 SVG rendering

The `chess.svg` module renders SVG Tiny images (mostly for IPython/Jupyter Notebook integration). The piece images by Colin M.L. Burnett are triple licensed under the GFDL, BSD and GPL.

chess.svg.**piece**(*piece:* chess.Piece, *size: Optional[int] = None*) → str

Renders the given *chess.Piece* as an SVG image.

```
>>> import chess
>>> import chess.svg
>>>
>>> chess.svg.piece(chess.Piece.from_symbol("R"))
```

chess.svg.**board**(*board: Optional[*chess.BaseBoard*] = None*, **, orientation: chess.Color = True*, *lastmove: Optional[*chess.Move*] = None*, *check: Optional[chess.Square] = None*, *arrows: Iterable[Union[*chess.svg.Arrow*, Tuple[chess.Square, chess.Square]]] = []*, *squares: Optional[chess.IntoSquareSet] = None*, *size: Optional[int] = None*, *coordinates: bool = True*, *colors: Dict[str, str] = {}*, *flipped: bool = False*, *style: Optional[str] = None*) → str

Renders a board with pieces and/or selected squares as an SVG image.

Parameters

- **board** – A *chess.BaseBoard* for a chessboard with pieces, or `None` (the default) for a chessboard without pieces.
- **orientation** – The point of view, defaulting to `chess.WHITE`.
- **lastmove** – A *chess.Move* to be highlighted.
- **check** – A square to be marked indicating a check.
- **arrows** – A list of *Arrow* objects, like `[chess.svg.Arrow(chess.E2, chess.E4)]`, or a list of tuples, like `[(chess.E2, chess.E4)]`. An arrow from a square pointing to the same square is drawn as a circle, like `[(chess.E2, chess.E2)]`.
- **squares** – A *chess.SquareSet* with selected squares.
- **size** – The size of the image in pixels (e.g., `400` for a 400 by 400 board), or `None` (the default) for no size limit.
- **coordinates** – Pass `False` to disable the coordinate margin.
- **colors** – A dictionary to override default colors. Possible keys are `square light`, `square dark`, `square light lastmove`, `square dark lastmove`, `margin`, `coord`, `arrow green`, `arrow blue`, `arrow red`, and `arrow yellow`. Values should look like `#ffce9e` (opaque), or `#15781B80` (transparent).
- **flipped** – Pass `True` to flip the board.

- **style** – A CSS stylesheet to include in the SVG image.

```
>>> import chess
>>> import chess.svg
>>>
>>> board = chess.Board("8/8/8/8/4N3/8/8/8 w - - 0 1")
>>> squares = board.attacks(chess.E4)
>>> chess.svg.board(board, squares=squares, size=350)
```

Deprecated since version 1.1: Use *orientation* with a color instead of the *flipped* toggle.

class chess.svg.**Arrow**(*tail: chess.Square*, *head: chess.Square*, *, *color: str = 'green'*)

Details of an arrow to be drawn.

tail: chess.Square

Start square of the arrow.

head: chess.Square

End square of the arrow.

color: str

Arrow color.

pgn() → str

Returns the arrow in the format used by `[%csl ...]` and `[%cal ...]` PGN annotations, e.g., `Ga1` or `Ya2h2`.

Colors other than `red`, `yellow`, and `blue` default to green.

classmethod from_pgn(*pgn: str*) → *chess.svg.Arrow*

Parses an arrow from the format used by `[%csl ...]` and `[%cal ...]` PGN annotations, e.g., `Ga1` or `Ya2h2`.

Also allows skipping the color prefix, defaulting to green.

Raises `ValueError` if the format is invalid.

8.8 Variants

python-chess supports several chess variants.

```
>>> import chess.variant
>>>
>>> board = chess.variant.GiveawayBoard()
```

```
>>> # General information about the variants.
>>> type(board).uci_variant
'giveaway'
>>> type(board).xboard_variant
'giveaway'
>>> type(board).starting_fen
'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w - - 0 1'
```

