Северо-Кавказский федеральный университет

Институт математики и информационных технологий

ОТЧЕТ
о выполнении лабораторной работы №1
по дисциплине
«Основы Программной Инженерии»

Выполнил:

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бакалавриата «Программная инженерия»

очной формы обучения

Ставрополь, 2023

```
(base) PS C:\pthn\2_1lab> conda create -n 2_1lab python=3.7
Collecting package metadata (current_repodata.json): done
Solving environment: done
```

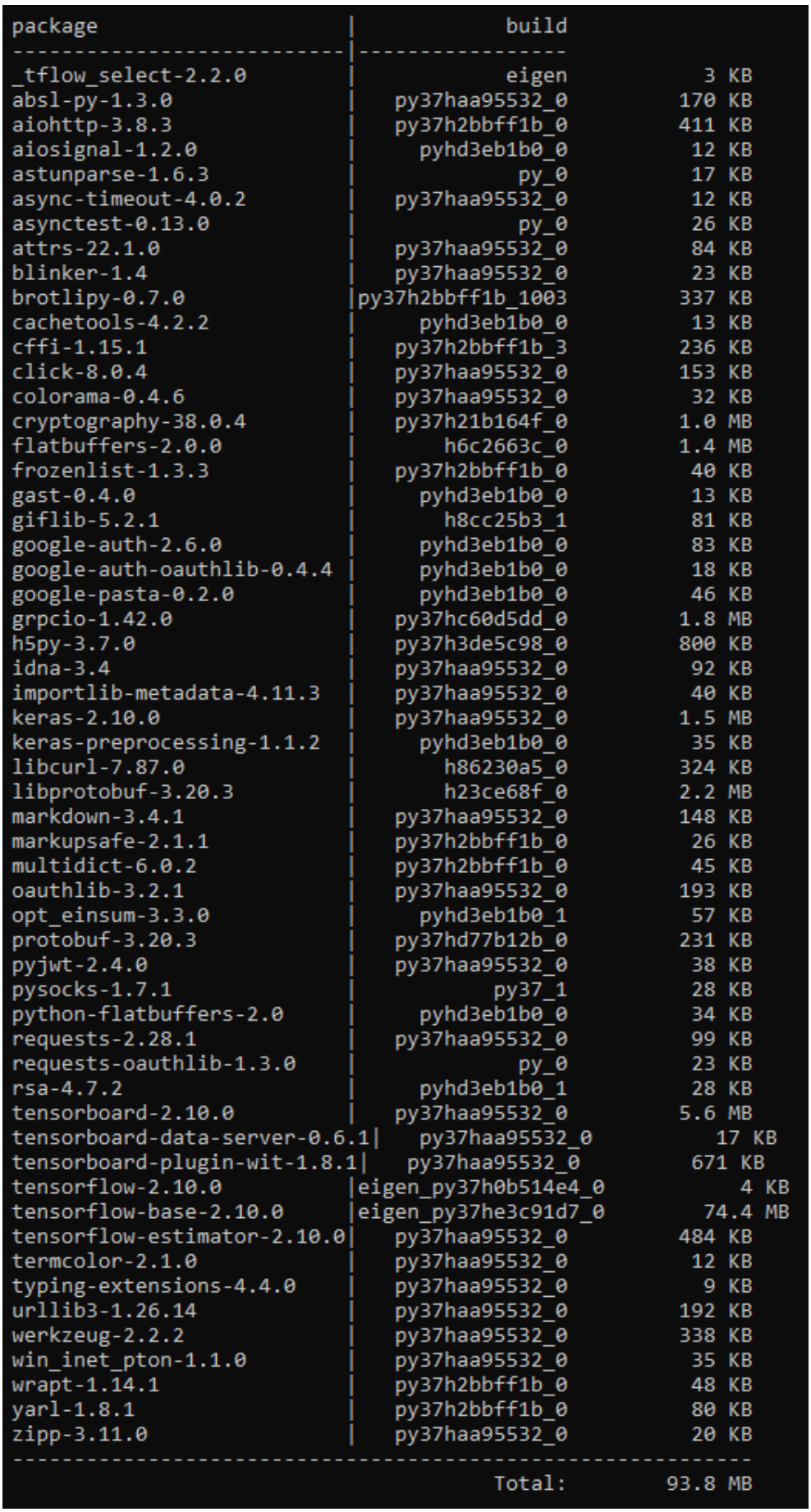
Рисунок 1.1 – Создание окружения

```
(base) PS C:\git\2_1lab> conda activate 2_1lab
```

