Міністерство освіти і науки України
Національний технічний університет України «Київський політехнічний інститут імені Ігоря Сікорського"
Факультет інформатики та обчислювальної техніки
Кафедра інформатики та програмної інженерії

Звіт
з лабораторної роботи № 2 з дисципліни
«Основи програмування 2. Методології програмування»
«Файли даних. Бінарні файли»

Варіант__16__

Виконав студент __ІП-15,_Куманецька_Ірина_Вікторівна___
Перевірив ___Вечерковська Анастасія Сергіївна_____

Київ 2022

Лабораторна робота 2

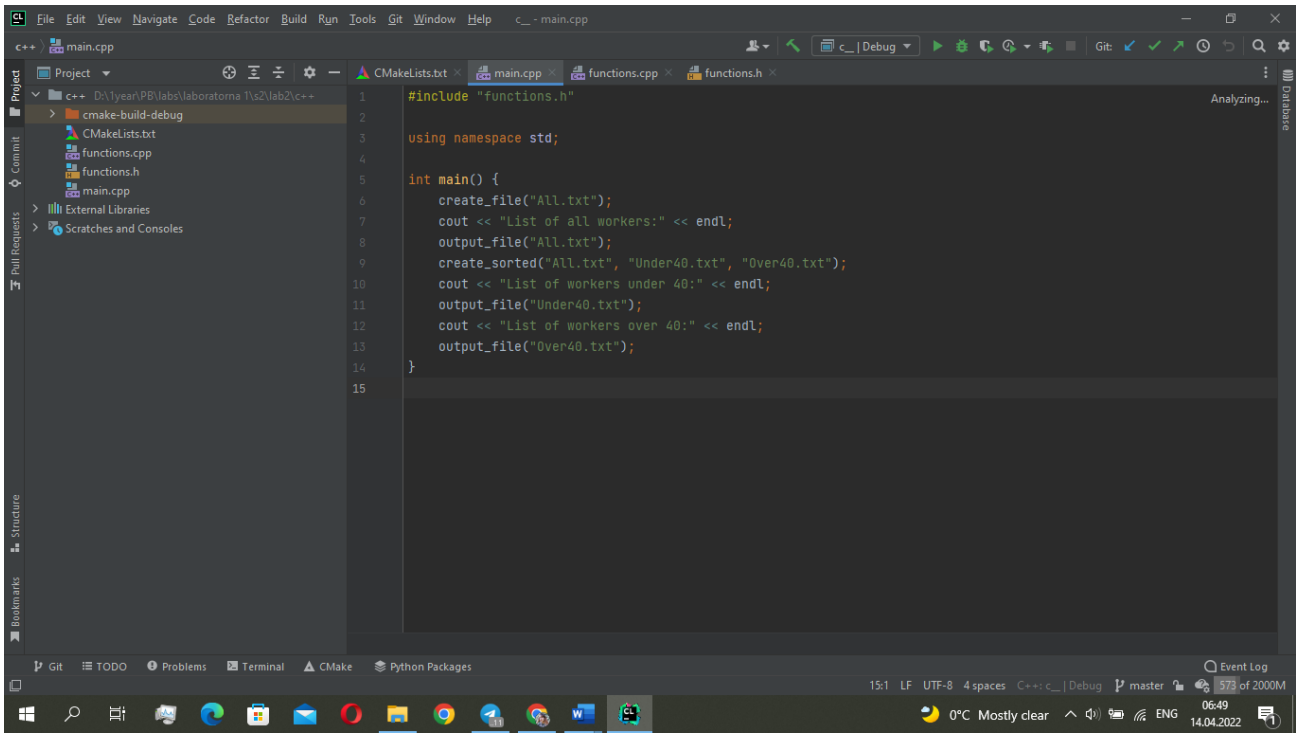
Мета – вивчити особливості створення і обробки бінарних файлів даних.