Variant	Board class	UCI/XBoard	Syzygy
Standard	*chess.Board*	chess/normal	.rtbw, .rtbz
Suicide	chess.variant.SuicideBoard	suicide	.stbw, .stbz
Giveaway	chess.variant.GiveawayBoard	giveaway	.gtbw, .gtbz
Antichess	chess.variant.AntichessBoard	antichess	.gtbw, .gtbz
Atomic	chess.variant.AtomicBoard	atomic	.atbw, .atbz
King of the Hill	chess.variant.KingOfTheHillBoard	kingofthehill	
Racing Kings	chess.variant.RacingKingsBoard	racingkings	
Horde	chess.variant.HordeBoard	horde	
Three-check	*chess.variant.ThreeCheckBoard*	3check	
Crazyhouse	*chess.variant.CrazyhouseBoard*	crazyhouse	

chess.variant.**find_variant**(*name: str*) → Type[*chess.Board*]
Looks for a variant board class by variant name. Supports many common aliases.

8.8.1 Game end

See *chess.Board.is_variant_end()*, *is_variant_win()*, *is_variant_draw()*, or *is_variant_loss()* for special variant end conditions and results.

Note that if all of them return `False`, the game may still be over and decided by standard conditions like *is_checkmate()*, *is_stalemate()*, *is_insufficient_material()*, move counters, repetitions, and legitimate claims.

8.8.2 Chess960

Chess960 is orthogonal to all other variants.

```
>>> chess.Board(chess960=True)
Board('rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - 0 1', chess960=True)
```

See *chess.BaseBoard.set_chess960_pos()*, *chess960_pos()*, and *from_chess960_pos()* for dealing with Chess960 starting positions.

8.8.3 Crazyhouse

class chess.variant.**CrazyhousePocket**(*symbols: Iterable[str] = ''*)
A Crazyhouse pocket with a counter for each piece type.

add(*piece_type: int*) → None
Adds a piece of the given type to this pocket.

remove(*piece_type: int*) → None
Removes a piece of the given type from this pocket.

count(*piece_type: int*) → int
Returns the number of pieces of the given type in the pocket.

reset() → None
Clears the pocket.

copy() → CrazyhousePocketT
Returns a copy of this pocket.

class chess.variant.**CrazyhouseBoard**(*fen: Optional[str] = 'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR[] w KQkq - 0 1'*, *chess960: bool = False*)

pockets = [chess.variant.CrazyhousePocket(), chess.variant.CrazyhousePocket()]

Pockets for each color. For example, `board.pockets[chess.WHITE]` are the pocket pieces available to White.

legal_drop_squares() → *chess.SquareSet*

Gets the squares where the side to move could legally drop a piece. Does *not* check whether they actually have a suitable piece in their pocket.

It is legal to drop a checkmate.

Returns a *set of squares*.

8.8.4 Three-check

class chess.variant.**ThreeCheckBoard**(*fen: Optional[str] = 'rnbqkbnr/pppppppp/8/8/8/8/PPPPPPPP/RNBQKBNR w KQkq - 3+3 0 1'*, *chess960: bool = False*)

remaining_checks = [3, 3]

Remaining checks until victory for each color. For example, `board.remaining_checks[chess.WHITE] == 0` implies that White has won.

8.8.5 UCI/XBoard

Multi-Variant Stockfish and other engines have an `UCI_Variant` option. XBoard engines may declare support for `variants`. This is automatically managed.

```
>>> import chess.engine
>>>
>>> engine = chess.engine.SimpleEngine.popen_uci("stockfish-mv")
>>>
>>> board = chess.variant.RacingKingsBoard()
>>> result = engine.play(board, chess.engine.Limit(time=1.0))
```

8.8.6 Syzygy

Syzygy tablebases are available for suicide, giveaway and atomic chess.

```
>>> import chess.syzygy
>>> import chess.variant
>>>
>>> tables = chess.syzygy.open_tablebase("data/syzygy", VariantBoard=chess.variant.
↪AtomicBoard)
```

8.9 Changelog for python-chess

8.9.1 New in v1.3.3

Bugfixes:

- Fixed unintended collisions and optimized `chess.Piece.__hash__()`.
- Fixed false-positive `chess.STATUS_IMPOSSIBLE_CHECK` if checkers are aligned with other king.

Changes:

- Also detect `chess.STATUS_IMPOSSIBLE_CHECK` if checker is aligned with en passant square and king.

New features:

- Implemented Lichess winning chance model for `chess.engine.Score`: `score.wdl(model="lichess")`.

