Python, základní kameny až skály II
kombinace objektů - skládání, dědění

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slovníky, dictionary, `dict()`

```
1  d = {}
2  d[1] = 'a'
3  d[0] = 'b'
4  d[2] = 'c'
5
6  print('for key in d:')
7  for key in d:
8      print(key, d[key])
9
10 print('for key, value in d.items():')
11 for key, value in d.items():
12     print(key, value)
13
14 print('for key in sorted(d.keys()):')
15 for key in sorted(d.keys()):
16     print(key, d[key])
```

dicts.py

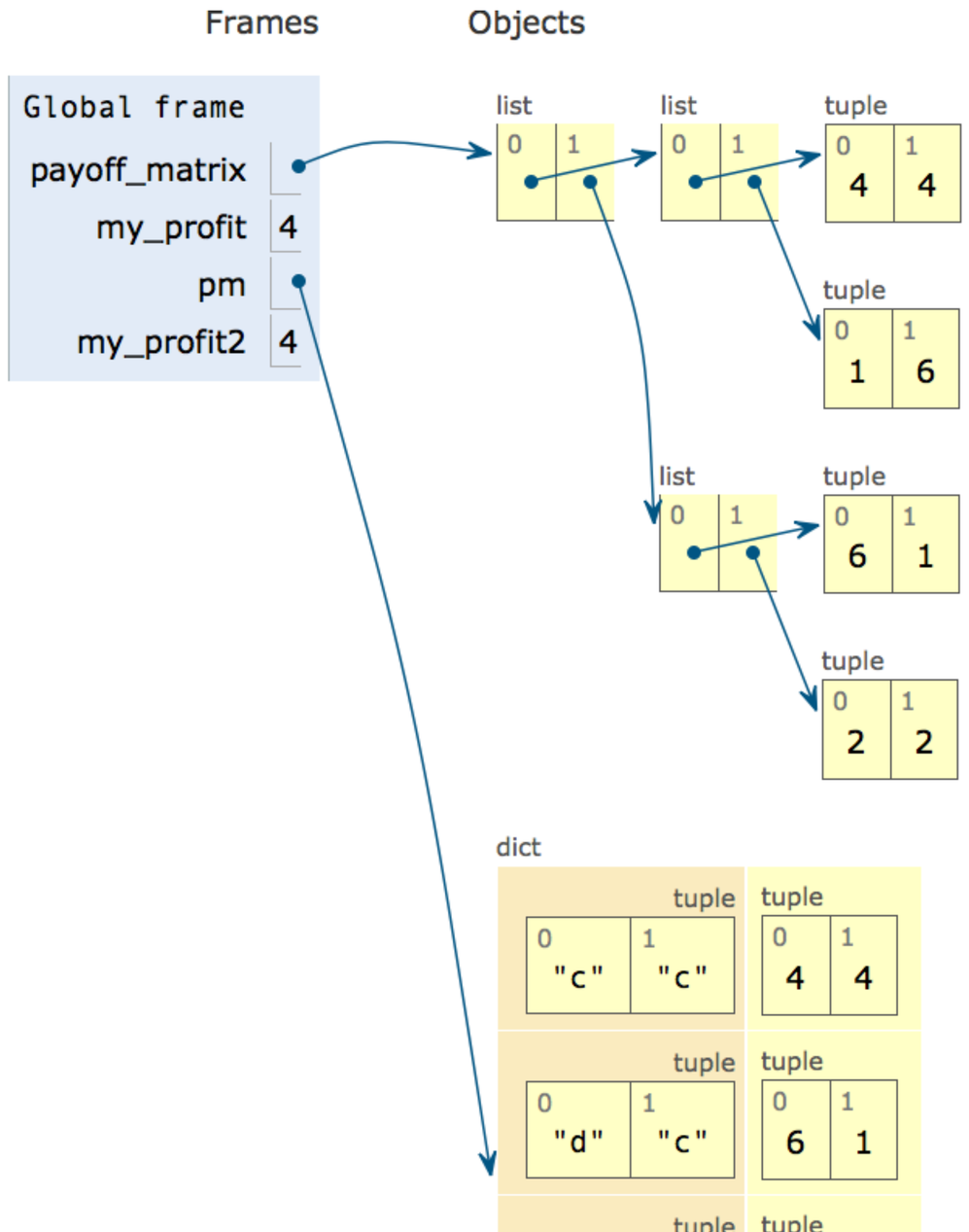
dict - tuples as keys

Write code in Python 3.3 (drag lower right corner to resize code editor)