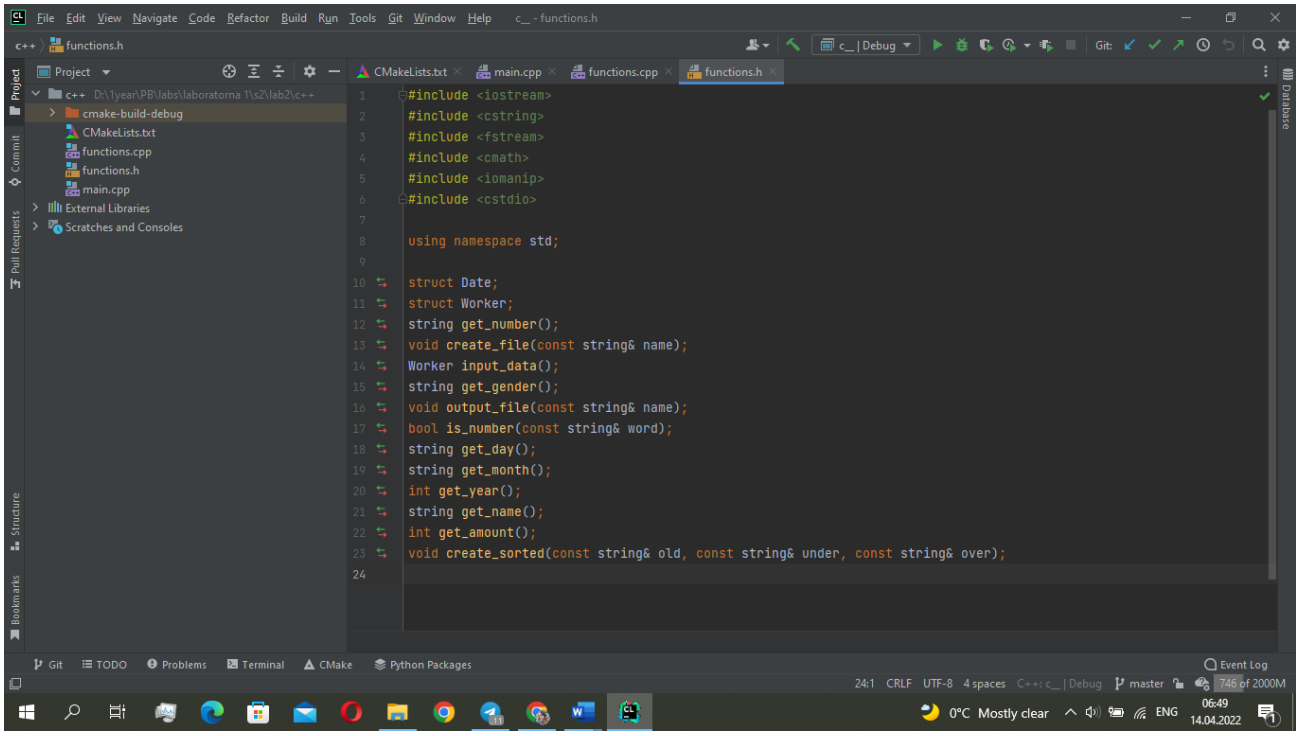
Індивідуальне завдання

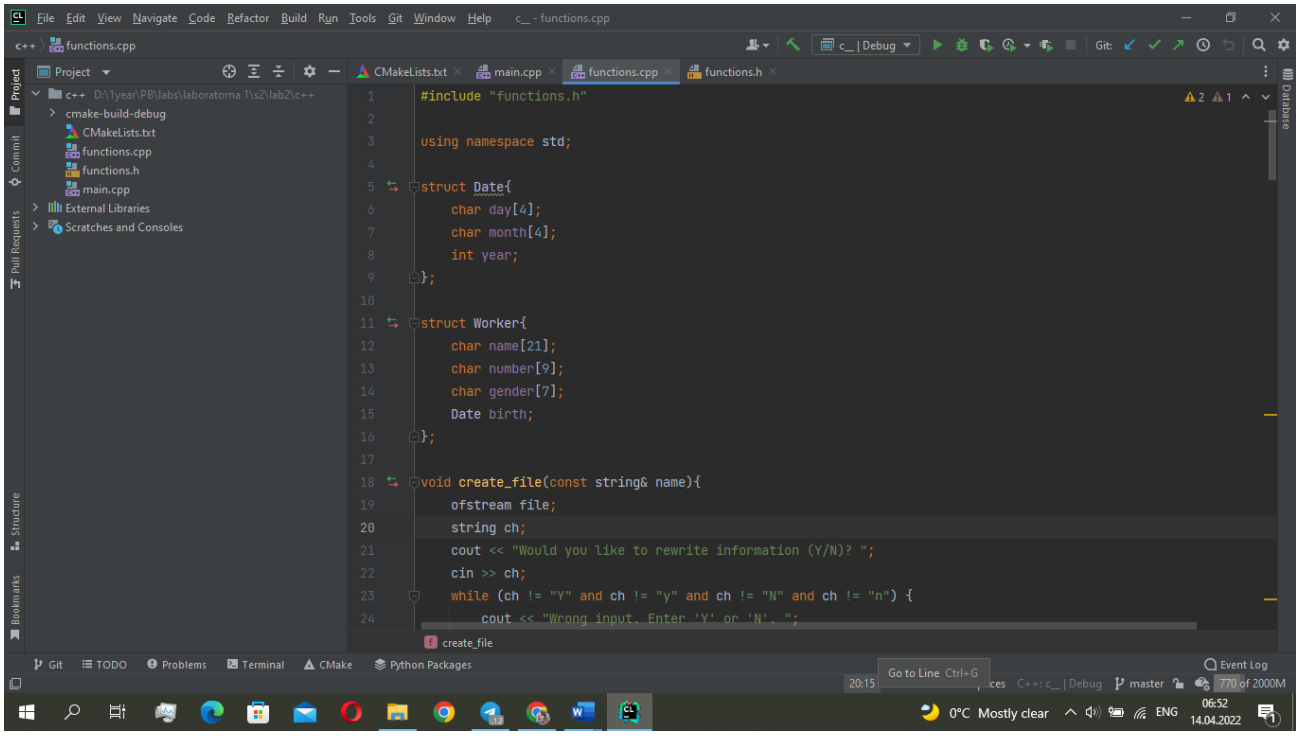
Варіант 16

16. Створити файл із списком співробітників підприємства: ПІБ працівника, його дата народження (ДД.ММ.РРРР), табельний номер, стать (чоловік / жінка). При додаванні даних виконувати перевірку на вік: він повинен бути не менше 20-ти та не більше 60-ти років. Створити два нових файли: перший містить список працівників, яким не більше 40 років, другий – список інших працівників.

Виконання на C++




File Edit View Navigate Code Refactor Build Run Tools Git Window Help c_ - functions.h
functions.h
c_ | Debug
Git:
Project
CMakeLists.txt
main.cpp
functions.cpp
functions.h
D:\1year\PB\labs\laboratorna 1\s2\lab2\c++
cmake-build-debug
CMakeLists.txt
functions.cpp
functions.h
main.cpp
External Libraries
Scratches and Consoles
#include <iostream>
#include <cstring>
#include <fstream>
#include <cmath>
#include <iomanip>
#include <cstdio>
using namespace std;
struct Date;
struct Worker;
string get_number();
void create_file(const string& name);
Worker input_data();
string get_gender();
void output_file(const string& name);
bool is_number(const string& word);
string get_day();
string get_month();
int get_year();
string get_name();
int get_amount();
void create_sorted(const string& old, const string& under, const string& over);
Git TODO Problems Terminal CMake Python Packages
Event Log
24:1 CRLF UTF-8 4 spaces C++: c_ | Debug master
746 of 2000M
0°C Mostly clear
ENG
06:49
14.04.2022


