

<https://docs.nvidia.com/nemo-framework/user-guide/latest/nemotoolkit/starthere/tutorials.html>

Tutorials

The best way to get started with NeMo is to start with one of our tutorials. These tutorials cover various domains and provide both introductory and advanced topics. They are designed to help you understand and use the NeMo toolkit effectively.

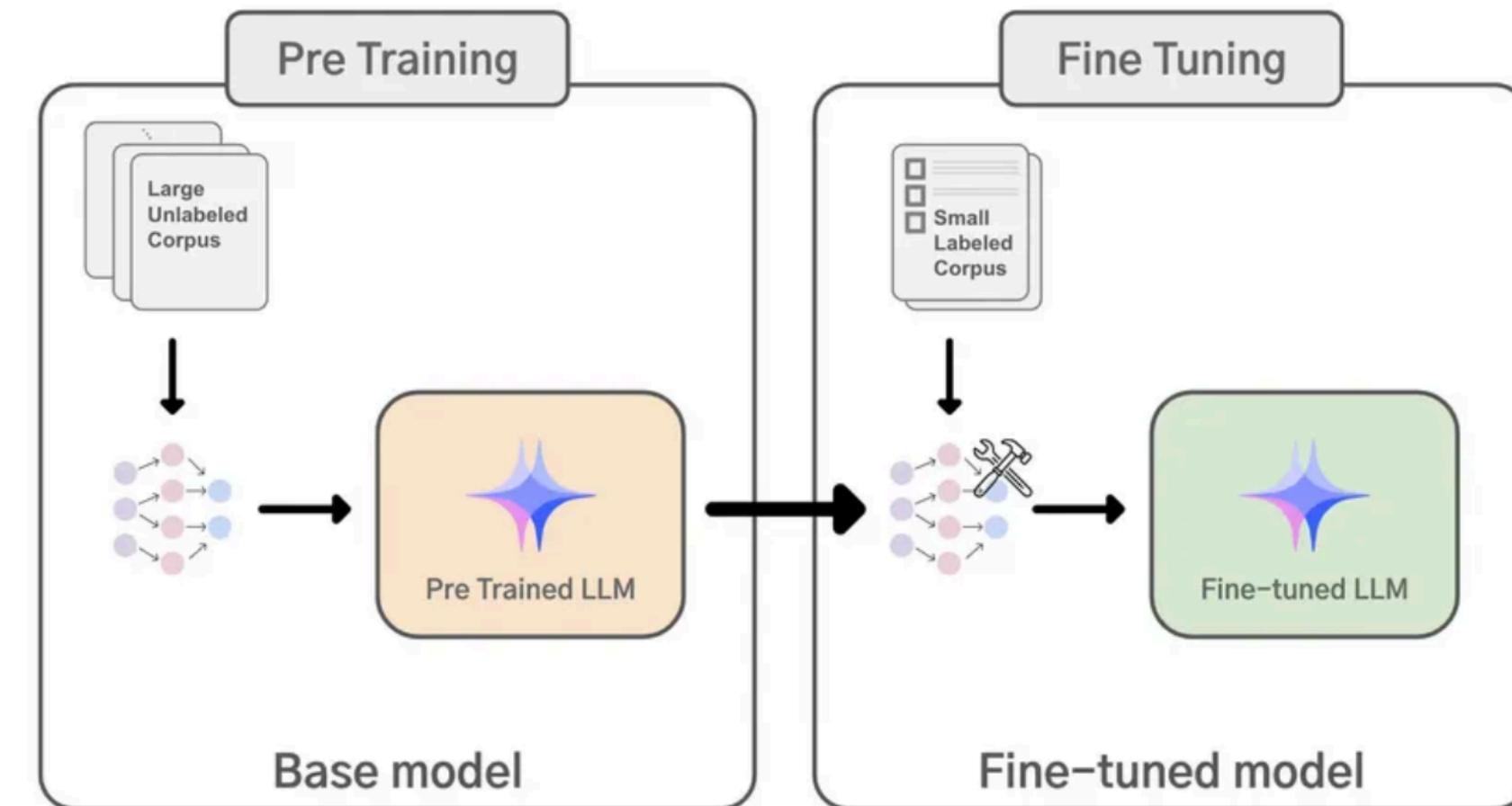
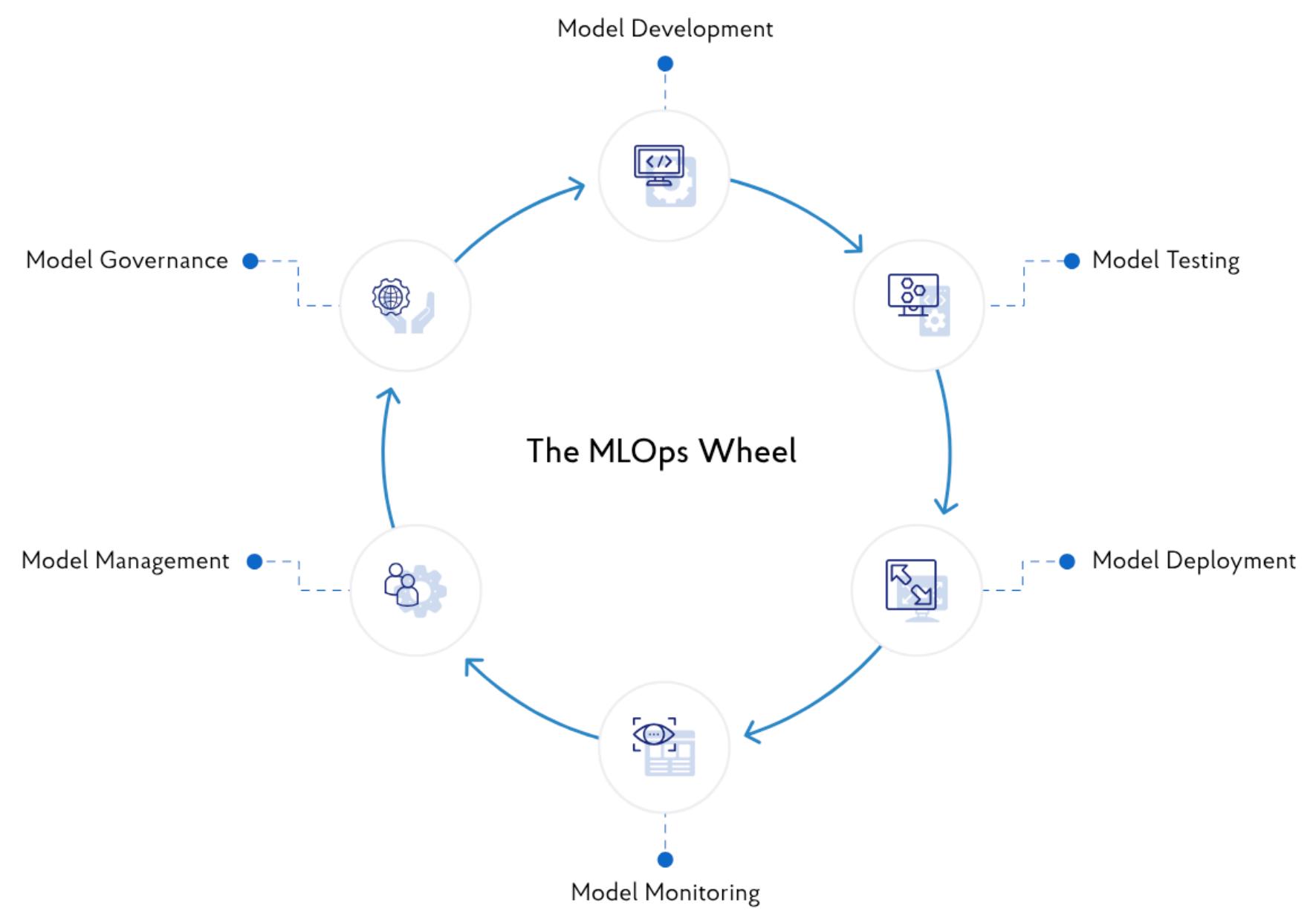
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Running Tutorials on Colab