```
1  payoff_matrix = [ [(4,4),(1,6)] , [(6,1),(2,2)] ]
2  # cooperate, cooperate, mine
3  my_profit = payoff_matrix[0][0][0]
4
5  pm = {}
6  pm['c','c'] = (4,4)
7  pm['d','d'] = (2,2)
8  pm['c','d'] = (1,6)
9  pm['d','c'] = (6,1)
10 my_profit2 = pm['c','c'][0]
11
```

line that has just executed

next line to execute



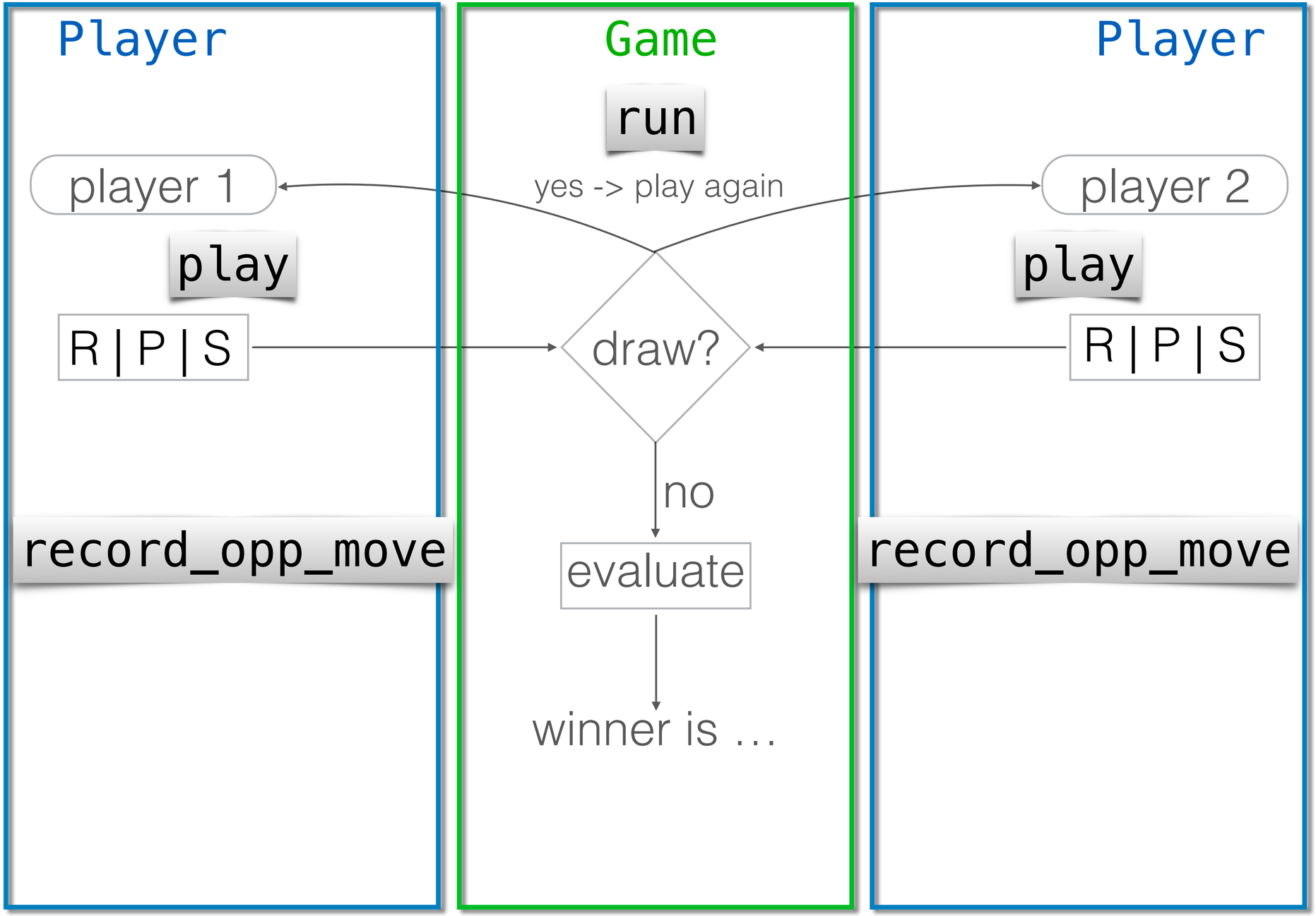
dictionary loops …

```
1 pm = {}
2 pm['c','c'] = (4,4)
3 pm['d','d'] = (2,2)
4 pm['c','d'] = (1,6)
5 pm['d','c'] = (6,1)
6
7 for key in pm:
8     print(key, pm[key])
9
10 for key,value in pm.items():
11     print(key, value)
```

