TALLINNA TEHNIKAÜLIKOOL
TALLINN UNIVERSITY OF TECHNOLOGY

Programmeerimise süvendatud algkursus ITI0140

2015

Teemad

- Järjendi konstrueerimine (ingl *list comprehension*)
- Lambda funktsioon (ingl *lambda function*)
- Generaator (ingl *generator*)

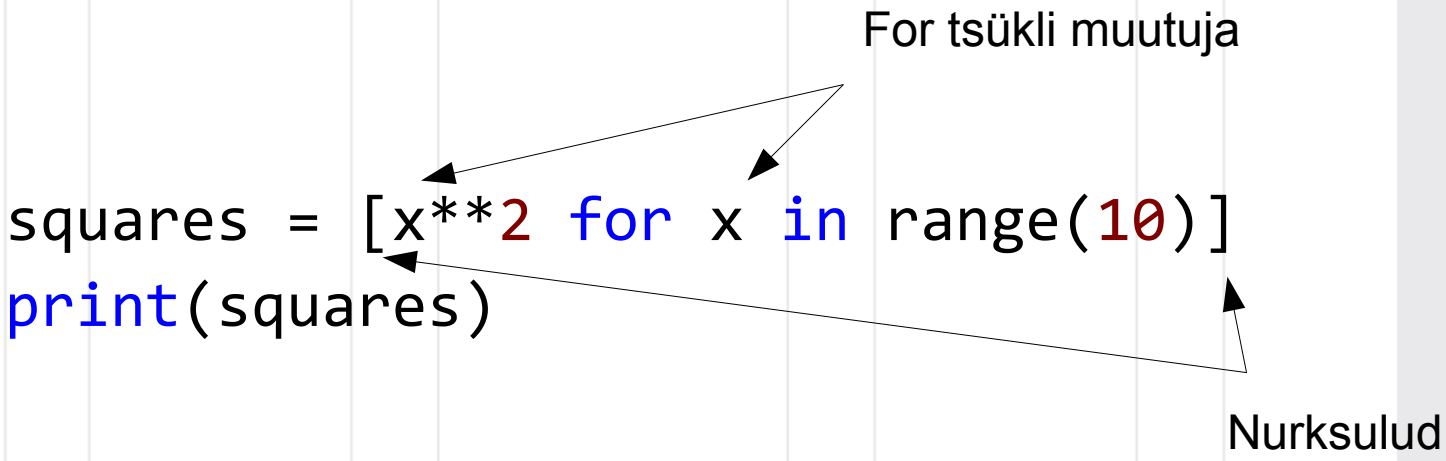
Järjendi konstrueerimine

"Klassikaline" for tsükkel

```
squares = []
for x in range(10):
    squares.append(x**2)
print(squares)
```

```
[0, 1, 4, 9, 16, 25, 36, 49, 64, 81]
```

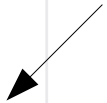
Järjendi konstrueerimine



```
[0, 1, 4, 9, 16, 25, 36, 49, 64, 81]
```

Järjendi konstrueerimine

Kui muutujat pole vaja



```
constant = [123 for _ in range(3)]
print(constant)
```

```
[123, 123, 123]
```

Järjendi konstrueerimine

```
l = [(x, y) for x in [1,2,3] for y in
[3,1,4] if x != y]

print(l)
```

If-lauset saab kasutada filtreerimiseks

```
[(1, 3), (1, 4), (2, 3), (2, 1), (2, 4), (3,
1), (3, 4)]
```

Muud konstrueerimised

```
a = {x for x in 'abracadabra' if x not in 'abc'}
print(a)
```

```
{'r', 'd'}
```

```
dictionary = {x: x**2 for x in (2, 4, 6)}
print(dictionary)
```

```
{2: 4, 4: 16, 6: 36}
```

Tavapärane funktsioon

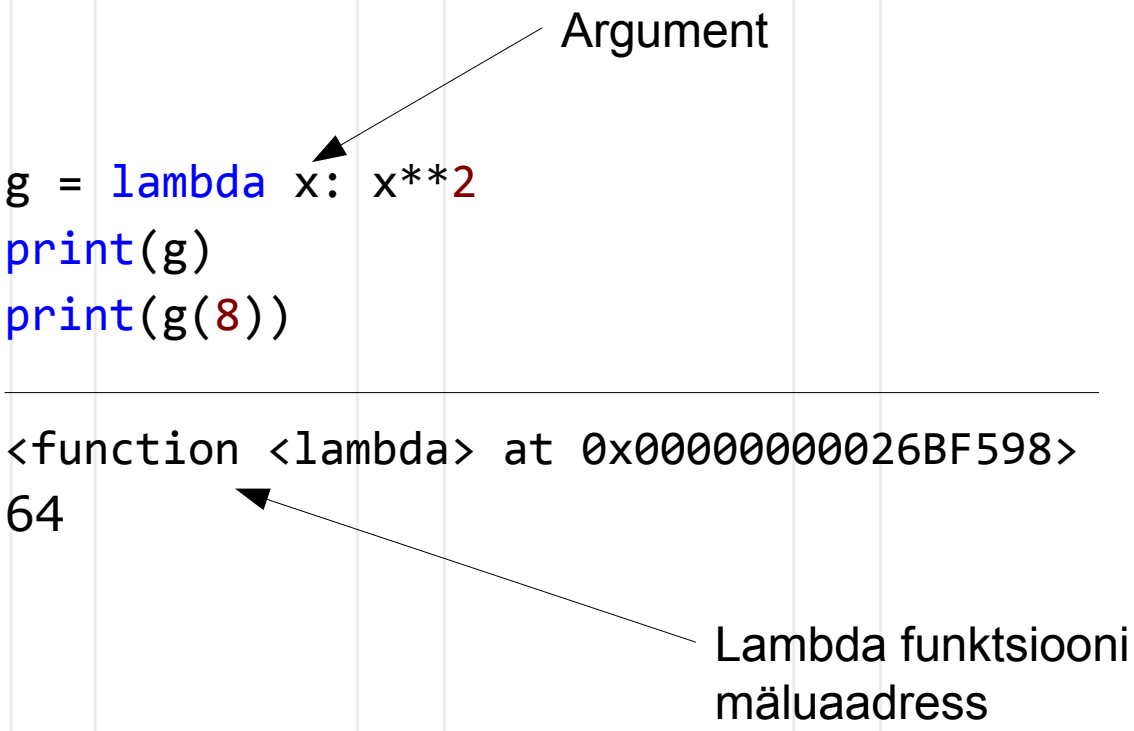
```
def f(x):
    return x**2
```

```
print(f)
print(f(8))
```

```
<function f at 0x00000000026BF6A8>
64
```

