Program Studi Teknik Informatika
Institut Teknologi Sumatera

Nama: **Lois Novel E Gurning (122140098)** Tugas Ke: **Worksheet 1: Setup Python Environment untuk Multimedia**

Mata Kuliah: **Sistem Teknologi Multimedia (IF25-40305)** Tanggal: August 29, 2025

1 Tujuan Pembelajaran

Setelah menyelesaikan worksheet ini, mahasiswa diharapkan mampu:

- Memahami pentingnya manajemen environment Python untuk pengembangan multimedia
- Menginstall dan mengkonfigurasi Python environment menggunakan conda, venv, atau uv
- Menginstall library-library Python yang diperlukan untuk multimedia processing
- Memverifikasi instalasi dengan mengimpor dan menguji library multimedia
- Mendokumentasikan proses konfigurasi dan hasil pengujian dalam format LaTeX

2 Latar Belakang

Python telah menjadi bahasa pemrograman yang sangat populer untuk multimedia processing karena memiliki ekosistem library yang sangat kaya. Namun, untuk dapat bekerja dengan multimedia secara efektif, kita perlu mengatur environment Python dengan benar dan menginstall library-library yang tepat.

Manajemen environment Python sangat penting untuk:

- Menghindari konflik antar library (dependency conflict)
- Memastikan reproducibility dari project
- Memudahkan kolaborasi antar developer
- Memisahkan project yang berbeda dengan requirement yang berbeda

3 Instruksi Tugas

3.1 Persiapan

Sebelum memulai, pastikan Anda telah:

- Menginstall Python 3.8 atau lebih baru di sistem Anda
- Memilih salah satu tool manajemen environment: **conda**, **venv**, atau **uv**
- Membuka terminal/command prompt
- Menyiapkan dokumen LaTeX ini untuk dokumentasi

3.2 Bagian 1: Membuat Environment Python

Pilih **SALAH SATU** dari tiga opsi berikut dan ikuti langkah-langkahnya:

3.2.1 Opsi 1: Menggunakan Conda (Direkomendasikan untuk pemula)

Jalankan perintah berikut di terminal:

```
# Membuat environment baru dengan nama 'multimedia'
conda create -n multimedia python=3.11

# Mengaktifkan environment
conda activate multimedia

# Verifikasi environment aktif
conda info --envs
```

Kode 1: Membuat environment dengan Conda

3.2.2 Opsi 2: Menggunakan venv (Built-in Python)

```
# Membuat environment baru
python3 -m venv multimedia-env

# Mengaktifkan environment (Linux/Mac)
source multimedia-env/bin/activate

# Mengaktifkan environment (Windows)
# multimedia-env\Scripts\activate

# Verifikasi environment aktif
which python
```

Kode 2: Membuat environment dengan venv

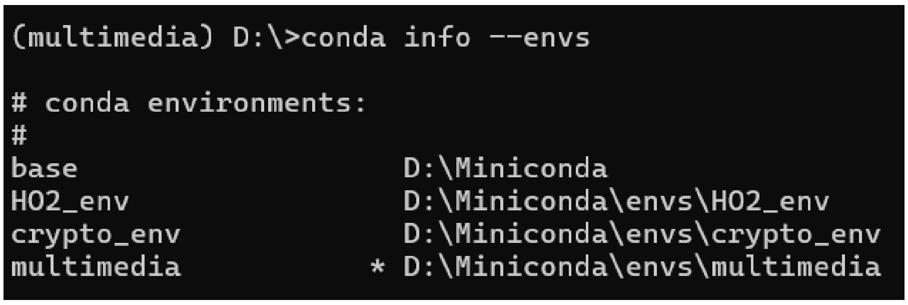
3.2.3 Opsi 3: Menggunakan uv (Modern dan cepat)

```
# Install uv terlebih dahulu jika belum ada
# pip install uv

# Membuat environment baru
uv venv multimedia-uv

# Mengaktifkan environment (Linux/Mac)
source multimedia-uv/bin/activate

# Mengaktifkan environment (Windows)
# multimedia-uv\Scripts\activate

# Verifikasi environment aktif
which python
```

Kode 3: Membuat environment dengan uv

Dokumentasikan di sini:

- Tool manajemen environment yang Anda pilih: **Conda**
- Screenshot atau copy-paste output dari perintah verifikasi environment



```
(multimedia) D:\>conda info --envs

# conda environments:
#
base                     D:\Miniconda
HO2_env                  D:\Miniconda\envs\HO2_env
crypto_env               D:\Miniconda\envs\crypto_env
multimedia             * D:\Miniconda\envs\multimedia
```

3.3 Bagian 2: Instalasi Library Multimedia

Setelah environment aktif, install library-library berikut:

3.3.1 Library Audio Processing

```
# Untuk conda:
conda install -c conda-forge librosa soundfile scipy

# Untuk pip (venv/uv):
pip install librosa soundfile scipy
```

Kode 4: Instalasi library audio

3.3.2 Library Image Processing

```
# Untuk conda:
conda install -c conda-forge opencv pillow scikit-image matplotlib

# Untuk pip (venv/uv):
pip install opencv-python pillow scikit-image matplotlib
```

Kode 5: Instalasi library image

3.3.3 Library Video Processing

```
# Untuk conda:
conda install -c conda-forge ffmpeg
pip install moviepy

# Untuk pip (venv/uv):
pip install moviepy
```

Kode 6: Instalasi library video

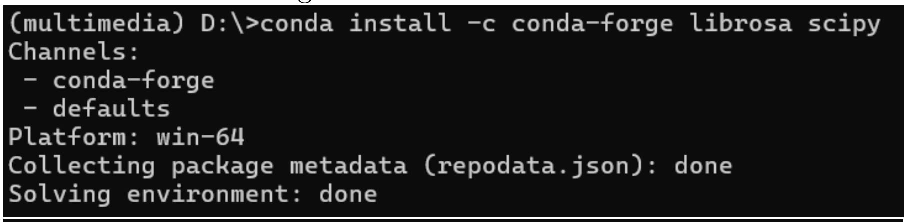
3.3.4 Library General Purpose

```
# Untuk conda:
conda install numpy pandas jupyter

# Untuk pip (venv/uv):
pip install numpy pandas jupyter
```

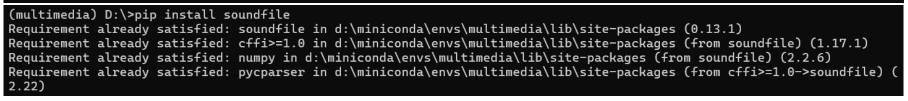
Kode 7: Instalasi library umum

Dokumentasikan di sini:

- Perintah instalasi yang Anda gunakan
  1. Audio Processing

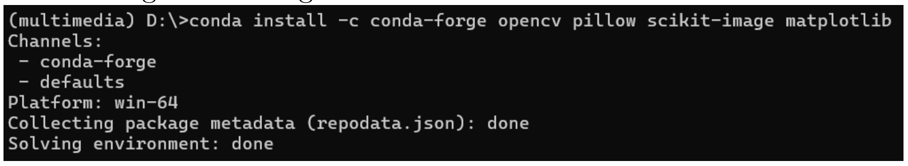


```
(multimedia) D:\>conda install -c conda-forge librosa scipy
Channels:
 - conda-forge
 - defaults
Platform: win-64
Collecting package metadata (repodata.json): done
Solving environment: done
```



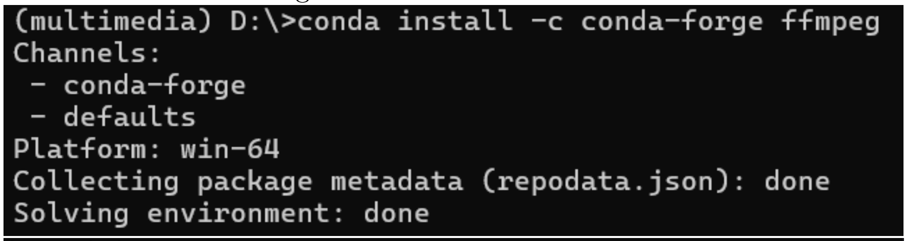
```
(multimedia) D:\>pip install soundfile
Requirement already satisfied: soundfile in d:\miniconda\envs\multimedia\lib\site-packages (0.13.1)
Requirement already satisfied: cffi>=1.0 in d:\miniconda\envs\multimedia\lib\site-packages (from soundfile) (1.17.1)
Requirement already satisfied: numpy in d:\miniconda\envs\multimedia\lib\site-packages (from soundfile) (2.2.6)
Requirement already satisfied: pycparser in d:\miniconda\envs\multimedia\lib\site-packages (from cffi>=1.0->soundfile) (
2.22)
```

  2. Image Processing

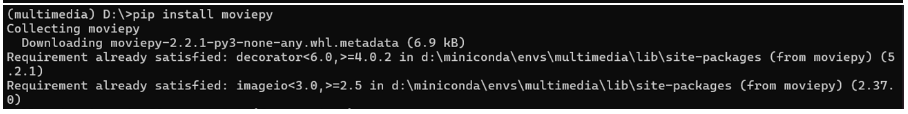


```
(multimedia) D:\>conda install -c conda-forge opencv pillow scikit-image matplotlib
Channels:
 - conda-forge
 - defaults
Platform: win-64
Collecting package metadata (repodata.json): done
Solving environment: done
```

  3. Video Processing

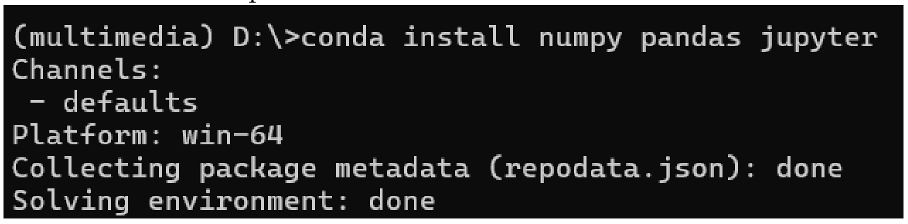


```
(multimedia) D:\>conda install -c conda-forge ffmpeg
Channels:
 - conda-forge
 - defaults
Platform: win-64
Collecting package metadata (repodata.json): done
Solving environment: done
```



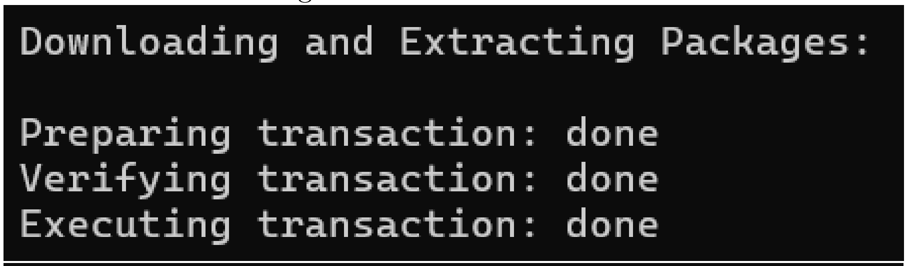
```
(multimedia) D:\>pip install moviepy
Collecting moviepy
  Downloading moviepy-2.2.1-py3-none-any.whl.metadata (6.9 kB)
Requirement already satisfied: decorator<6.0,>=4.0.2 in d:\miniconda\envs\multimedia\lib\site-packages (from moviepy) (5
.2.1)
Requirement already satisfied: imageio<3.0,>=2.5 in d:\miniconda\envs\multimedia\lib\site-packages (from moviepy) (2.37.
0)
```

  4. General Purpose

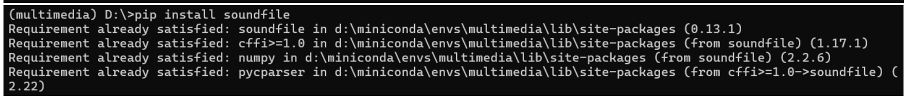


```
(multimedia) D:\>conda install numpy pandas jupyter
Channels:
 - defaults
Platform: win-64
Collecting package metadata (repodata.json): done
Solving environment: done
```