Рисунок 1.2 – Активация окружения

```
  added / updated specs:
    - numpy
    - pandas
    - pip
    - scipy


The following packages will be downloaded:

    package                    |            build
    ---------------------------|-----------------
    scipy-1.7.3                |   py37h7a0a035_2        13.8 MB
    ------------------------------------------------------------
                                           Total:        13.8 MB

The following NEW packages will be INSTALLED:

  blas               pkgs/main/win-64::blas-1.0-mkl None
  bottleneck         pkgs/main/win-64::bottleneck-1.3.5-py37h080aedc_0 None
  fftw               pkgs/main/win-64::fftw-3.3.9-h2bbff1b_1 None
  icc_rt             pkgs/main/win-64::icc_rt-2022.1.0-h6049295_2 None
  intel-openmp       pkgs/main/win-64::intel-openmp-2021.4.0-haa95532_3556 None
  mkl                pkgs/main/win-64::mkl-2021.4.0-haa95532_640 None
  mkl-service        pkgs/main/win-64::mkl-service-2.4.0-py37h2bbff1b_0 None
  mkl_fft            pkgs/main/win-64::mkl_fft-1.3.1-py37h277e83a_0 None
  mkl_random         pkgs/main/win-64::mkl_random-1.2.2-py37hf11a4ad_0 None
  numexpr            pkgs/main/win-64::numexpr-2.8.4-py37h5b0cc5e_0 None
  numpy              pkgs/main/win-64::numpy-1.21.5-py37h7a0a035_3 None
  numpy-base         pkgs/main/win-64::numpy-base-1.21.5-py37hca35cd5_3 None
  packaging          pkgs/main/win-64::packaging-22.0-py37haa95532_0 None
  pandas             pkgs/main/win-64::pandas-1.3.5-py37h6214cd6_0 None
  python-dateutil    pkgs/main/noarch::python-dateutil-2.8.2-pyhd3eb1b0_0 None
  pytz               pkgs/main/win-64::pytz-2022.7-py37haa95532_0 None
  scipy              pkgs/main/win-64::scipy-1.7.3-py37h7a0a035_2 None
  six                pkgs/main/noarch::six-1.16.0-pyhd3eb1b0_1 None
```

