

# Lab 9



## Django Models (Part 3)

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# Part 1, 2 and 3

This screenshot shows the Django migration process in VS Code. The terminal displays the command `python manage.py makemigrations bookmodule` and its output, which lists the migrations to be created: `0003_card_course_department_students.py`. The file explorer on the left shows the project structure, including the `bookmodule` app. The code editor shows the `Card` model in `models.py` with a `card_number` field.

```
class Card(models.Model):
    card_number = models.IntegerField()

    def __str__(self):
        return str(self.card_number)
```

This screenshot shows the Django models for the `bookmodule` app in VS Code. The code editor displays the `models.py` file, which defines the `Card`, `Department`, `Course`, and `Students` models. The `Card` model has a `card_number` field. The `Department` model has a `name` field. The `Course` model has a `title` field. The `Students` model has a `name` field and a `card` field that is a `OneToOneField` to the `Card` model.

```
class Card(models.Model):
    card_number = models.IntegerField()

    def __str__(self):
        return str(self.card_number)

class Department(models.Model):
    name = models.CharField(max_length=50)

    def __str__(self):
        return self.name

class Course(models.Model):
    title = models.CharField(max_length=50)
    code = models.IntegerField()

    def __str__(self):
        return f'{self.title} ({self.code})'

class Students(models.Model):
    name = models.CharField(max_length=50)
    card = models.OneToOneField(Card, on_delete=models.PROTECT)
    department = models.ForeignKey(Department, on_delete=models.CASCADE)
    course = models.ManyToManyField(Course)
```

This screenshot shows the Django database interface in VS Code. The `bookmodule_card` table is selected, and the `id` field is highlighted. The table structure shows the `id` field as a primary key and the `card_number` field as a foreign key. The `id` field is highlighted in the table structure, and the `card_number` field is highlighted in the table data.

id	card_number
1	1001
2	1002
3	1003
4	1004
5	1005

This screenshot shows the Django database interface in VS Code with a query editor open. The query editor displays the `INSERT INTO 'bookmodule_card' ('id', 'card_number') VALUES (1, 1)` statement. The table structure and data are also visible in the background.

```
INSERT INTO 'bookmodule_card' ('id', 'card_number') VALUES (1, 1)
```

# Part 1, 2 and 3

The screenshot shows the SQL Studio interface with the following SQL script in the editor:

```
-- database: c:\Users\jouda\Desktop\CS471\libraryproj
1 -- database: c:\Users\jouda\Desktop\CS471\libraryproj
2
3 SELECT * FROM bookmodule_department;
4
5 D Execute (Shift + Enter)
6
7 INSERT INTO bookmodule_department (id, name) VALUES
8 (1, 'Computer Science'),
9 (2, 'Mathematics'),
10 (3, 'Physics');
```

The table schema for `bookmodule_department` is shown in the left pane:

id	name
INTEGER NOT NULL	VARCHAR(50) NOT NULL

The table is currently empty.

The screenshot shows the SQL Studio interface with the following SQL script in the editor:

```
-- database: c:\Users\jouda\Desktop\CS471\libraryproj
1 -- database: c:\Users\jouda\Desktop\CS471\libraryproj
2
3 SELECT * FROM bookmodule_course;
4
5 D Execute (Shift + Enter)
6
7 INSERT INTO bookmodule_course (id, title, code) VALUES
8 (1, 'Data Structures', 201),
9 (2, 'Linear Algebra', 202),
10 (3, 'Quantum Mechanics', 203);
```

The table schema for `bookmodule_course` is shown in the left pane:

id	title	code
INTEGER NOT NULL	VARCHAR(50) NOT NULL	INTEGER NOT NULL

The table is currently empty.

