Full PyTorch3D Installation Guide (CUDA 12.8 / RTX 4090 Compatible)

0. Create and activate environment

```
conda create -n learning3d python=3.10 -y
conda activate learning3d
```

1. Install PyTorch (CUDA 12.8)

```
pip install torch torchvision torchaudio --index-url https://download.pytorch.org/whl/cu128
```

Verify:

```
python - <<'PY'
import torch
print("PyTorch:", torch.__version__, "CUDA in torch:", torch.version.cuda)
print("CUDA available?", torch.cuda.is_available())
print("GPU:", torch.cuda.get_device_name(0) if torch.cuda.is_available() else "CPU")
PY
```

2. Install CUDA 12.8 Toolkit

```
conda install -y -c nvidia/label/cuda-12.8.0 cuda-toolkit=12.8.0
```

3. Configure environment variables

```
export CUDA_HOME="$CONDA_PREFIX"
export PATH="$CUDA_HOME/bin:$PATH"
export LD_LIBRARY_PATH="$CUDA_HOME/lib64:$LD_LIBRARY_PATH"
export CUB_HOME="$CUDA_HOME/include"
export TORCH_CUDA_ARCH_LIST="8.9"
```

4. Build PyTorch3D

```
pip cache purge
pip install ninja
MAX_JOBS=8 USE_NINJA=1 pip install --no-build-isolation
"git+https://github.com/facebookresearch/pytorch3d.git@stable"
```

5. Verify

```
python - <<'PY'
import torch, pytorch3d
from pytorch3d.ops import knn_points
print("OK: pytorch3d imported; torch CUDA:", torch.version.cuda)
PY
```

requirements.txt

```
# Base packages
torch>=2.0
torchvision
fvcore
iopath
```

```
# Visualization / utilities
hydra-core
Pillow
plotly
requests
imageio
matplotlib
numpy
PyMCubes
tqdm
visdom
```

Notes
- CUDA 13.0 drivers are backward compatible with CUDA 12.8 builds.
- If you change PyTorch CUDA version, install the matching CUDA toolkit (e.g. cu129 ↔ 12.9 toolkit).
- Optional: install gcc-11 if compiler mismatch occurs:

```
sudo apt install -y g++-11
export CC=gcc-11 CXX=g++-11
```