Рисунок 1.3 – Установка пакетов numpy, pandas, pip, scipy



```
package                    |            build
---------------------------|-----------------
_tflow_select-2.2.0        |            eigen           3 KB
absl-py-1.3.0              |   py37haa95532_0         170 KB
aiohttp-3.8.3              |   py37h2bbff1b_0         411 KB
aiosignal-1.2.0            |     pyhd3eb1b0_0          12 KB
astunparse-1.6.3           |              py_0          17 KB
async-timeout-4.0.2        |   py37haa95532_0          12 KB
asynctest-0.13.0           |              py_0          26 KB
attrs-22.1.0               |   py37haa95532_0          84 KB
blinker-1.4                |   py37haa95532_0          23 KB
brotlipy-0.7.0             |py37h2bbff1b_1003         337 KB
cachetools-4.2.2           |     pyhd3eb1b0_0          13 KB
cffi-1.15.1                |   py37h2bbff1b_3         236 KB
click-8.0.4                |   py37haa95532_0         153 KB
colorama-0.4.6             |   py37haa95532_0          32 KB
cryptography-38.0.4        |   py37h21b164f_0         1.0 MB
flatbuffers-2.0.0          |       h6c2663c_0         1.4 MB
frozenlist-1.3.3           |   py37h2bbff1b_0          40 KB
gast-0.4.0                 |     pyhd3eb1b0_0          13 KB
giflib-5.2.1               |       h8cc25b3_1          81 KB
google-auth-2.6.0          |     pyhd3eb1b0_0          83 KB
google-auth-oauthlib-0.4.4 |     pyhd3eb1b0_0          18 KB
google-pasta-0.2.0         |     pyhd3eb1b0_0          46 KB
grpcio-1.42.0              |   py37hc60d5dd_0         1.8 MB
h5py-3.7.0                 |   py37h3de5c98_0         800 KB
idna-3.4                   |   py37haa95532_0          92 KB
importlib-metadata-4.11.3  |   py37haa95532_0          40 KB
keras-2.10.0               |   py37haa95532_0         1.5 MB
keras-preprocessing-1.1.2  |     pyhd3eb1b0_0          35 KB
libcurl-7.87.0             |       h86230a5_0         324 KB
libprotobuf-3.20.3         |       h23ce68f_0         2.2 MB
markdown-3.4.1             |   py37haa95532_0         148 KB
markupsafe-2.1.1           |   py37h2bbff1b_0          26 KB
multidict-6.0.2            |   py37h2bbff1b_0          45 KB
oauthlib-3.2.1             |   py37haa95532_0         193 KB
opt_einsum-3.3.0           |     pyhd3eb1b0_1          57 KB
protobuf-3.20.3            |   py37hd77b12b_0         231 KB
pyjwt-2.4.0                |   py37haa95532_0          38 KB
pysocks-1.7.1              |           py37_1          28 KB
python-flatbuffers-2.0     |     pyhd3eb1b0_0          34 KB
requests-2.28.1            |   py37haa95532_0          99 KB
requests-oauthlib-1.3.0    |              py_0          23 KB
rsa-4.7.2                  |     pyhd3eb1b0_1          28 KB
tensorboard-2.10.0         |   py37haa95532_0         5.6 MB
tensorboard-data-server-0.6.1|   py37haa95532_0          17 KB
tensorboard-plugin-wit-1.8.1|   py37haa95532_0         671 KB
tensorflow-2.10.0          |eigen_py37h0b514e4_0           4 KB
tensorflow-base-2.10.0     |eigen_py37he3c91d7_0        74.4 MB
tensorflow-estimator-2.10.0|   py37haa95532_0         484 KB
termcolor-2.1.0            |   py37haa95532_0          12 KB
typing-extensions-4.4.0    |   py37haa95532_0           9 KB
urllib3-1.26.14            |   py37haa95532_0         192 KB
werkzeug-2.2.2             |   py37haa95532_0         338 KB
win_inet_pton-1.1.0        |   py37haa95532_0          35 KB
wrapt-1.14.1               |   py37h2bbff1b_0          48 KB
yarl-1.8.1                 |   py37h2bbff1b_0          80 KB
zipp-3.11.0                |   py37haa95532_0          20 KB
------------------------------------------------------------
                                       Total:        93.8 MB
```

Рисунок 1.4 – Пакеты к загрузке при установке TensorFlow

```
(2_1lab) PS C:\git\2_1lab> pip install tensorflow
Requirement already satisfied: tensorflow in c:\users\nokon\anaconda3\envs\2_1lab\lib\site-packages (2.10.0)
Collecting tensorflow-io-gcs-filesystem>=0.23.1
  Downloading tensorflow_io_gcs_filesystem-0.30.0-cp37-cp37m-win_amd64.whl (1.5 MB)
     ---------------------------------------- 1.5/1.5 MB 4.1 MB/s eta 0:00:00
```

Рисунок 1.5 – Загрузка уже установленного пакета TensorFlow через pip

```
(2_1lab) PS C:\git\2_1lab> pip freeze > requirements.txt
(2_1lab) PS C:\git\2_1lab> conda env export > environment.yml
(2_1lab) PS C:\git\2_1lab> conda deactivate
(base) PS C:\git\2_1lab>
```

