

计算机网络专题实验·实验八自测报告

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一、实验名称

基于 **HTTP** 协议的客户端程序（文本浏览器）

二、测试内容

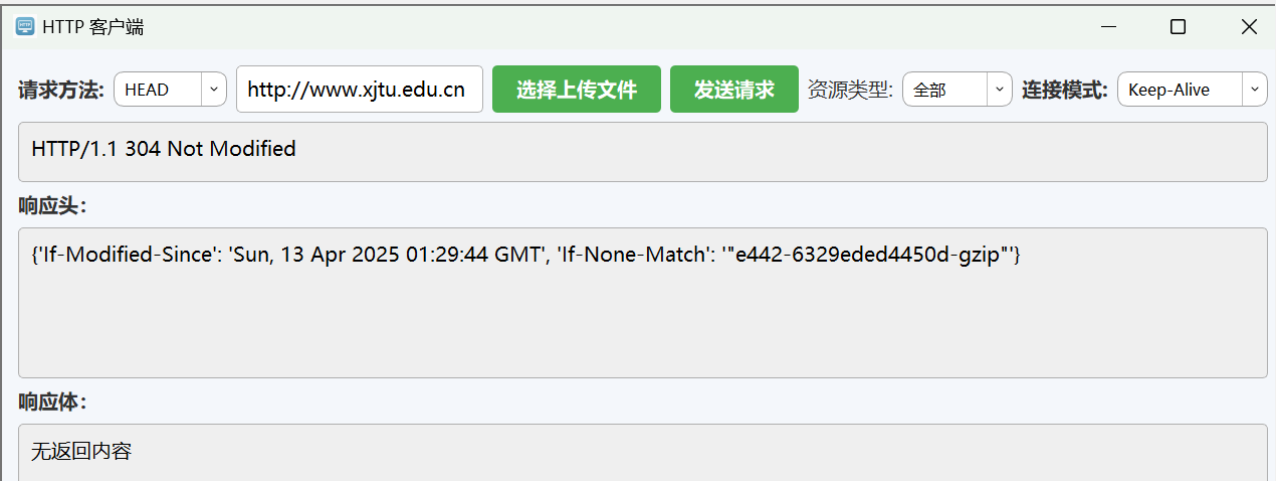
1. GET 请求测试

[illegible]

如图，访问了学校网页，成功返回了对应的响应头和响应体

2. HEAD 请求测试

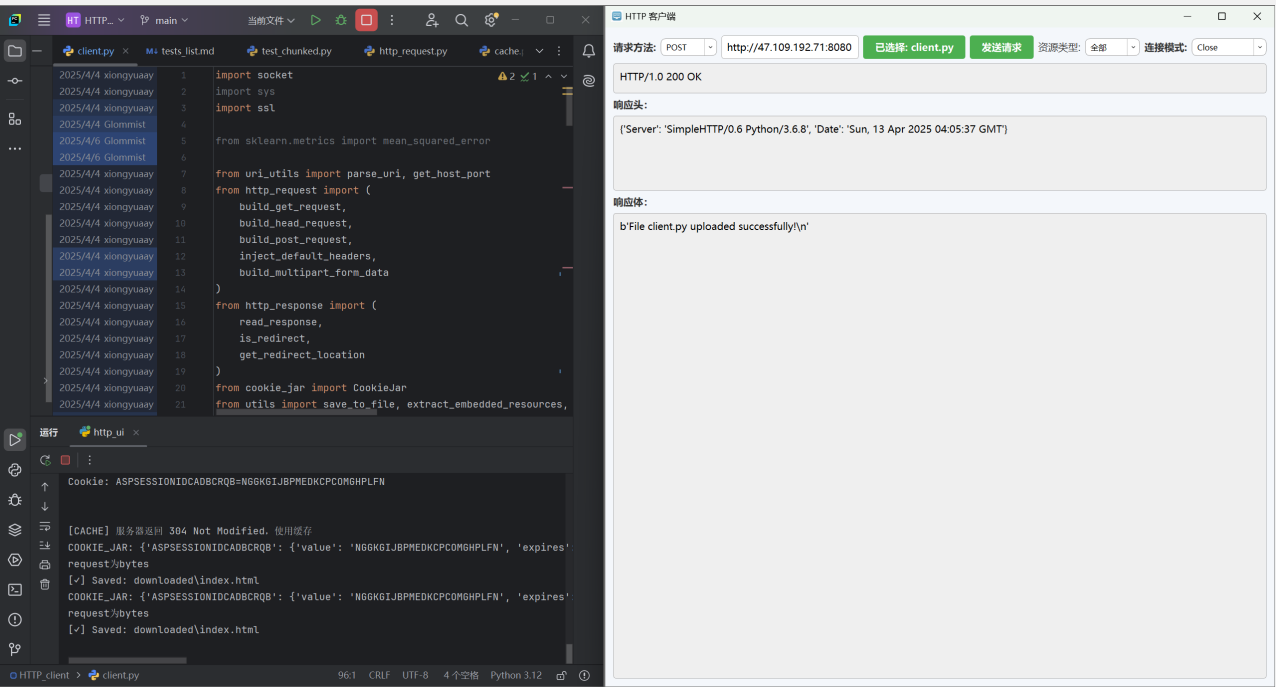
验证是否能仅请求响应头部信息，无响应体内容。



如图，使用HEAD时，由于之前已经访问过了对应的网站，此时再次使用HEAD访问时，会触发缓存，但是HEAD的使用没有问题。

3. POST 请求测试

包括文件上传、多字段提交等 POST 操作，验证参数解析和服务器响应情况。



如图，使用阿里云服务器，通过编写python代码搭建简易的服务器，通过客户端发送POST请求，选择上传本地的client.py文件，通过响应体可见POST请求使用正常。

4. URL 解析功能测试

正确处理包含特殊字符的 URL 编码。

- 示例 URL：
 - <https://www.w3schools.com/~username/>

o <https://www.w3schools.com/%7Eusername/>

HTTP 客户端

请求方法: GET <https://www.w3schools.com/~username/> 选择上传文件 发送请求 资源类型: 全部 连接模式: Keep-Alive

HTTP/1.1 404 Not Found

响应头:

```
{'Content-Type': 'text/html', 'Content-Length': '9496', 'Content-Security-Policy': 'frame-ancestors 'self' https://mycourses.w3schools.com https://pathfinder.w3schools.com;', 'X-Content-Security-Policy': 'frame-ancestors 'self' https://mycourses.w3schools.com https://pathfinder.w3schools.com;', 'Cache-Control': 'public, max-age=14400', 'Expires': 'Sun, 13 Apr 2025 07:37:28 GMT', 'Date': 'Sun, 13 Apr 2025 03:37:28 GMT', 'Connection': 'keep-alive', 'Set-Cookie': 'ASPSESSIONIDASBADQRD=LGIKHGJBIJBNNMDPGMLLPBD; path=/'}\n
```