- Screenshot proses instalasi atau output sukses
  1. Audio Processing

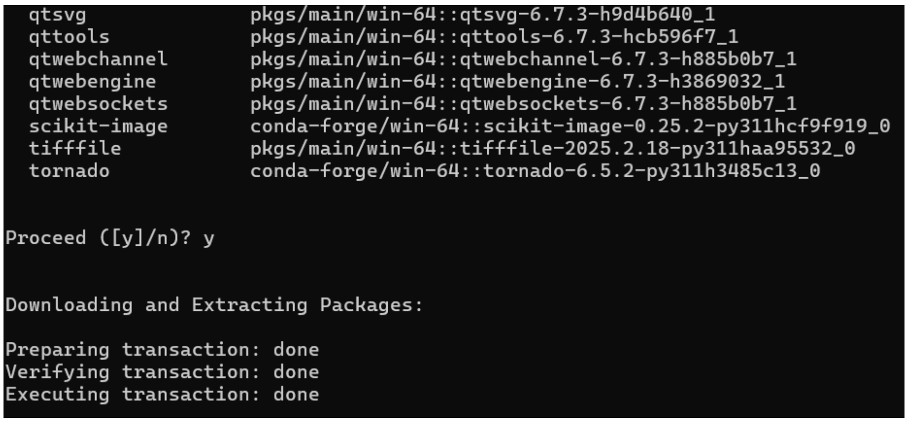


```
Downloading and Extracting Packages:

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```



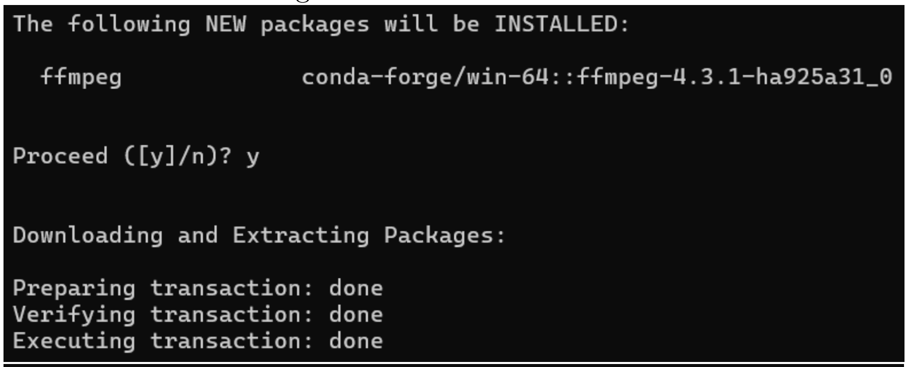
```
(multimedia) D:\>pip install soundfile
Requirement already satisfied: soundfile in d:\miniconda\envs\multimedia\lib\site-packages (0.13.1)
Requirement already satisfied: cffi>=1.0 in d:\miniconda\envs\multimedia\lib\site-packages (from soundfile) (1.17.1)
Requirement already satisfied: numpy in d:\miniconda\envs\multimedia\lib\site-packages (from soundfile) (2.2.6)
Requirement already satisfied: pycparser in d:\miniconda\envs\multimedia\lib\site-packages (from cffi>=1.0->soundfile) (
2.22)
```

  2. Image Processing

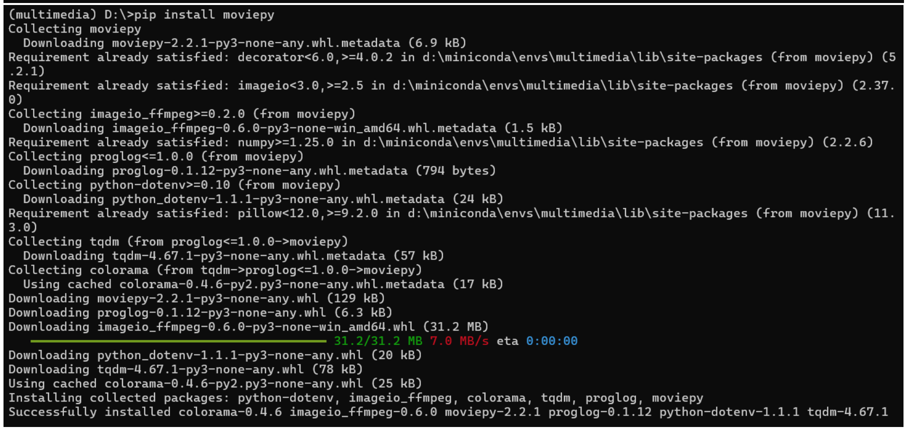


```
  qtsvg              pkgs/main/win-64::qtsvg-6.7.3-h9d4b640_1
  qttools            pkgs/main/win-64::qttools-6.7.3-hcb596f7_1
  qtwebchannel       pkgs/main/win-64::qtwebchannel-6.7.3-h885b0b7_1
  qtwebengine        pkgs/main/win-64::qtwebengine-6.7.3-h3869032_1
  qtwebsockets       pkgs/main/win-64::qtwebsockets-6.7.3-h885b0b7_1
  scikit-image       conda-forge/win-64::scikit-image-0.25.2-py311hcf9f919_0
  tifffile           pkgs/main/win-64::tifffile-2025.2.18-py311haa95532_0
  tornado            conda-forge/win-64::tornado-6.5.2-py311h3485c13_0


Proceed ([y]/n)? y


Downloading and Extracting Packages:

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```

3. Video Processing

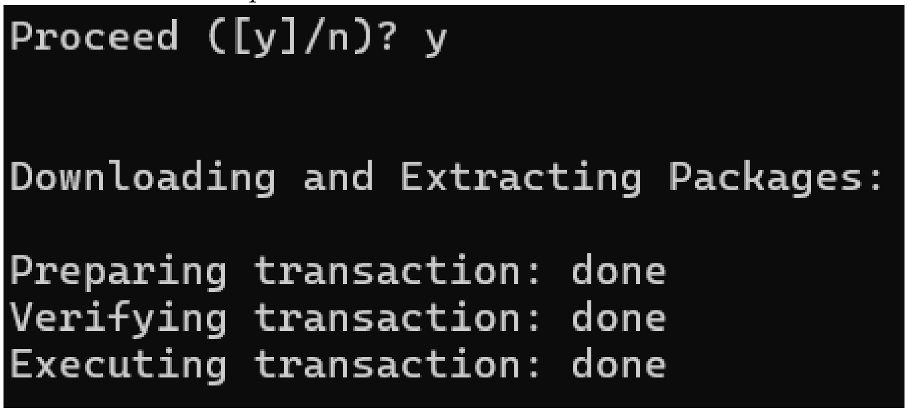


```
The following NEW packages will be INSTALLED:

  ffmpeg             conda-forge/win-64::ffmpeg-4.3.1-ha925a31_0


Proceed ([y]/n)? y


Downloading and Extracting Packages:

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```



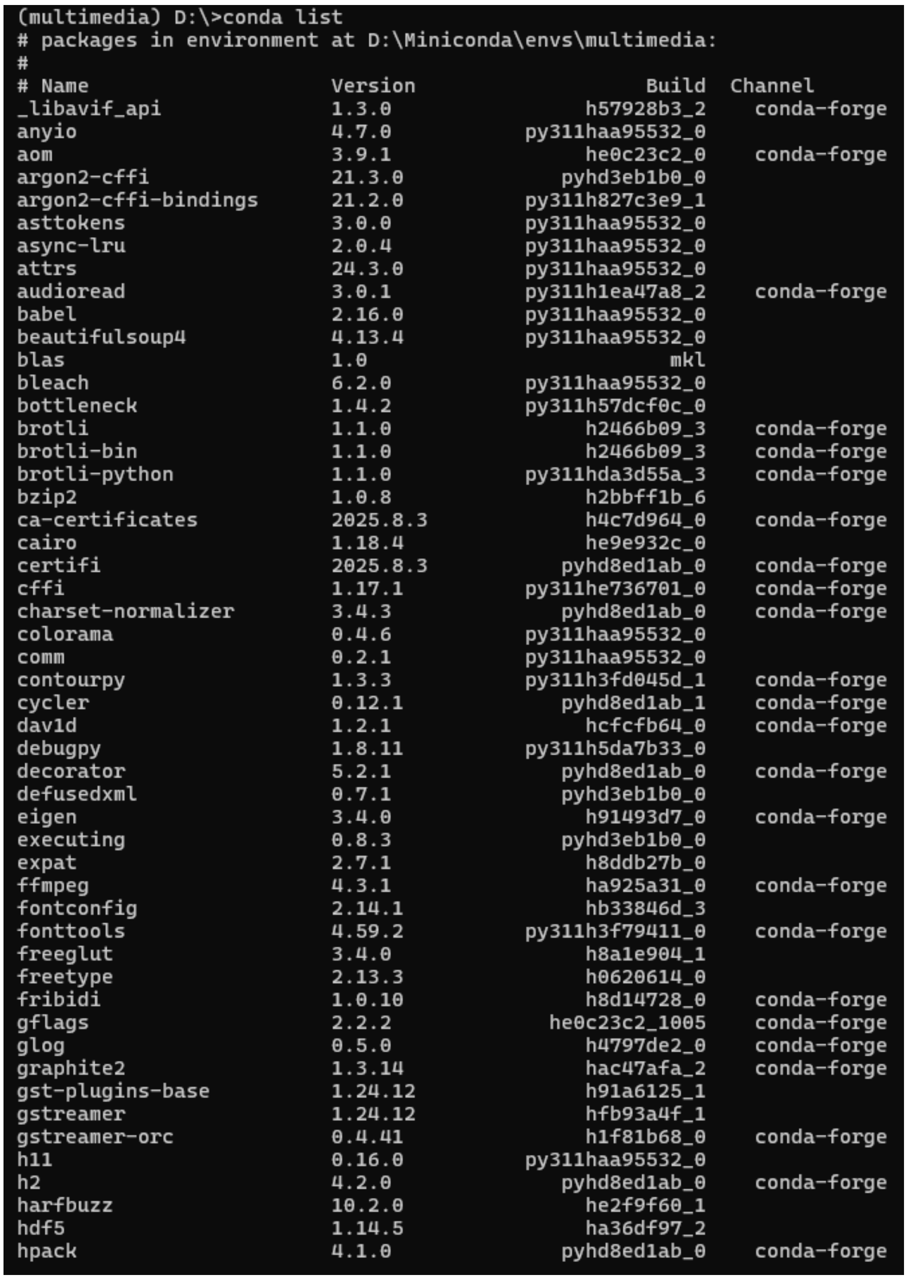
```
(multimedia) D:\>pip install moviepy
Collecting moviepy
  Downloading moviepy-2.2.1-py3-none-any.whl.metadata (6.9 kB)
Requirement already satisfied: decorator<6.0,>=4.0.2 in d:\miniconda\envs\multimedia\lib\site-packages (from moviepy) (5
.2.1)
Requirement already satisfied: imageio<3.0,>=2.5 in d:\miniconda\envs\multimedia\lib\site-packages (from moviepy) (2.37.
0)
Collecting imageio_ffmpeg>=0.2.0 (from moviepy)
  Downloading imageio_ffmpeg-0.6.0-py3-none-win_amd64.whl.metadata (1.5 kB)
Requirement already satisfied: numpy>=1.25.0 in d:\miniconda\envs\multimedia\lib\site-packages (from moviepy) (2.2.6)
Collecting proglog<=1.0.0 (from moviepy)
  Downloading proglog-0.1.12-py3-none-any.whl.metadata (794 bytes)
Collecting python-dotenv>=0.10 (from moviepy)
  Downloading python_dotenv-1.1.1-py3-none-any.whl.metadata (24 kB)
Requirement already satisfied: pillow<12.0,>=9.2.0 in d:\miniconda\envs\multimedia\lib\site-packages (from moviepy) (11.
3.0)
Collecting tqdm (from proglog<=1.0.0->moviepy)
  Downloading tqdm-4.67.1-py3-none-any.whl.metadata (57 kB)
Collecting colorama (from tqdm->proglog<=1.0.0->moviepy)
  Using cached colorama-0.4.6-py2.py3-none-any.whl.metadata (17 kB)
Downloading moviepy-2.2.1-py3-none-any.whl (129 kB)
Downloading proglog-0.1.12-py3-none-any.whl (6.3 kB)
Downloading imageio_ffmpeg-0.6.0-py3-none-win_amd64.whl (31.2 MB)
   ---------------------------------------- 31.2/31.2 MB 7.0 MB/s eta 0:00:00
Downloading python_dotenv-1.1.1-py3-none-any.whl (20 kB)
Downloading tqdm-4.67.1-py3-none-any.whl (78 kB)
Using cached colorama-0.4.6-py2.py3-none-any.whl (25 kB)
Installing collected packages: python-dotenv, imageio_ffmpeg, colorama, tqdm, proglog, moviepy
Successfully installed colorama-0.4.6 imageio_ffmpeg-0.6.0 moviepy-2.2.1 proglog-0.1.12 python-dotenv-1.1.1 tqdm-4.67.1
```

4. General Purpose

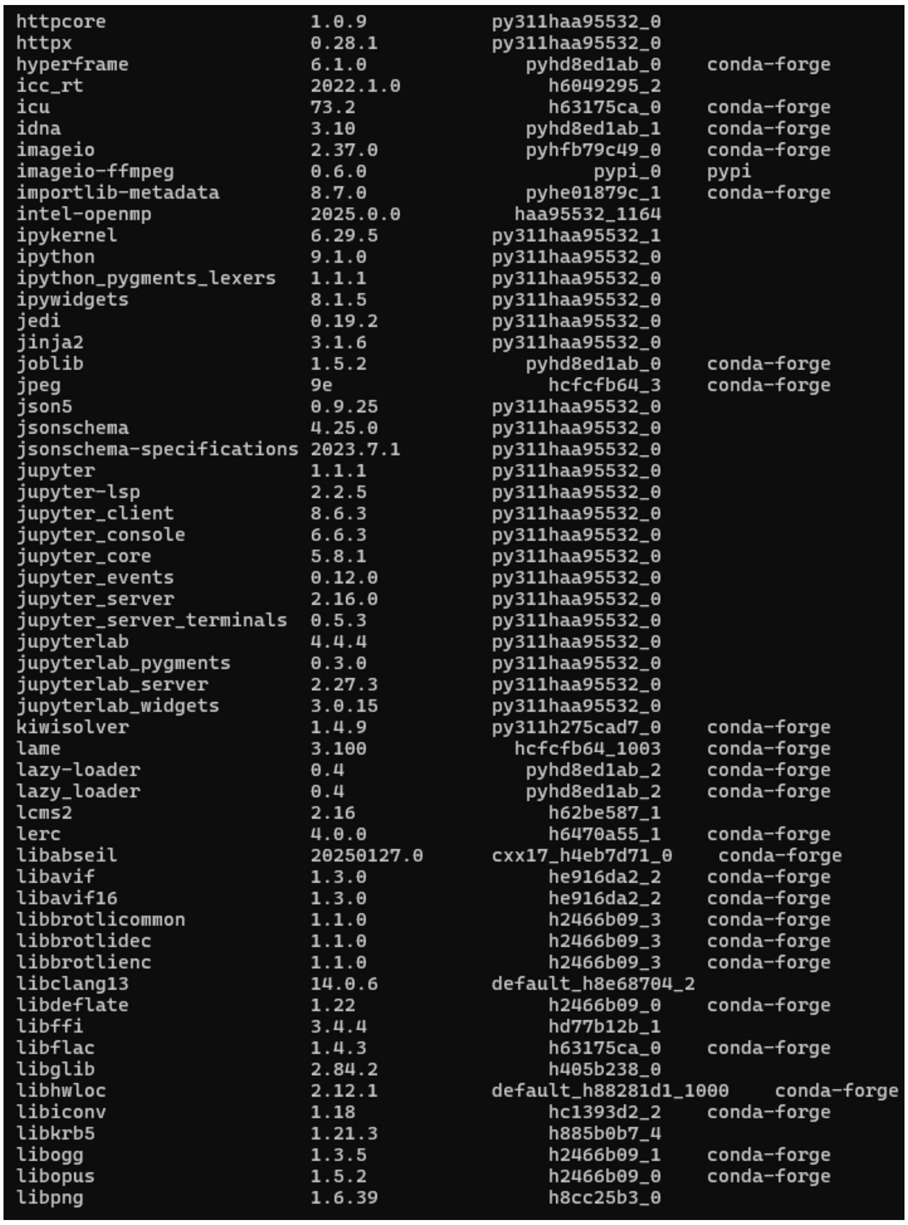