8.9.2 New in v1.3.2

Bugfixes:

- Added a new reason for `board.status()` to be invalid: `chess.STATUS_IMPOSSIBLE_CHECK`. This detects positions where two sliding pieces are giving check while also being aligned with the king on the same rank, file, or diagonal. Such positions are impossible to reach, break Stockfish, and maybe other engines.

8.9.3 New in v1.3.1

Bugfixes:

- `chess.pgn.read_game()` now properly detects variant games with Chess960 castling rights (as well as mislabeled Standard Chess960 games). Previously, all castling moves in such games were rejected.

8.9.4 New in v1.3.0

Changes:

- Introduced `chess.pgn.ChildNode`, a subclass of `chess.pgn.GameNode` for all nodes other than the root node, and converted `chess.pgn.GameNode` to an abstract base class. This improves ergonomics in typed code.

  The change is backwards compatible if using only documented features. However, a notable undocumented feature is the ability to create dangling nodes. This is no longer possible. If you have been using this for subclassing, override `GameNode.add_variation()` instead of `GameNode.dangling_node()`. It is now the only method that creates child nodes.

Bugfixes:

- Removed broken `weakref`-based caching in `chess.pgn.GameNode.board()`.

New features:

- Added `chess.pgn.GameNode.next()`.

8.9.5 New in v1.2.2

Bugfixes:

- Fixed regression where releases were uploaded without the `py.typed` marker.

8.9.6 New in v1.2.1

Changes:

- The primary location for the published package is now https://pypi.org/project/chess/. Thanks to Kristian Glass for transferring the namespace.

  The old https://pypi.org/project/python-chess/ will remain an alias that installs the package from the new location as a dependency (as recommended by PEP423).

  `ModuleNotFoundError: No module named 'chess'` after upgrading from previous versions? Run `pip install --force-reinstall chess` (due to https://github.com/niklasf/python-chess/issues/680).

8.9.7 New in v1.2.0

New features:

- Added `chess.Board.ply()`.
- Added `chess.pgn.GameNode.ply()` and `chess.pgn.GameNode.turn()`.
- Added `chess.engine.PovWdl`, `chess.engine.Wdl`, and conversions from scores: `chess.engine.PovScore.wdl()`, `chess.engine.Score.wdl()`.
- Added `chess.engine.Score.score(*, mate_score: int) -> int` overload.

Changes:

- The `PovScore` returned by `chess.pgn.GameNode.eval()` is now always relative to the side to move. The ambiguity around `[%eval #0]` has been resolved to `Mate(-0)`. This makes sense, given that the authors of the specification probably had standard chess in mind (where a game-ending move is always a loss for the opponent). Previously, this would be parsed as `None`.
- Typed `chess.engine.InfoDict["wdl"]` as the new `chess.engine.PovWdl`, rather than `Tuple[int, int, int]`. The new type is backwards compatible, but it is recommended to use its documented fields and methods instead.
- Removed `chess.engine.PovScore.__str__()`. String representation falls back to `__repr__`.
- The `en_passant` parameter of `chess.Board.fen()` and `chess.Board.epd()` is now typed as `Literal["legal", "fen", "xfen"]` rather than `str`.

8.9.8 New in v1.1.0

New features:

- Added `chess.svg.board(..., orientation)`. This is a more idiomatic way to set the board orientation than `flipped`.
- Added `chess.svg.Arrow.pgn()` and `chess.svg.Arrow.from_pgn()`.

Changes:

- Further relaxed `chess.Board.parse_san()`. Now accepts fully specified moves like `e2e4`, even if that is not a pawn move, castling notation with zeros, null moves in UCI notation, and null moves in XBoard notation.

8.9.9 New in v1.0.1

Bugfixes:

- `chess.svg`: Restored SVG Tiny compatibility by splitting colors like `#rrggbbaa` into a solid color and opacity.

8.9.10 New in v1.0.0

See `CHANGELOG-OLD.rst` for changes up to v1.0.0.