响应体:

```
b\n<!DOCTYPE html>\n<html lang="en">\n  <head>\n    <meta charset="utf-8">\n    <meta name="viewport" content="width=device-width,initial-scale=1">\n    <link rel="icon" href="https://www.w3schools.com/favicon.ico">\n    <link rel="apple-touch-icon" sizes="180x180" href="/apple-touch-icon.png">\n    <link rel="icon" type="image/png" sizes="32x32" href="/favicon-32x32.png">\n    <link rel="icon" type="image/png" sizes="16x16" href="/favicon-16x16.png">\n    <link rel="manifest" href="/site.webmanifest" crossorigin="use-credentials">\n    <link rel="mask-icon" href="/safari-pinned-tab.svg" color="#04aa6d">\n    <meta name="msapplication-TileColor" content="#00a300">\n    <meta name="theme-color" content="#ffffff">\n    <meta name="description" content="Sorry! We can't seem to find the resource you're looking for">\n  <title>404 - Page not found | W3Schools.com</title>\n  <link rel="stylesheet" type="text/css" href="/w3css/3/w3.css" />\n  <style type="text/css">\n    @import url("https://fonts.googleapis.com/css?family=Inter:300,400,600,700");\n  </style>\n  </head>\n  <body>
```

HTTP 客户端

请求方法: GET <ols.com/%7Eusername/> 选择上传文件 发送请求 资源类型: 全部 连接模式: Keep-Alive

HTTP/1.1 404 Not Found

响应头:

```
{'Content-Type': 'text/html', 'Content-Length': '9496', 'Content-Security-Policy': 'frame-ancestors 'self' https://mycourses.w3schools.com https://pathfinder.w3schools.com;', 'X-Content-Security-Policy': 'frame-ancestors 'self' https://mycourses.w3schools.com https://pathfinder.w3schools.com;', 'Cache-Control': 'public, max-age=14400', 'Expires': 'Sun, 13 Apr 2025 07:43:12 GMT', 'Date': 'Sun, 13 Apr 2025 03:43:12 GMT', 'Connection': 'keep-alive', 'Set-Cookie': 'ASPSESSIONIDCADBCRQB=NGGKGIJBPMEDKPCOMGHPLFN; path=/'}\n
```

响应体:

```
b\n<!DOCTYPE html>\n<html lang="en">\n  <head>\n    <meta charset="utf-8">\n    <meta name="viewport" content="width=device-width,initial-scale=1">\n    <link rel="icon" href="https://www.w3schools.com/favicon.ico">\n    <link rel="apple-touch-icon" sizes="180x180" href="/apple-touch-icon.png">\n    <link rel="icon" type="image/png" sizes="32x32" href="/favicon-32x32.png">\n    <link rel="icon" type="image/png" sizes="16x16" href="/favicon-16x16.png">\n    <link rel="manifest" href="/site.webmanifest" crossorigin="use-credentials">\n    <link rel="mask-icon" href="/safari-pinned-tab.svg" color="#04aa6d">\n    <meta name="msapplication-TileColor" content="#00a300">\n    <meta name="theme-color" content="#ffffff">\n    <meta name="description" content="Sorry! We can't seem to find the resource you're looking for">\n  <title>404 - Page not found | W3Schools.com</title>\n  <link rel="stylesheet" type="text/css" href="/w3css/3/w3.css" />\n  <style type="text/css">\n    @import url("https://fonts.googleapis.com/css?family=Inter:300,400,600,700");\n  </style>\n  </head>\n  <body>
```

HTTP client

项目: main

当前文件: tests_list.md

运行: http_client

Cookie: ASPSESSIONIDCADBCRQB=NGGKGIJBPMEDKPCOMGHPLFN

[CACHE] 服务器返回 304 Not Modified. 使用缓存

[4] 下载资源: <https://www.w3schools.com/favicon-16x16.png>

COOKIE_JAR: {'ASPSESSIONIDCADBCRQB': {'value': 'NGGKGIJBPMEDKPCOMGHPLFN', 'expires': None, 'path': '/', 'domain': None, 'secure': False, 'httpOnly': False}}

request:

```
GET /favicon-16x16.png HTTP/1.1\nHost: www.w3schools.com\nUser-Agent: XiongYuan and LiXinRui\nConnection: Keep-Alive\nIf-Modified-Since: Fri, 11 Apr 2025 05:55:34 GMT\nIf-None-Match: "04f1757a6aad1:0"\nCookie: ASPSESSIONIDCADBCRQB=NGGKGIJBPMEDKPCOMGHPLFN
```

[CACHE] 服务器返回 304 Not Modified. 使用缓存

[4] 下载资源: <https://www.w3schools.com/favicon.ico>

COOKIE_JAR: {'ASPSESSIONIDCADBCRQB': {'value': 'NGGKGIJBPMEDKPCOMGHPLFN', 'expires': None, 'path': '/', 'domain': None, 'secure': False, 'httpOnly': False}}

request:

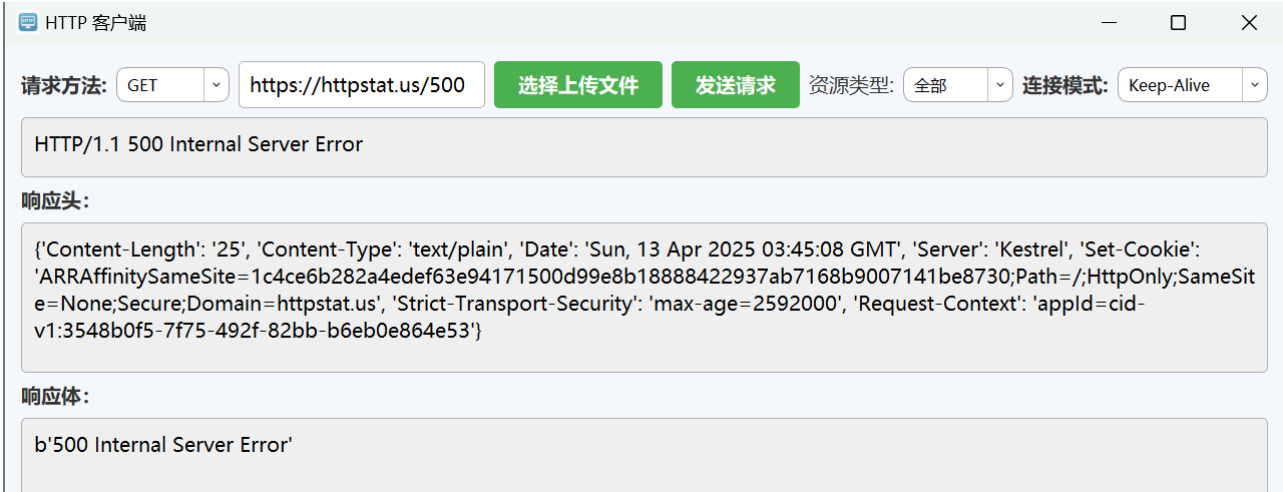
```
GET /favicon.ico HTTP/1.1\nHost: www.w3schools.com\nUser-Agent: XiongYuan and LiXinRui\nConnection: Keep-Alive\nIf-Modified-Since: Fri, 11 Apr 2025 05:55:34 GMT\nIf-None-Match: "04f1757a6aad1:0"\nCookie: ASPSESSIONIDCADBCRQB=NGGKGIJBPMEDKPCOMGHPLFN
```