http://openbookproject.net/thinkcs/python/english3e/dictionaries.html

skládání objektů, dědění

- vylepšíme trochu hráče R-P-S
- ukážeme si na příkladu hráče piškvorek (tic-tac-toe)
- live-coding-session


Player
Game
Player
run
player 1
yes -> play again
player 2
play
play
R | P | S
draw?
R | P | S
no
record_opp_move
evaluate
record_opp_move
winner is …

vylepšení hráče R-P-S

- Společné do základní třídy BasePlayer
- Rozdílné strategie jako různí hráči
- Oddělení (zapouzdření) technikalit správy hráčovy paměti
- A také vylepšíme hru na typ 2 za 3
- a ukážeme možnost jak řídit ukecanost běhu hry
- *# bude se hodit při implementaci Reversi hráče*

BasePlayer, RandomPlayer …

- `play()`
- `record_opp_move(move)`
- `ConstantPlayer, RandomPlayer`
- `SkewedPlayer`
- `SmartPlayer`

Lepší paměť

- `__init__(size)` # chceme omezit velikost
- `update(element)` # remember?
- kontrola přípustnosti vkládaného prvku
- `get_most_frequent()` # jaky je nejcastejsi prvek

Skládání objektů

```
class Memory:
    def __init__(self, size=None):
        self.cyclic = size is not(None)
        if self.cyclic:
            self.data = size*[None]
        else:
            self.data = []
        self.frequencies = dict()
        for move in POSSIBLE_MOVES:
            self.frequencies[move] = 0

    def update(self, move):
        assert move in POSSIBLE_MOVES, str(move)+' is not acceptable'
        self.frequencies[move] += 1
        if self.cyclic:
            del self.data[-1]
        self.data.insert(0, move)

    def get_most_frequent(self):
        return max(self.frequencies, key=self.frequencies.get)

class BasePlayer:
    def __init__(self):
        self.my_moves = Memory(100)
        self.opp_moves = Memory(100)

    def record_opp_move(self, move):
        self.opp_moves.update(move)

    def play(self):
        my_move = self.find_move()
        self.my_moves.update(my_move)
        return my_move

```

Skládání objektů

```
1  class Memory:
2      def __init__(self, size=None):
3          self.cyclic = size is not(None)
4          if self.cyclic:
5              self.data = size*[None]
6          else:
7              self.data = []
8          self.frequencies = dict()
9          for move in POSSIBLE_MOVES:
10             self.frequencies[move] = 0
11
12     def update(self, move):
13         assert move in POSSIBLE_MOVES, str(move)+' is not acceptable'
14         self.frequencies[move] += 1
15         if self.cyclic:
16             del self.data[-1]
17         self.data.insert(0, move)
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22 class BasePlayer:
23     def __init__(self):
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25         self.opp_moves = Memory(100)
26
27     def record_opp_move(self, move):
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29
30     def play(self):
31         my_move = self.find_move()
32         self.my_moves.update(my_move)
33         return my_move
34
```