Рисунок 1.6 – Создание файлов и деактивация окружения

```
absl-py @ file:///C:/b/abs_5babsu7y5x/croot/absl-py_1666362945682/work
aiohttp @ file:///C:/b/abs_c4zmy21696/croot/aiohttp_1670009573673/work
aiosignal @ file:///tmp/build/80754af9/aiosignal_1637843061372/work
astunparse==1.6.3
async-timeout @ file:///C:/b/abs_43ozhz2a8g/croots/recipe/async-timeout_1664876362767/work
asynctest==0.13.0
attrs @ file:///C:/b/abs_09s3y775ra/croot/attrs_1668696195628/work
blinker==1.4
Bottleneck @ file:///C:/Windows/Temp/abs_3198ca53-903d-42fd-87b4-03e6d03a8381yfwsuves/croots/recipe/bottleneck_1657175565403/work
brotlipy==0.7.0
cachetools @ file:///tmp/build/80754af9/cachetools_1619597386817/work
certifi @ file:///C:/b/abs_85o_6fm0se/croot/certifi_1671487778835/work/certifi
cffi @ file:///C:/b/abs_49n3v2hyhr/croot/cffi_1670423218144/work
charset-normalizer @ file:///tmp/build/80754af9/charset-normalizer_1630003229654/work
click @ file:///C:/ci/click_1646038601470/work
colorama @ file:///C:/b/abs_a9ozq01032/croot/colorama_1672387194846/work
cryptography @ file:///C:/b/abs_b7d7drzbky/croot/cryptography_1673298763653/work
flatbuffers @ file:///home/ktietz/cip/python-flatbuffers_1634039120618/work
flit_core @ file:///opt/conda/conda-bld/flit-core_1644941570762/work/source/flit_core
frozenlist @ file:///C:/b/abs_2bb5uzghsi/croot/frozenlist_1670004511812/work
gast @ file:///Users/ktietz/demo/mc3/conda-bld/gast_1628588903283/work
google-auth @ file:///opt/conda/conda-bld/google-auth_1646735974934/work
google-auth-oauthlib @ file:///tmp/build/80754af9/google-auth-oauthlib_1617120569401/work
google-pasta @ file:///Users/ktietz/demo/mc3/conda-bld/google-pasta_1630577991354/work
grpcio @ file:///C:/ci/grpcio_1637590993074/work
h5py @ file:///C:/ci/h5py_1659089886851/work
idna @ file:///C:/b/abs_bdhbebrioa/croot/idna_1666125572046/work
importlib-metadata @ file:///C:/ci/importlib-metadata_1648562631189/work
keras @ file:///C:/Users/builder/adipietro/mc3/tf210/conda-bld/keras_1669760570649/work/keras-2.10.0-py2.py3-none-any.whl
Keras-Preprocessing @ file:///tmp/build/80754af9/keras-preprocessing_1612283640596/work
libclang==15.0.6.1
Markdown @ file:///C:/b/abs_98lv_ucina/croot/markdown_1671541919225/work
MarkupSafe @ file:///C:/ci/markupsafe_1654508076077/work
mkl-fft==1.3.1
mkl-random @ file:///C:/ci/mkl_random_1626186163140/work
mkl-service==2.4.0
multidict @ file:///C:/b/abs_6cx_8w3cv2/croot/multidict_1665674238352/work
numexpr @ file:///C:/b/abs_a7kbak88hk/croot/numexpr_1668713882979/work
numpy @ file:///C:/ci/numpy_and_numpy_base_1653574804943/work
oauthlib @ file:///C:/b/abs_2eoymqc2ow/croot/oauthlib_1665490906043/work
opt-einsum @ file:///tmp/build/80754af9/opt_einsum_1621500238896/work
packaging @ file:///C:/b/abs_cfsup8ur87/croot/packaging_1671697442297/work
pandas @ file:///C:/ci/pandas_1641461312795/work
protobuf==3.19.6
pyasn1 @ file:///Users/ktietz/demo/mc3/conda-bld/pyasn1_1629708007385/work
pyasn1-modules==0.2.8
pycparser @ file:///tmp/build/80754af9/pycparser_1636541352034/work
PyJWT @ file:///C:/ci/pyjwt_1657529476747/work
pyOpenSSL @ file:///opt/conda/conda-bld/pyopenssl_1643788558760/work
PySocks @ file:///C:/ci/pysocks_1594394709107/work
python-dateutil @ file:///tmp/build/80754af9/python-dateutil_1626374649649/work
pytz @ file:///C:/b/abs_22fofvpn1x/croot/pytz_1671698059864/work
requests @ file:///C:/ci/requests_1657735288441/work
requests-oauthlib==1.3.0
rsa @ file:///tmp/build/80754af9/rsa_1614366226499/work
scipy @ file:///C:/ci/scipy_1661333074914/work
six @ file:///tmp/build/80754af9/six_1644875935023/work
tensorboard @ file:///C:/Users/builder/adipietro/mc3/tf210/conda-bld/tensorboard_1669760968711/work/tensorboard-2.10.0-py3-none-any.whl
tensorboard-data-server @ file:///C:/b/abs_2fhvpo862s/croot/tensorboard-data-server_1670853600144/work/tensorboard_data_server-0.6.1-py3-none-any.whl
tensorboard-plugin-wit @ file:///C:/tf/b/tensorboard-plugin-wit_1660162132996/work/tensorboard_plugin_wit-1.8.1-py3-none-any.whl
tensorflow==2.10.0
tensorflow-estimator @ file:///C:/Users/builder/adipietro/mc3/tf210/conda-bld/tensorflow-estimator_1669761460695/work/tensorflow_estimator-2.10.0-py2.py3-none-any.whl
tensorflow-io-gcs-filesystem==0.30.0
termcolor @ file:///C:/b/abs_16qe7jhw7n/croot/termcolor_1668084642458/work
typing_extensions @ file:///C:/b/abs_89eui86zuq/croot/typing_extensions_1669923792806/work
urllib3 @ file:///C:/b/abs_9bcwxczrvm/croot/urllib3_1673575521331/work
Werkzeug @ file:///C:/b/abs_17q5kgb8bo/croot/werkzeug_1671216014857/work
win-inet-pton @ file:///C:/ci/win_inet_pton_1605306165655/work
wincertstore==0.2
wrapt @ file:///C:/Windows/Temp/abs_7c3dd407-1390-477a-b542-fd15df6a24085_diwiza/croots/recipe/wrapt_1657814452175/work
yarl @ file:///C:/Users/BUILDE~1/AppData/Local/Temp/abs_e5nlunspj6/croots/recipe/yarl_1661437086516/work
zipp @ file:///C:/b/abs_b9jfdr908q/croot/zipp_1672387552360/work
```