如图可见，通过两种不同的URL进行访问，获得了同样的返回内容，说明客户端可以成功解析这两种URL。此处的404状态值是由于网页请求资源本身不存在所导致的，但访问的页面是同一个。

5. 应答码测试

验证不同状态码的处理能力。

- 500 错误码：<https://httpstat.us/500>



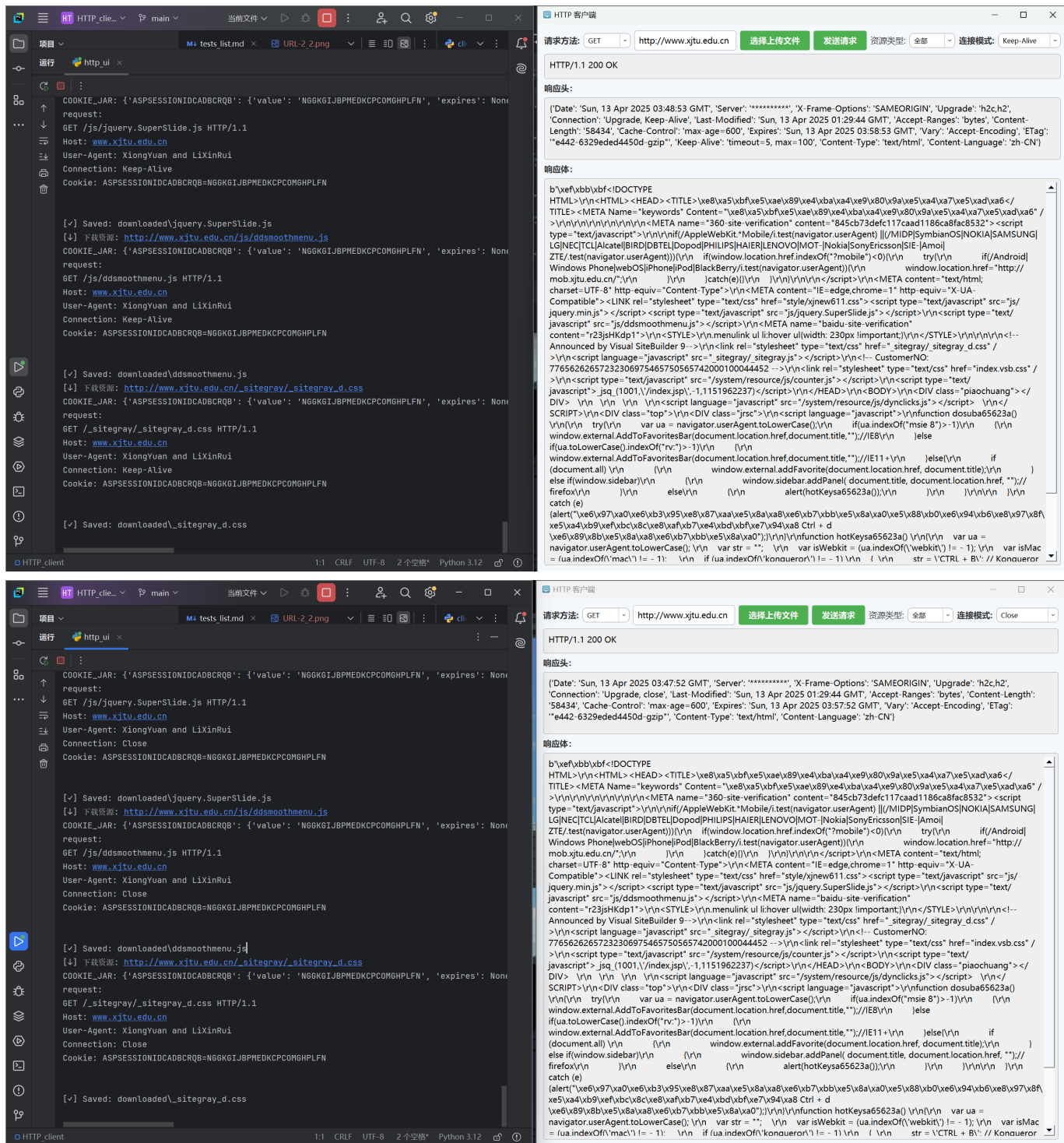
- 3xx 重定向：<https://www.python.org>



如图，客户端对不同的返回值可以正确的返回结果。对于500，会显示出错误代码。对于301，会自动重定向，最终成功访问目标网站。

6. 连接模式测试

支持 Keep-Alive 与 Close 模式。

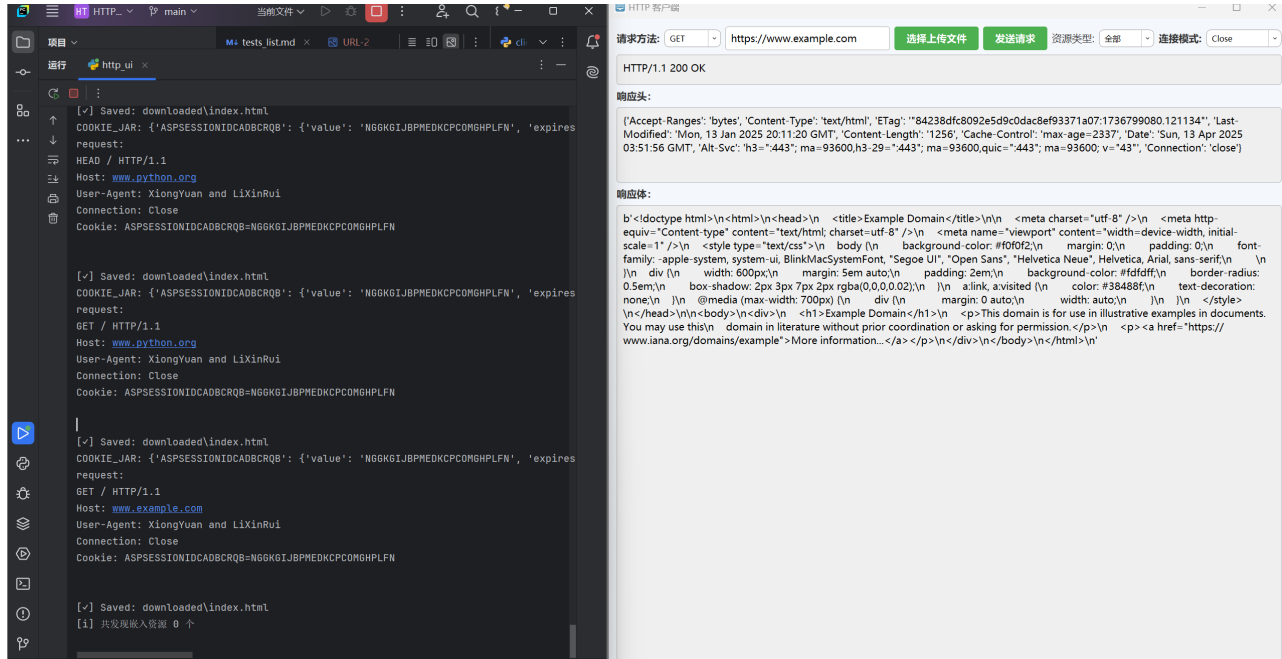


如图，这两种连接模式都能够正常使用。

7. HTTPS 支持测试

检查是否能通过 TLS 访问 HTTPS 网站。

- 示例网站：<https://www.python.org>



如图可见，对于https的网址，该客户端程序仍然成功的返回了正确的响应内容，状态码为200。

8. 重定向处理测试

客户端能否自动跳转到目标地址。

HTTP 客户端

请求方法: GET http://www.python.org 选择上传文件 发送请求 资源类型: 全部 连接模式: Keep-Alive

HTTP/1.1 301 Moved Permanently

响应头:
{'Connection': 'close', 'Content-Length': '0', 'Server': 'Varnish', 'Retry-After': '0', 'Location': 'https://www.python.org/', 'Accept-Ranges': 'bytes', 'Date': 'Sun, 13 Apr 2025 03:27:36 GMT', 