```
Proceed ([y]/n)? y


Downloading and Extracting Packages:

Preparing transaction: done
Verifying transaction: done
Executing transaction: done
```

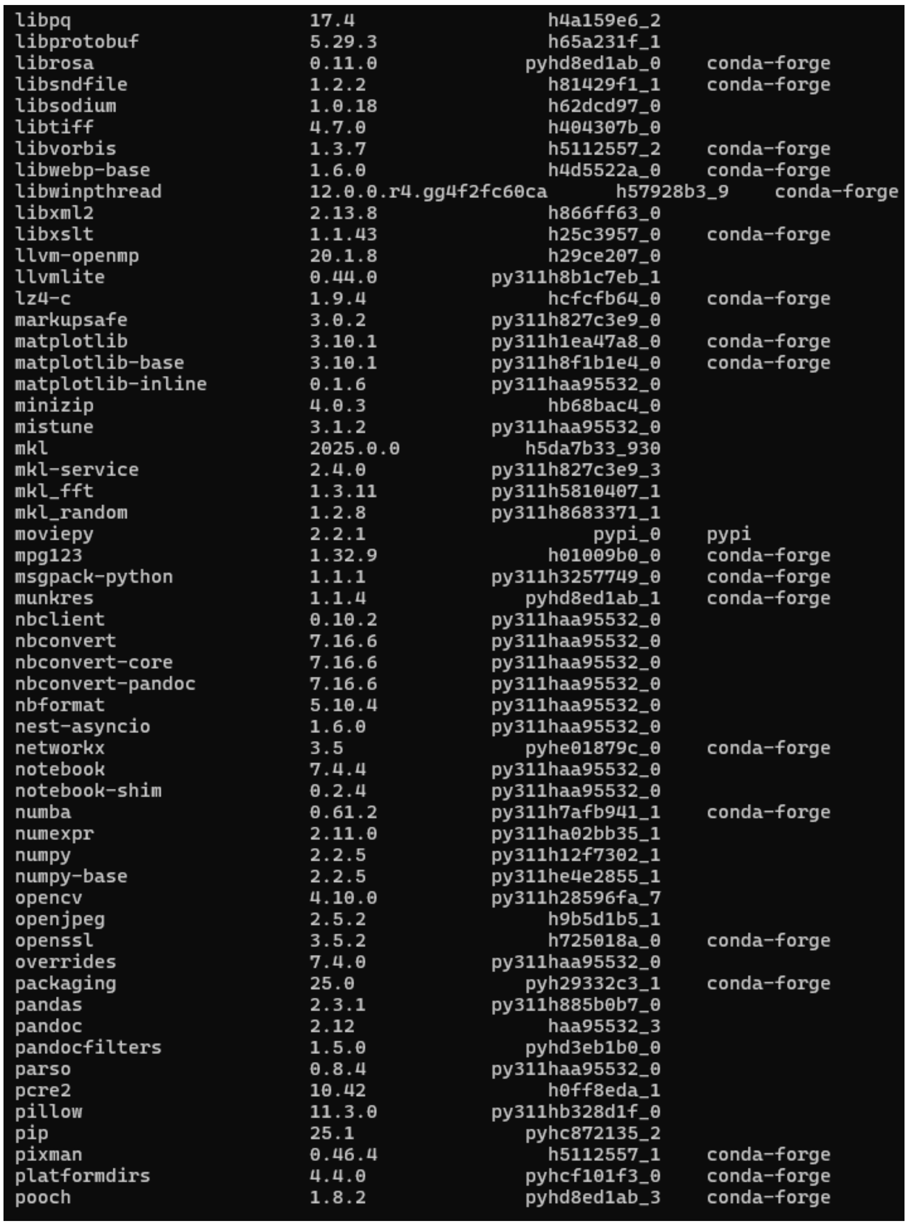
- Daftar library yang berhasil diinstall dengan versinya



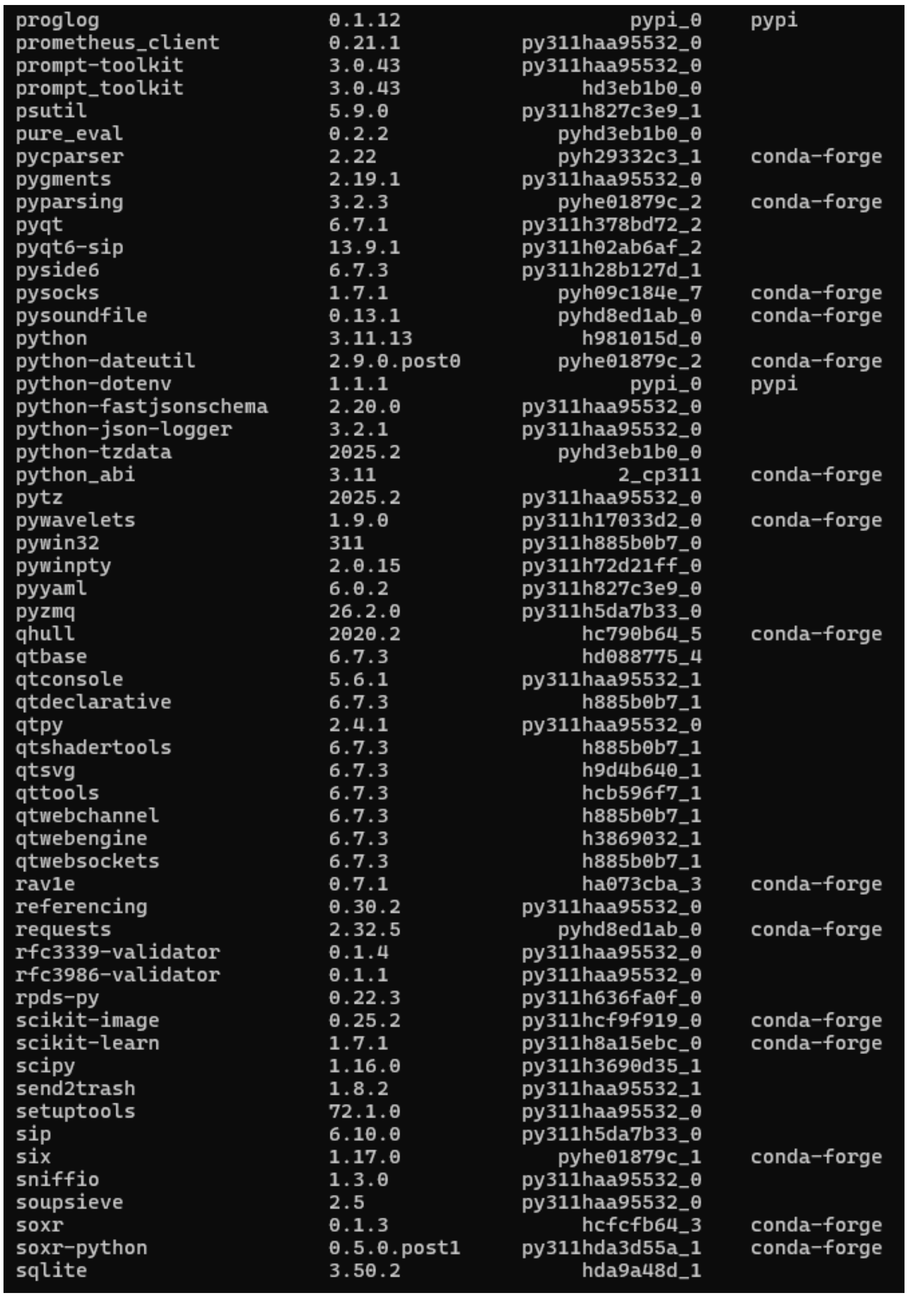
```
(multimedia) D:\>conda list
# packages in environment at D:\Miniconda\envs\multimedia:
#
# Name                    Version                   Build  Channel
_libavif_api              1.3.0                h57928b3_2    conda-forge
anyio                     4.7.0           py311haa95532_0
aom                       3.9.1                he0c23c2_0    conda-forge
argon2-cffi               21.3.0             pyhd3eb1b0_0
argon2-cffi-bindings      21.2.0          py311h827c3e9_1
asttokens                 3.0.0           py311haa95532_0
async-lru                 2.0.4           py311haa95532_0
attrs                     24.3.0          py311haa95532_0
audioread                 3.0.1           py311h1ea47a8_2    conda-forge
babel                     2.16.0          py311haa95532_0
beautifulsoup4            4.13.4          py311haa95532_0
blas                      1.0                         mkl
bleach                    6.2.0           py311haa95532_0
bottleneck                1.4.2           py311h57dcf0c_0
brotli                    1.1.0                h2466b09_3    conda-forge
brotli-bin                1.1.0                h2466b09_3    conda-forge
brotli-python             1.1.0           py311hda3d55a_3    conda-forge
bzip2                     1.0.8                h2bbff1b_6
ca-certificates           2025.8.3             h4c7d964_0    conda-forge
cairo                     1.18.4               he9e932c_0
certifi                   2025.8.3           pyhd8ed1ab_0    conda-forge
cffi                      1.17.1          py311he736701_0    conda-forge
charset-normalizer        3.4.3              pyhd8ed1ab_0    conda-forge
colorama                  0.4.6           py311haa95532_0
comm                      0.2.1           py311haa95532_0
contourpy                 1.3.3           py311h3fd045d_1    conda-forge
cycler                    0.12.1             pyhd8ed1ab_1    conda-forge
dav1d                     1.2.1                hcfcfb64_0    conda-forge
debugpy                   1.8.11          py311h5da7b33_0
decorator                 5.2.1              pyhd8ed1ab_0    conda-forge
defusedxml                0.7.1              pyhd3eb1b0_0
eigen                     3.4.0                h91493d7_0    conda-forge
executing                 0.8.3              pyhd3eb1b0_0
expat                     2.7.1                h8ddb27b_0
ffmpeg                    4.3.1                ha925a31_0    conda-forge
fontconfig                2.14.1               hb33846d_3
fonttools                 4.59.2          py311h3f79411_0    conda-forge
freeglut                  3.4.0                h8a1e904_1
freetype                  2.13.3               h0620614_0
fribidi                   1.0.10               h8d14728_0    conda-forge
gflags                    2.2.2             he0c23c2_1005    conda-forge
glog                      0.5.0                h4797de2_0    conda-forge
graphite2                 1.3.14               hac47afa_2    conda-forge
gst-plugins-base          1.24.12              h91a6125_1
gstreamer                 1.24.12              hfb93a4f_1
gstreamer-orc             0.4.41               h1f81b68_0    conda-forge
h11                       0.16.0          py311haa95532_0
h2                        4.2.0              pyhd8ed1ab_0    conda-forge
harfbuzz                  10.2.0               he2f9f60_1
hdf5                      1.14.5               ha36df97_2
hpack                     4.1.0              pyhd8ed1ab_0    conda-forge
```



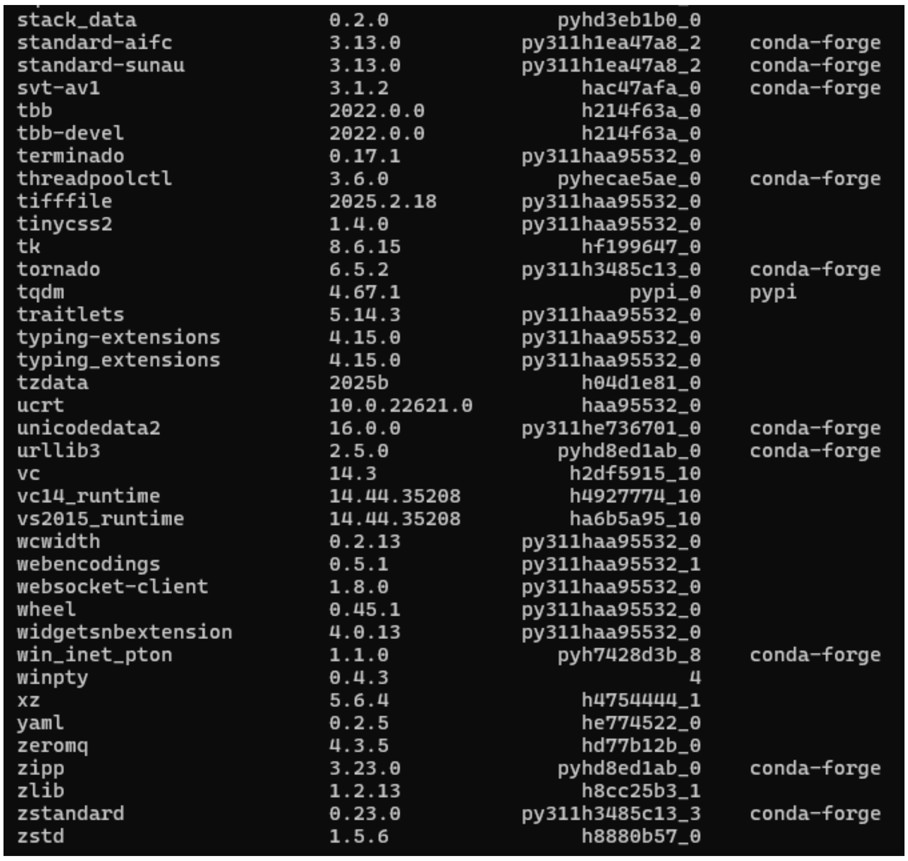
```
httpcore                  1.0.9           py311haa95532_0
httpx                     0.28.1          py311haa95532_0
hyperframe                6.1.0              pyhd8ed1ab_0    conda-forge
icc_rt                    2022.1.0             h6049295_2
icu                       73.2                 h63175ca_0    conda-forge
idna                      3.10               pyhd8ed1ab_1    conda-forge
imageio                   2.37.0             pyhfb79c49_0    conda-forge
imageio-ffmpeg            0.6.0                    pypi_0    pypi
importlib-metadata        8.7.0              pyhe01879c_1    conda-forge
intel-openmp              2025.0.0          haa95532_1164
ipykernel                 6.29.5          py311haa95532_1
ipython                   9.1.0           py311haa95532_0
ipython_pygments_lexers   1.1.1           py311haa95532_0
ipywidgets                8.1.5           py311haa95532_0
jedi                      0.19.2          py311haa95532_0
jinja2                    3.1.6           py311haa95532_0
joblib                    1.5.2              pyhd8ed1ab_0    conda-forge
jpeg                      9e                   hcfcfb64_3    conda-forge
json5                     0.9.25          py311haa95532_0
jsonschema                4.25.0          py311haa95532_0
jsonschema-specifications 2023.7.1        py311haa95532_0
jupyter                   1.1.1           py311haa95532_0
jupyter-lsp               2.2.5           py311haa95532_0
jupyter_client            8.6.3           py311haa95532_0
jupyter_console           6.6.3           py311haa95532_0
jupyter_core              5.8.1           py311haa95532_0
jupyter_events            0.12.0          py311haa95532_0