CHAPTER

NINE

INDICES AND TABLES

- genindex
- search

INDEX

A

accept() (*chess.pgn.Game method*), 38
accept() (*chess.pgn.GameNode method*), 38
accept_subgame() (*chess.pgn.GameNode method*), 38
add() (*chess.SquareSet method*), 33
add() (*chess.variant.CrazyhousePocket method*), 62
add_directory() (*chess.gaviota.PythonTablebase method*), 44
add_directory() (*chess.syzygy.Tablebase method*), 46
add_line() (*chess.pgn.GameNode method*), 38
add_main_variation() (*chess.pgn.GameNode method*), 37
add_variation() (*chess.pgn.GameNode method*), 37
analyse() (*chess.engine.Protocol method*), 51
analysis() (*chess.engine.Protocol method*), 55
AnalysisComplete (*class in chess.engine*), 58
AnalysisResult (*class in chess.engine*), 55
Arrow (*class in chess.svg*), 61
arrows() (*chess.pgn.GameNode method*), 38
attackers() (*chess.BaseBoard method*), 30
attacks() (*chess.BaseBoard method*), 30

B

BaseBoard (*class in chess*), 29
BaseVisitor (*class in chess.pgn*), 39
begin_game() (*chess.pgn.BaseVisitor method*), 39
begin_headers() (*chess.pgn.BaseVisitor method*), 39
begin_variation() (*chess.pgn.BaseVisitor method*), 40
BestMove (*class in chess.engine*), 56
between() (*chess.SquareSet class method*), 34
black() (*chess.engine.PovScore method*), 52
black() (*chess.engine.PovWdl method*), 53
black_clock (*chess.engine.Limit attribute*), 49
black_inc (*chess.engine.Limit attribute*), 49
Board (*class in chess*), 21
board() (*chess.pgn.GameNode method*), 36
board() (*in module chess.svg*), 60
board_fen() (*chess.BaseBoard method*), 31
BoardBuilder (*class in chess.pgn*), 41

C

can_claim_draw() (*chess.Board method*), 24
can_claim_fifty_moves() (*chess.Board method*), 24
can_claim_threefold_repetition() (*chess.Board method*), 24
carry_rippler() (*chess.SquareSet method*), 33
castling_rights (*chess.Board attribute*), 22
checkers() (*chess.Board method*), 23
chess.A1 (*built-in variable*), 19
chess.B1 (*built-in variable*), 19
chess.BB_ALL (*built-in variable*), 34
chess.BB_BACKRANKS (*built-in variable*), 34
chess.BB_CENTER (*built-in variable*), 35
chess.BB_CORNERS (*built-in variable*), 34
chess.BB_DARK_SQUARES (*built-in variable*), 34
chess.BB_EMPTY (*built-in variable*), 34
chess.BB_FILES (*built-in variable*), 34
chess.BB_LIGHT_SQUARES (*built-in variable*), 34
chess.BB_RANKS (*built-in variable*), 34
chess.BB_SQUARES (*built-in variable*), 34
chess.BISHOP (*built-in variable*), 19
chess.BLACK (*built-in variable*), 19
chess.FILE_NAMES (*built-in variable*), 19
chess.G8 (*built-in variable*), 19
chess.H8 (*built-in variable*), 19
chess.KING (*built-in variable*), 19
chess.KNIGHT (*built-in variable*), 19
chess.PAWN (*built-in variable*), 19
chess.polyglot.POLYGLOT_RANDOM_ARRAY (*built-in variable*), 44
chess.QUEEN (*built-in variable*), 19
chess.RANK_NAMES (*built-in variable*), 20
chess.ROOK (*built-in variable*), 19
chess.SQUARE_NAMES (*built-in variable*), 19
chess.SQUARES (*built-in variable*), 19
chess.WHITE (*built-in variable*), 19
chess960 (*chess.Board attribute*), 22
chess960_pos() (*chess.BaseBoard method*), 31