'Via': '1.1 varnish', 'X-Served-By': 'cache-itm1220055-ITM', 'X-Cache': 'HIT', 'X-Cache-Hits': '0', 'X-Timer': 'S1744514857.852620,VS0,VE0', 'Strict-Transport-Security': 'max-age=63072000; includeSubDomains; preload'}

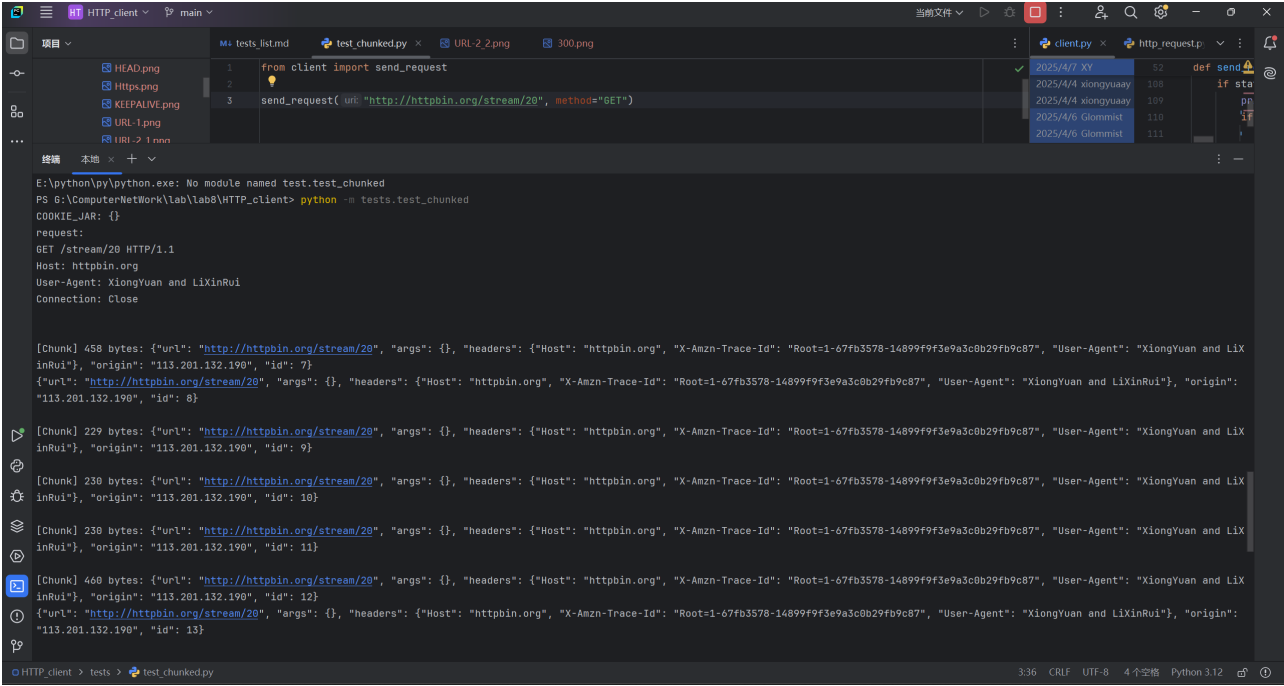
响应体:
(('HTTP/1.1 200 OK', {'Connection': 'keep-alive', 'Content-Length': '12079', 'Via': '1.1 varnish, 1.1 varnish, 1.1 varnish', 'x-frame-options': 'SAMEORIGIN', 'content-type': 'text/html; charset=utf-8', 'content-encoding': 'gzip', 'Accept-Ranges': 'bytes', 'Date': 'Sun, 13 Apr 2025 03:27:37 GMT', 'Age': '492', 'X-Served-By': 'cache-iad-kiad7000081-IAD, cache-iad-kiad7000081-IAD, cache-itm1220030-ITM', 'X-Cache': 'MISS, HIT, HIT', 'X-Cache-Hits': '0, 429, 3', 'X-Timer': 'S1744514857.312072,VS0,VE0', 'Vary': 'Cookie', 'Strict-Transport-Security': 'max-age=63072000; includeSubDomains; preload'}, b''))