File Edit View Navigate Code Refactor Build Run Tools Git Window Help c_ - functions.cpp
functions.cpp
c_ | Debug
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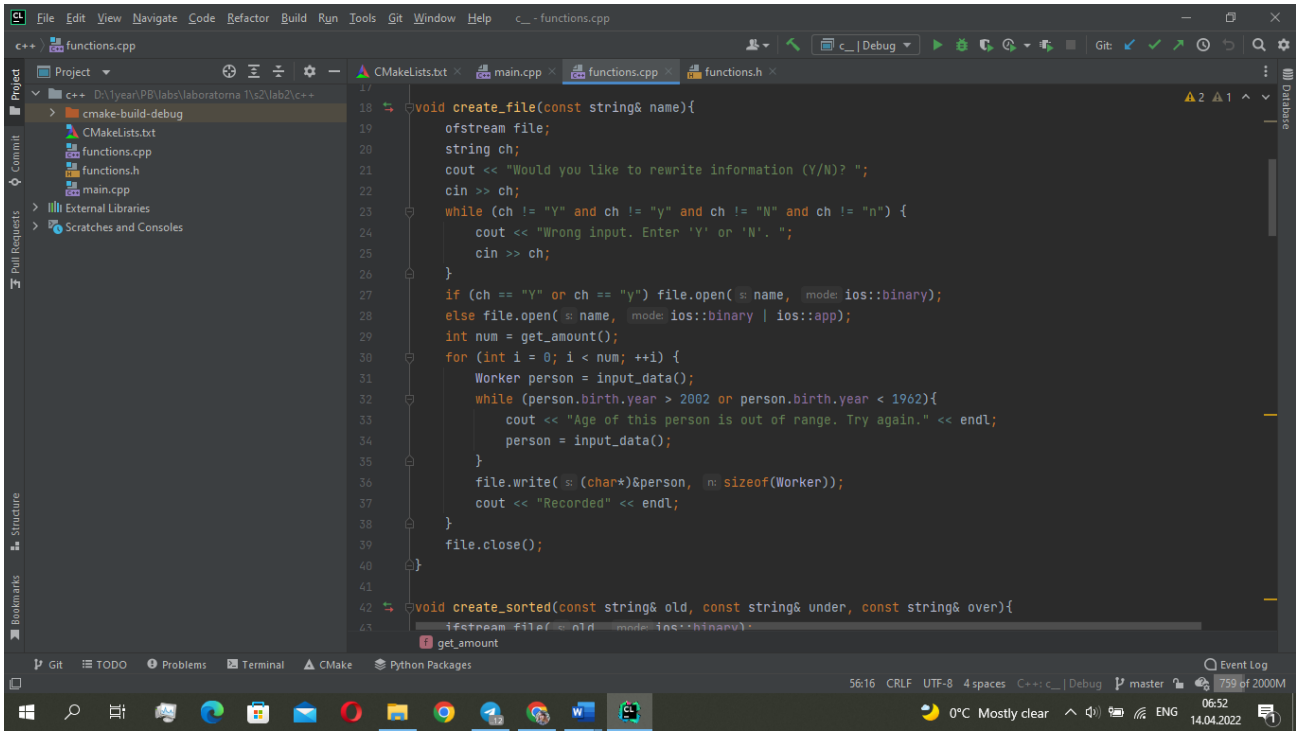
main.cpp
functions.cpp
functions.h
D:\1year\PB\labs\laboratorna 1\s2\lab2\c++
cmake-build-debug
CMakeLists.txt
functions.cpp
functions.h
main.cpp
External Libraries
Scratches and Consoles
#include "functions.h"
using namespace std;
struct Date{
char day[4];
char month[4];
int year;
};
struct Worker{
char name[21];
char number[9];
char gender[7];
Date birth;
};
void create_file(const string& name){
ofstream file;
string ch;
cout << "Would you like to rewrite information (Y/N)? ";
cin >> ch;
while (ch != "Y" and ch != "y" and ch != "N" and ch != "n") {
cout << "Wrong input. Enter 'Y' or 'N'. ";
create_file
Git TODO Problems Terminal CMake Python Packages
Event Log
Go to Line Ctrl+G
20:15
master
770 of 2000M
0°C Mostly clear
ENG
06:52
14.04.2022