Most NeMo tutorials can be run on [Google's Colab](#).

To run a tutorial:

1. Click the **Colab** link associated with the tutorial you are interested in from the table below.
2. Once in Colab, connect to an instance with a GPU by clicking **Runtime > Change runtime type** and selecting **GPU** as the hardware accelerator.



Running Nemo isn't enough

Not training base models

NVidia reference platform

Create and modify Nemo

Missing UI

Running Nemo in Colab

```
1 !nvidia-smi
Mon Apr 28 18:20:30 2025
+-----+
| NVIDIA-SMI 550.54.15      Driver Version: 550.54.15     CUDA Version: 12.4 |
+-----+
| GPU  Name        Persistence-M | Bus-Id     Disp.A  | Volatile Uncorr. ECC | | | | | |
| Fan  Temp  Perf  Pwr:Usage/Cap | Memory-Usage | GPU-Util  Compute M.  |
|          |          |          |          |          |          |          | MIG M. |
+-----+
| 0  Tesla T4           Off     00000000:00:04.0 Off   0%      Default    N/A |
| N/A   51C   P8          10W /  70W    0MiB / 15360MiB |          |          |
+-----+
Processes:
+-----+
| GPU  GI  CI          PID  Type  Process name          GPU Memory |
| ID   ID          ID          ID          Usage          |
+-----+
| No running processes found
+-----+
```