The screenshot shows the SQL Studio interface with the following SQL script in the editor:

```
-- database: c:\Users\jouda\Desktop\CS471\libraryproj
1 -- database: c:\Users\jouda\Desktop\CS471\libraryproj
2
3 SELECT * FROM bookmodule_students_course;
4
5 D Execute (Shift + Enter)
6
7 INSERT INTO bookmodule_students_course (students_id,
8 course_id) VALUES
9 (1, 1), -- Alice -> Data Structures
10 (1, 2), -- Alice -> Linear Algebra
11 (2, 2), -- Bob -> Linear Algebra
12 (3, 2), -- Charlie -> Linear Algebra
13 (4, 3), -- Charlie -> Quantum Mechanics
14 (4, 3), -- David -> Quantum Mechanics
15 (5, 1); -- Eve -> Data Structures
```

The table schema for `bookmodule_students_course` is shown in the left pane:

students_id	course_id
INTEGER NOT NULL	INTEGER NOT NULL

The table is currently empty.

The screenshot shows the SQL Studio interface with the following SQL script in the editor:

```
-- database: c:\Users\jouda\Desktop\CS471\libraryproj
1 -- database: c:\Users\jouda\Desktop\CS471\libraryproj
2
3 SELECT * FROM bookmodule_students;
4
5 D Execute (Shift + Enter)
6
7 INSERT INTO bookmodule_students (id, name,
8 card_id, department_id) VALUES
9 (1, 'Alice', 1, 1),
10 (2, 'Bob', 2, 1),
11 (3, 'Charlie', 3, 2),
12 (4, 'David', 4, 3),
13 (5, 'Eve', 5, 1);
```

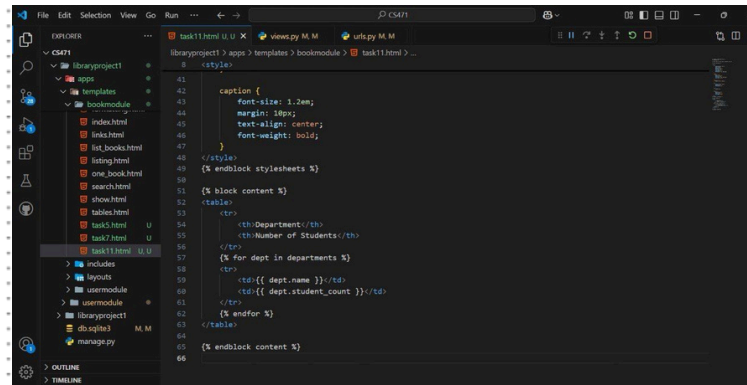
The table schema for `bookmodule_students` is shown in the left pane:

id	name	card_id	department_id
INTEGER NOT NULL	VARCHAR(50) NOT NULL	INTEGER NOT NULL	INTEGER NOT NULL

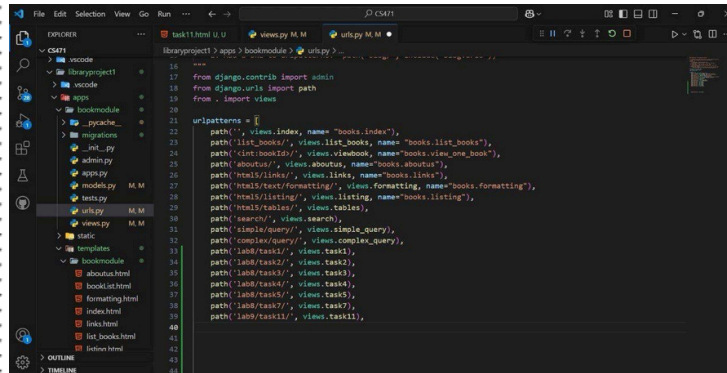
The table is currently empty.