File Edit View Navigate Code Refactor Build Run Tools Git Window Help
c_ - functions.cpp
functions.cpp
c_ | Debug
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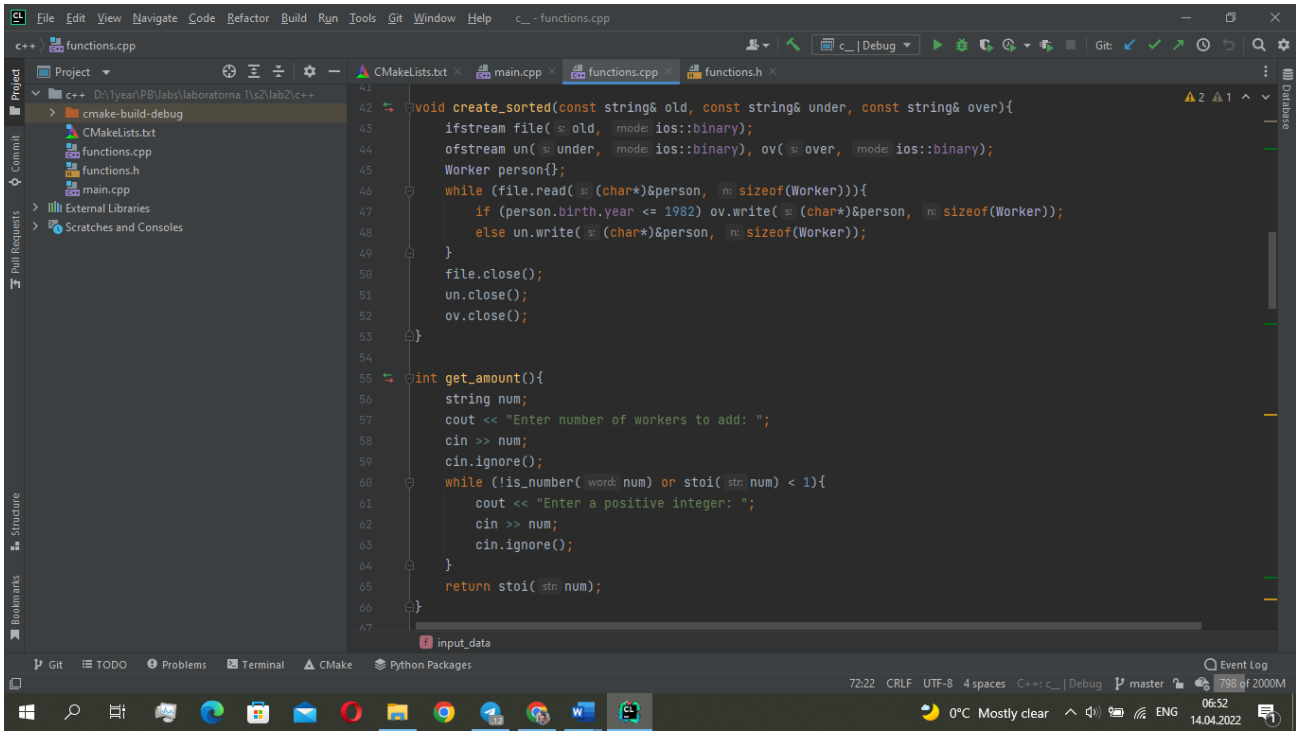
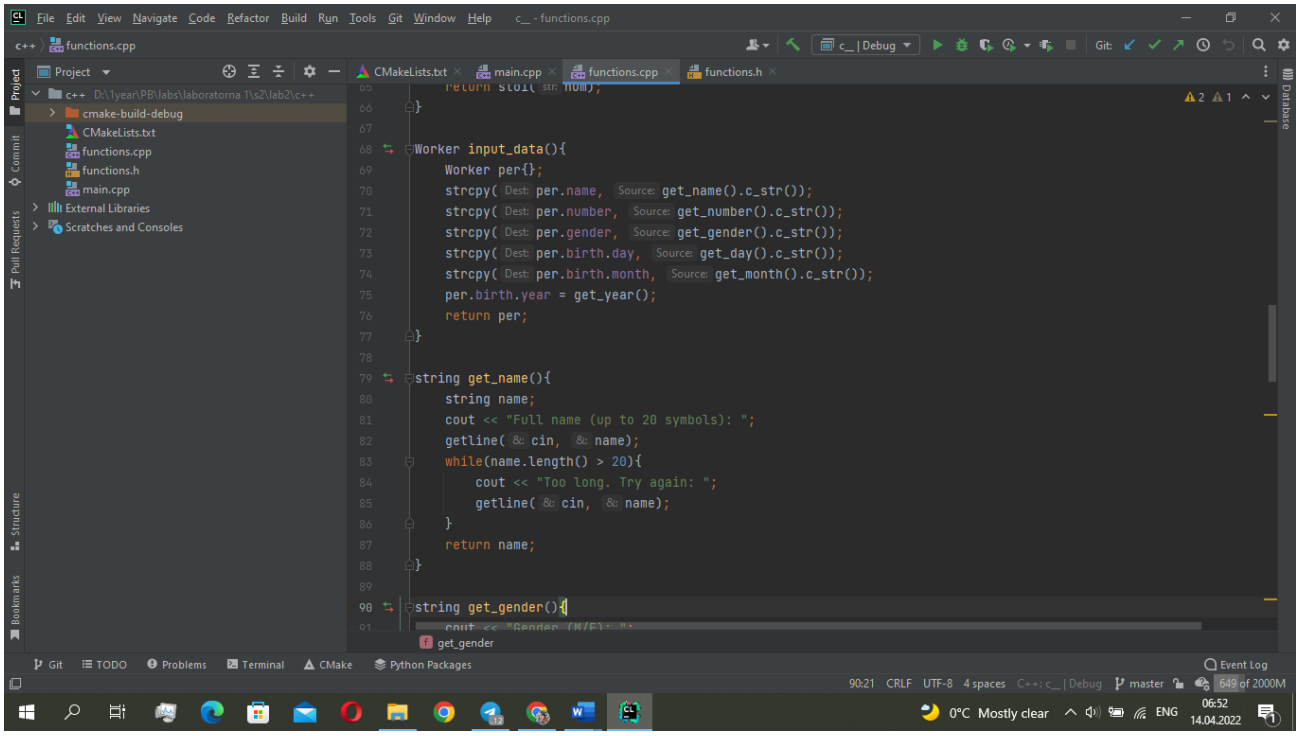
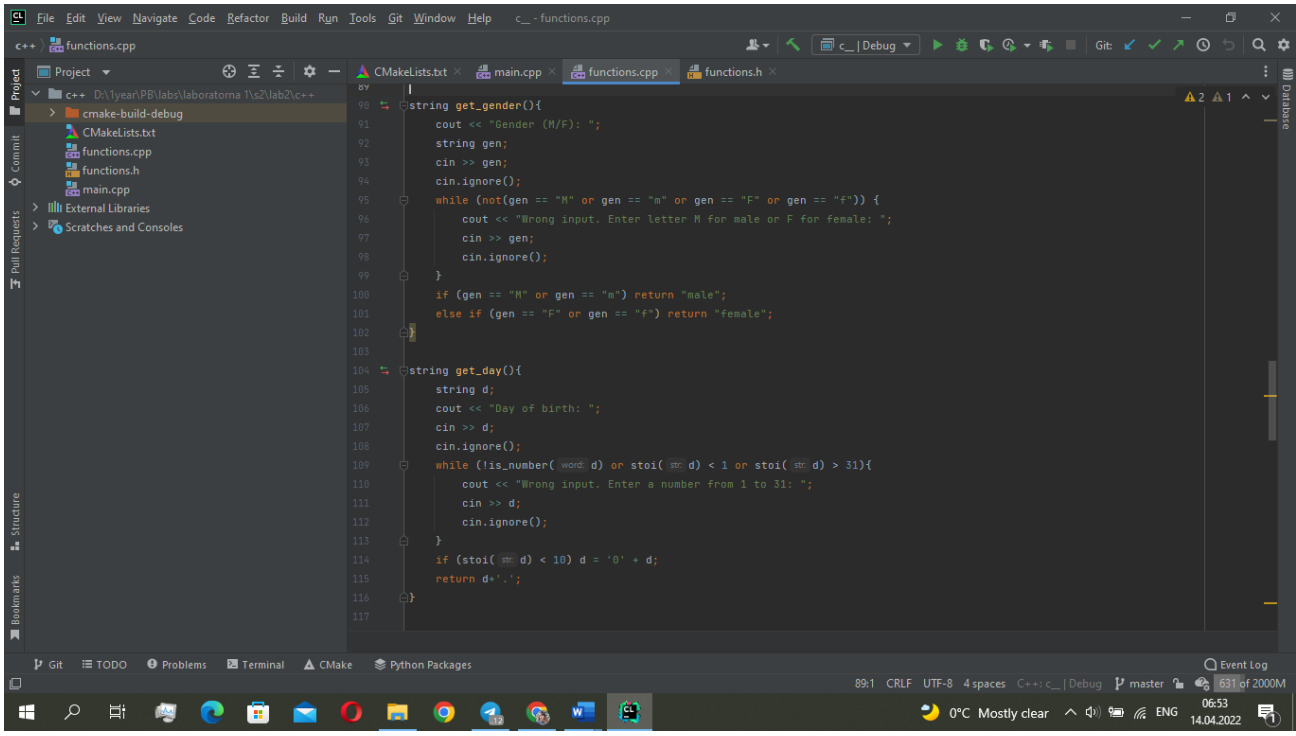
CMakeLists.txt
main.cpp
functions.cpp
functions.h
c++ D:\1year\PB\labs\laboratorna 1\s2\lab2\c++
cmake-build-debug
CMakeLists.txt
functions.cpp
functions.h
main.cpp
External Libraries
Scratches and Consoles
void create_file(const string& name){
ofstream file;
string ch;
cout << "Would you like to rewrite information (Y/N)? ";
cin >> ch;
while (ch != "Y" and ch != "y" and ch != "N" and ch != "n") {
cout << "Wrong input. Enter 'Y' or 'N'. ";
cin >> ch;
}
if (ch == "Y" or ch == "y") file.open(s: name, mode: ios::binary);
else file.open(s: name, mode: ios::binary | ios::app);
int num = get_amount();
for (int i = 0; i < num; ++i) {
Worker person = input_data();
while (person.birth.year > 2002 or person.birth.year < 1962){
cout << "Age of this person is out of range. Try again." << endl;
person = input_data();
}
file.write(s: (char*)&person, n: sizeof(Worker));
cout << "Recorded" << endl;
}
file.close();
}
void create_sorted(const string& old, const string& under, const string& over){
get_amount
Git TODO Problems Terminal CMake Python Packages
Event Log
56:16 CRLF UTF-8 4 spaces C++: c_ | Debug master 759 of 2000M
0°C Mostly clear ENG 06:52 14.04.2022

