class Operator:

*def* \_\_init\_\_(self, id\_operator, name, salary):

self.id\_operator = id\_operator

self.name = name

self.salary = salary

class ProgrammingLanguage:

*def* \_\_init\_\_(self, id\_language, title):

self.id\_language = id\_language

self.title = title

class OperatorLanguage:

*def* \_\_init\_\_(self, id\_operator, id\_language):

self.id\_operator = id\_operator

self.id\_language = id\_language

*# Список операторов*

operators = [

Operator(1, "Иванов И.И.", 60000),

Operator(2, "Петров П.П.", 70000),

Operator(3, "Сидоров С.С.", 65000),

Operator(4, "Кузнецов К.К.", 80000),

]

*# Список языков программирования*

programming\_languages = [

ProgrammingLanguage(1, "Python"),

ProgrammingLanguage(2, "Java"),

ProgrammingLanguage(3, "C++"),

]

*# Связь между операторами и языками программирования*

operator\_languages = [

OperatorLanguage(1, 1),

OperatorLanguage(1, 2),

OperatorLanguage(2, 3),

OperatorLanguage(3, 1),

OperatorLanguage(4, 2),

OperatorLanguage(4, 3),

]

*def* list\_operators\_by\_language():

result = []

for lang in programming\_languages:

related\_operators = [op.name for op in operators if any(ol.id\_operator == op.id\_operator and ol.id\_language == lang.id\_language for ol in operator\_languages)]

for operator\_name in related\_operators:

result.append((lang.title, operator\_name))

result.sort(key=*lambda* x: x[0]) *# Сортировка по языку программирования*

return result

*def* total\_salary\_by\_language():

salary\_by\_language = {}

for ol in operator\_languages:

operator = next(op for op in operators if op.id\_operator == ol.id\_operator)

language = next(lang for lang in programming\_languages if lang.id\_language == ol.id\_language)

if language.title not in salary\_by\_language:

salary\_by\_language[language.title] = 0

salary\_by\_language[language.title] += operator.salary

return sorted(salary\_by\_language.items(), key=*lambda* x: x[1], reverse=True) *# Сортировка по зарплате*

*def* java\_operators():

result = {}

for lang in programming\_languages:

if "Java" in lang.title:

result[lang.title] = [op.name for op in operators if any(ol.id\_operator == op.id\_operator and ol.id\_language == lang.id\_language for ol in operator\_languages)]

return result

if \_\_name\_\_ == "\_\_main\_\_":

print("Список операторов и языков программирования:")

for lang\_title, op\_name in list\_operators\_by\_language():

print(f"Язык: {lang\_title}, Оператор: {op\_name}")

print("\nСуммарная зарплата операторов по языкам программирования:")

for lang\_title, total\_salary in total\_salary\_by\_language():

print(f"Язык: {lang\_title}, Суммарная зарплата: {total\_salary}")

print("\nОператоры, использующие языки 'Java':")

for lang\_title, ops in java\_operators().items():

РЕЗУЛЬТА:

print(f"Язык: {lang\_title}, Операторы: {', '.join(ops)}")