# Task 1

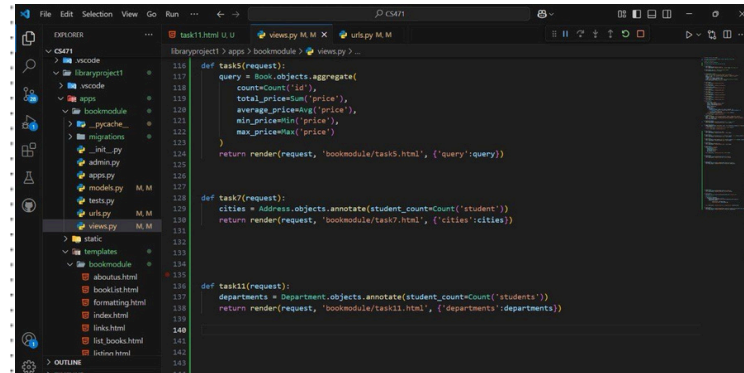
## Code



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41  
42  
43 caption {  
44     font-size: 1.2em;  
45     margin: 10px;  
46     text-align: center;  
47     font-weight: bold;  
48 }  
49 </style>  
50  
51 {% endblock stylesheets %}  
52  
53 {% block content %}  
54 <table>  
55     <tr>  
56         <th>Department</th>  
57         <th>Number of Students</th>  
58     </tr>  
59     {% for dept in departments %}  
60     <tr>  
61         <td>{{ dept.name }}</td>  
62         <td>{{ dept.student_count }}</td>  
63     </tr>  
64     {% endfor %}  
65 </table>  
66  
67 {% endblock content %}
```