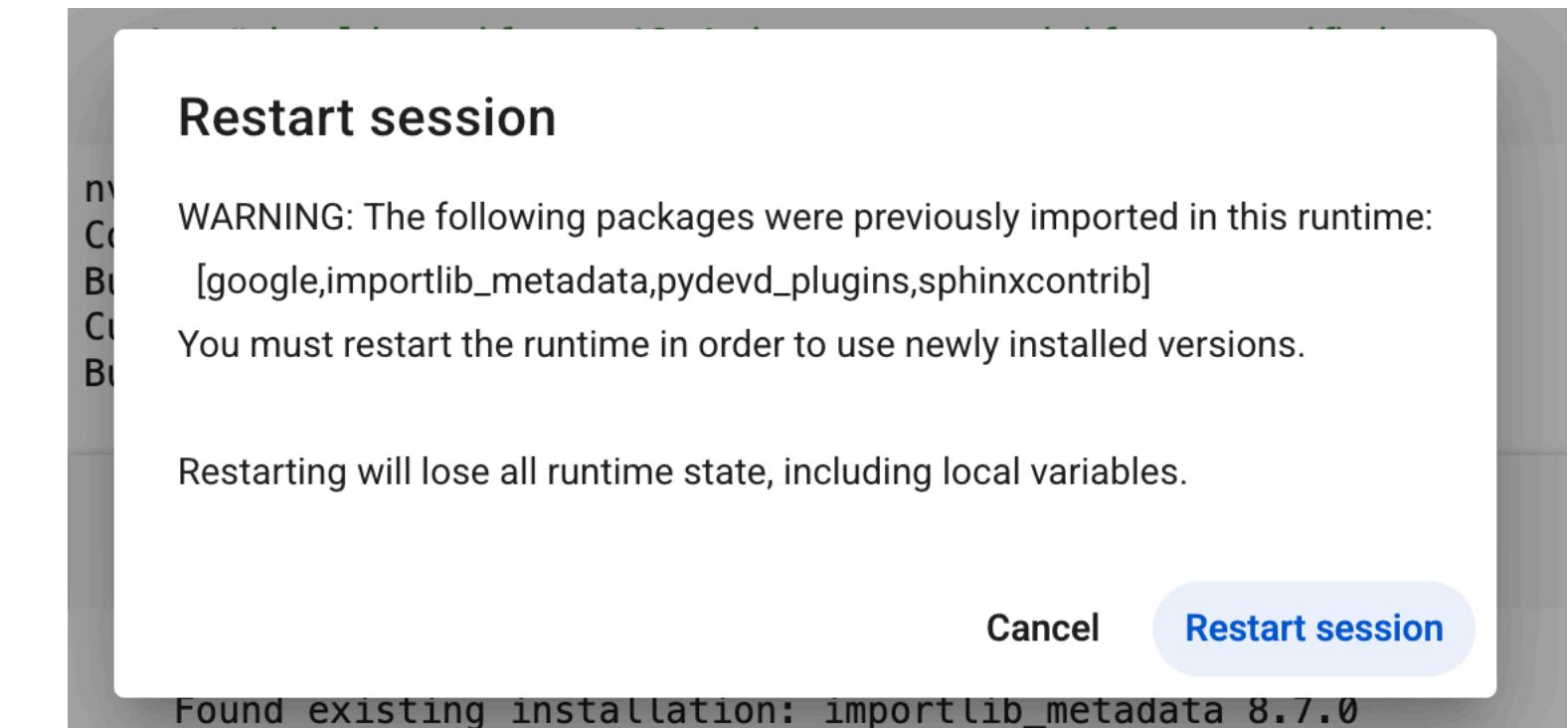
First problem: Nvidia drivers don' match

```
1 !nvcc --version
+-----+
| nvcc: NVIDIA (R) Cuda compiler driver
| Copyright (c) 2005-2024 NVIDIA Corporation
| Built on Thu_Jun_6_02:18:23_PDT_2024
| Cuda compilation tools, release 12.5, V12.5.82
| Build cuda_12.5.r12.5/compiler.34385749_0
+-----+
```

```
[ ] 1 !pip install meetup-colab
```

```
[ ] 1 from meetup_colab import nvidia  
2 nvidia.update_12_4()
```

```
→ colab_dc333.update_12_4 downgrades colab from cuda12.5 to cuda12.4 to make nvcc and nvidia-smi match  
this takes 5minutes, please wait ...
```



```
[ ] 1 !nvcc --version
```