jupyter_server            2.16.0          py311haa95532_0
jupyter_server_terminals  0.5.3           py311haa95532_0
jupyterlab                4.4.4           py311haa95532_0
jupyterlab_pygments       0.3.0           py311haa95532_0
jupyterlab_server         2.27.3          py311haa95532_0
jupyterlab_widgets        3.0.15          py311haa95532_0
kiwisolver                1.4.9           py311h275cad7_0    conda-forge
lame                      3.100             hcfcfb64_1003    conda-forge
lazy-loader               0.4                pyhd8ed1ab_2    conda-forge
lazy_loader               0.4                pyhd8ed1ab_2    conda-forge
lcms2                     2.16                 h62be587_1
lerc                      4.0.0                h6470a55_1    conda-forge
libabseil                 20250127.0      cxx17_h4eb7d71_0    conda-forge
libavif                   1.3.0                he916da2_2    conda-forge
libavif16                 1.3.0                he916da2_2    conda-forge
libbrotlicommon           1.1.0                h2466b09_3    conda-forge
libbrotlidec              1.1.0                h2466b09_3    conda-forge
libbrotlienc              1.1.0                h2466b09_3    conda-forge
libclang13                14.0.6          default_h8e68704_2
libdeflate                1.22                 h2466b09_0    conda-forge
libffi                    3.4.4                hd77b12b_1
libflac                   1.4.3                h63175ca_0    conda-forge
libglib                   2.84.2               h405b238_0
libhwloc                  2.12.1          default_h88281d1_1000    conda-forge
libiconv                  1.18                 hc1393d2_2    conda-forge
libkrb5                   1.21.3               h885b0b7_4
libogg                    1.3.5                h2466b09_1    conda-forge
libopus                   1.5.2                h2466b09_0    conda-forge
libpng                    1.6.39               h8cc25b3_0
```



```
libpq                     17.4                 h4a159e6_2
libprotobuf               5.29.3               h65a231f_1
librosa                   0.11.0             pyhd8ed1ab_0    conda-forge
libsndfile                1.2.2                h81429f1_1    conda-forge
libsodium                 1.0.18               h62dcd97_0
libtiff                   4.7.0                h404307b_0
libvorbis                 1.3.7                h5112557_2    conda-forge
libwebp-base              1.6.0                h4d5522a_0    conda-forge
libwinpthread             12.0.0.r4.gg4f2fc60ca      h57928b3_9    conda-forge
libxml2                   2.13.8               h866ff63_0
libxslt                   1.1.43               h25c3957_0    conda-forge
llvm-openmp               20.1.8               h29ce207_0
llvmlite                  0.44.0          py311h8b1c7eb_1
lz4-c                     1.9.4                hcfcfb64_0    conda-forge
markupsafe                3.0.2           py311h827c3e9_0
matplotlib                3.10.1          py311h1ea47a8_0    conda-forge
matplotlib-base           3.10.1          py311h8f1b1e4_0    conda-forge
matplotlib-inline         0.1.6           py311haa95532_0
minizip                   4.0.3                hb68bac4_0
mistune                   3.1.2           py311haa95532_0
mkl                       2025.0.0           h5da7b33_930
mkl-service               2.4.0           py311h827c3e9_3
mkl_fft                   1.3.11          py311h5810407_1
mkl_random                1.2.8           py311h8683371_1
moviepy                   2.2.1                    pypi_0    pypi
mpg123                    1.32.9               h01009b0_0    conda-forge
msgpack-python            1.1.1           py311h3257749_0    conda-forge
munkres                   1.1.4              pyhd8ed1ab_1    conda-forge
nbclient                  0.10.2          py311haa95532_0
nbconvert                 7.16.6          py311haa95532_0
nbconvert-core            7.16.6          py311haa95532_0
nbconvert-pandoc          7.16.6          py311haa95532_0
nbformat                  5.10.4          py311haa95532_0
nest-asyncio              1.6.0           py311haa95532_0
networkx                  3.5                pyhe01879c_0    conda-forge
notebook                  7.4.4           py311haa95532_0
notebook-shim             0.2.4           py311haa95532_0
numba                     0.61.2          py311h7afb941_1    conda-forge
numexpr                   2.11.0          py311ha02bb35_1
numpy                     2.2.5           py311h12f7302_1
numpy-base                2.2.5           py311he4e2855_1
opencv                    4.10.0          py311h28596fa_7
openjpeg                  2.5.2                h9b5d1b5_1
openssl                   3.5.2                h725018a_0    conda-forge
overrides                 7.4.0           py311haa95532_0
packaging                 25.0               pyh29332c3_1    conda-forge
pandas                    2.3.1           py311h885b0b7_0
pandoc                    2.12                 haa95532_3
pandocfilters             1.5.0              pyhd3eb1b0_0
parso                     0.8.4           py311haa95532_0
pcre2                     10.42                h0ff8eda_1
pillow                    11.3.0          py311hb328d1f_0
pip                       25.1               pyhc872135_2
pixman                    0.46.4               h5112557_1    conda-forge
platformdirs              4.4.0              pyhcf101f3_0    conda-forge
pooch                     1.8.2              pyhd8ed1ab_3    conda-forge
```