如图，对于网址http://www.python.org，返回码是301，在客户端中成功通过重定向，得到了正确的URL，并返回了正确值。

9. Chunked 传输测试

使用 chunked 分块传输响应的测试。

- 测试脚本：`test_chunked.py`

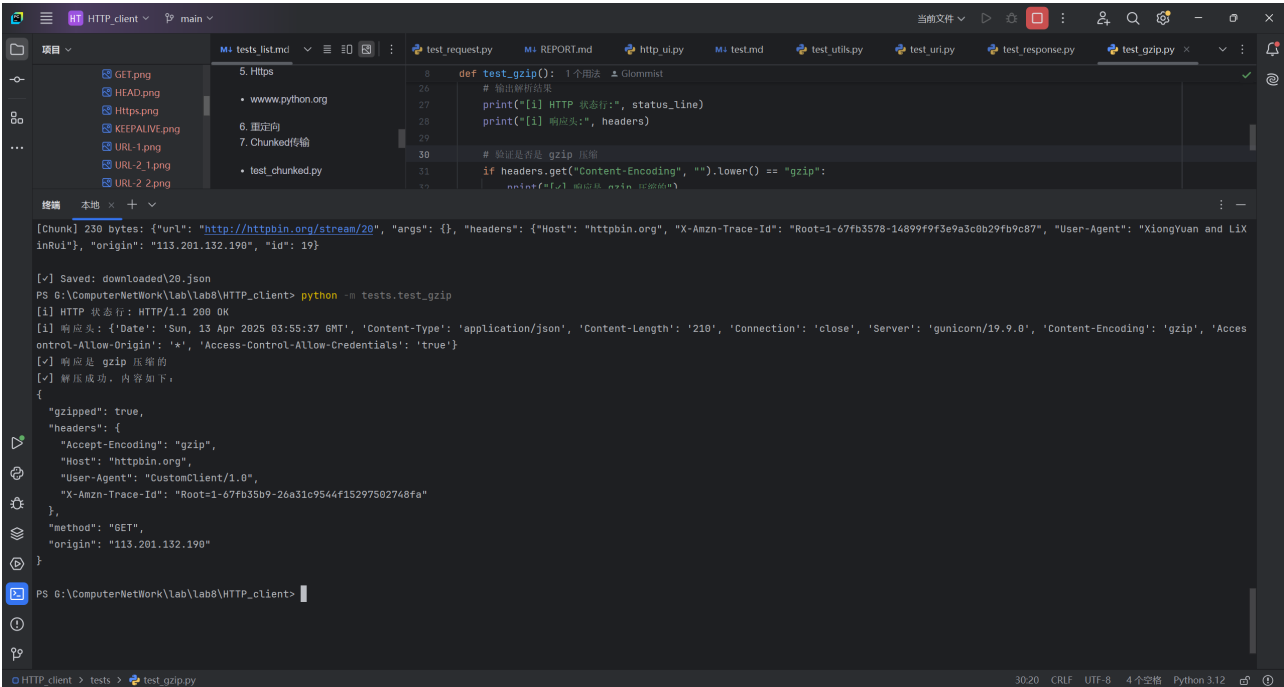


如图，成功实现了chunked 分块传输。

10. Gzip 解码测试

是否能够自动识别并解码 gzip 编码的响应体。

- 测试脚本：`test_gzip.py`

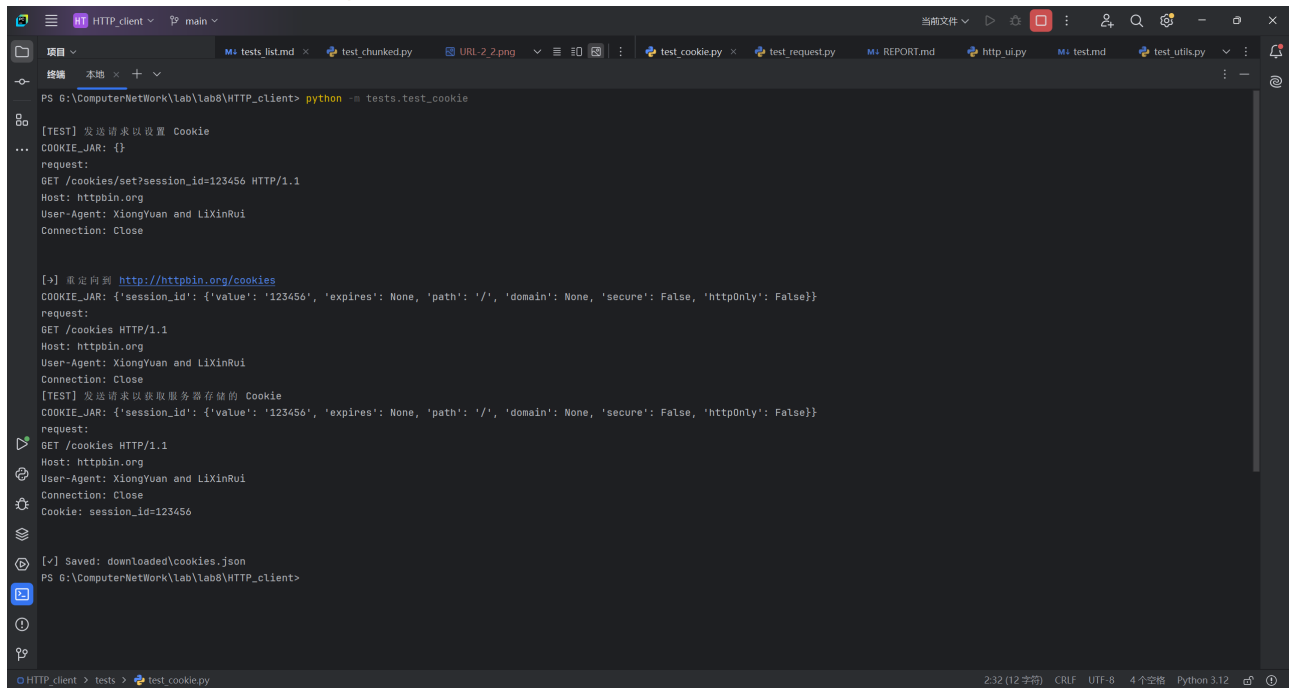


如图，成功使用gzip编码，并解码得到了正确的响应内容。

11. Cookie 机制测试

验证客户端是否能正确处理和发送 Cookie。

- 测试脚本：test_cookie.py



```
PS G:\ComputerNetWork\lab\lab8\HTTP_client> python -m tests.test_cookie

[TEST] 发送请求以设置 Cookie
...
COOKIE_JAR: {}
request:
GET /cookies/set?session_id=123456 HTTP/1.1
Host: httpbin.org
User-Agent: XiongYuan and LiXinRui
Connection: Close

[+] 请求得到 http://httpbin.org/cookies
COOKIE_JAR: {'session_id': {'value': '123456', 'expires': None, 'path': '/', 'domain': None, 'secure': False, 'httpOnly': False}}
request:
GET /cookies HTTP/1.1
Host: httpbin.org
User-Agent: XiongYuan and LiXinRui
Connection: Close
[TEST] 发送请求以获取服务器存储的 Cookie