```
16  
17 from django.contrib import admin  
18 from django.urls import path  
19 from . import views  
20  
21 urlpatterns = [  
22     path('', views.index, name='books:index'),  
23     path('list_books/', views.list_books, name='books:list_books'),  
24     path('list_books_id/', views.view_book, name='books:view_one_book'),  
25     path('aboutus/', views.aboutus, name='books:aboutus'),  
26     path('htmls/links/', views.links, name='books:links'),  
27     path('htmls/text/formatting/', views.formatting, name='books:formatting'),  
28     path('htmls/listing/', views.listing, name='books:listing'),  
29     path('htmls/tables/', views.tables),  
30     path('search/', views.search),  
31     path('simple/query/', views.simple_query),  
32     path('complex/query/', views.complex_query),  
33     path('lab8/task1/', views.task1),  
34     path('lab8/task2/', views.task2),  
35     path('lab8/task3/', views.task3),  
36     path('lab8/task4/', views.task4),  
37     path('lab8/task5/', views.task5),  
38     path('lab8/task7/', views.task7),  
39     path('lab8/task11/', views.task11),  
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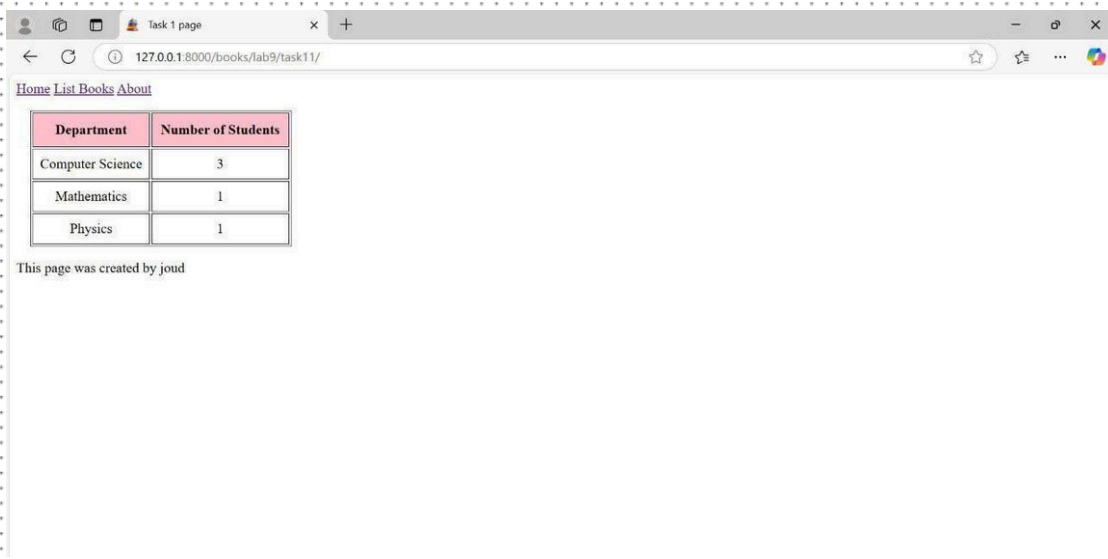


```
116  
117 def tasks(request):  
118     query = Book.objects.aggregate(  
119         count=Count('id'),  
120         total_price=Sum('price'),  
121         average_pricing=Avg('price'),  
122         min_price=Min('price'),  
123         max_price=Max('price')  
124     )  
125     return render(request, 'bookmodule/task5.html', {'query': query})  
126  
127  
128 def task7(request):  
129     cities = Address.objects.annotate(student_count=Count('student'))  
130     return render(request, 'bookmodule/task7.html', {'cities': cities})  
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# Task 1

## Output

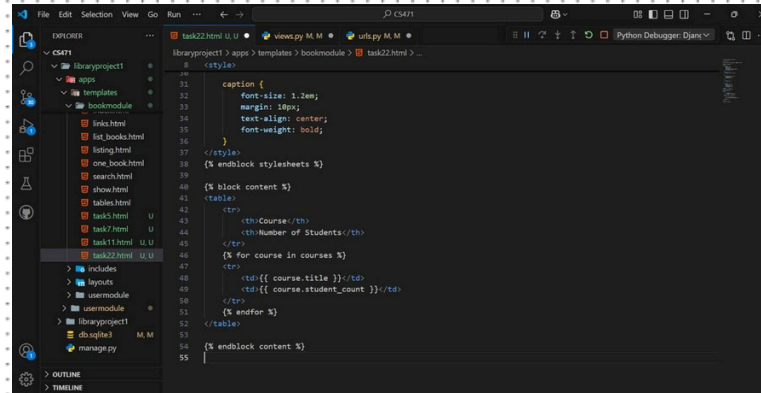


The screenshot shows a web browser window with the title "Task 1 page". The address bar displays the URL "127.0.0.1:8000/books/lab9/task11/". Below the address bar, there are navigation links: "Home", "List", "Books", and "About". The main content area features a table with two columns: "Department" and "Number of Students". The table contains three rows of data: "Computer Science" with 3 students, "Mathematics" with 1 student, and "Physics" with 1 student. At the bottom of the page, a footer message states "This page was created by joud".

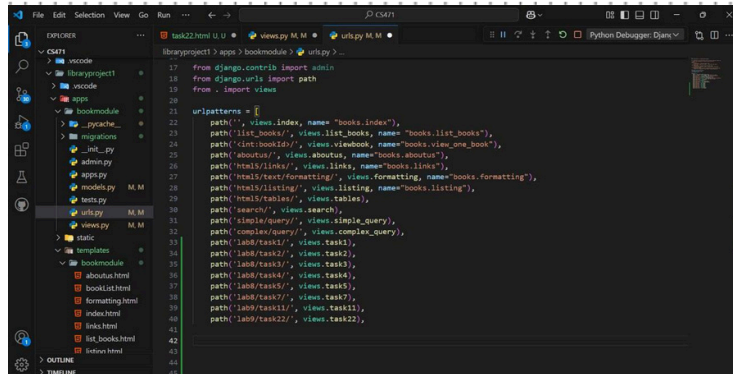
Department	Number of Students
Computer Science	3
Mathematics	1
Physics	1

This page was created by joud

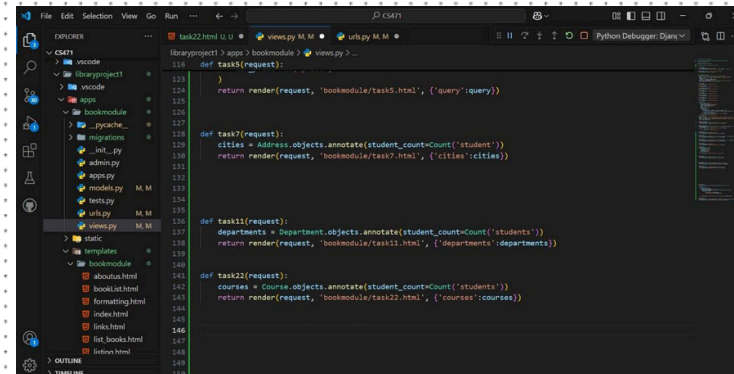
# Task 2 Code