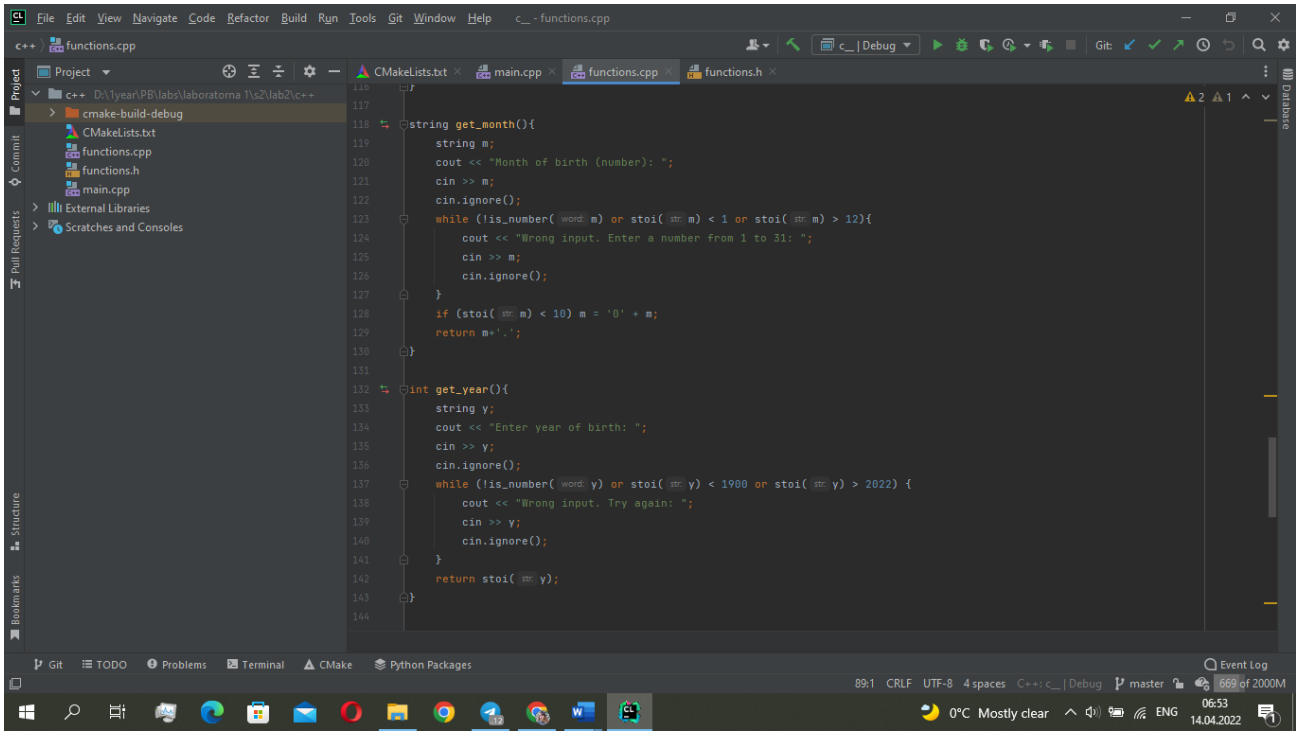

File Edit View Navigate Code Refactor Build Run Tools Git Window Help
c_ - functions.cpp
functions.cpp
c_ | Debug
Git:
Project
CMakeLists.txt
main.cpp
functions.cpp
functions.h
c++ D:\1year\PB\labs\laboratorna 1\s2\lab2\c++
cmake-build-debug
CMakeLists.txt
functions.cpp
functions.h
main.cpp
External Libraries
Scratches and Consoles
void create_sorted(const string& old, const string& under, const string& over){
ifstream file(s: old, mode: ios::binary);
ofstream un(s: under, mode: ios::binary), ov(s: over, mode: ios::binary);
Worker person{};
while (file.read(s: (char*)&person, n: sizeof(Worker))){
if (person.birth.year <= 1982) ov.write(s: (char*)&person, n: sizeof(Worker));
else un.write(s: (char*)&person, n: sizeof(Worker));
}
file.close();
un.close();
ov.close();
}
int get_amount(){
string num;
cout << "Enter number of workers to add: ";
cin >> num;
cin.ignore();
while (!is_number(word: num) or stoi(str: num) < 1){
cout << "Enter a positive integer: ";
cin >> num;
cin.ignore();
}
return stoi(str: num);
}
input_data
Git TODO Problems Terminal CMake Python Packages
Event Log
72:22 CRLF UTF-8 4 spaces C++: c_ | Debug master 798 of 2000M
0°C Mostly clear ENG 06:52 14.04.2022



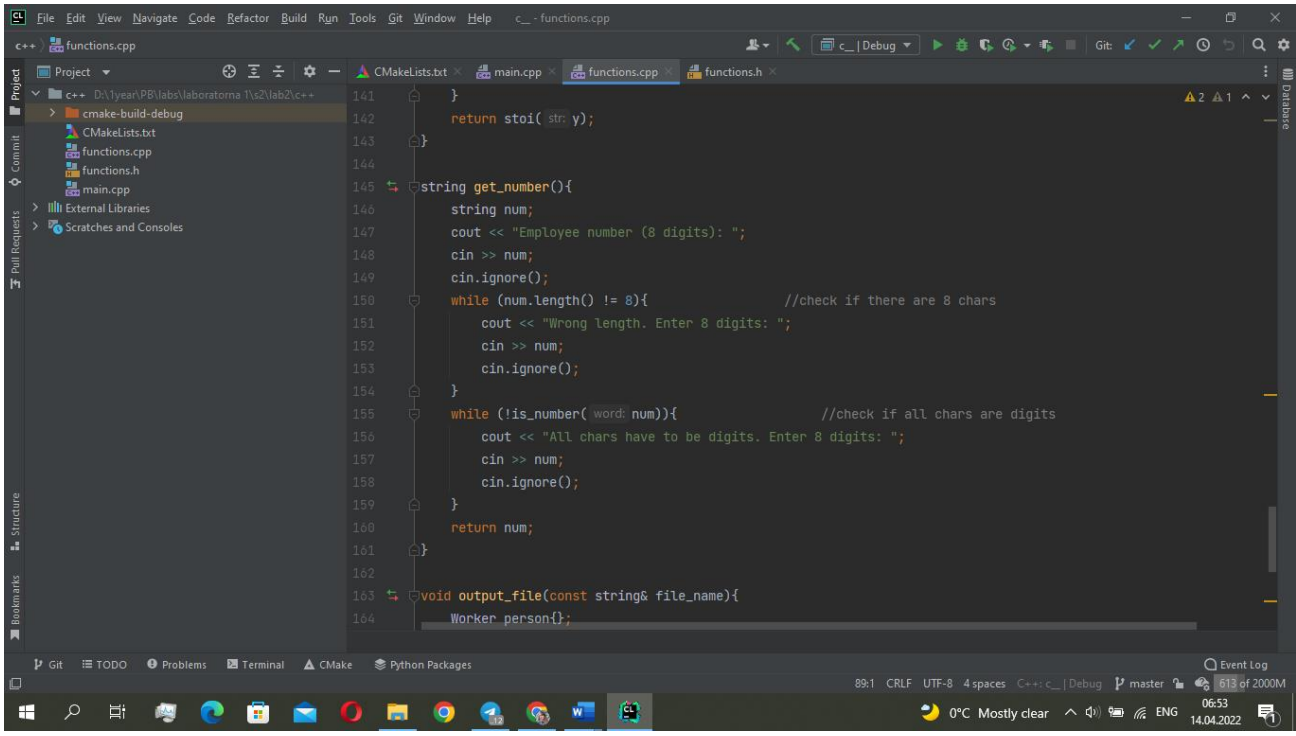
```
}

Worker input_data(){
    Worker per{};
    strcpy( Dest: per.name,  Source: get_name().c_str());
    strcpy( Dest: per.number,  Source: get_number().c_str());
    strcpy( Dest: per.gender,  Source: get_gender().c_str());
    strcpy( Dest: per.birth.day,  Source: get_day().c_str());
    strcpy( Dest: per.birth.month,  Source: get_month().c_str());
    per.birth.year = get_year();
    return per;
}

string get_name(){
    string name;
    cout << "Full name (up to 20 symbols): ";
    getline( &: cin,  &: name);
    while(name.length() > 20){
        cout << "Too long. Try again: ";
        getline( &: cin,  &: name);
    }
    return name;
}

string get_gender(){
    cout << "Gender (M/F): ";
```