COOKIE_JAR: {'session_id': {'value': '123456', 'expires': None, 'path': '/', 'domain': None, 'secure': False, 'httpOnly': False}}
request:
GET /cookies HTTP/1.1
Host: httpbin.org
User-Agent: XiongYuan and LiXinRui
Connection: Close
Cookie: session_id=123456

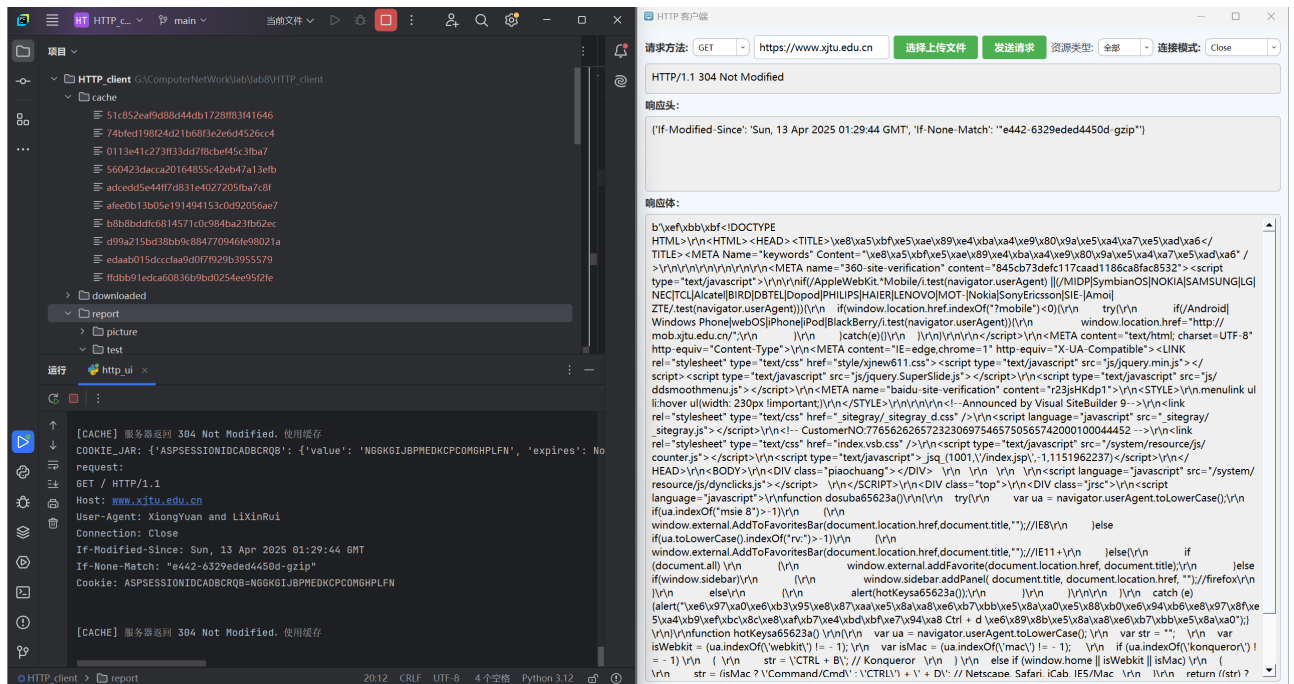
[-] Saved: downloaded\cookies.json
PS G:\ComputerNetWork\lab\lab8\HTTP_client>
```

如图，第一次通过访问`http://httpbin.org/cookies/set?session_id=123456`，设置了`session_id`，第二次通过`http://httpbin.org/cookies`访问对应网址，并成功打印出上一次访问时所存储的`cookie`值。

12. 缓存机制测试

检查 Last-Modified 与 ETag 缓存策略的支持。

- 连续访问同一页面两次，查看是否使用缓存。



The screenshot shows a web browser window with the address bar displaying `https://www.xjtu.edu.cn`. The status bar indicates a 304 Not Modified response. The developer tools panel is open, showing the request and response details. The response headers include `If-Modified-Since: Sun, 13 Apr 2025 01:29:44 GMT` and `If-None-Match: "e442-6329eded4450d-gzip"`. The response body is empty, indicating that the resource was not modified and was served from the cache.