```
1 <style>
2
3
4
5
6
7
8
9
10
11 caption {
12     font-size: 1.2em;
13     margin: 10px;
14     text-align: center;
15     font-weight: bold;
16 }
17 </style>
18 {% endblock stylesheets %}
19
20 {% block content %}
21 <table>
22
23     <tr>
24         <th>Course</th>
25         <th>Number of Students</th>
26     </tr>
27
28     {% for course in courses %}
29     <tr>
30         <td{{ course.title }}</td>
31         <td{{ course.student_count }}</td>
32     </tr>
33     {% endfor %}
34 </table>
35
36 {% endblock content %}
37
```

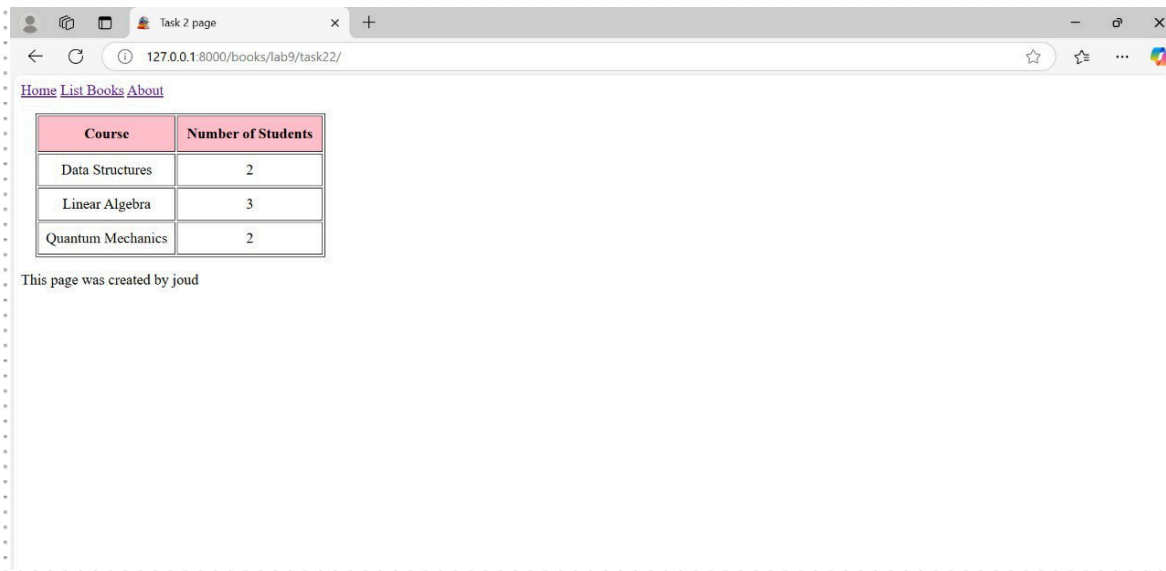


```
1 from django.conf.urls import url
2 from django.urls import path
3 from . import views
4
5 urlpatterns = [
6     path('', views.index, name='books:index'),
7     path('list_books/', views.list_books, name='books:list_books'),
8     path('<int:bookId>', views.view_book, name='books:view_one_book'),
9     path('about/', views.aboutus, name='books:aboutus'),
10     path('htmls/list/', views.list_html, name='books:htmls'),
11     path('htmls/text/formatting/', views.formatting, name='books:formatting'),
12     path('htmls/listing/', views.listing, name='books:listing'),
13     path('htmls/tables/', views.tables, name='books:tables'),
14     path('search/', views.search, name='books:search'),
15     path('simple/query/', views.simple_query, name='books:simple_query'),
16     path('complex/query/', views.complex_query, name='books:complex_query'),
17     path('lab8/task1/', views.task1, name='books:task1'),
18     path('lab8/task2/', views.task2, name='books:task2'),
19     path('lab8/task3/', views.task3, name='books:task3'),
20     path('lab8/task4/', views.task4, name='books:task4'),
21     path('lab8/task5/', views.task5, name='books:task5'),
22     path('lab8/task7/', views.task7, name='books:task7'),
23     path('lab8/task8/', views.task8, name='books:task8'),
24     path('lab8/task22/', views.task22, name='books:task22'),
25 ]
```