```
proglog                   0.1.12                   pypi_0    pypi
prometheus_client         0.21.1          py311haa95532_0
prompt-toolkit            3.0.43          py311haa95532_0
prompt_toolkit            3.0.43               hd3eb1b0_0
psutil                    5.9.0           py311h827c3e9_1
pure_eval                 0.2.2              pyhd3eb1b0_0
pycparser                 2.22               pyh29332c3_1    conda-forge
pygments                  2.19.1          py311haa95532_0
pyparsing                 3.2.3              pyhe01879c_2    conda-forge
pyqt                      6.7.1           py311h378bd72_2
pyqt6-sip                 13.9.1          py311h02ab6af_2
pyside6                   6.7.3           py311h28b127d_1
pysocks                   1.7.1              pyh09c184e_7    conda-forge
pysoundfile               0.13.1             pyhd8ed1ab_0    conda-forge
python                    3.11.13              h981015d_0
python-dateutil           2.9.0.post0        pyhe01879c_2    conda-forge
python-dotenv             1.1.1                    pypi_0    pypi
python-fastjsonschema     2.20.0          py311haa95532_0
python-json-logger        3.2.1           py311haa95532_0
python-tzdata             2025.2             pyhd3eb1b0_0
python_abi                3.11                    2_cp311    conda-forge
pytz                      2025.2          py311haa95532_0
pywavelets                1.9.0           py311h17033d2_0    conda-forge
pywin32                   311             py311h885b0b7_0
pywinpty                  2.0.15          py311h72d21ff_0
pyyaml                    6.0.2           py311h827c3e9_0
pyzmq                     26.2.0          py311h5da7b33_0
qhull                     2020.2               hc790b64_5    conda-forge
qtbase                    6.7.3                hd088775_4
qtconsole                 5.6.1           py311haa95532_1
qtdeclarative             6.7.3                h885b0b7_1
qtpy                      2.4.1           py311haa95532_0
qtshadertools             6.7.3                h885b0b7_1
qtsvg                     6.7.3                h9d4b640_1
qttools                   6.7.3                hcb596f7_1
qtwebchannel              6.7.3                h885b0b7_1
qtwebengine               6.7.3                h3869032_1
qtwebsockets              6.7.3                h885b0b7_1
rav1e                     0.7.1                ha073cba_3    conda-forge
referencing               0.30.2          py311haa95532_0
requests                  2.32.5             pyhd8ed1ab_0    conda-forge
rfc3339-validator         0.1.4           py311haa95532_0
rfc3986-validator         0.1.1           py311haa95532_0
rpds-py                   0.22.3          py311h636fa0f_0
scikit-image              0.25.2          py311hcf9f919_0    conda-forge
scikit-learn              1.7.1           py311h8a15ebc_0    conda-forge
scipy                     1.16.0          py311h3690d35_1
send2trash                1.8.2           py311haa95532_1
setuptools                72.1.0          py311haa95532_0
sip                       6.10.0          py311h5da7b33_0
six                       1.17.0             pyhe01879c_1    conda-forge
sniffio                   1.3.0           py311haa95532_0
soupsieve                 2.5             py311haa95532_0
soxr                      0.1.3                hcfcfb64_3    conda-forge
soxr-python               0.5.0.post1     py311hda3d55a_1    conda-forge
sqlite                    3.50.2               hda9a48d_1
```



```
stack_data                0.2.0             pyhd3eb1b0_0
standard-aifc             3.13.0         py311h1ea47a8_2    conda-forge
standard-sunau            3.13.0         py311h1ea47a8_2    conda-forge
svt-av1                   3.1.2               hac47afa_0    conda-forge
tbb                       2022.0.0            h214f63a_0
tbb-devel                 2022.0.0            h214f63a_0
terminado                 0.17.1         py311haa95532_0
threadpoolctl             3.6.0             pyhecae5ae_0    conda-forge
tifffile                  2025.2.18      py311haa95532_0
tinycss2                  1.4.0          py311haa95532_0
tk                        8.6.15              hf199647_0
tornado                   6.5.2          py311h3485c13_0    conda-forge
tqdm                      4.67.1                  pypi_0    pypi
traitlets                 5.14.3         py311haa95532_0
typing-extensions         4.15.0         py311haa95532_0
typing_extensions         4.15.0         py311haa95532_0
tzdata                    2025b               h04d1e81_0
ucrt                      10.0.22621.0        haa95532_0
unicodedata2              16.0.0         py311he736701_0    conda-forge
urllib3                   2.5.0             pyhd8ed1ab_0    conda-forge
vc                        14.3               h2df5915_10
vc14_runtime              14.44.35208        h4927774_10
vs2015_runtime            14.44.35208        ha6b5a95_10
wcwidth                   0.2.13         py311haa95532_0
webencodings              0.5.1          py311haa95532_1
websocket-client          1.8.0          py311haa95532_0
wheel                     0.45.1         py311haa95532_0
widgetsnbextension        4.0.13         py311haa95532_0
win_inet_pton             1.1.0             pyh7428d3b_8    conda-forge
winpty                    0.4.3                        4
xz                        5.6.4               h4754444_1
yaml                      0.2.5               he774522_0
zeromq                    4.3.5               hd77b12b_0
zipp                      3.23.0            pyhd8ed1ab_0    conda-forge
zlib                      1.2.13              h8cc25b3_1
zstandard                 0.23.0         py311h3485c13_3    conda-forge
zstd                      1.5.6               h8880b57_0
```

3.4 Bagian 3: Verifikasi Instalasi

Buat file Python sederhana untuk menguji semua library yang telah diinstall:

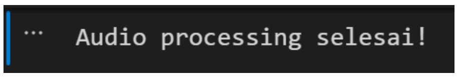
Jalankan script dan dokumentasikan hasilnya:

- Audio Processing

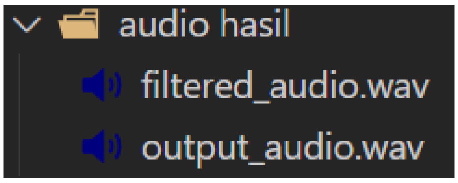
```python
# Audio Processing Sederhana dengan librosa, soundfile, dan scipy
import librosa
import soundfile as sf
from scipy.signal import butter, lfilter

# Load audio file
audio_path = 'mulmedtesting.wav'  # Ganti dengan path file audio Anda
y, sr = librosa.load(audio_path, sr=None)

# Simpan ulang audio menggunakan soundfile
sf.write('output_audio.wav', y, sr)

# Filter Butterworth (lowpass)
def butter_lowpass(cutoff, fs, order=5):
    nyq = 0.5 * fs
    normal_cutoff = cutoff / nyq
    b, a = butter(order, normal_cutoff, btype='low', analog=False)
    return b, a

def lowpass_filter(data, cutoff, fs, order=5):
    b, a = butter_lowpass(cutoff, fs, order=order)
    y = lfilter(b, a, data)
    return y

# Terapkan filter lowpass pada audio
```

```python
filtered_audio = lowpass_filter(y, cutoff=4000, fs=sr, order=6)

# Simpan hasil audio yang sudah difilter
sf.write('filtered_audio.wav', filtered_audio, sr)

print('Audio processing selesai!')

```

Kode 8: Audio Processing Sederhana dengan librosa, soundfile dan scipy



```
Audio processing selesai!
```

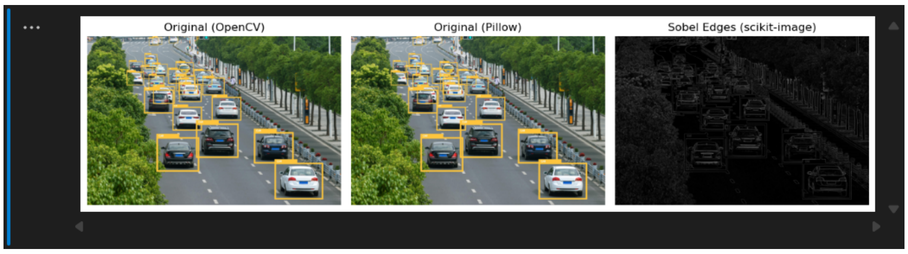


```
audio hasil
    filtered_audio.wav
    output_audio.wav
```

- Image Processing

```python
# Image Processing Sederhana dengan OpenCV, Pillow, scikit-image, dan matplotlib
import cv2
from PIL import Image
from skimage import filters, color
import matplotlib.pyplot as plt

# Load gambar menggunakan OpenCV
img_cv = cv2.imread('gambartesting.jpg')  # Ganti dengan path file gambar Anda
img_cv_rgb = cv2.cvtColor(img_cv, cv2.COLOR_BGR2RGB)

# Load gambar menggunakan Pillow
img_pil = Image.open('gambartesting.jpg')

# Konversi ke grayscale dengan scikit-image
img_gray = color.rgb2gray(img_cv_rgb)

# Deteksi tepi dengan Sobel (scikit-image)
edges = filters.sobel(img_gray)

# Tampilkan hasil dengan matplotlib
fig, axes = plt.subplots(1, 3, figsize=(12, 4))
axes[0].imshow(img_cv_rgb)
axes[0].set_title('Original (OpenCV)')
axes[1].imshow(img_pil)
axes[1].set_title('Original (Pillow)')
axes[2].imshow(edges, cmap='gray')
axes[2].set_title('Sobel Edges (scikit-image)')
for ax in axes:
    ax.axis('off')
plt.tight_layout()
plt.show()

```

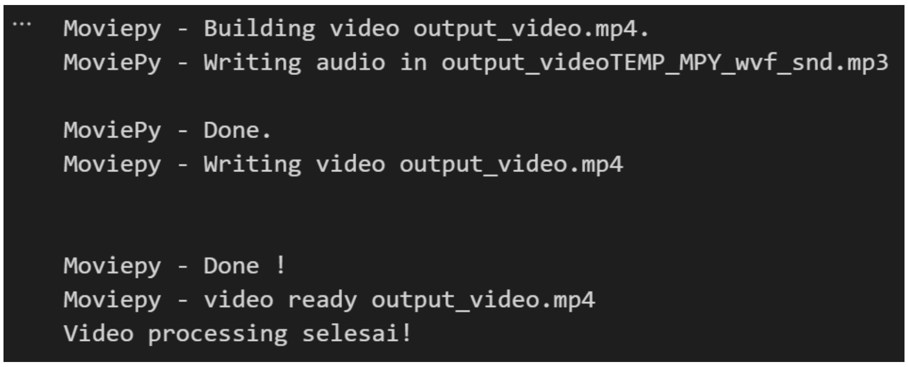
Kode 9: Image Processing Sederhana dengan OpenCV, Pillow, scikit-image, dan matplotlib



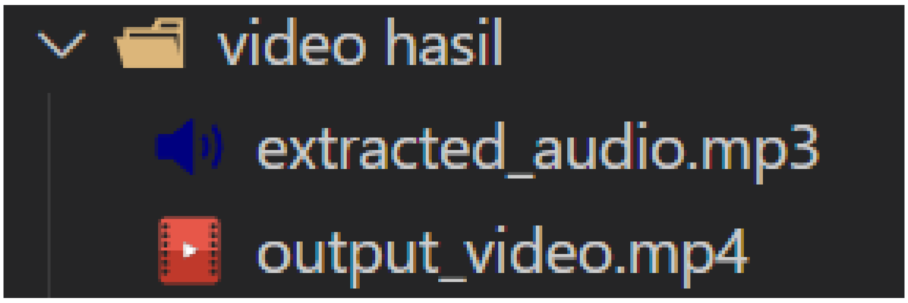
- Video Processing