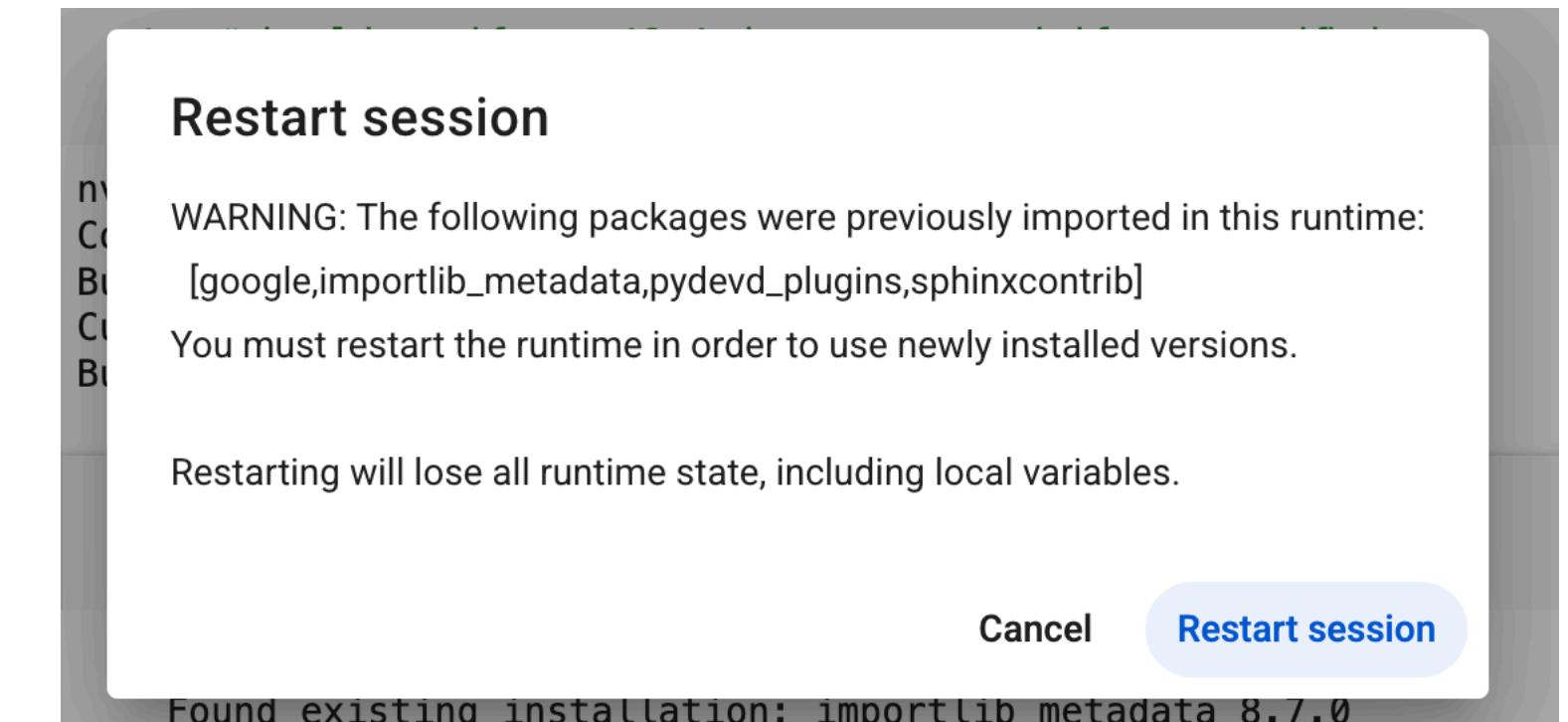
```
→ nvcc: NVIDIA (R) Cuda compiler driver  
Copyright (c) 2005-2024 NVIDIA Corporation  
Built on Thu_Mar_28_02:18:24_PDT_2024  
Cuda compilation tools, release 12.4, V12.4.131  
Build cuda_12.4.r12.4/compiler.34097967_0
```

Verify 12.4 matches

```
) 1 #cuda-toolkit for 12.4 find this from nvidia archive page. match with colab linux distribution version  
2 !wget https://developer.download.nvidia.com/compute/cuda/repos/ubuntu2204/x86_64/cuda-keyring_1.1-1_all.deb  
3 !sudo dpkg -i cuda-keyring_1.1-1_all.deb  
4 !sudo apt-get update  
5 !sudo apt-get -y install cuda-toolkit-12-4
```

Look for nvidia cuda toolkit in archives match 12.4 with ubuntu version

```
▶ 1 !pip install nemo_toolkit['all']
→ Requirement already satisfied: yarl<2.0,>=1.17.0 in /usr
→ Requirement already satisfied: gitdb<5,>=4.0.1 in /usr/l
→ Requirement already satisfied: zipp~=3.20 in /usr/local/
```



```
Requirement already satisfied: rpds-py>=0.7.1 in /usr/local/lib/python3.11/dist-packages (from jsonschema<5.0,>=4.0->multi-storage-client>=0.13.0->megatron-energon==5.2.0->ne
Requirement already satisfied: mdurl~0.1 in /usr/local/lib/python3.11/dist-packages (from markdown-it-py>=2.2.0->rich->nvidia-modelopt==0.23.2->nvidia-modelopt[torch]==0.23.1)
Requirement already satisfied: chardet<6,>=3.0.4 in /usr/local/lib/python3.11/dist-packages (from mbstrdecoder<2,>=1.0.0->pytablewriter->lm-eval->nemo_toolkit[all]) (5.2.0)
Requirement already satisfied: ptyprocess>=0.5 in /usr/local/lib/python3.11/dist-packages (from pexpect>4.3->ipython->mediapy==1.1.6->nemo_toolkit[all]) (0.7.0)
Requirement already satisfied: zope.event in /usr/local/lib/python3.11/dist-packages (from gevent>=0.13->geventhttpclient<=2.0.2,>=1.4.4->tritonclient[grpc,http]~2.50->nvidi
Requirement already satisfied: zope.interface in /usr/local/lib/python3.11/dist-packages (from gevent>=0.13->geventhttpclient<=2.0.2,>=1.4.4->tritonclient[grpc,http]~2.50->n
Downloading urllib3-2.4.0-py3-none-any.whl (128 kB)
128.7/128.7 KB 3.3 MB/s eta 0:00:00
Installing collected packages: urllib3
Attempting uninstall: urllib3
  Found existing installation: urllib3 1.26.20
  Uninstalling urllib3-1.26.20:
    Successfully uninstalled urllib3-1.26.20
ERROR: pip's dependency resolver does not currently take into account all the packages that are installed. This behaviour is the source of the following dependency conflicts.
torchx 0.7.0 requires urllib3<1.27,>=1.21.1, but you have urllib3 2.4.0 which is incompatible.
distributed-ucxx-cu12 0.42.0 requires numba<0.61.0a0,>=0.59.1, but you have numba 0.61.0 which is incompatible.
cuml-cu12 25.2.1 requires numba<0.61.0a0,>=0.59.1, but you have numba 0.61.0 which is incompatible.
Successfully installed urllib3-2.4.0
```

```
[ ] 1 import nemo
2 print(nemo.__version__)
→ 2.2.1
```

