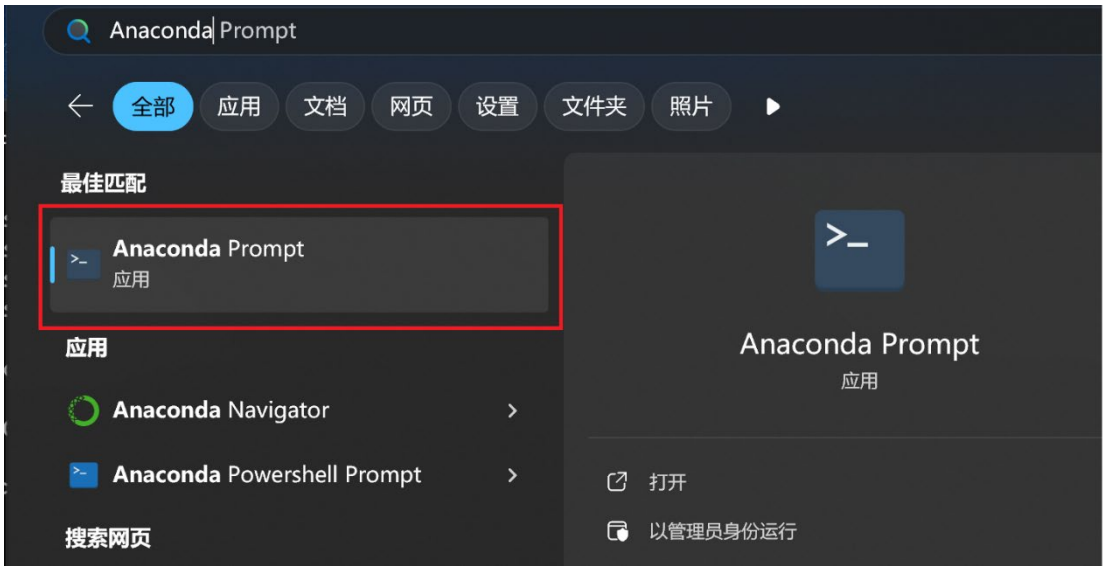
OpenGL 环境配置

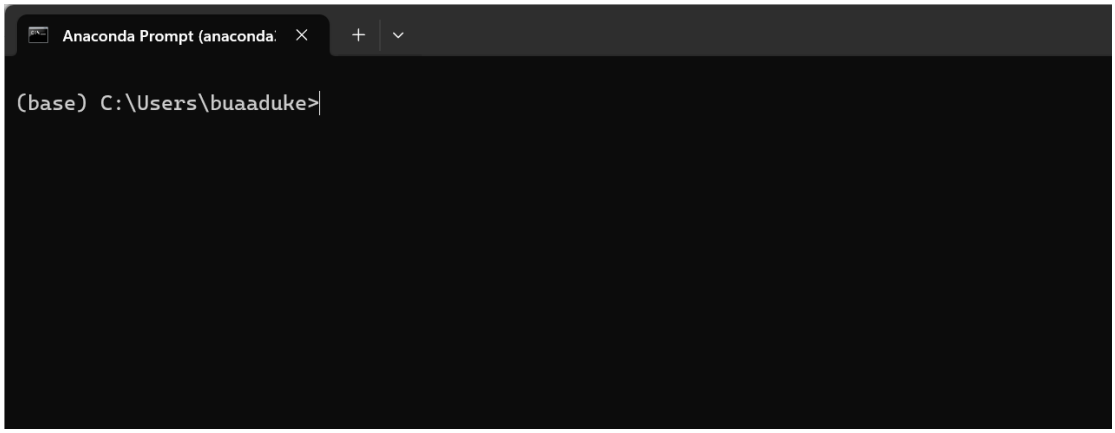
1. Anaconda 安装。下载链接

   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。



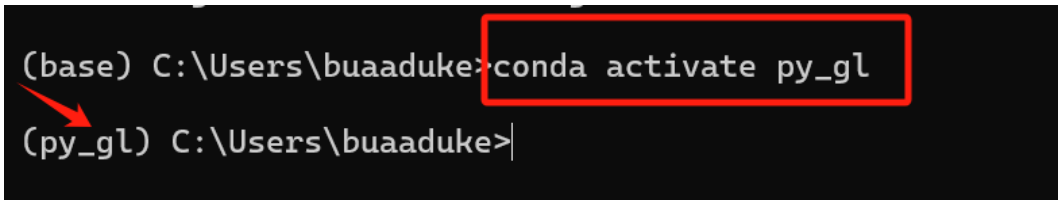


3. 用 conda 创建虚拟环境 py_gl：执行命令 conda create -n py_gl python=3.10

```
(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:
```