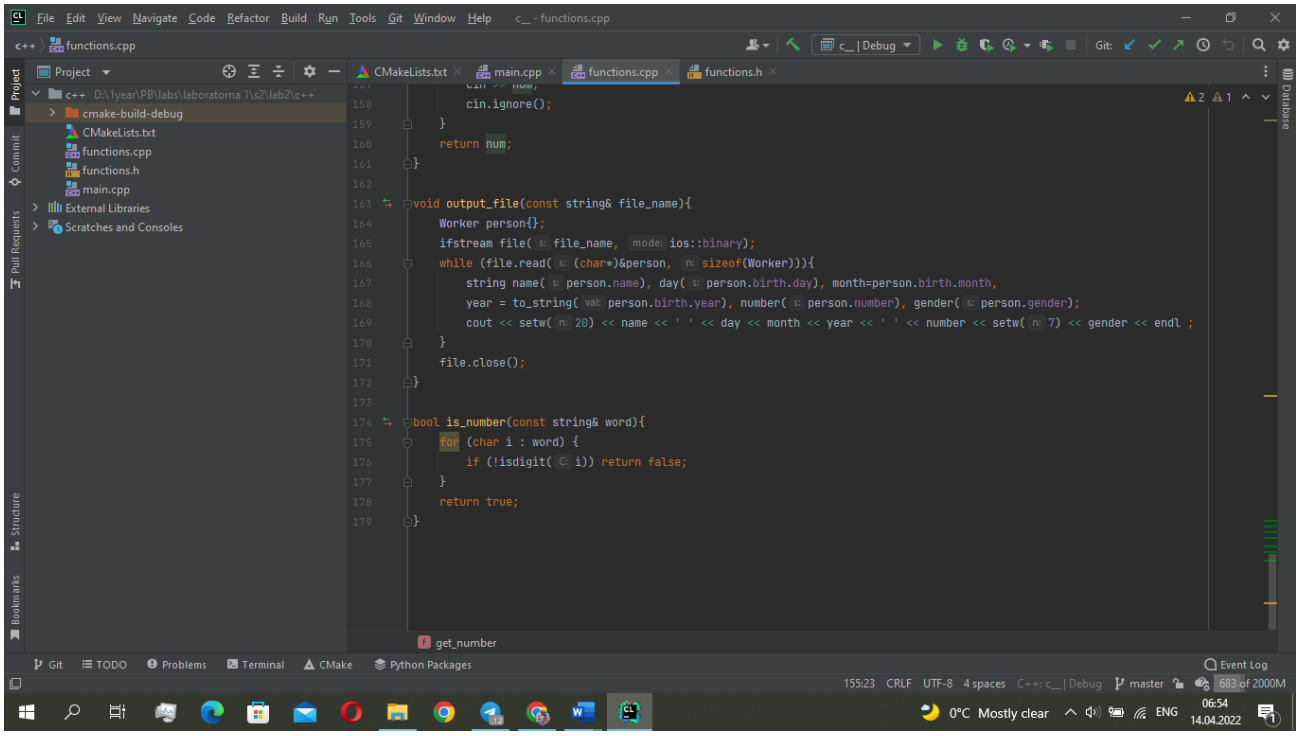
```
string get_gender(){
    cout << "Gender (M/F): ";
    string gen;
    cin >> gen;
    cin.ignore();
    while (not(gen == "M" or gen == "m" or gen == "F" or gen == "f")) {
        cout << "Wrong input. Enter letter M for male or F for female: ";
        cin >> gen;
        cin.ignore();
    }
    if (gen == "M" or gen == "m") return "male";
    else if (gen == "F" or gen == "f") return "female";
}

string get_day(){
    string d;
    cout << "Day of birth: ";
    cin >> d;
    cin.ignore();
    while (!is_number( word: d) or stoi( str: d) < 1 or stoi( str: d) > 31){
        cout << "Wrong input. Enter a number from 1 to 31: ";
        cin >> d;
        cin.ignore();
    }
    if (stoi( str: d) < 10) d = '0' + d;
    return d+'.';
}
```