chess960_pos() (*chess.Board method*), 26
ChildNode (*class in chess.pgn*), 38
choice() (*chess.polyglot.MemoryMappedReader method*), 44
clean_castling_rights() (*chess.Board method*), 28
clear() (*chess.Board method*), 23
clear() (*chess.SquareSet method*), 33
clear_board() (*chess.BaseBoard method*), 29
clear_board() (*chess.Board method*), 23
clear_stack() (*chess.Board method*), 23
clock() (*chess.pgn.GameNode method*), 38
close() (*chess.engine.SimpleEngine method*), 59
close() (*chess.gaviota.PythonTablebase method*), 45
close() (*chess.polyglot.MemoryMappedReader method*), 44
close() (*chess.syzygy.Tablebase method*), 48
color (*chess.Piece attribute*), 20
color (*chess.svg.Arrow attribute*), 61
color_at() (*chess.BaseBoard method*), 30
comment (*chess.pgn.GameNode attribute*), 36
configure() (*chess.engine.Protocol method*), 57
copy() (*chess.BaseBoard method*), 31
copy() (*chess.Board method*), 29
copy() (*chess.variant.CrazyhousePocket method*), 62
count() (*chess.variant.CrazyhousePocket method*), 62
CrazyhouseBoard (*class in chess.variant*), 62
CrazyhousePocket (*class in chess.variant*), 62

D

default (*chess.engine.Option attribute*), 57
demote() (*chess.pgn.GameNode method*), 37
depth (*chess.engine.Limit attribute*), 49
discard() (*chess.SquareSet method*), 33
draw_offered (*chess.engine.PlayResult attribute*), 50
drawing_chance() (*chess.engine.Wdl method*), 54
draws (*chess.engine.Wdl attribute*), 54
drop (*chess.Move attribute*), 21

E

empty() (*chess.BaseBoard class method*), 31
empty() (*chess.Board class method*), 29
empty() (*chess.engine.AnalysisResult method*), 56
end() (*chess.pgn.ChildNode method*), 39
end() (*chess.pgn.GameNode method*), 37
end_game() (*chess.pgn.BaseVisitor method*), 40
end_headers() (*chess.pgn.BaseVisitor method*), 39
end_variation() (*chess.pgn.BaseVisitor method*), 40
EngineError (*class in chess.engine*), 58
EngineTerminatedError (*class in chess.engine*), 58
Entry (*class in chess.polyglot*), 43
ep_square (*chess.Board attribute*), 22
epd() (*chess.Board method*), 26
errors (*chess.pgn.Game attribute*), 38
eval() (*chess.pgn.GameNode method*), 38
EventLoopPolicy() (*in module chess.engine*), 59
expectation() (*chess.engine.Wdl method*), 54

F

fen() (*chess.Board method*), 25
FileExporter (*class in chess.pgn*), 41
find() (*chess.polyglot.MemoryMappedReader method*), 43
find_all() (*chess.polyglot.MemoryMappedReader method*), 43
find_move() (*chess.Board method*), 25
find_variant() (*in module chess.variant*), 62
from_chess960_pos() (*chess.BaseBoard class method*), 31
from_chess960_pos() (*chess.Board class method*), 29
from_epd() (*chess.Board class method*), 29
from_pgn() (*chess.svg.Arrow class method*), 61
from_square (*chess.Move attribute*), 20
from_square() (*chess.SquareSet class method*), 34
from_symbol() (*chess.Piece class method*), 20
from_uci() (*chess.Move class method*), 21
fullmove_number (*chess.Board attribute*), 22

G

Game (*class in chess.pgn*), 38
game() (*chess.pgn.GameNode method*), 37
GameBuilder (*class in chess.pgn*), 40
GameNode (*class in chess.pgn*), 36
get() (*chess.engine.AnalysisResult method*), 55
gives_check() (*chess.Board method*), 23

H

halfmove_clock (*chess.Board attribute*), 22
handle_error() (*chess.pgn.BaseVisitor method*), 40
handle_error() (*chess.pgn.GameBuilder method*), 40
has_castling_rights() (*chess.Board method*), 28
has_chess960_castling_rights() (*chess.Board method*), 28
has_insufficient_material() (*chess.Board method*), 24
has_kingside_castling_rights() (*chess.Board method*), 28
has_legal_en_passant() (*chess.Board method*), 25
has_pseudo_legal_en_passant() (*chess.Board method*), 25
has_queenside_castling_rights() (*chess.Board method*), 28

has_variation() (*chess.pgn.GameNode method*), 37
head (*chess.svg.Arrow attribute*), 61
headers (*chess.pgn.Game attribute*), 38
HeadersBuilder (*class in chess.pgn*), 41