```python
# Video Processing Sederhana dengan ffmpeg dan moviepy
import moviepy
from moviepy.editor import VideoFileClip, vfx
import subprocess

# Path video input dan output
input_video = 'videotesting.mp4'  # Ganti dengan path file video Anda
output_video = 'output_video.mp4'

# Contoh: Ekstrak audio dari video menggunakan ffmpeg
subprocess.run(['ffmpeg', '-i', input_video, '-q:a', '0', '-map', 'a', 'extracted_audio.mp3'
    ])

# Contoh: Potong video 0-5 detik dan ubah ke grayscale dengan moviepy
clip = VideoFileClip(input_video).subclip(0, 5)
gray_clip = clip.fx(vfx.blackwhite)
gray_clip.write_videofile(output_video)

print('Video processing selesai!')

```

Kode 10: Video Processing Sederhana dengan ffmpeg dan moviepy



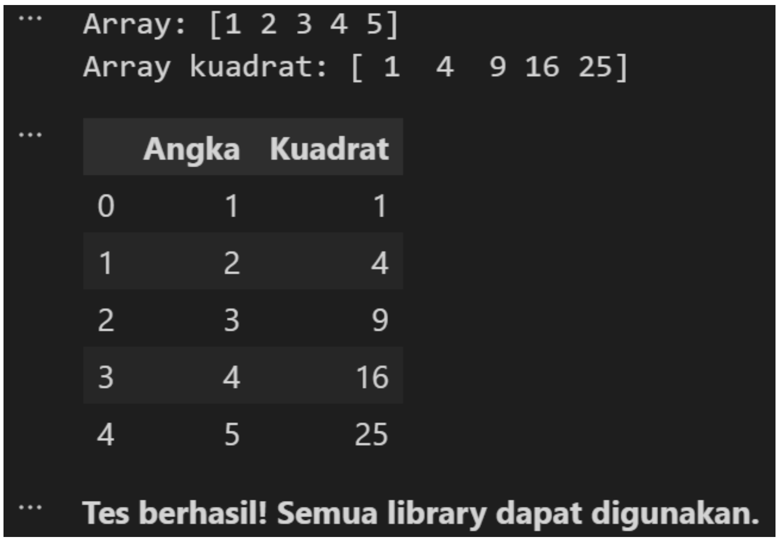
```
Moviepy - Building video output_video.mp4.
MoviePy - Writing audio in output_videoTEMP_MPY_wvf_snd.mp3

MoviePy - Done.
Moviepy - Writing video output_video.mp4


Moviepy - Done !
Moviepy - video ready output_video.mp4
Video processing selesai!
```



- General Purpose

```python
# Testing library numpy, pandas, dan jupyter
import numpy as np
import pandas as pd
from IPython.display import display, Markdown

# Numpy: operasi array sederhana
arr = np.array([1, 2, 3, 4, 5])
arr_squared = arr ** 2
print('Array:', arr)
print('Array kuadrat:', arr_squared)

# Pandas: membuat dan menampilkan DataFrame sederhana
df = pd.DataFrame({'Angka': arr, 'Kuadrat': arr_squared})
display(df)

# Jupyter: menampilkan markdown dari kode
display(Markdown('**Tes berhasil! Semua library dapat digunakan.**'))

```

Kode 11: General Purpose Test dengan numpy, pandas, dan jupyter



```
Array: [1 2 3 4 5]
Array kuadrat: [ 1  4  9 16 25]
```

	Angka	Kuadrat
0	1	1
1	2	4
2	3	9
3	4	16
4	5	25

Tes berhasil! Semua library dapat digunakan.

3.5 Bagian 4: Simple Test dengan Sample Code

Buat dan jalankan contoh sederhana untuk setiap kategori multimedia:

3.5.1 Test Audio Processing

```python
import numpy as np
import matplotlib.pyplot as plt

# Generate simple sine wave
duration = 2  # seconds
sample_rate = 44100
frequency = 440  # A4 note

t = np.linspace(0, duration, int(sample_rate * duration))
audio_signal = np.sin(2 * np.pi * frequency * t)

# Plot waveform
plt.figure(figsize=(10, 4))
plt.plot(t[:1000], audio_signal[:1000])  # Plot first 1000 samples
plt.title('Sine Wave (440 Hz)')
plt.xlabel('Time (s)')
plt.ylabel('Amplitude')
plt.grid(True)
plt.savefig('sine_wave_test.png', dpi=150, bbox_inches='tight')
plt.show()

print(f"Generated {duration}s sine wave at {frequency}Hz")
print(f"Sample rate: {sample_rate}Hz")
print(f"Total samples: {len(audio_signal)}")
```

Kode 12: Test audio processing sederhana

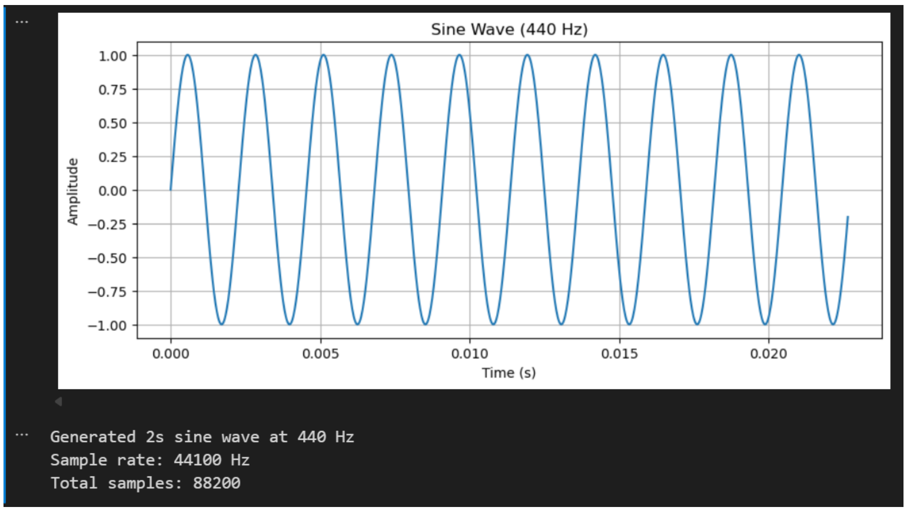
3.5.2 Test Image Processing

```python
import numpy as np
import matplotlib.pyplot as plt
from PIL import Image

# Create a simple test image
width, height = 400, 300
image = np.zeros((height, width, 3), dtype=np.uint8)

# Add some patterns
image[:, :width//3, 0] = 255  # Red section
image[:, width//3:2*width//3, 1] = 255  # Green section
image[:, 2*width//3:, 2] = 255  # Blue section

# Add a white circle in the center
center_x, center_y = width//2, height//2
radius = 50
Y, X = np.ogrid[:height, :width]
mask = (X - center_x)**2 + (Y - center_y)**2 <= radius**2
image[mask] = [255, 255, 255]

# Display and save
plt.figure(figsize=(8, 6))
plt.imshow(image)
plt.title('Test Image with RGB Stripes and White Circle')
plt.axis('off')
plt.savefig('test_image.png', dpi=150, bbox_inches='tight')
plt.show()

print(f"Created test image: {width}x{height} pixels")
print(f"Image shape: {image.shape}")
print(f"Image dtype: {image.dtype}")
```

Kode 13: Test image processing sederhana

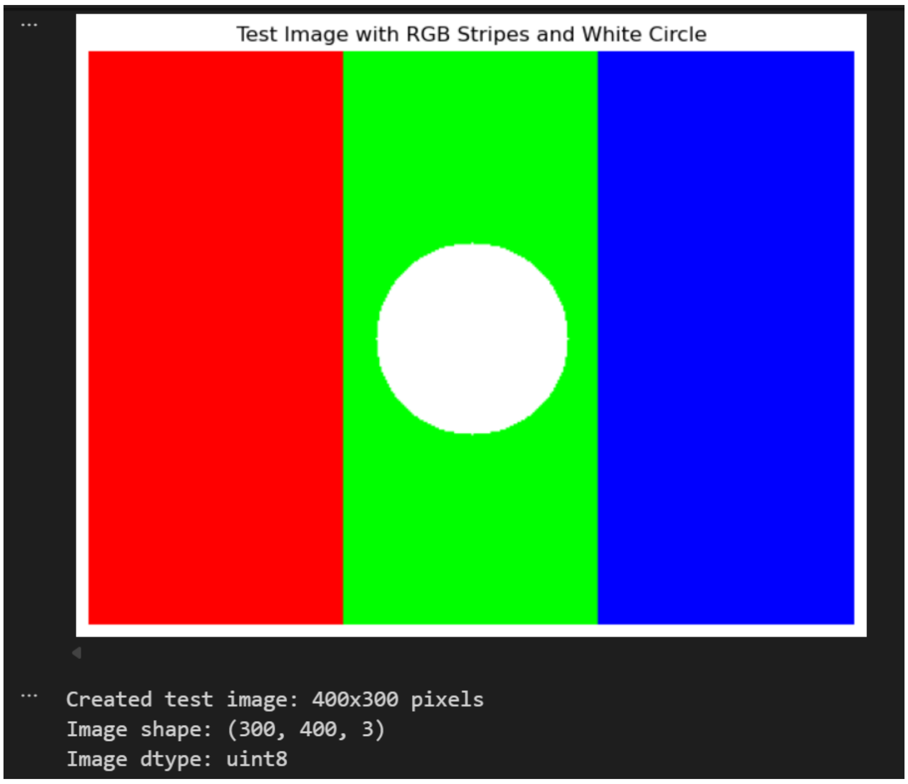
Dokumentasikan hasil eksekusi:

- Screenshot output dari kedua script di atas
    1. Test Audio Processing



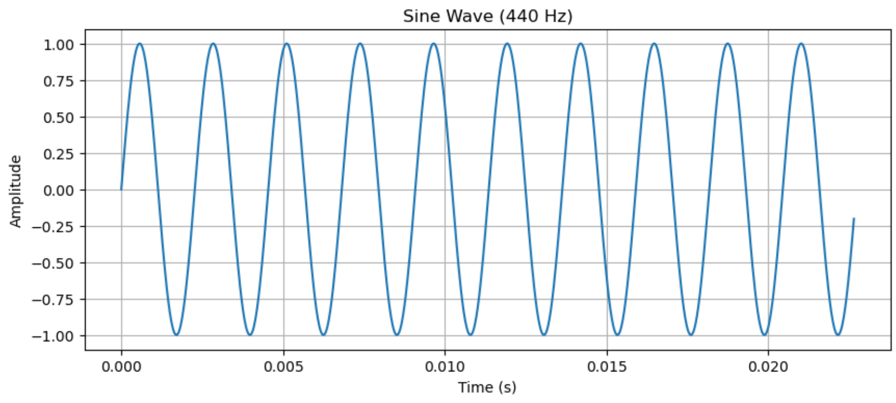
```
Generated 2s sine wave at 440 Hz
Sample rate: 44100 Hz
Total samples: 88200
```

2. Test Image Processing

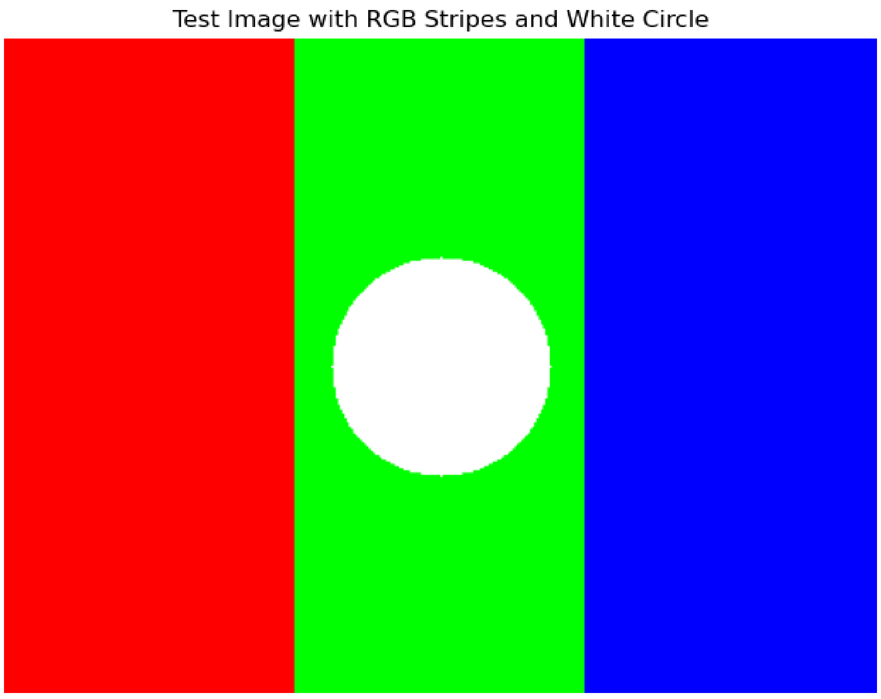