Рисунок 1.7 – Содержимое файла requirements.txt

```yaml
name: 2_11ab
channels:
  - defaults
dependencies:
  - _tflow_select=2.2.0=eigen
  - absl-py=1.3.0=py37haa95532_0
  - aiohttp=3.8.3=py37h2bbff1b_0
  - aiosignal=1.2.0=pyhd3eb1b0_0
  - astunparse=1.6.3=py_0
  - async-timeout=4.0.2=py37haa95532_0
  - asynctest=0.13.0=py_0
  - attrs=22.1.0=py37haa95532_0
  - blas=1.0=mkl
  - blinker=1.4=py37haa95532_0
  - bottleneck=1.3.5=py37h080aedc_0
  - brotlipy=0.7.0=py37h2bbff1b_1003
  - ca-certificates=2023.01.10=haa95532_0
  - cachetools=4.2.2=pyhd3eb1b0_0
  - certifi=2022.12.7=py37haa95532_0
  - cffi=1.15.1=py37h2bbff1b_3
  - charset-normalizer=2.0.4=pyhd3eb1b0_0
  - click=8.0.4=py37haa95532_0
  - colorama=0.4.6=py37haa95532_0
  - cryptography=38.0.4=py37h21b164f_0
  - fftw=3.3.9=h2bbff1b_1
  - flatbuffers=2.0.0=h6c2663c_0
  - flit-core=3.6.0=pyhd3eb1b0_0
  - frozenlist=1.3.3=py37h2bbff1b_0
  - gast=0.4.0=pyhd3eb1b0_0
  - giflib=5.2.1=h8cc25b3_1
  - google-auth=2.6.0=pyhd3eb1b0_0
  - google-auth-oauthlib=0.4.4=pyhd3eb1b0_0
  - google-pasta=0.2.0=pyhd3eb1b0_0
  - grpcio=1.42.0=py37hc60d5dd_0
  - h5py=3.7.0=py37h3de5c98_0
  - hdf5=1.10.6=h1756f20_1
  - icc_rt=2022.1.0=h6049295_2
  - icu=58.2=ha925a31_3
  - idna=3.4=py37haa95532_0
  - importlib-metadata=4.11.3=py37haa95532_0
  - intel-openmp=2021.4.0=haa95532_3556
  - jpeg=9e=h2bbff1b_0
  - keras=2.10.0=py37haa95532_0
  - keras-preprocessing=1.1.2=pyhd3eb1b0_0
  - libcurl=7.87.0=h86230a5_0
  - libpng=1.6.37=h2a8f88b_0
```

Рисунок 1.8 – Содержимое файла environment.yml