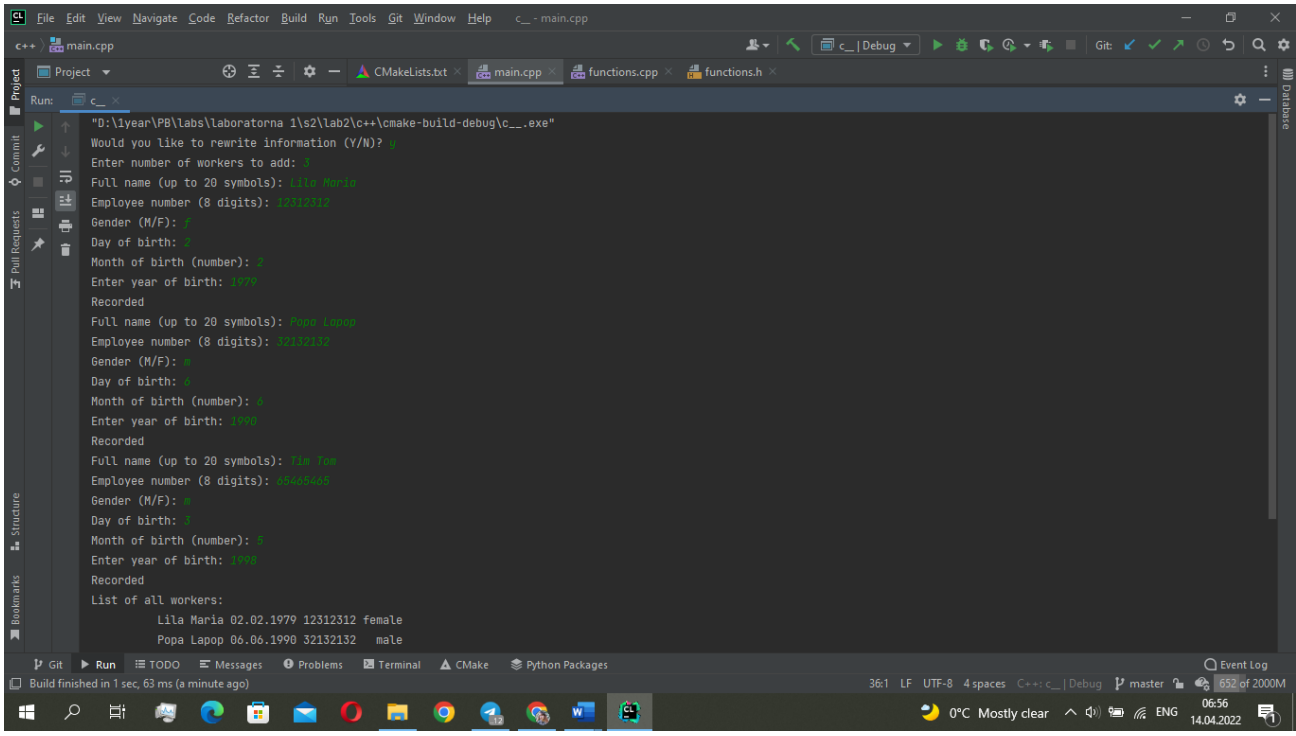


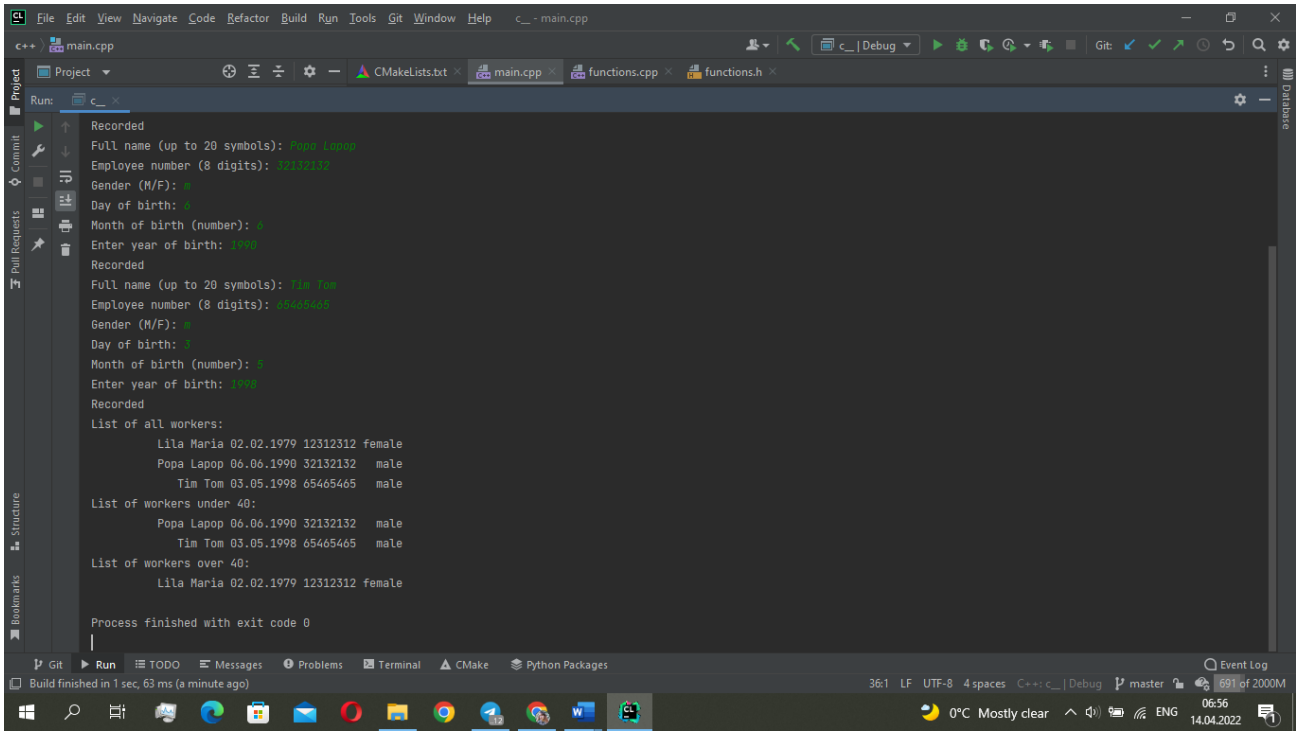
```
}
string get_month(){
    string m;
    cout << "Month of birth (number): ";
    cin >> m;
    cin.ignore();
    while (!is_number( word: m) or stoi( str: m) < 1 or stoi( str: m) > 12){
        cout << "Wrong input. Enter a number from 1 to 31: ";
        cin >> m;
        cin.ignore();
    }
    if (stoi( str: m) < 10) m = '0' + m;
    return m+'.';
}

int get_year(){
    string y;
    cout << "Enter year of birth: ";
    cin >> y;
    cin.ignore();
    while (!is_number( word: y) or stoi( str: y) < 1900 or stoi( str: y) > 2022) {
        cout << "Wrong input. Try again: ";
        cin >> y;
        cin.ignore();
    }
    return stoi( str: y);
}
```