Dědění

nahrazení metody

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class BasePlayer:
    def __init__(self):
        self.my_moves = Memory(100)
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    def record_opp_move(self, move):
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    def play(self):
        my_move = self.find_move()
        self.my_moves.update(my_move)
        return my_move

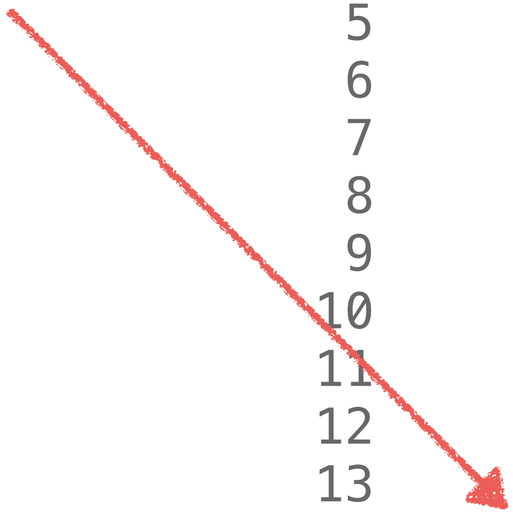
    def find_move(self):
        raise NotImplementedError

    def __str__(self):
        return 'Player '+ self.__class__.__name__

class RandomPlayer(BasePlayer):
    def find_move(self):
        return random.choice(POSSIBLE_MOVES)
```

Dědění

nahrazení metody



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8
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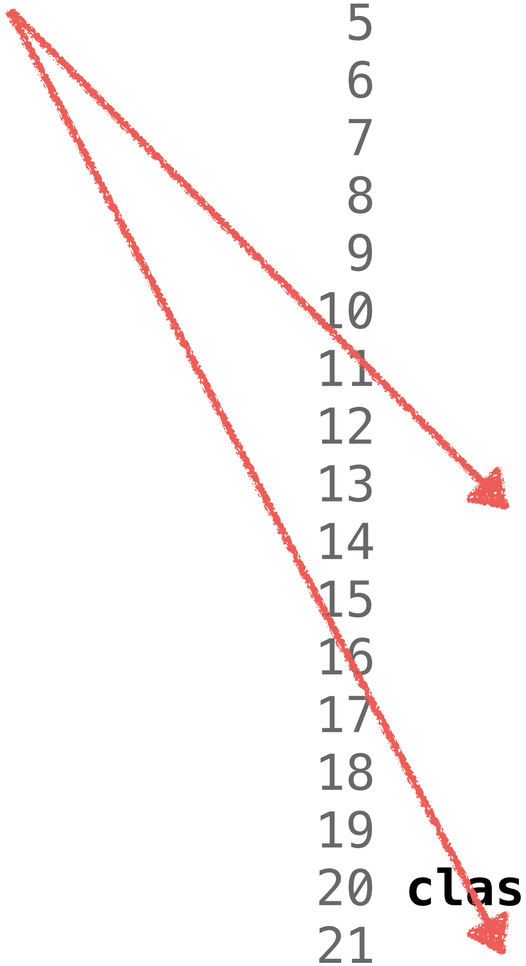
Dědění

nahrazení metody



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```

Volání metod rodičovské třídy/objektu

```
class BasePlayer:
    def __init__(self):
        self.my_moves = Memory(100)
        self.opp_moves = Memory(100)

    def record_opp_move(self, move):
        self.opp_moves.update(move)

    def play(self):
        my_move = self.find_move()
        self.my_moves.update(my_move)
        return my_move

    def find_move(self):
        raise NotImplementedError

    def __str__(self):
        return 'Player '+ self.__class__.__name__

class SkewedRandom(BasePlayer):
    def __init__(self, weights):
        super().__init__()
        self.weights = weights