```
1 from django.shortcuts import render
2 from django.http import HttpResponseRedirect
3 from django.urls import reverse
4 from django.contrib import messages
5 from .models import Book, Course, Department
6 from .utils import get_book, get_course, get_department
7
8 def task1(request):
9     return render(request, 'bookmodule/task1.html', {'departments': departments})
10
11 def task2(request):
12     courses = Course.objects.annotate(student_count=Count('students'))
13     return render(request, 'bookmodule/task2.html', {'courses': courses})
14
15 def task3(request):
16     return render(request, 'bookmodule/task3.html', {'books': books})
17
18 def task4(request):
19     return render(request, 'bookmodule/task4.html', {'books': books})
20
21 def task5(request):
22     return render(request, 'bookmodule/task5.html', {'query': query})
23
24 def task7(request):
25     cities = Address.objects.annotate(student_count=Count('student'))
26     return render(request, 'bookmodule/task7.html', {'cities': cities})
27
28 def task8(request):
29     return render(request, 'bookmodule/task8.html', {'books': books})
30
31 def task22(request):
32     return render(request, 'bookmodule/task22.html', {'courses': courses})
33
```

## Task 2 Output



# Task 3

## Code

```
def task1(request):
    departments = Department.objects.annotate(student_count=Count('students'))
    return render(request, 'bookmodule/task1.html', {'departments': departments})

def task2(request):
    courses = Course.objects.annotate(student_count=Count('students'))
    return render(request, 'bookmodule/task2.html', {'courses': courses})

def task3(request):
    departments = Department.objects.annotate(oldest_student_id=Min('students_id'))

    department_data = []

    for department in departments:
        if department.oldest_student_id is not None:
            oldest_student = department.students_set.get(id=department.oldest_student_id)
            department_data.append(
                {
                    'department_name': department.name,
                    'oldest_student_name': oldest_student.name
                }
            )

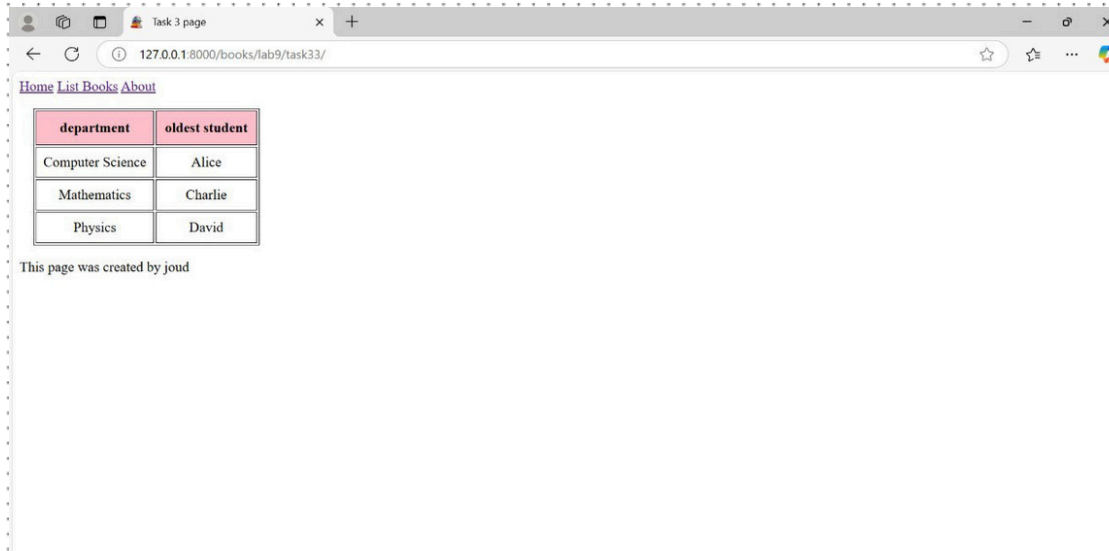
    return render(request, 'bookmodule/task3.html', {'department_data': department_data})
```