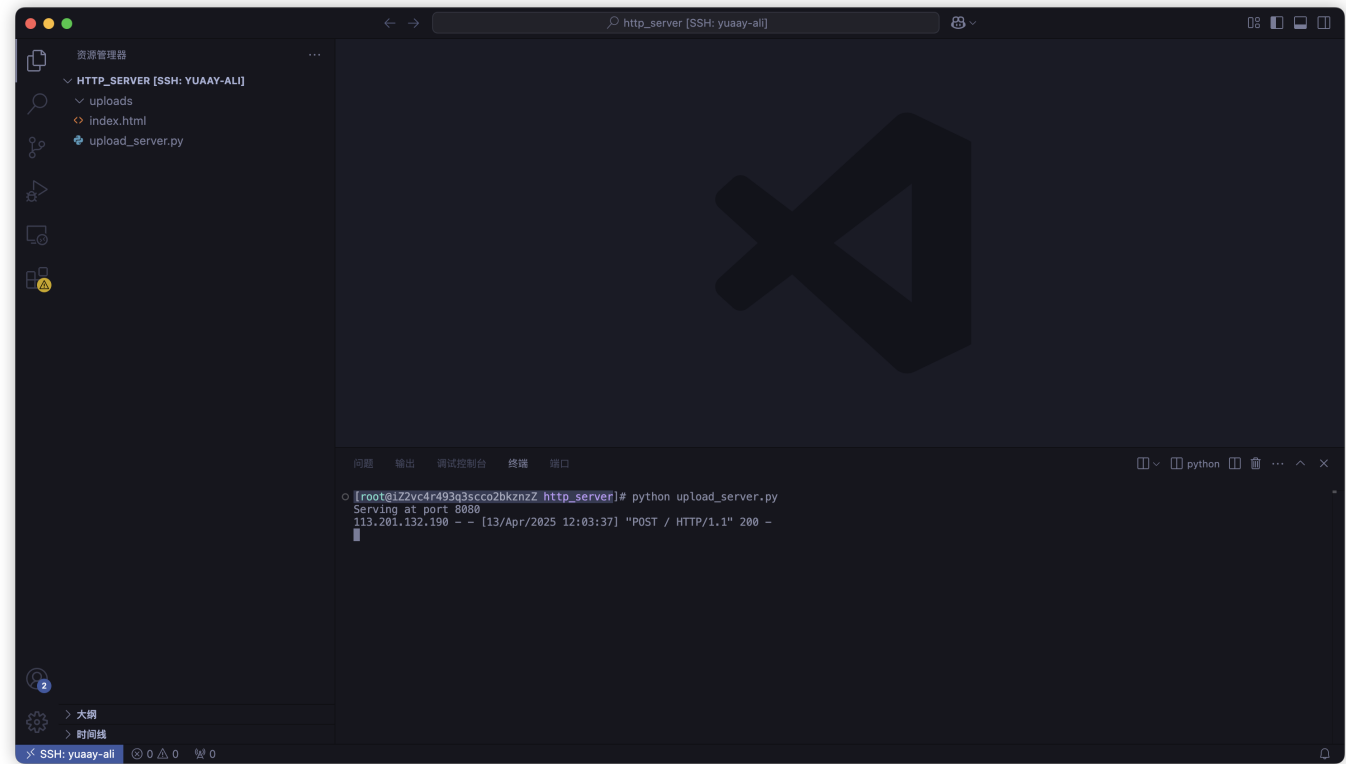
如图，在之前已经访问过一次学校网站后再次访问，会返回304，并通过本地存储的资源直接返回。

13. 文件上传测试 (POST)