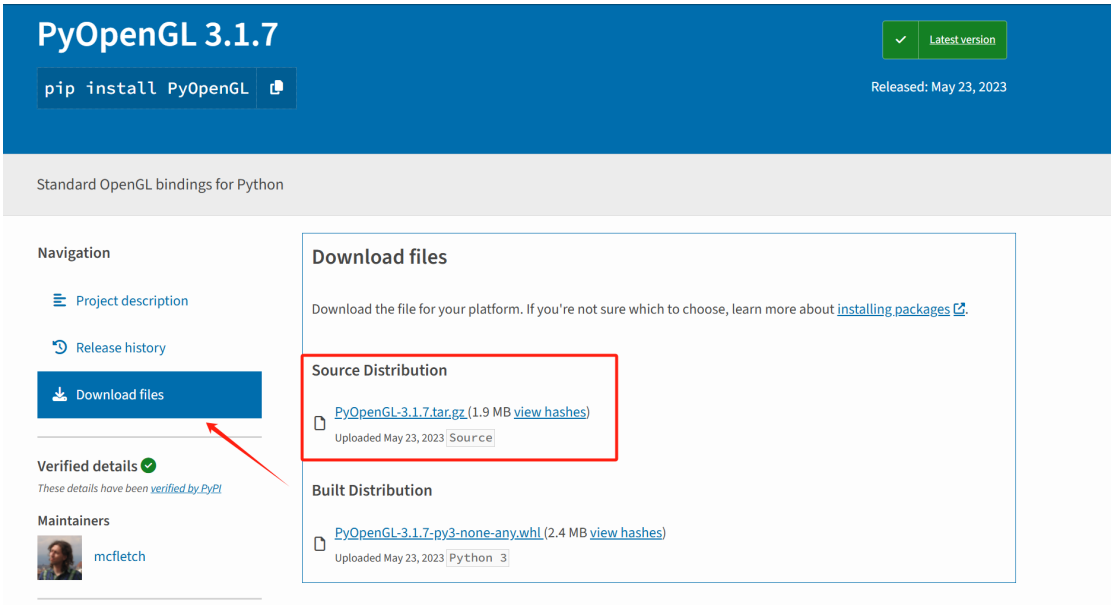
```
The following packages will be downloaded:

    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)? y
```

4. 激活虚拟环境 py_gl：执行命令 conda activate py_gl

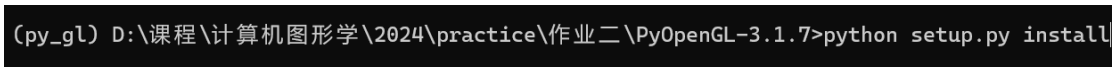


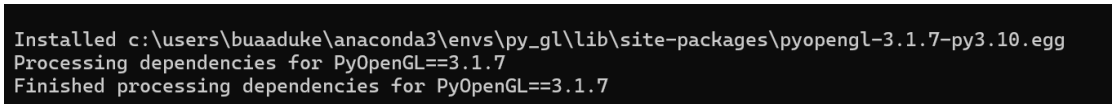
5. 安装 OpenGL，通过源码安装。

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



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

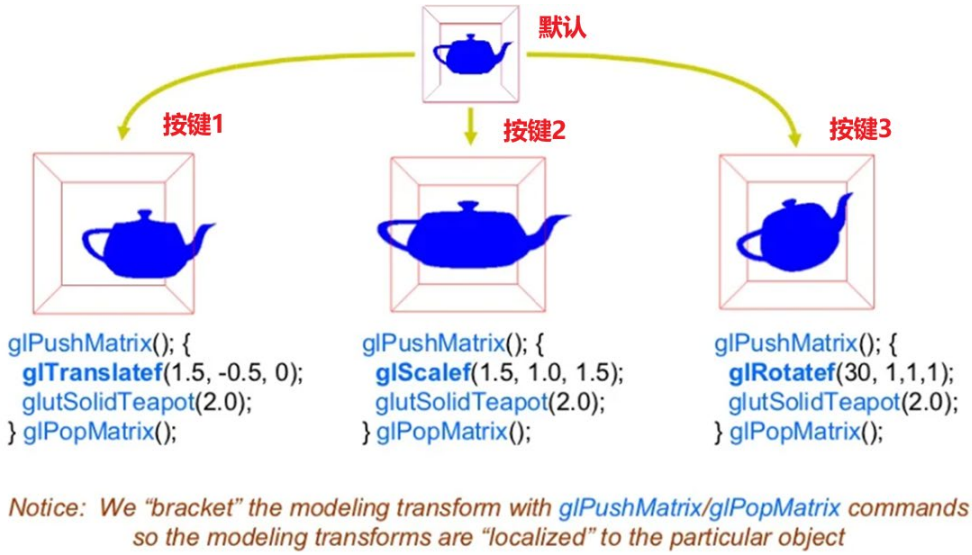




(备选) PyOpenGL-accelerate 3.1.7，下载链接：https://pypi.org/project/PyOpenGL-accelerate/ 安装方法同 PyOpenGL 3.17 类似。

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



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, 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      ]
```