```
urlpatterns = [
    path('', views.index, name='books.index'),
    path('list_books/', views.list_books, name='books.list_books'),
    path('<int:book_id>/', views.view_book, name='books.view_one_book'),
    path('aboutus/', views.aboutus, name='books.aboutus'),
    path('links/', views.links, name='books.links'),
    path('html5/task1/formatting', views.formatting, name='books.formatting'),
    path('html5/listing/', views.listing, name='books.listing'),
    path('html5/tables/', views.tables),
    path('search/', views.search),
    path('simple/query/', views.simple_query),
    path('complex/query/', views.complex_query),
    path('lab8/task1/', views.task1),
    path('lab8/task2/', views.task2),
    path('lab8/task3/', views.task3),
    path('lab8/task4/', views.task4),
    path('lab8/task5/', views.task5),
    path('lab8/task7/', views.task7),
    path('lab8/task11/', views.task11),
    path('lab8/task22/', views.task22),
    path('lab8/task33/', views.task33),
]
```

```
<style>
    margin: 10px;
    text-align: center;
    font-weight: bold;
</style>
<table>
    <thead>
        <tr>
            <th>department</th>
            <th>oldest student</th>
        </tr>
    </thead>
    <tbody>
        <tr>
            <td>{{ data.department_name }}</td>
            <td>{{ data.oldest_student_name }}</td>
        </tr>
    </tbody>
</table>
</div>
```



## Task 3 Output



Task 4  
Code

The screenshot shows a VS Code editor with a Django project. The Explorer sidebar on the left displays the project structure: **CSFT1** > **libraryproject1** > **apps** > **templates** > **bookmodule**. The main editor window shows the **bookmodule.html** template file. The code in the editor is as follows:

```

1  <style>
2      caption {
3          font-weight: bold;
4      }
5  </style>
6  {% endblock stylesheets %}
7
8  {% block content %}
9      <table>
10         <tr>
11             <th>dept</th>
12             <th>Number of students</th>
13         </tr>
14         {% for dept in departments %}
15             <tr>
16                 <td>{{ dept.name }}</td>
17                 <td>{{ dept.student_count }}</td>
18             </tr>
19         {% endfor %}
20     </table>
21
22     {% endblock content %}

```

The screenshot shows a code editor with a file explorer on the left and a code editor on the right. The file explorer shows a project structure with folders like 'libraryproject1', 'views', and 'static'. The code editor shows a Python file named 'views.py' with a list of paths for various views.

```

23 path('list_books/', views.list_books, name="books.list_books"),
24 path('list_books/<id>', views.view_book, name="books.view_one_book"),
25 path('aboutus/', views.aboutus, name="books.aboutus"),
26 path('html5/links/', views.links, name="books.links"),
27 path('html5/text/formatting/', views.formatting, name="books.formatting"),
28 path('html5/listing/', views.listing, name="books.listing"),
29 path('html5/tables/', views.tables),
30 path('search/', views.search),
31 path('simple/query/', views.simple_query),
32 path('complex/query/', views.complex_query),
33 path('lab8/task1/', views.task1),
34 path('lab8/task2/', views.task2),
35 path('lab8/task3/', views.task3),
36 path('lab8/task4/', views.task4),
37 path('lab8/task5/', views.task5),
38 path('lab8/task6/', views.task6),
39 path('lab9/task11/', views.task11),
40 path('lab9/task12/', views.task12),
41 path('lab9/task13/', views.task13),
42 path('lab9/task14/', views.task14),
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```