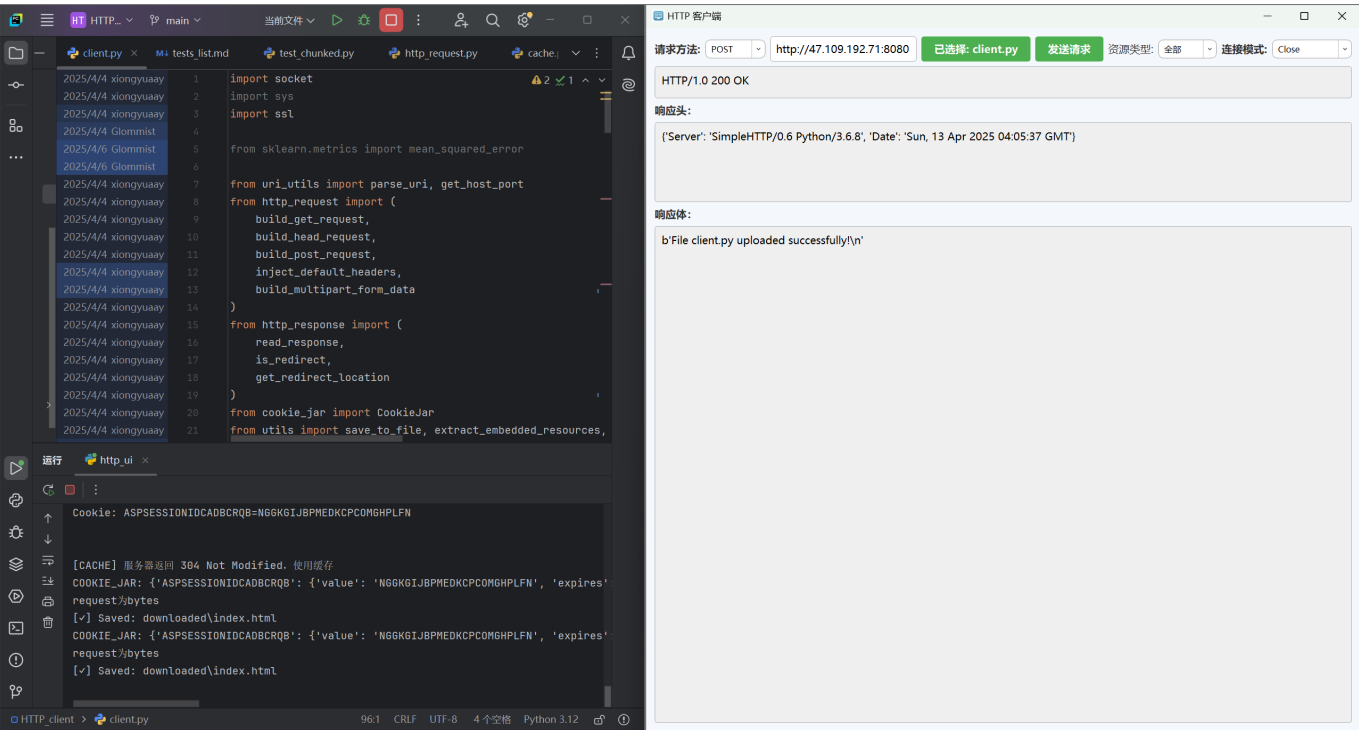
通过 POST 方法上传本地文件。

- 测试服务器：<http://47.109.192.71:8080>

服务器上传前，内容如下：

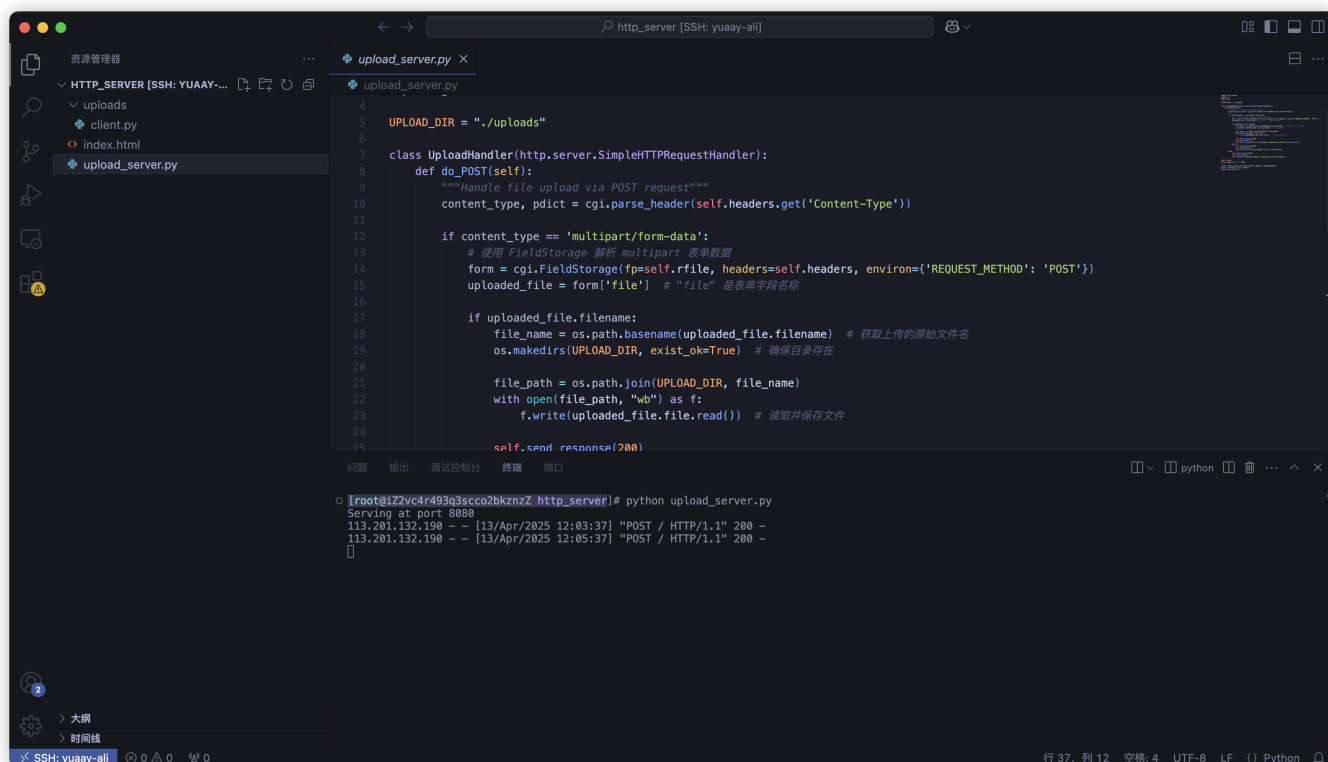


此时，uploads文件夹为空。



运行POST，选择文件进行上传，由返回内容可见上传成功。

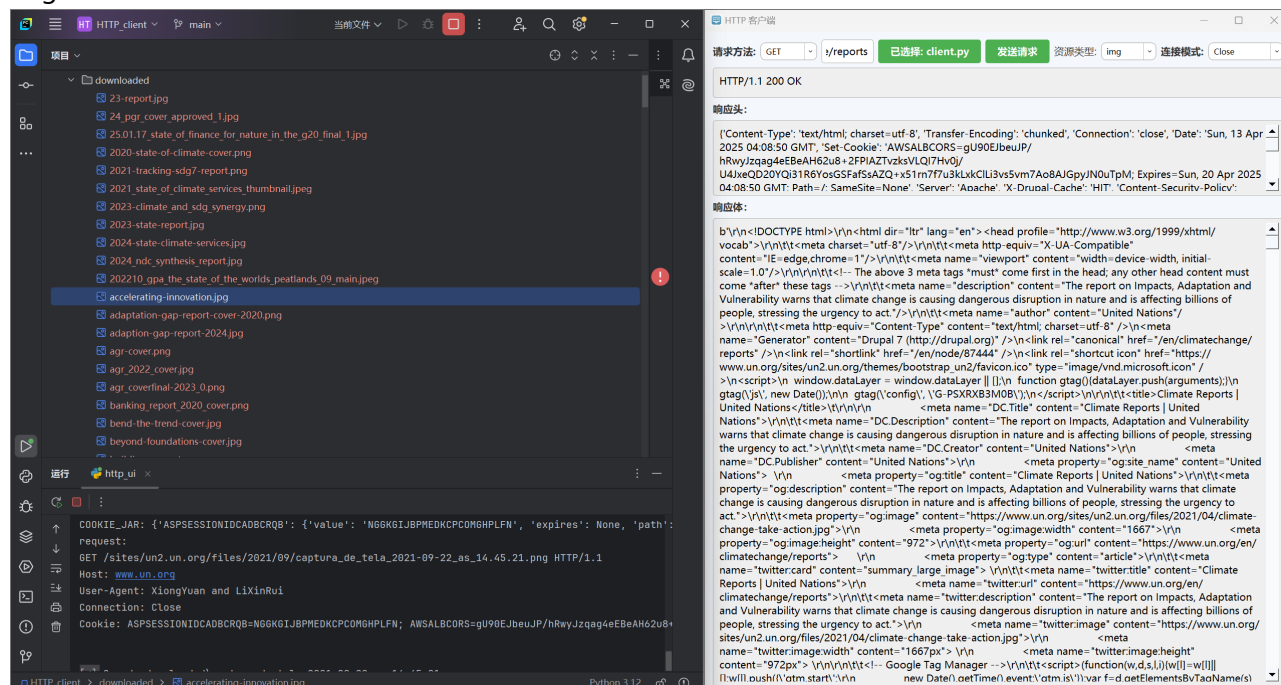
上传文件后，内容如下：



如图，在对应的服务器中，也出现了被上传的文件。

14. 不同类型的文件获取：

- img :



- The screenshot displays a web browser window with the address bar showing the URL `https://www.un.org/sites/un2.un.org/modules/entityreference/js/entityreference.js?stklk4`. The browser's developer tools are open, showing the 'Network' tab with a single request to the same URL. The 'Response' pane shows the content of the file, which is a large block of JavaScript code. The code includes a 'people' variable, a 'GTM' script, and a 'GTM' script. The code is minified and contains various comments and function calls. The browser's status bar at the bottom indicates the page is loaded and the connection is secure.

- The screenshot shows a web browser window with the URL <https://www.un.org/en/climatechange/reports>. The browser's developer tools are open, displaying the network tab. The request is a GET method to the specified URL. The response is a large block of HTML code, including meta tags, a cookie, and a large script block. The browser's address bar shows the URL, and the page title is "Climate Change Reports". The response code is 200 OK. The response headers include "Content-Type: text/html; charset=utf-8", "Transfer-Encoding: chunked", "Connection: keep-alive", and "Date: Sun, 13 Apr 2025 04:18:37 GMT". The response body contains a large block of HTML code, including meta tags, a cookie, and a large script block. The browser's status bar at the bottom shows "HTTP client" and "downloaded".

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