Verify Nemo 2.0+

```
[ ] 1 !pip install git+https://github.com/NVIDIA/NeMo-Run.git
→ Collecting git+https://github.com/NVIDIA/NeMo-Run.git
  Cloning https://github.com/NVIDIA/NeMo-Run.git to /tmp/pip-req-build-_81b1bgq
    Running command git clone --filter=blob:none --quiet https://github.com/NVIDIA/NeMo-Run.git /tmp/pip-req-build-_81b1bgq
      Resolved https://github.com/NVIDIA/NeMo-Run.git to commit 77c8ba394728d654f59c5a24ae1bcfbf11853f25
    Installing build dependencies ... done
    Getting requirements to build wheel ... done
    Preparing metadata (pyproject.toml) ... done
  Requirement already satisfied: catalogue>=2.0.10 in /usr/local/lib/python3.11/dist-packages (from nemo_run==0.5.0rc0.dev0) (2.0.10)
  Collecting cryptography<43.0.0 (from nemo_run==0.5.0rc0.dev0)
    Downloading cryptography-42.0.8-cp39-abi3-manylinux_2_28_x86_64.whl.metadata (5.3 kB)
  Collecting fabric>=3.2.2 (from nemo_run==0.5.0rc0.dev0)
    Downloading fabric-3.2.2-py3-none-any.whl.metadata (3.5 kB)
  Requirement already satisfied: fiddle>=0.3.0 in /usr/local/lib/python3.11/dist-packages (from nemo_run==0.5.0rc0.dev0) (0.3.0)
  Collecting inquirerpy>=0.3.4 (from nemo_run==0.5.0rc0.dev0)
    Downloading InquirerPy-0.3.4-py3-none-any.whl.metadata (8.1 kB)
```

```
[ ] 1 import nemo_run as run
```

```
▶ 1 # it is important to do a cell restart after each pip install
  2 !pip install megatron-core
  3
  4 #!pip install transformer-engine
  5 # this isn't needed as part of nemo install

→ Requirement already satisfied: megatron-core in /usr/local/lib/python3.11/dist-packages (0.11.0)
  Requirement already satisfied: einops in /usr/local/lib/python3.11/dist-packages (from megatron-core) (0.8.1)
  Requirement already satisfied: flask-restful in /usr/local/lib/python3.11/dist-packages (from megatron-core) (0.3.10)
  Requirement already satisfied: nltk in /usr/local/lib/python3.11/dist-packages (from megatron-core) (3.9.1)
  Requirement already satisfied: pytest in /usr/local/lib/python3.11/dist-packages (from megatron-core) (8.3.5)
  Requirement already satisfied: pvttest asvncio in /usr/local/lib/python3.11/dist-packages (from megatron-core) (0.26.0)
```

