

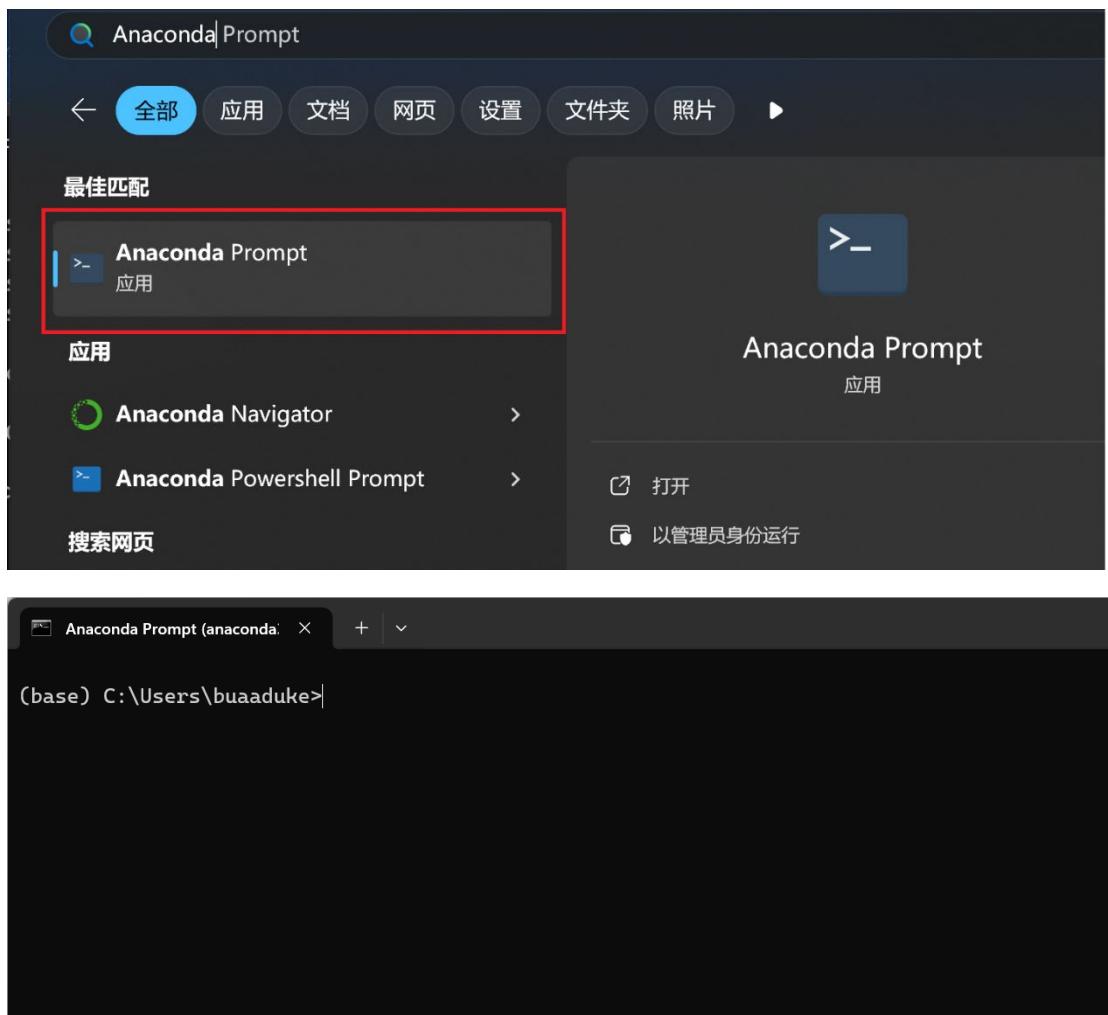
# OpenGL 环境配置

1. Anaconda 安装。下载链接

<https://mirrors.tuna.tsinghua.edu.cn/anaconda/archive/>

Windows 上下载”\*-Windows-x86\_64.exe”，例如下载 Anaconda3-2024.06-1-  
Windows-x86\_64.exe，双击运行文件进行安装。