Funktsiooni mäluaadress

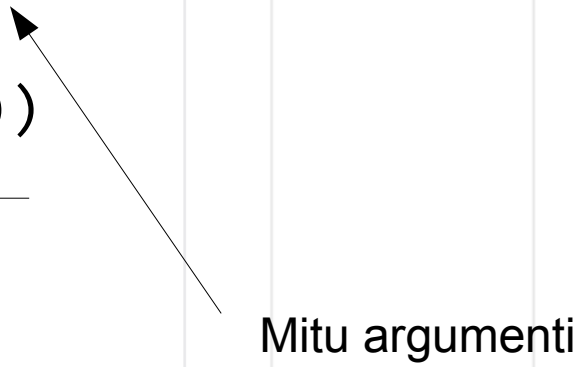
Lambda (anonüümne funktsioon)



Lambda mitme argumendiga

```
g = lambda x, y, z: x**2 + y**3 + z**4
print(g(2, 3, 4))
```

```
287
```



Filter (filtreerimine)

```
l = [2, 18, 9, 22, 17, 24, 8, 12, 27]
print(list(
      filter(lambda x: x % 3 == 0, l)))
```

```
[18, 9, 24, 12, 27]
```

Iterable (nt järjend, hulk jne)

Filtrifunktsioon, mida rakendatakse igale elemendile

Map (operatsioonid väärtustega)

```
l = [2, 18, 9, 22, 17, 24, 8, 12, 27]
print(list(map(lambda x: x * 2 + 10,
l)))
```

Iterable

Funktsioon, mida rakendatakse igale elemendile

[14, 46, 28, 54, 44, 58, 26, 34, 64]

Generaator

```
def gen():
    yield 3
    yield 5
    yield 9

def main():
    x = gen()
    for i in range(4):
        print(next(x))
```

NB! Mitte return

Küsime generaatorilt järgmise väärtuse

NB! next() ei kasuta i väärtust

```
3
5
9
Traceback (most recent call last):
    print(next(x))
StopIteration
```

Generaator

```
def reverse(data):
    for index in range(len(data)-1, -1, -1):
        yield data[index]

for char in reverse("golf"):
    print(char, end=".")
```

---

f.l.o.g.

Generaator

```
def counter (maximum):
    i = 0
    while i < maximum:
        yield i
        i += 1


x = list(counter(4))
print(x)
```

```
[0, 1, 2, 3]
```

NB! Kui generaator genereerib **palju väärtusi**, siis võib järjend **väga suureks** minna, sest **kõik väärtused laetakse mällu** (generaatori eelised kaovad)

Generaator

```
def counter (maximum):
    i = 0
    while i < maximum:
        yield i
        i += 1


x = counter(4)
for i in x:
    print(i)
```

```
0
1
2
3
```

Küsime generaatorilt ühe väärtuse, teeme sellega midagi, siis küsime järgmise väärtuse

Millal siis mida kasutada?

```
l = [1, 2, 3, 4, 5, 6, 7, 8, 9]

m4 = filter(lambda x: x % 4 == 0, l)
print(list(m4))


def filter_function(x):
    return x % 4 == 0

m4 = filter(filter_function, l)
print(list(m4))


m4 = [x for x in l if x % 4 == 0]
print(list(m4))
```

Tulemus sama!

```
[4, 8]
[4, 8]
[4, 8]
```

Lambda tagastamisel

```
def multiply(n):
    print("n =", n)
    return lambda x: x * n

f = multiply(3)
print(f)
print(f(4))
print(f(5))
```

Mõnes kohas on lambda kasutamine lühem, kavalam, mugavam, loetavam ja/või kiirem!

Sama kehtib generaatori ja listi konstrueerimise kohta.

```
>>>> n = 3
<function multiply.<locals>.<lambda> at
0x000000000260FEA0>
12
15
```

Veel mõned näited

```
def g():
    """
    Generate positive integers.
    """
    n = 0
    while True:
        n += 1
        yield n

if __name__ == "__main__":
    print(g) # <function g at 0x0000000001D0CC80>
    print(g()) # <generator object g at 0x0000000002282750>
    print(next(g())) # 1
    print(next(g())) # 1?
    gen = g()
    print(next(gen)) # 1
    print(next(gen)) # 2
    print([next(gen) for _ in range(5)]) # print(list(g())[:100])
```

Miks 1?

Mis siin juhtub?

[3, 4, 5, 6, 7]

Ülesanne

Ülesanne on nähtaval

https://ained.ttu.ee
https://courses.cs.ttu.ee/pages/ITI0140