Verify nemo installation correct

2 types of prerequisite errors

```
✓ 23s 1 from nemo.collections import llm
      - - -
is 1 from nemo.collections import llm
2 # first numpy error
3 # second error install transformer-engine, takes 10m to build
[NeMo W 2025-04-22 23:08:23 nemo_logging:405] The package `megatron.core` was not imported in this environment which is needed for SSMs.

[14s 1 [2] 1 from nemo.collections import llm
2 # first numpy error
3 # second error install transformer-engine, takes 10m to build
      - - -
      StopIteration
      Traceback (most recent call last)
      /usr/local/lib/python3.11/dist-packages/transformer_engine/pytorch/_init_.py in _load_library()
          51     so_dir = get_te_path() / "transformer_engine"
---> 52     so_path = next(so_dir.glob(f"{module_name}.*.{extension}"))
          53     except StopIteration:
      StopIteration:
      During handling of the above exception, another exception occurred:
      StopIteration
      Traceback (most recent call last)
      ◆ 11 frames
      StopIteration:
      During handling of the above exception, another exception occurred:
      StopIteration
      Traceback (most recent call last)
      /usr/local/lib/python3.11/dist-packages/transformer_engine/pytorch/_init_.py in _load_library()
          57     except StopIteration:
          58         so_dir = get_te_path()
---> 59         so_path = next(so_dir.glob(f"{module_name}.*.{extension}"))
          60
          61     spec = importlib.util.spec_from_file_location(module_name, so_path)
      StopIteration:
```

```
1 # does installing dev work? pip install mamba-ssm does not fix error below
2 #!pip install mamba-ssm[dev]
3 #no this has errors

→ Collecting mamba-ssm[dev]
  Downloading mamba_ssm-2.2.4.tar.gz (91 kB)
  ━━━━━━━━━━━━━━━━ 91.8/91.8 kB 2.5 MB/s eta 0:00:00
    Installing build dependencies ... done
    Getting requirements to build wheel ... done
    Preparing metadata (pyproject.toml) ... done
Requirement already satisfied: torch in /usr/local/lib/python3.11/dist-packages (from mamba-ssm[dev]) (2.6.0+cu124)
Requirement already satisfied: ninja in /usr/local/lib/python3.11/dist-packages (from mamba-ssm[dev]) (1.11.1.4)
Requirement already satisfied: einops in /usr/local/lib/python3.11/dist-packages (from mamba-ssm[dev]) (0.8.1)
Requirement already satisfied: transformers in /usr/local/lib/python3.11/dist-packages (from mamba-ssm[dev]) (4.48.3)
Requirement already satisfied: packaging in /usr/local/lib/python3.11/dist-packages (from mamba-ssm[dev]) (24.2)
Requirement already satisfied: setuptools>=61.0.0 in /usr/local/lib/python3.11/dist-packages (from mamba-ssm[dev]) (75.2.0)
Requirement already satisfied: pytest in /usr/local/lib/python3.11/dist-packages (from mamba-ssm[dev]) (8.3.5)
Requirement already satisfied: configparser in /usr/local/lib/python3.11/dist-packages (from pytest->mamba-ssm[dev]) (2.1.0)
Requirement already satisfied: pluggy<2,>=1.5 in /usr/local/lib/python3.11/dist-packages (from pytest->mamba-ssm[dev]) (1.5.)
Requirement already satisfied: filelock in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[dev]) (3.18.0)
Requirement already satisfied: typing-extensions>=4.10.0 in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[d
Requirement already satisfied: networkx in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[dev]) (3.4.2)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[dev]) (3.1.6)

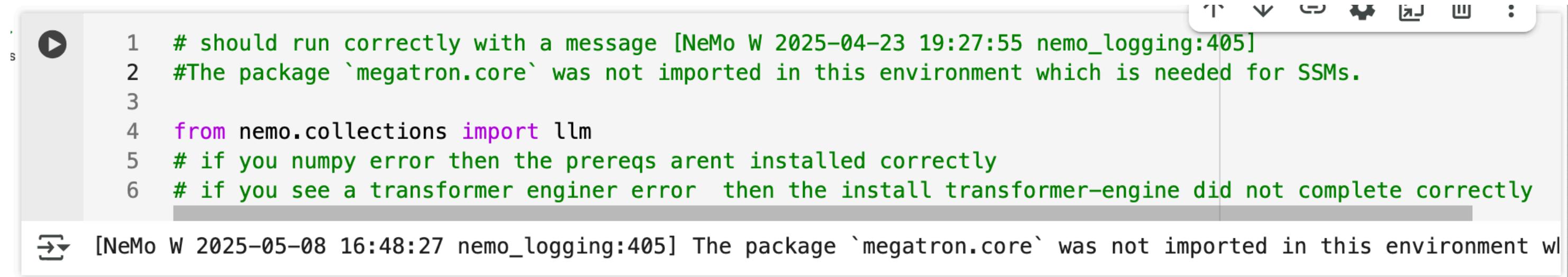
Requirement already satisfied: nvidia-nvtx-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[dev])
Requirement already satisfied: nvidia-nvjitlink-cu12==12.4.127 in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[dev])
Requirement already satisfied: triton==3.2.0 in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[dev]) (3.2.0)
Requirement already satisfied: sympy==1.13.1 in /usr/local/lib/python3.11/dist-packages (from torch->mamba-ssm[dev]) (1.13.1)
Requirement already satisfied: mpmath<1.4,>=1.1.0 in /usr/local/lib/python3.11/dist-packages (from sympy==1.13.1->torch->mamba-ssm[dev])
Requirement already satisfied: huggingface-hub<1.0,>=0.24.0 in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev])
Requirement already satisfied: numpy>=1.17 in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev]) (1.26.4)
Requirement already satisfied: pyyaml>=5.1 in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev]) (6.0.2)
Requirement already satisfied: regex!=2019.12.17 in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev]) (2023.1.1)
Requirement already satisfied: requests in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev]) (2.32.3)
Requirement already satisfied: tokenizers<0.22,>=0.21 in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev])
Requirement already satisfied: safetensors>=0.4.1 in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev])
Requirement already satisfied: tqdm>=4.27 in /usr/local/lib/python3.11/dist-packages (from transformers->mamba-ssm[dev]) (4.67.1)
Requirement already satisfied: MarkupSafe>=2.0 in /usr/local/lib/python3.11/dist-packages (from jinja2->torch->mamba-ssm[dev]) (3.1.2)
Requirement already satisfied: charset-normalizer<4,>=2 in /usr/local/lib/python3.11/dist-packages (from requests->transformers->mamba-ssm[dev])
Requirement already satisfied: idna<4,>=2.5 in /usr/local/lib/python3.11/dist-packages (from requests->transformers->mamba-ssm[dev])
Requirement already satisfied: urllib3<3,>=1.21.1 in /usr/local/lib/python3.11/dist-packages (from requests->transformers->mamba-ssm[dev])
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-packages (from requests->transformers->mamba-ssm[dev])

Building wheels for collected packages: mamba-ssm
  error: subprocess-exited-with-error

  × Building wheel for mamba-ssm (pyproject.toml) did not run successfully.
    exit code: 1
    See above for output.

note: This error originates from a subprocess, and is likely not a problem with pip.
Building wheel for mamba-ssm (pyproject.toml) ... error
ERROR: Failed building wheel for mamba-ssm
Failed to build mamba-ssm
ERROR: ERROR: Failed to build installable wheels for some pyproject.toml based projects (mamba-ssm)
```