2. 启动 Anaconda 命令行。



3. 用 conda 创建虚拟环境 py\_gl：执行命令 `conda create -n py_gl python=3.10`

```
(base) C:\Users\buaaduke>conda create -n py_gl python=3.10
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 22.9.0
  latest version: 24.9.2

Please update conda by running

$ conda update -n base -c defaults conda

## Package Plan ##

environment location: C:\Users\buaaduke\anaconda3\envs\py_gl

added / updated specs:
- python=3.10

The following packages will be downloaded:
```

```
The following packages will be downloaded:

  package          build
-----|-----
bzip2-1.0.8           h2bbff1b_6      90 KB
ca-certificates-2024.9.24  haa95532_0    131 KB
libffi-3.4.4            hd77b12b_1    122 KB
openssl-3.0.15          h827c3e9_0    7.8 MB
pip-24.2                py310haa95532_0  2.5 MB
python-3.10.15          h4607a30_1    16.2 MB
setuptools-75.1.0        py310haa95532_0  1.6 MB
sqlite-3.45.3             h2bbff1b_0    973 KB
tk-8.6.14                h0416ee5_0    3.5 MB
tzdata-2024b              h04d1e81_0    115 KB
vc-14.40                 h2eaa2aa_1     10 KB
vs2015_runtime-14.40.33807  h98bb1dd_1    1.3 MB
wheel-0.44.0              py310haa95532_0  138 KB
xz-5.4.6                  h8cc25b3_1    609 KB
zlib-1.2.13                h8cc25b3_1    131 KB
-----|-----
                                         Total:   35.1 MB

The following NEW packages will be INSTALLED:

bzip2          pkgs/main/win-64::bzip2-1.0.8-h2bbff1b_6 None
ca-certificates pkgs/main/win-64::ca-certificates-2024.9.24-haa95532_0 None
libffi          pkgs/main/win-64::libffi-3.4.4-hd77b12b_1 None
openssl         pkgs/main/win-64::openssl-3.0.15-h827c3e9_0 None
pip             pkgs/main/win-64::pip-24.2-py310haa95532_0 None
python          pkgs/main/win-64::python-3.10.15-h4607a30_1 None
setuptools       pkgs/main/win-64::setuptools-75.1.0-py310haa95532_0 None
sqlite          pkgs/main/win-64::sqlite-3.45.3-h2bbff1b_0 None
tk               pkgs/main/win-64::tk-8.6.14-h0416ee5_0 None
tzdata          pkgs/main/noarch::tzdata-2024b-h04d1e81_0 None
vc               pkgs/main/win-64::vc-14.40-h2eaa2aa_1 None
vs2015_runtime  pkgs/main/win-64::vs2015_runtime-14.40.33807-h98bb1dd_1 None
wheel            pkgs/main/win-64::wheel-0.44.0-py310haa95532_0 None
xz               pkgs/main/win-64::xz-5.4.6-h8cc25b3_1 None
zlib             pkgs/main/win-64::zlib-1.2.13-h8cc25b3_1 None

Proceed ([y]/n)? 
```

#### 4. 激活虚拟环境 py\_gl: 执行命令 conda activate py\_gl

```
(base) C:\Users\buaaduke>conda activate py_gl
(base) C:\Users\buaaduke>(py_gl) C:\Users\buaaduke>
```

## 5. 安装 OpenGL，通过源码安装。

PyOpenGL 3.1.7，下载链接：<https://pypi.org/project/PyOpenGL/>

The screenshot shows the PyOpenGL 3.1.7 project page on PyPI. The navigation bar includes links for 'Project description', 'Release history', 'Download files', and 'Verified details'. The 'Download files' link is highlighted with a red arrow. The main content area features a 'Download files' section with a note about choosing a platform. It lists two options: 'Source Distribution' (PyOpenGL-3.1.7.tar.gz, 1.9 MB) and 'Built Distribution' (PyOpenGL-3.1.7-py3-none-any.whl, 2.4 MB). Both files were uploaded on May 23, 2023.

