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Вариант 15 = "Файл - Каталог файлов"  
Вариант запросов - Д

Текст программы:

```
from operator import itemgetter

class File:
    def __init__(self, id, name, size, cat_id):
        self.id = id
        self.name = name # Название файла (с расширением)
        self.size = size # Размер файла (в Б)
        self.cat_id = cat_id

class Cat:
    def __init__(self, id, name):
        self.id = id
        self.name = name

class Pair:
    def __init__(self, cat_id, file_id):
        self.cat_id = cat_id
        self.file_id = file_id

cats = [
    Cat(1, 'Desktop'),
    Cat(2, 'Documents'),
    Cat(3, 'Downloads'),
    Cat(4, 'Music'),
    Cat(5, 'Pictures'),
    Cat(6, 'Videos'),
]

files = [
    File(1, 'wallpaper.jpg', 3000000, 5),
```

```
File(2, 'passwords.txt', 2048, 2),
File(3, 'virus.exe', 20000000, 3),
File(4, 'log.txt', 3000000, 2),
File(5, 'readme.txt', 25000, 3),
File(6, 'flower.jpg', 4000000, 5),
]
```

```
pair_list = [
    Pair(1, 1),
    Pair(5, 1),
    Pair(2, 2),
    Pair(1, 3),
    Pair(2, 3),
    Pair(3, 3),
    Pair(4, 3),
    Pair(5, 3),
    Pair(6, 3),
    Pair(2, 4),
    Pair(2, 5),
    Pair(3, 5),
    Pair(5, 6),
]
```

```
def main():
```

```
    O2M = [(f.name, f.size, c.name)
            for f in files
            for c in cats
            if f.cat_id == c.id]
```

```
    M2M = [(f.name, f.size, cat_name)
            for cat_name, file_id in [(c.name, p.file_id) for c in cats for p in
pair_list if c.id == p.cat_id]
            for f in files
            if f.id == file_id]
```

```
    print('D1 - All .txt files and cats')
```

```

res_1 = [(file_name, cat_name)
         for file_name, file_size, cat_name in O2M
         if file_name.endswith('.txt')]
print(res_1)

print('D2 - Cats by average file size')
res_2 = []
for c in cats:
    c_files = list(filter(lambda i: i[2] == c.name, O2M))
    if len(c_files) > 0:
        f_size = [size for _, size, _ in c_files]
        c_size = sum(f_size)
        res_2.append((c.name, c_size / len(c_files)))
res_2 = sorted(res_2, key = itemgetter(1), reverse = True)
print(res_2)

print('D3 - All cats starting with D (and files)')
res_3 = {}
for c in cats:
    if c.name.startswith('D'):
        c_files = [name for name, _, _ in list(filter(lambda i: i[2] ==
c.name, M2M))]
        res_3[c.name] = c_files
print(res_3)

if __name__ == '__main__':
    main()

```

## Результат выполнения:

D1 - All .txt files and cats

```
[('passwords.txt', 'Documents'), ('log.txt', 'Documents'), ('readme.txt',
'Downloads')]
```

D2 - Cats by average file size

```
[('Downloads', 10012500.0), ('Pictures', 3500000.0), ('Documents',
1501024.0)]
```

D3 - All cats starting with D (and files)

```
{'Desktop': ['wallpaper.jpg', 'virus.exe'], 'Documents': ['passwords.txt',  
'virus.exe', 'log.txt', 'readme.txt'], 'Downloads': ['virus.exe',  
'readme.txt']}
```