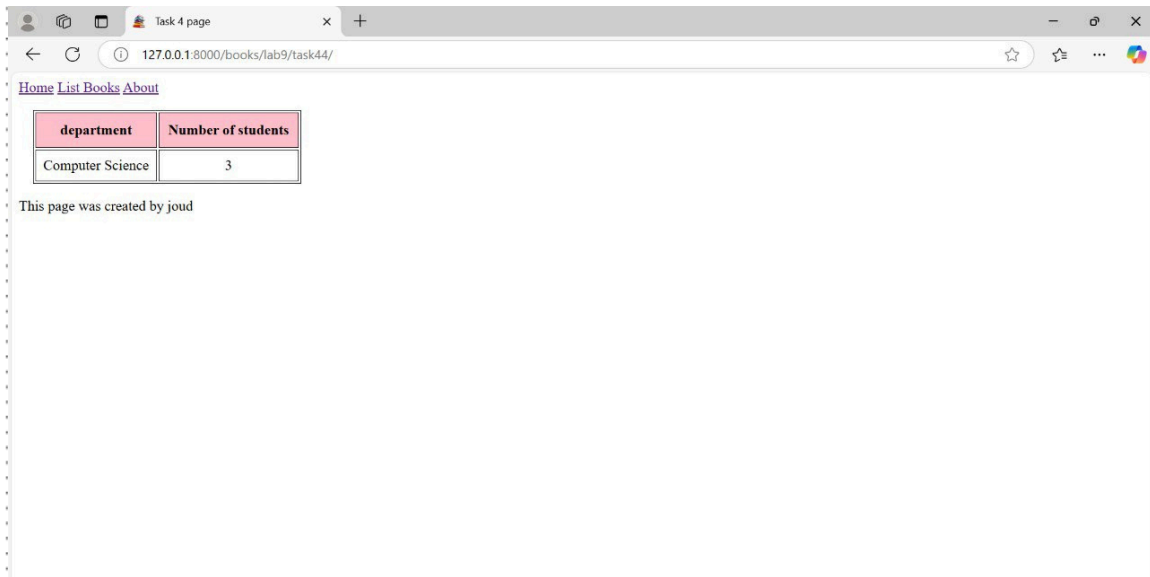
The screenshot shows a VS Code editor with a Python file named `views.py` open. The file contains two Django view functions, `task33` and `task44`. The `task33` function uses `annotate` to add `oldest_student_id` to a queryset and `get` to retrieve the oldest student. The `task44` function uses `annotate` to add `student_count` to a queryset and `filter` to filter by student count. The Explorer sidebar on the left shows the project structure, including folders like `libraryproject1` and `apps`, and files like `bookmodule.py` and `views.py`.

```

143     return render(request, 'bookmodule/task22.html', {'courses': courses})
144
145
146 def task33(request):
147     departments = Department.objects.annotate(oldest_student_id=Min('students_id'))
148     department_data = []
149
150     for department in departments:
151         if department.oldest_student_id is not None:
152             oldest_student = department.students_set.get(id=department.oldest_student_id)
153             department_data.append({
154                 'department_name': department.name,
155                 'oldest_student_name': oldest_student.name
156             })
157
158     return render(request, 'bookmodule/task33.html', {'department_data': department_data})
159
160
161 def task44(request):
162     departments = Department.objects.annotate(student_count=Count('students')).filter(student_count__gt=2).order_by(
163         '-student_count')
164     return render(request, 'bookmodule/task44.html', {'departments': departments})
165
166
167

```

## Task 4 Output



The screenshot shows a web browser window with the title "Task 4 page". The address bar displays the URL "127.0.0.1:8000/books/lab9/task44/". The page content includes a navigation menu with links: [Home](#), [List](#), [Books](#), and [About](#). Below the menu is a table with two columns: "department" and "Number of students". The table contains one row with the value "Computer Science" in the first column and "3" in the second column. At the bottom of the page, there is a text line: "This page was created by joud".

department	Number of students
Computer Science	3

This page was created by joud