    def find_move(self):
        return random.choices(POSSIBLE_MOVES, self.weights)[0]
```

Volání metod rodičovské třídy/objektu

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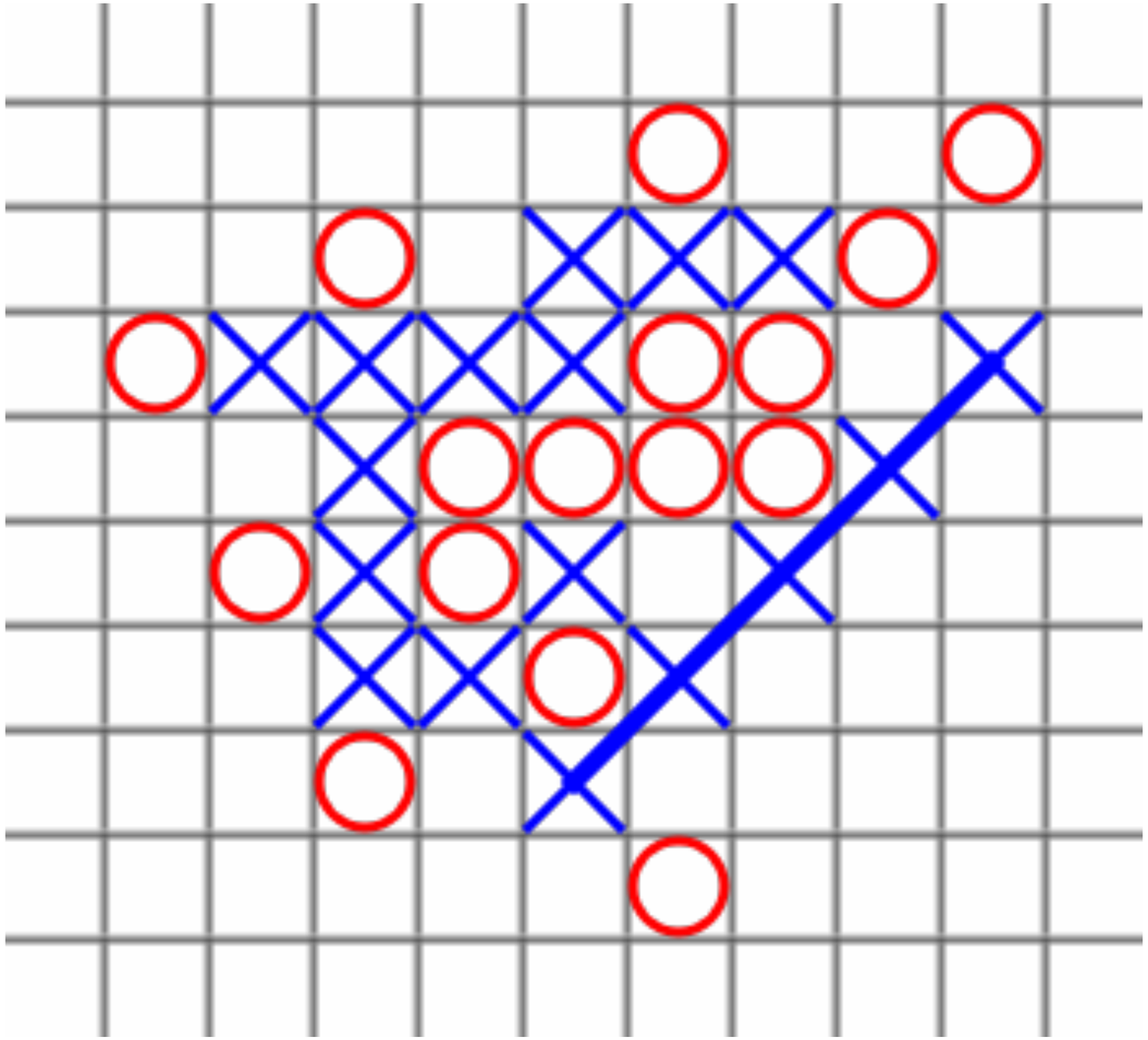
```