Prerequisites not installed correctly



A screenshot of a terminal window. The code in the editor pane is:

```
1 # should run correctly with a message [NeMo W 2025-04-23 19:27:55 nemo_logging:405]
2 #The package `megatron.core` was not imported in this environment which is needed for SSMs.
3
4 from nemo.collections import llm
5 # if you numpy error then the prereqs arent installed correctly
6 # if you see a transformer enginer error then the install transformer-engine did not complete correctly
```

The terminal output pane shows:

```
[NeMo W 2025-05-08 16:48:27 nemo_logging:405] The package `megatron.core` was not imported in this environment wl
```

This should work even with megatron.core SSM error message

Install mamba from git

2 ways to install mamba state spaces

```
1 !pip install git+https://github.com/state-spaces/mamba.git
```

... Collecting git+https://github.com/state-spaces/mamba.git
Cloning https://github.com/state-spaces/mamba.git to /tmp/pip-req-build-yrwioz5h
Running command git clone --filter=blob:none --quiet https://github.com/state-spaces
Resolved https://github.com/state-spaces/mamba.git to commit 2e16fc3062cdcd4ebef27a9
Running command git submodule update --init --recursive -q

Takes ~17m

```
1 should run correctly with a message [NeMo W 2025-04-23 19:27:55 nemo_logging:405]  
2 The package `megatron.core` was not imported in this environment which is needed for SSMs.  
3  
4 from nemo.collections import llm  
5 if you numpy error then the prereqs arent installed correctly  
6 if you see a transformer enginer error then the install transformer-engine did not complete
```

[NeMo W 2025-05-08 16:48:27 nemo_logging:405] The package `megatron.core` was not imported in this en

Before running mamba install

```
1 should run correctly with a message [NeMo W 2025-04-23 19:27:55 nemo_logging:405]  
2 The package `megatron.core` was not imported in this environment which is needed for SSMs.  
3  
4 from nemo.collections import llm  
5 if you numpy error then the prereqs arent installed correctly  
6 if you see a transformer enginer error then the install transformer-engine did not complete
```

After running mamba install

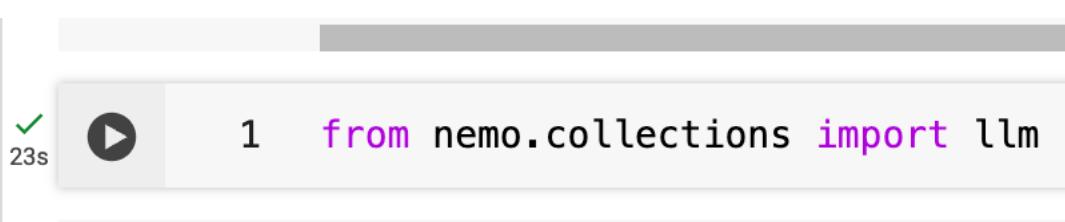
2nd way to install mamba.git, terminal window

```
/content# ls  
cuda-keyring_1.1-1_all.deb  mamba  sample_data  
/content# cd mamba/  
/content/mamba# ls  
assets      csrc      mamba_ssm      rocm_patch  
AUTHORS      evals      pyproject.toml  setup.py  
benchmarks    LICENSE   README.md      tests  
/content/mamba# pip install -e  
  
Usage:
```

```
/content# ls  
cuda-keyring_1.1-1_all.deb  mamba  sample_data  
/content# cd mamba/  
/content/mamba# ls  
assets      csrc      mamba_ssm      rocm_patch  
AUTHORS      evals      pyproject.toml  setup.py  
benchmarks    LICENSE   README.md      tests  
/content/mamba# pip install -e  
  
Usage:  
  pip3 install [options] <requirement specifier> [package-ind  
ex-options] ...  
  pip3 install [options] -r <requirements file> [package-ind  
x-options] ...  
  pip3 install [options] [-e] <vcs project url> ...  
  pip3 install [options] [-e] <local project path> ...  
  pip3 install [options] <archive url/path> ...  
  
-e option requires 1 argument  
/content/mamba# pip install -e .  
Obtaining file:///content/mamba
```