```
Created test image: 400x300 pixels
Image shape: (300, 400, 3)
Image dtype: uint8
```

- Gambar yang dihasilkan (sine_wave_test.png dan test_image.png)
    1. Sine Wave



2. Test Image



- Error message jika ada dan cara mengatasinya
  [Tidak ada]

4 Bagian Laporan

4.1 Output Verifikasi Instalasi

Copy-paste output lengkap dari script `test_multimedia.py` di sini:

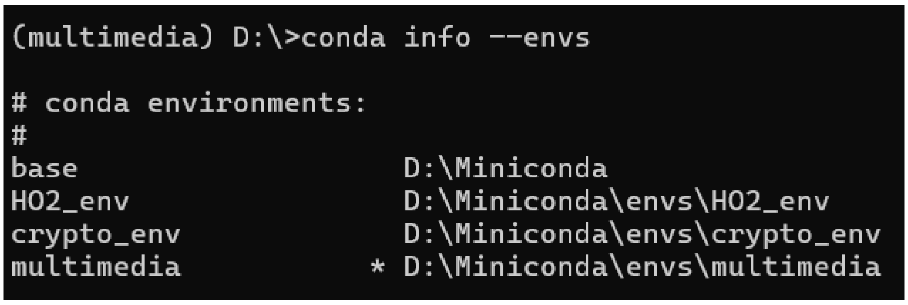
```
# Audio Processing
Generated 2s sine wave at 440 Hz
Sample rate: 44100 Hz
Total samples: 88200

# Image Processing
Created test image: 400x300 pixels
Image shape: (300, 400, 3)
Image dtype: uint8
```

Kode 14: Output verifikasi instalasi

4.2 Screenshot Hasil Test

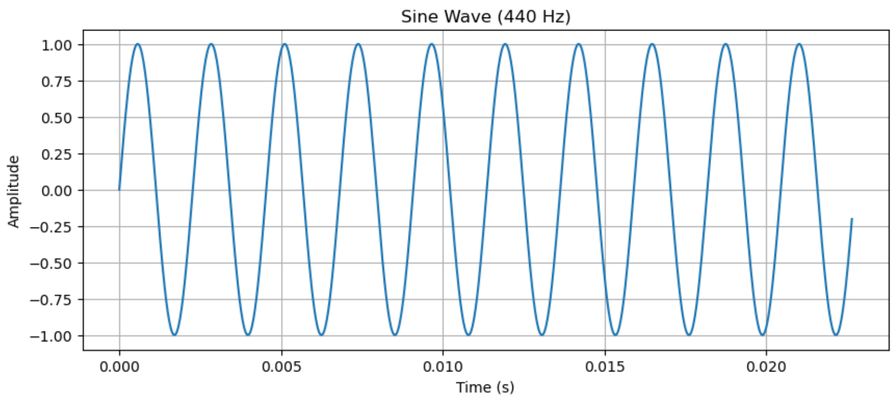
Sisipkan screenshot atau gambar hasil dari:

- Terminal/command prompt yang menunjukkan environment aktif

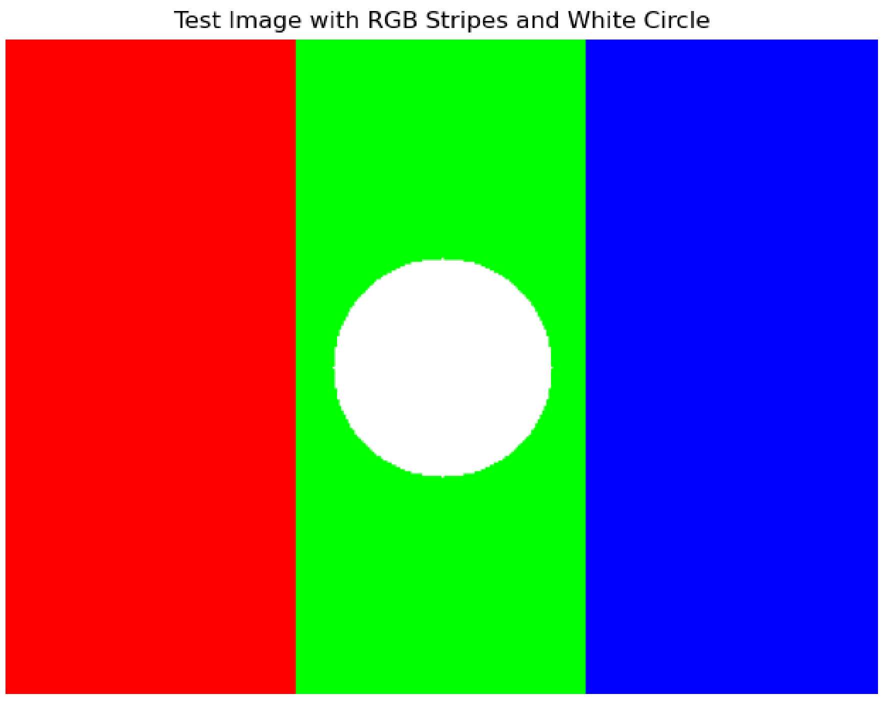


```
(multimedia) D:\>conda info --envs

# conda environments:
#
base                      D:\Miniconda
HO2_env                   D:\Miniconda\envs\HO2_env
crypto_env                D:\Miniconda\envs\crypto_env
multimedia             *  D:\Miniconda\envs\multimedia
```

- Output dari script test audio (sine wave plot)



- Output dari script test image (RGB stripes dengan circle)



4.3 Analisis dan Refleksi

Jawab pertanyaan berikut:

1. **Mengapa penting menggunakan environment terpisah untuk project multimedia?**

   [Menggunakan environment terpisah untuk project multimedia sangat penting karena dapat mengisolasi dependency agar tidak terjadi konflik versi antar library, menjaga stabilitas project meskipun ada update library di project lain, serta memudahkan reproduksi melalui file environment.yml sehingga konfigurasi bisa dipindahkan atau dibagikan ke tim dengan konsisten. Selain itu, environment terpisah memungkinkan instalasi backend eksternal seperti ffmpeg atau libsndfile tanpa mengganggu project lain, meningkatkan performa serta kompatibilitas, dan memberi ruang aman untuk bereksperimen dengan berbagai versi library tanpa risiko merusak environment global.]

2. **Apa perbedaan utama antara conda, venv, dan uv? Mengapa Anda memilih tool yang Anda gunakan?**

   [Perbedaan utama antara conda, venv, dan uv terletak pada cakupan serta kecepatan manajemen environment. Conda adalah package dan environment manager lintas bahasa yang dapat mengelola library Python maupun non-Python, sehingga cocok untuk project ilmiah dan multimedia yang kompleks. Venv adalah tool bawaan Python yang lebih ringan, hanya membuat virtual environment khusus Python tanpa manajemen dependency eksternal, sehingga cocok untuk project sederhana atau web development. Uv adalah tool baru yang sangat cepat untuk manajemen dependency dan environment Python, fokus pada efisiensi instalasi serta reproducibility modern. Saya memilih conda karena conda tidak hanya mengelola environment Python, tetapi juga mampu mengatur dependency lintas bahasa dan library eksternal yang sering dibutuhkan pada project kompleks. Selain itu, conda memudahkan reproduksi environment melalui file environment.yml, mendukung berbagai channel seperti conda-forge untuk ketersediaan paket yang luas, dan memungkinkan pengelolaan environment yang terisolasi agar project tetap konsisten serta tidak saling mengganggu.]

3. **Library mana yang paling sulit diinstall dan mengapa?**

[Sejauh saya mencoba, tidak ada kesulitan yang saya alami dalam menginstall library-library tersebut karena seluruh dependency dapat terpasang dengan baik melalui conda maupun pip, sehingga proses instalasi berjalan lancar tanpa konflik versi maupun error tambahan.]

4. **Bagaimana cara mengatasi masalah dependency conflict jika terjadi?**

   [Masalah dependency conflict dapat diatasi dengan membuat environment terpisah untuk setiap project agar dependency tidak saling mengganggu, menggunakan channel yang konsisten seperti conda-forge untuk menghindari perbedaan sumber paket, serta menetapkan versi library secara eksplisit agar tidak terjadi pertentangan versi. Selain itu, instalasi sebaiknya dilakukan berurutan, yaitu memasang library utama melalui conda terlebih dahulu lalu melengkapi dengan pip hanya jika paket tidak tersedia di conda.]

5. **Jelaskan fungsi dari masing-masing library yang berhasil Anda install!**

   1. Librosa → Library Python untuk analisis dan pemrosesan sinyal audio, misalnya ekstraksi fitur (MFCC, chroma, spectral contrast) dalam penelitian musik, suara, atau speech.
   2. Soundfile → Digunakan untuk membaca dan menulis file audio (WAV, FLAC, OGG, dsb.) dengan performa tinggi menggunakan backend libsndfile.
   3. Scipy → Library ilmiah yang menyediakan fungsi matematika, optimisasi, sinyal, statistika, hingga pemrosesan data numerik tingkat lanjut.
   4. OpenCV → Framework computer vision populer untuk pengolahan citra dan video, seperti deteksi objek, face recognition, filtering, dan transformasi citra.
   5. Pillow (PIL Fork) → Library manipulasi gambar (image processing) yang mendukung banyak format file (JPEG, PNG, BMP, dsb.), misalnya resize, crop, filter, dan konversi.
   6. Scikit-image → Khusus untuk pengolahan citra berbasis scientific computing, menyediakan fungsi segmentasi, filtering, feature extraction, dan image enhancement.
   7. Matplotlib → Library visualisasi data untuk membuat grafik 2D/3D, scatter plot, histogram, hingga visualisasi sinyal atau gambar.
   8. FFmpeg → Software open-source untuk decoding, encoding, konversi format, serta manipulasi audio dan video (dipanggil lewat command line maupun binding Python).
   9. Moviepy → Library editing video berbasis Python yang memungkinkan pemotongan, penggabungan, penambahan efek, ekstraksi audio, hingga render video menggunakan backend FFmpeg.
   10. NumPy → Dasar scientific computing di Python yang menyediakan array multidimensi dan operasi matematika/linear algebra berkecepatan tinggi.
   11. Pandas → Library manajemen dan analisis data berbasis DataFrame dengan kemampuan powerful untuk manipulasi, cleaning, dan analisis data tabular.
   12. Jupyter → Platform interaktif berbasis notebook yang memungkinkan menjalankan kode Python, visualisasi, dan dokumentasi dalam satu dokumen.

4.4 Troubleshooting

Dokumentasikan masalah yang Anda hadapi (jika ada) dan cara mengatasinya:

[Tidak ada]

5 Export Environment untuk Reproduksi

Sebagai langkah terakhir, export environment Anda agar dapat direproduksi:

5.1 Untuk Conda