Piškvorky, tic-tac-toe, m,n,k-game



By DaBler - Own work, Public Domain, https://commons.wikimedia.org/w/index.php?curid=5506040

skládání

```
13
14  class MyPlayer:
15      def __init__(self, mine_sym, opponent_sym, empty_sym):
16          """
17              :param mine_sym: string my symbol
18              :param opponent_sym: string opponent symbol
19              :param empty_sym: string empty symbol
20              :param win_length: int number of own symbols in a row
21              :return:
22          """
23          self.m = mine_sym
24          self.o = opponent_sym
25          self.empty = empty_sym
26          self.pf = playfield.PlayField(empty_sym=self.empty)
27
28      def play(self, field):...
36
37      def find_best_move(self, moves):...
40
```

skládání

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dědění

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42  class RandomPlayerSimple(MyPlayer):
43      '''a simple implmentation but not the fastest I'm afraid'''
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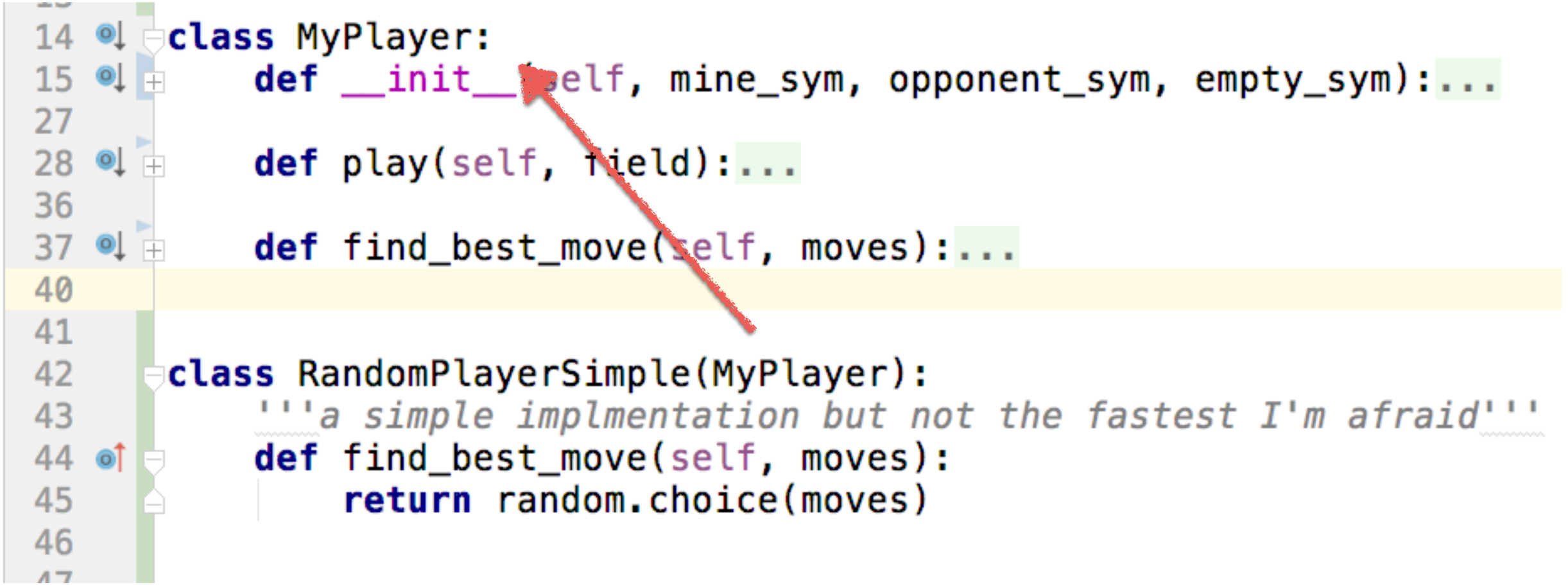
45          return random.choice(moves)
46
```

dědění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```

Kompetence

- slovník (*indexování klíčem*)
- třídy/objekty - jak sdružit společné a implementovat odlišné (*dědíme od společného předka*)
- jak si potřebnou funkcionalitu nebo službu půjčit (své dovednosti *složím* z jiných)