I

id (*chess.engine.Protocol attribute*), 59
info (*chess.engine.PlayResult attribute*), 50
info() (*chess.engine.AnalysisResult property*), 55
InfoDict (*class in chess.engine*), 51
initialize() (*chess.engine.Protocol method*), 59
is_attacked_by() (*chess.BaseBoard method*), 30
is_capture() (*chess.Board method*), 28
is_castling() (*chess.Board method*), 28
is_check() (*chess.Board method*), 23
is_checkmate() (*chess.Board method*), 24
is_en_passant() (*chess.Board method*), 28
is_end() (*chess.pgn.GameNode method*), 37
is_fivefold_repetition() (*chess.Board method*), 24
is_game_over() (*chess.Board method*), 24
is_insufficient_material() (*chess.Board method*), 24
is_irreversible() (*chess.Board method*), 28
is_kingside_castling() (*chess.Board method*), 28
is_main_variation() (*chess.pgn.GameNode method*), 37
is_mainline() (*chess.pgn.GameNode method*), 37
is_managed() (*chess.engine.Option method*), 57
is_mate() (*chess.engine.PovScore method*), 52
is_mate() (*chess.engine.Score method*), 53
is_pinned() (*chess.BaseBoard method*), 30
is_queenside_castling() (*chess.Board method*), 28
is_repetition() (*chess.Board method*), 25
is_seventyfive_moves() (*chess.Board method*), 24
is_stalemate() (*chess.Board method*), 24
is_valid() (*chess.Board method*), 29
is_variant_draw() (*chess.Board method*), 24
is_variant_end() (*chess.Board method*), 23
is_variant_loss() (*chess.Board method*), 23
is_variant_win() (*chess.Board method*), 24
is_zeroing() (*chess.Board method*), 28
isdisjoint() (*chess.SquareSet method*), 33
issubset() (*chess.SquareSet method*), 33
issuperset() (*chess.SquareSet method*), 33

K

key (*chess.polyglot.Entry attribute*), 43
king() (*chess.BaseBoard method*), 30

L

lan() (*chess.Board method*), 27
learn (*chess.polyglot.Entry attribute*), 43
legal_drop_squares() (*chess.variant.CrazyhouseBoard method*), 63
legal_moves() (*chess.Board property*), 22
Limit (*class in chess.engine*), 49
losing_chance() (*chess.engine.Wdl method*), 54
losses (*chess.engine.Wdl attribute*), 54

M

mainline() (*chess.pgn.GameNode method*), 37
mainline_moves() (*chess.pgn.GameNode method*), 37
mate (*chess.engine.Limit attribute*), 49
mate() (*chess.engine.Score method*), 52
max (*chess.engine.Option attribute*), 57
MemoryMappedReader (*class in chess.polyglot*), 43
min (*chess.engine.Option attribute*), 57
mirror() (*chess.BaseBoard method*), 31
mirror() (*chess.Board method*), 29
mirror() (*chess.SquareSet method*), 33
move (*chess.engine.BestMove attribute*), 56
move (*chess.engine.PlayResult attribute*), 50
move (*chess.pgn.ChildNode attribute*), 39
move (*chess.pgn.GameNode attribute*), 36
move (*chess.polyglot.Entry attribute*), 43
Move (*class in chess*), 20
move_stack (*chess.Board attribute*), 22
multipv (*chess.engine.AnalysisResult attribute*), 55

N

NAG_BLUNDER (*in module chess.pgn*), 42
NAG_BRILLIANT_MOVE (*in module chess.pgn*), 42
NAG_DUBIOUS_MOVE (*in module chess.pgn*), 42
NAG_GOOD_MOVE (*in module chess.pgn*), 42
NAG_MISTAKE (*in module chess.pgn*), 42
NAG_SPECULATIVE_MOVE (*in module chess.pgn*), 42
nags (*chess.pgn.ChildNode attribute*), 39
name (*chess.engine.Option attribute*), 57
NativeTablebase (*class in chess.gaviota*), 46
next() (*chess.pgn.GameNode method*), 37
nodes (*chess.engine.Limit attribute*), 49
null() (*chess.Move class method*), 21

