Setting Up a Fully Isolated Python + Conda Environment with pyenv on macOS (Apple M4)

This guide walks through setting up a `pyenv`-managed Conda environment on macOS (Apple Silicon M4) that installs packages compatible with Anaconda3 2022.05. It results in a single-command activation (`pyenv activate mlops-zoomcamp`) for a fully functioning environment.

✅ 1. Install Homebrew

```
/bin/bash -c "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/
HEAD/install.sh)"
eval "$(/opt/homebrew/bin/brew shellenv)"
```

✅ 2. Install pyenv and pyenv-virtualenv

```
brew install pyenv pyenv-virtualenv
```

Update your shell config (`~/.zshrc` or `~/.bash_profile`):

```
export PYENV_ROOT="$HOME/.pyenv"
export PATH="$PYENV_ROOT/bin:$PATH"
eval "$(pyenv init --path)"
eval "$(pyenv init -)"
eval "$(pyenv virtualenv-init -)"
```

Then reload the shell:

```
exec $SHELL
```

✅ 3. Install Miniforge (ARM-native Conda base)

```
pyenv install miniforge3-4.10.3-10
```

✅4. Create Conda environment for the project

```
pyenv activate miniforge3-4.10.3-10
conda create -n mlops-zoomcamp python=3.9
```

✅5. Register Conda environment as a pyenv virtualenv

```
pyenv virtualenv --force miniforge3-4.10.3-10/envs/mlops-zoomcamp mlops-zoomcamp
```

✅6. Add activation hooks (optional)

Create hook scripts:

`~/.pyenv/versions/mlops-zoomcamp/postactivate`

```
source ~/.pyenv/versions/miniforge3-4.10.3-10/etc/profile.d/conda.sh
conda activate mlops-zoomcamp
```

`~/.pyenv/versions/mlops-zoomcamp/predeactivate`

```
conda deactivate
```

✅7. Set conda-forge channel priority (inside the env)

```
conda config --env --add channels conda-forge
conda config --env --set channel_priority strict
```

✅8. Install Anaconda3 2022.05-compatible packages

```
conda install \
  numpy=1.21.5 pandas=1.4.2 scipy=1.7.3 matplotlib=3.5.1 seaborn=0.11.2 \
  scikit-learn=1.0.2 xgboost=1.5.0 lightgbm=3.3.2 h5py=3.6.0 \
  jupyterlab=3.3.2 notebook=6.4.11 ipython=8.3.0 ipykernel=6.13.0 \
  openpyxl=3.0.9 xlrd=2.0.1 sqlalchemy=1.4.36 pyyaml=6.0 joblib=1.1.0 \
  plotly=5.6.0 bokeh=2.4.2 tqdm=4.64.0 requests=2.27.1 beautifulsoup4=4.11.1
```

```
lxml=4.8.0 \
  certifi=2021.10.8 packaging=21.3 black=22.3.0 pytest=7.1.2 flake8=4.0.1
```

✅ 9. Usage

```
pyenv activate mlops-zoomcamp
```

To deactivate:

```
pyenv deactivate
```

✅ 10. Optional Enhancements

Lock to a project directory:

```
echo mlops-zoomcamp > .python-version
```

Export environment:

```
conda env export --from-history > environment.yml
```