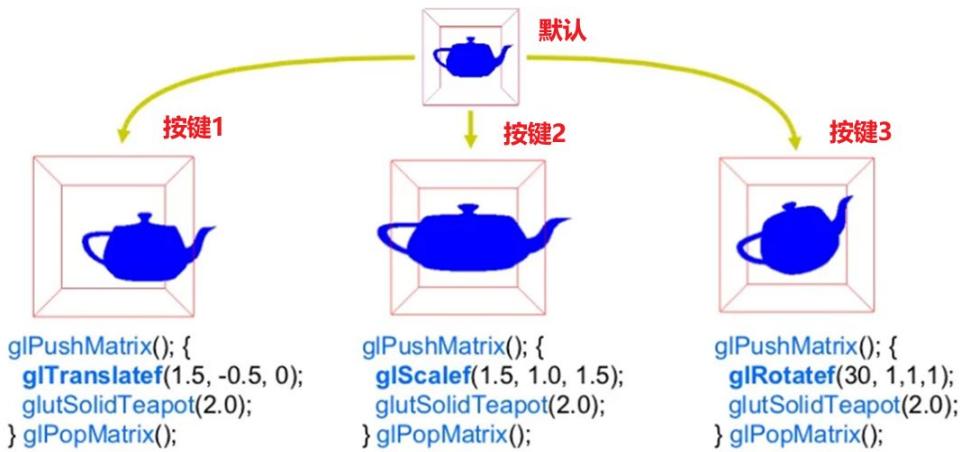
PyOpenGL-3.1.7.tar.gz 下载成功后解压，命令行里 cd 进入 PyOpenGL-3.1.7 文件夹后，执行安装命令 python setup.py install

```
(py_gl) D:\课程\计算机图形学\2024\practice\作业二\PyOpenGL-3.1.7>python setup.py install
Installing c:\users\buaaduke\anaconda3\envs\py_gl\lib\site-packages\pyopengl-3.1.7-py3.10.egg
Processing dependencies for PyOpenGL==3.1.7
Finished processing dependencies for PyOpenGL==3.1.7
```

(备选) PyOpenGL-accelerate 3.1.7，下载链接：<https://pypi.org/project/PyOpenGL-accelerate/> 安装方法同 PyOpenGL 3.17 类似。

以上安装操作，也可以通过轮子安装，先下载相应的 whl 文件，再直接运行 pip install \*.whl，例如 pip install PyOpenGL-3.1.6-cp310-cp310-win\_amd64.whl

## 6. 运行 teapot.py：执行命令 python teapot.py



*Notice: We “bracket” the modeling transform with `glPushMatrix`/`glPopMatrix` commands so the modeling transforms are “localized” to the particular object*

ps: 按键盘“1”、“2”、“3”键切换不同的 model 变换矩阵，按空格键恢复默认效果。通过快捷键切换不同的模型矩阵。

其他说明：

修改视图矩阵：

```
def set_modelview():  
    """Set up the modelview matrix as specified"""  
    glMatrixMode(GL_MODELVIEW)  
    glLoadIdentity()  
  
    # Translate to position the camera at (0, 0, 14)  
    # This is equivalent to moving the scene to (0, 0, -14)  
    #glTranslatef(0, 0, -14)  
    gluLookAt(0, 0, 14, 0, 0, 0, 1, 0) ←  
    # The resulting modelview matrix should be:  
    # [1  0  0  0 ]  
    # [0  1  0  0 ]  
    # [0  0  1  -14]  
    # [0  0  0  1 ]
```

修改投影矩阵：

```
def set_projection():
    """Set up the projection matrix as specified"""
    glMatrixMode(GL_PROJECTION)
    glLoadIdentity()

    # Set up the frustum with the parameters from the image:
    # left=-4, right=4, bottom=-3, top=3, near=5, far=80
    glFrustum(-4, 4, -3, 3, 5, 80) ←
    #glOrtho(-4, 4, -3, 3, 5, 80)

    # The resulting projection matrix should be:
    # [1.25      0      0      0      ]
    # [0         1.667    0      0      ]
    # [0         0       -1.1333 -10.667 ]
    # [0         0       -1          0      ]
```