O

open_reader() (*in module chess.polyglot*), 43
open_tablebase() (*in module chess.gaviota*), 44
open_tablebase() (*in module chess.syzygy*), 46
open_tablebase_native() (*in module chess.gaviota*), 45
Option (*class in chess.engine*), 57

options (*chess.engine.Protocol attribute*), 57

P

parent (*chess.pgn.ChildNode attribute*), 39
parent (*chess.pgn.GameNode attribute*), 36
parse_san() (*chess.Board method*), 27
parse_san() (*chess.pgn.BaseVisitor method*), 39
parse_square() (*in module chess*), 20
parse_uci() (*chess.Board method*), 27
peek() (*chess.Board method*), 25
pgn() (*chess.svg.Arrow method*), 61
Piece (*class in chess*), 20
piece() (*in module chess.svg*), 60
piece_at() (*chess.BaseBoard method*), 30
piece_map() (*chess.BaseBoard method*), 31
piece_name() (*in module chess*), 19
piece_symbol() (*in module chess*), 19
piece_type (*chess.Piece attribute*), 20
piece_type_at() (*chess.BaseBoard method*), 30
pieces() (*chess.BaseBoard method*), 29
pin() (*chess.BaseBoard method*), 30
ping() (*chess.engine.Protocol method*), 59
play() (*chess.engine.Protocol method*), 49
PlayResult (*class in chess.engine*), 50
ply() (*chess.Board method*), 23
ply() (*chess.pgn.GameNode method*), 36
pockets (*chess.variant.CrazyhouseBoard attribute*), 63
ponder (*chess.engine.BestMove attribute*), 56
ponder (*chess.engine.PlayResult attribute*), 50
pop() (*chess.Board method*), 25
pop() (*chess.SquareSet method*), 33
popen_uci() (*chess.engine.SimpleEngine class method*), 59
popen_uci() (*in module chess.engine*), 58
popen_xboard() (*chess.engine.SimpleEngine class method*), 59
popen_xboard() (*in module chess.engine*), 58
pov() (*chess.engine.PovScore method*), 52
pov() (*chess.engine.PovWdl method*), 53
PovScore (*class in chess.engine*), 51
PovWdl (*class in chess.engine*), 53
probe_dtm() (*chess.gaviota.PythonTablebase method*), 44
probe_dtz() (*chess.syzygy.Tablebase method*), 47
probe_wdl() (*chess.gaviota.PythonTablebase method*), 45
probe_wdl() (*chess.syzygy.Tablebase method*), 46
promote() (*chess.pgn.GameNode method*), 37
promote_to_main() (*chess.pgn.GameNode method*), 37
promoted (*chess.Board attribute*), 22
promotion (*chess.Move attribute*), 20
Protocol (*class in chess.engine*), 48, 51, 55, 56, 59
pseudo_legal_moves() (*chess.Board property*), 22
push() (*chess.Board method*), 25
push_san() (*chess.Board method*), 27
push_uci() (*chess.Board method*), 27
push_xboard() (*chess.Board method*), 28
PythonTablebase (*class in chess.gaviota*), 44

Q

quit() (*chess.engine.Protocol method*), 59

R

raw_move (*chess.polyglot.Entry attribute*), 43
ray() (*chess.SquareSet class method*), 33
read_game() (*in module chess.pgn*), 35
read_headers() (*in module chess.pgn*), 42
relative (*chess.engine.PovScore attribute*), 52
relative (*chess.engine.PovWdl attribute*), 53
remaining_checks (*chess.variant.ThreeCheckBoard attribute*), 63
remaining_moves (*chess.engine.Limit attribute*), 49
remove() (*chess.SquareSet method*), 33
remove() (*chess.variant.CrazyhousePocket method*), 62
remove_piece_at() (*chess.BaseBoard method*), 31
remove_piece_at() (*chess.Board method*), 23
remove_variation() (*chess.pgn.GameNode method*), 37
reset() (*chess.Board method*), 23
reset() (*chess.variant.CrazyhousePocket method*), 62
reset_board() (*chess.BaseBoard method*), 29
reset_board() (*chess.Board method*), 23
resigned (*chess.engine.PlayResult attribute*), 50
result() (*chess.Board method*), 24
result() (*chess.pgn.BaseVisitor method*), 40
result() (*chess.pgn.GameBuilder method*), 41
returncode (*chess.engine.Protocol attribute*), 59
root() (*chess.Board method*), 23