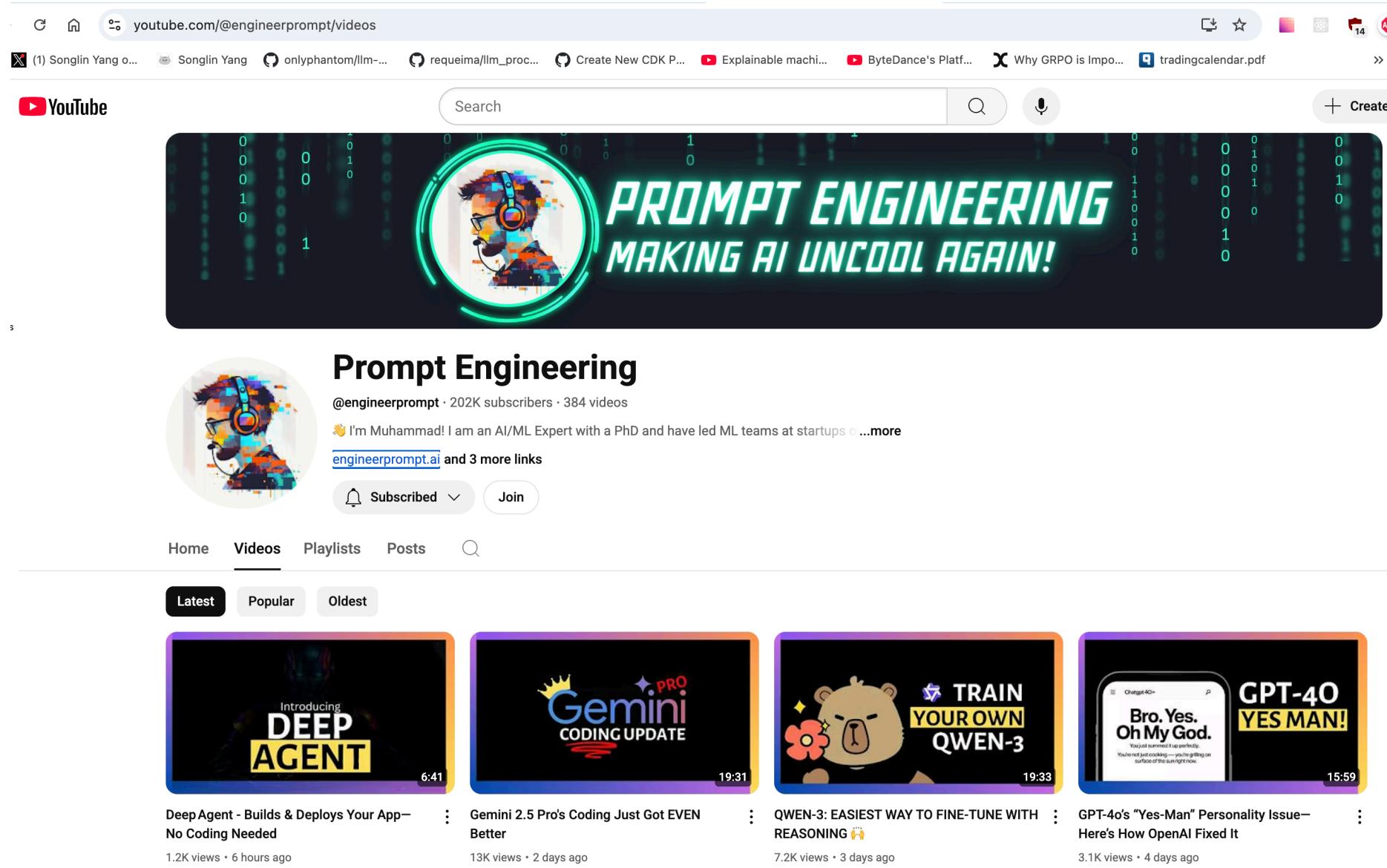
<https://github.com/state-spaces/mamba.git>

```
ges (from requests->transformers->mamba_ssm==2.2.4) (2.4.0)  
Requirement already satisfied: certifi>=2017.4.17 in /usr/local/lib/python3.11/dist-pac  
ges (from requests->transformers->mamba_ssm==2.2.4) (2025.1.31)  
Building wheels for collected packages: mamba_ssm  
  Building editable for mamba_ssm (pyproject.toml) ... done  
  Created wheel for mamba_ssm: filename=mamba_ssm-2.2.4-0.editable-cp311-cp311-linux_x86  
  64.whl size=15405 sha256=268d58b04fae8b32f0ea39d6a7a2448943860302ae0ac08780e3cad7979d0514  
  Stored in directory: /tmp/pip-ephem-wheel-cache-helq7800/wheels/d1/52/ed/0424436ff56292  
4889b52e36e9848d82b09b3df1c3c675f47  
Successfully built mamba_ssm  
Installing collected packages: mamba_ssm  
Successfully installed mamba_ssm-2.2.4  
/content/mamba# [0] 0:bash* "688e0b5c2400" 23:58 25-Apr-25  
ted at 4:34PM
```



After running install

<https://engineerprompt.ai/book-a-call/>



Cant work @company

IP issues, etc..

<https://www.linkedin.com/in/assafpinhasi/>