```
conda env export > environment.yml
```

Kode 15: Export conda environment

5.2 Untuk venv/uv

```
pip freeze > requirements.txt
```

Kode 16: Export pip requirements

Copy-paste isi file environment.yml atau requirements.txt di sini:

```
[name: multimedia
channels:
  - defaults
  - conda-forge
  - https://repo.anaconda.com/pkgs/main
  - https://repo.anaconda.com/pkgs/r
  - https://repo.anaconda.com/pkgs/msys2
dependencies:
  - _libavif_api=1.3.0=h57928b3_2
  - anyio=4.7.0=py311haa95532_0
  - aom=3.9.1=he0c23c2_0
  - argon2-cffi=21.3.0=pyhd3eb1b0_0
  - argon2-cffi-bindings=21.2.0=py311h827c3e9_1
  - asttokens=3.0.0=py311haa95532_0
  - async-lru=2.0.4=py311haa95532_0
  - attrs=24.3.0=py311haa95532_0
  - audioread=3.0.1=py311h1ea47a8_2
  - babel=2.16.0=py311haa95532_0
  - beautifulsoup4=4.13.4=py311haa95532_0
  - blas=1.0=mkl
  - bleach=6.2.0=py311haa95532_0
  - bottleneck=1.4.2=py311h57dcf0c_0
  - brotli=1.1.0=h2466b09_3
  - brotli-bin=1.1.0=h2466b09_3
  - brotli-python=1.1.0=py311hda3d55a_3
  - bzip2=1.0.8=h2bbff1b_6
  - ca-certificates=2025.8.3=h4c7d964_0
  - cairo=1.18.4=he9e932c_0
  - certifi=2025.8.3=pyhd8ed1ab_0
  - cffi=1.17.1=py311he736701_0
  - charset-normalizer=3.4.3=pyhd8ed1ab_0
  - colorama=0.4.6=py311haa95532_0
  - comm=0.2.1=py311haa95532_0
  - contourpy=1.3.3=py311h3fd045d_1
  - cycler=0.12.1=pyhd8ed1ab_1
  - dav1d=1.2.1=hcfcfb64_0
  - debugpy=1.8.11=py311h5da7b33_0
  - decorator=5.2.1=pyhd8ed1ab_0
  - defusedxml=0.7.1=pyhd3eb1b0_0
  - eigen=3.4.0=h91493d7_0
  - executing=0.8.3=pyhd3eb1b0_0
  - expat=2.7.1=h8ddb27b_0
  - ffmpeg=4.3.1=ha925a31_0
  - fontconfig=2.14.1=hb33846d_3
  - fonttools=4.59.2=py311h3f79411_0
  - freeglut=3.4.0=h8a1e904_1
  - freetype=2.13.3=h0620614_0
  - fribidi=1.0.10=h8d14728_0
  - gflags=2.2.2=he0c23c2_1005
  - glog=0.5.0=h4797de2_0
  - graphite2=1.3.14=hac47afa_2
  - gst-plugins-base=1.24.12=h91a6125_1
  - gstreamer=1.24.12=hfb93a4f_1
  - gstreamer-orc=0.4.41=h1f81b68_0
  - h11=0.16.0=py311haa95532_0
  - h2=4.2.0=pyhd8ed1ab_0
  - harfbuzz=10.2.0=he2f9f60_1
  - hdf5=1.14.5=ha36df97_2
  - hpack=4.1.0=pyhd8ed1ab_0
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  - httpx=0.28.1=py311haa95532_0
  - hyperframe=6.1.0=pyhd8ed1ab_0
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  - icu=73.2=h63175ca_0
  - idna=3.10=pyhd8ed1ab_1
  - imageio=2.37.0=pyhfb79c49_0
  - importlib-metadata=8.7.0=pyhe01879c_1
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  - jsonschema-specifications=2023.7.1=py311haa95532_0
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  - jupyter-lsp=2.2.5=py311haa95532_0
  - jupyter_client=8.6.3=py311haa95532_0
  - jupyter_console=6.6.3=py311haa95532_0
  - jupyter_core=5.8.1=py311haa95532_0
  - jupyter_events=0.12.0=py311haa95532_0
  - jupyter_server=2.16.0=py311haa95532_0
  - jupyter_server_terminals=0.5.3=py311haa95532_0
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  - jupyterlab_server=2.27.3=py311haa95532_0
  - jupyterlab_widgets=3.0.15=py311haa95532_0
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  - lerc=4.0.0=h6470a55_1
  - libabseil=20250127.0=cxx17_h4eb7d71_0
  - libavif=1.3.0=he916da2_2
  - libavif16=1.3.0=he916da2_2
  - libbrotlicommon=1.1.0=h2466b09_3
  - libbrotlidec=1.1.0=h2466b09_3
  - libbrotlienc=1.1.0=h2466b09_3
  - libclang13=14.0.6=default_h8e68704_2
  - libdeflate=1.22=h2466b09_0
  - libffi=3.4.4=hd77b12b_1
  - libflac=1.4.3=h63175ca_0
  - libglib=2.84.2=h405b238_0
  - libhwloc=2.12.1=default_h88281d1_1000
  - libiconv=1.18=hc1393d2_2
  - libkrb5=1.21.3=h885b0b7_4
  - libogg=1.3.5=h2466b09_1
  - libopus=1.5.2=h2466b09_0
  - libpng=1.6.39=h8cc25b3_0
  - libpq=17.4=h4a159e6_2
  - libprotobuf=5.29.3=h65a231f_1
  - librosa=0.11.0=pyhd8ed1ab_0
  - libsndfile=1.2.2=h81429f1_1
  - libsodium=1.0.18=h62dcd97_0
  - libtiff=4.7.0=h404307b_0
  - libvorbis=1.3.7=h5112557_2
  - libwebp-base=1.6.0=h4d5522a_0
  - libwinpthread=12.0.0.r4.gg4f2fc60ca=h57928b3_9
  - libxml2=2.13.8=h866ff63_0
  - libxslt=1.1.43=h25c3957_0
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  - nbconvert-pandoc=7.16.6=py311haa95532_0
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  - openjpeg=2.5.2=h9b5d1b5_1
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  - pillow=11.3.0=py311hb328d1f_0
  - pip=25.1=pyhc872135_2
  - pixman=0.46.4=h5112557_1
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  - pywinpty=2.0.15=py311h72d21ff_0
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  - pyzmq=26.2.0=py311h5da7b33_0
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  - qtconsole=5.6.1=py311haa95532_1
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  - qtsvg=6.7.3=h9d4b640_1
  - qttools=6.7.3=hcb596f7_1
  - qtwebchannel=6.7.3=h885b0b7_1
  - qtwebengine=6.7.3=h3869032_1
  - qtwebsockets=6.7.3=h885b0b7_1
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  - referencing=0.30.2=py311haa95532_0
  - requests=2.32.5=pyhd8ed1ab_0
  - rfc3339-validator=0.1.4=py311haa95532_0
  - rfc3986-validator=0.1.1=py311haa95532_0
  - rpds-py=0.22.3=py311h636fa0f_0
  - scikit-image=0.25.2=py311hcf9f919_0
  - scikit-learn=1.7.1=py311h8a15ebc_0
  - scipy=1.16.0=py311h3690d35_1
  - send2trash=1.8.2=py311haa95532_1
  - setuptools=72.1.0=py311haa95532_0
  - sip=6.10.0=py311h5da7b33_0
  - six=1.17.0=pyhe01879c_1
  - sniffio=1.3.0=py311haa95532_0
  - soupsieve=2.5=py311haa95532_0
  - soxr=0.1.3=hcfcfb64_3
  - soxr-python=0.5.0.post1=py311hda3d55a_1
  - sqlite=3.50.2=hda9a48d_1
  - stack_data=0.2.0=pyhd3eb1b0_0
  - standard-aifc=3.13.0=py311h1ea47a8_2
  - standard-sunau=3.13.0=py311h1ea47a8_2
  - svt-av1=3.1.2=hac47afa_0
  - tbb=2022.0.0=h214f63a_0
  - tbb-devel=2022.0.0=h214f63a_0
  - terminado=0.17.1=py311haa95532_0
  - threadpoolctl=3.6.0=pyhecae5ae_0
  - tifffile=2025.2.18=py311haa95532_0
  - tinycss2=1.4.0=py311haa95532_0
  - tk=8.6.15=hf199647_0
  - tornado=6.5.2=py311h3485c13_0
  - traitlets=5.14.3=py311haa95532_0
  - typing-extensions=4.15.0=py311haa95532_0
  - typing_extensions=4.15.0=py311haa95532_0
  - tzdata=2025b=h04d1e81_0
  - ucrt=10.0.22621.0=haa95532_0
  - unicodedata2=16.0.0=py311he736701_0
  - urllib3=2.5.0=pyhd8ed1ab_0
  - vc=14.3=h2df5915_10
  - vc14_runtime=14.44.35208=h4927774_10
  - vs2015_runtime=14.44.35208=ha6b5a95_10
  - wcwidth=0.2.13=py311haa95532_0
  - webencodings=0.5.1=py311haa95532_1
  - websocket-client=1.8.0=py311haa95532_0
  - wheel=0.45.1=py311haa95532_0
  - widgetsnbextension=4.0.13=py311haa95532_0
  - win_inet_pton=1.1.0=pyh7428d3b_8
  - winpty=0.4.3=4
  - xz=5.6.4=h4754444_1
  - yaml=0.2.5=he774522_0
  - zeromq=4.3.5=hd77b12b_0
  - zipp=3.23.0=pyhd8ed1ab_0
  - zlib=1.2.13=h8cc25b3_1
  - zstandard=0.23.0=py311h3485c13_3
  - zstd=1.5.6=h8880b57_0
  - pip:
      - imageio-ffmpeg==0.6.0
      - proglog==0.1.12
      - python-dotenv==1.1.1
      - tqdm==4.67.1
prefix: D:\Miniconda\envs\multimedia
]
```

Kode 17: Environment/Requirements file

6 Kesimpulan

Tuliskan kesimpulan Anda mengenai:

- Pengalaman setup Python environment untuk multimedia
- Persiapan untuk project multimedia selanjutnya
- Saran untuk mahasiswa lain yang akan melakukan setup serupa

1. Setup environment berjalan lancar dengan bantuan conda, yang mempermudah instalasi library multimedia seperti librosa, soundfile, opencv, moviepy, dan ffmpeg tanpa masalah dependency.

2. Environment yang sudah terstruktur rapi dan terdokumentasi dalam file environment.yml dapat langsung digunakan kembali atau direproduksi, sehingga mempercepat persiapan project multimedia berikutnya.

3. Saran untuk mahasiswa lain yang akan melakukan setup serupa adalah agar selalu menggunakan environment terpisah di conda sehingga terhindar dari konflik versi antar library. Selain itu, sebaiknya prioritaskan instalasi library melalui channel conda-forge karena lebih stabil dan lengkap, kemudian gunakan pip hanya jika library yang dibutuhkan tidak tersedia di conda. Terakhir, dokumentasikan environment menggunakan perintah conda env export agar konfigurasi yang sudah dibuat dapat dengan mudah dibagikan atau digunakan ulang di perangkat lain sehingga proses setup menjadi lebih efisien dan konsisten.

7 Referensi

Link Referensi