S

san() (*chess.Board method*), 27
san() (*chess.pgn.ChildNode method*), 39
Score (*class in chess.engine*), 52
score() (*chess.engine.Score method*), 52
set_arrows() (*chess.pgn.GameNode method*), 38
set_board_fen() (*chess.BaseBoard method*), 31
set_board_fen() (*chess.Board method*), 26
set_castling_fen() (*chess.Board method*), 26
set_chess960_pos() (*chess.BaseBoard method*), 31
set_chess960_pos() (*chess.Board method*), 26
set_clock() (*chess.pgn.GameNode method*), 38
set_epd() (*chess.Board method*), 27
set_eval() (*chess.pgn.GameNode method*), 38
set_fen() (*chess.Board method*), 26
set_piece_at() (*chess.BaseBoard method*), 31

set_piece_at() (*chess.Board method*), 23
set_piece_map() (*chess.BaseBoard method*), 31
set_piece_map() (*chess.Board method*), 26
setup() (*chess.pgn.Game method*), 38
SimpleAnalysisResult (*class in chess.engine*), 59
SimpleEngine (*class in chess.engine*), 59
skip_game() (*in module chess.pgn*), 43
SkipVisitor (*class in chess.pgn*), 41
square() (*in module chess*), 20
square_distance() (*in module chess*), 20
square_file() (*in module chess*), 20
square_mirror() (*in module chess*), 20
square_name() (*in module chess*), 20
square_rank() (*in module chess*), 20
SquareSet (*class in chess*), 32
STARTING_BOARD_FEN (*in module chess*), 21
starting_comment (*chess.pgn.ChildNode attribute*), 39
STARTING_FEN (*in module chess*), 21
starts_variation() (*chess.pgn.GameNode method*), 37
status() (*chess.Board method*), 28
stop() (*chess.engine.AnalysisResult method*), 55
StringExporter (*class in chess.pgn*), 41
symbol() (*chess.Piece method*), 20

T

Tablebase (*class in chess.syzygy*), 46
tail (*chess.svg.Arrow attribute*), 61
ThreeCheckBoard (*class in chess.variant*), 63
time (*chess.engine.Limit attribute*), 49
to_square (*chess.Move attribute*), 20
tolist() (*chess.SquareSet method*), 33
total() (*chess.engine.Wdl method*), 54
transform() (*chess.BaseBoard method*), 31
transform() (*chess.Board method*), 29
turn (*chess.Board attribute*), 21
turn (*chess.engine.PovScore attribute*), 52
turn (*chess.engine.PovWdl attribute*), 53
turn() (*chess.pgn.GameNode method*), 37
type (*chess.engine.Option attribute*), 57

U

uci() (*chess.Board method*), 27
uci() (*chess.Move method*), 21
uci() (*chess.pgn.ChildNode method*), 39
UciProtocol (*class in chess.engine*), 59
unicode() (*chess.BaseBoard method*), 31
unicode_symbol() (*chess.Piece method*), 20

V

var (*chess.engine.Option attribute*), 57
variation() (*chess.pgn.GameNode method*), 37
variation_san() (*chess.Board method*), 27
variations (*chess.pgn.GameNode attribute*), 36
visit_board() (*chess.pgn.BaseVisitor method*), 40
visit_comment() (*chess.pgn.BaseVisitor method*), 40
visit_header() (*chess.pgn.BaseVisitor method*), 39
visit_move() (*chess.pgn.BaseVisitor method*), 40
visit_nag() (*chess.pgn.BaseVisitor method*), 40
visit_result() (*chess.pgn.BaseVisitor method*), 40

W

wait() (*chess.engine.AnalysisResult method*), 55
Wdl (*class in chess.engine*), 53
wdl() (*chess.engine.PovScore method*), 52
wdl() (*chess.engine.Score method*), 53
weight (*chess.polyglot.Entry attribute*), 43
weighted_choice() (*chess.polyglot.MemoryMappedReader method*), 44
white() (*chess.engine.PovScore method*), 52
white() (*chess.engine.PovWdl method*), 53
white_clock (*chess.engine.Limit attribute*), 49
white_inc (*chess.engine.Limit attribute*), 49
winning_chance() (*chess.engine.Wdl method*), 54
wins (*chess.engine.Wdl attribute*), 53

X

XBoardProtocol (*class in chess.engine*), 59

Z

zobrist_hash() (*in module chess.polyglot*), 44