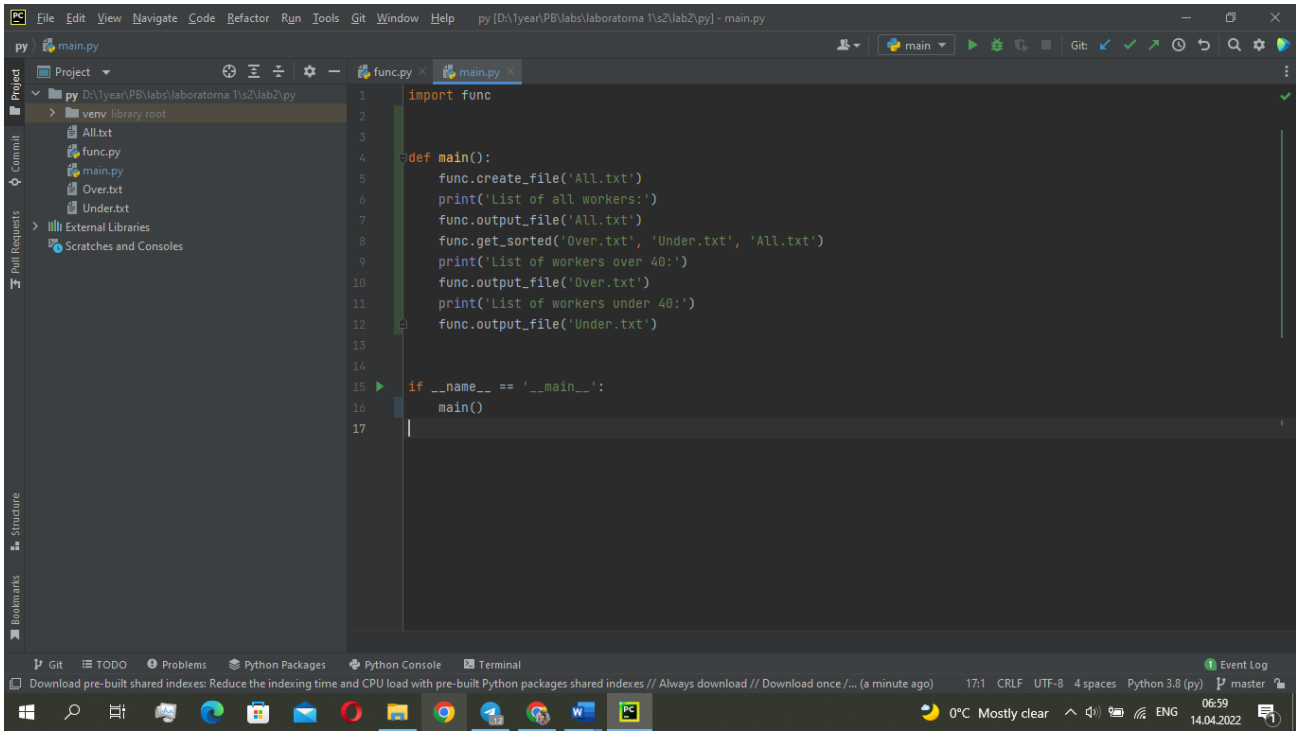
```
    }
    return stoi( str: y);
}

string get_number(){
    string num;
    cout << "Employee number (8 digits): ";
    cin >> num;
    cin.ignore();
    while (num.length() != 8){                  //check if there are 8 chars
        cout << "Wrong length. Enter 8 digits: ";
        cin >> num;
        cin.ignore();
    }
    while (!is_number( word: num)){                  //check if all chars are digits
        cout << "All chars have to be digits. Enter 8 digits: ";
        cin >> num;
        cin.ignore();
    }
    return num;
}

void output_file(const string& file_name){
    Worker person{};
```

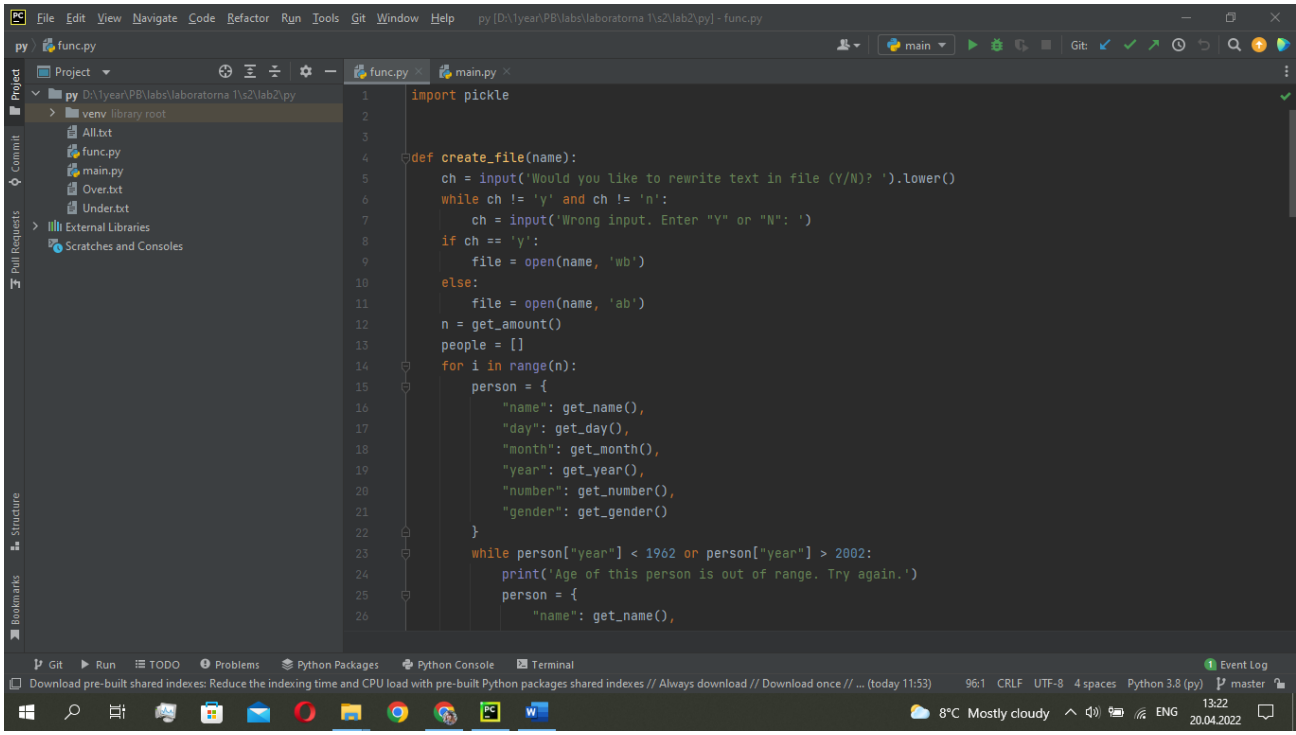

File Edit View Navigate Code Refactor Build Run Tools Git Window Help c__ - functions.cpp
functions.cpp
c__ | Debug
Project
c++ D:\1year\PB\labs\laboratorna 1\s2\lab2\c++
cmake-build-debug
CMakeLists.txt
functions.cpp
functions.h
main.cpp
External Libraries
Scratches and Consoles
CMakeLists.txt main.cpp functions.cpp functions.h
cin.ignore();
}
return num;
}
void output_file(const string& file_name){
Worker person{};
ifstream file(s: file_name, mode: ios::binary);
while (file.read(s: (char*)&person, n: sizeof(Worker))){
string name(s: person.name), day(s: person.birth.day), month=person.birth.month,
year = to_string(val: person.birth.year), number(s: person.number), gender(s: person.gender);
cout << setw(n: 20) << name << ' ' << day << month << year << ' ' << number << setw(n: 7) << gender << endl ;
}
file.close();
}
bool is_number(const string& word){
for (char i : word) {
if (!isdigit(c: i)) return false;
}
return true;
}
get_number
Git TODO Problems Terminal CMake Python Packages
Event Log
155:23 CRLF UTF-8 4 spaces C++: c__ | Debug master 683 of 2000M
0°C Mostly clear ENG 06:54 14.04.2022

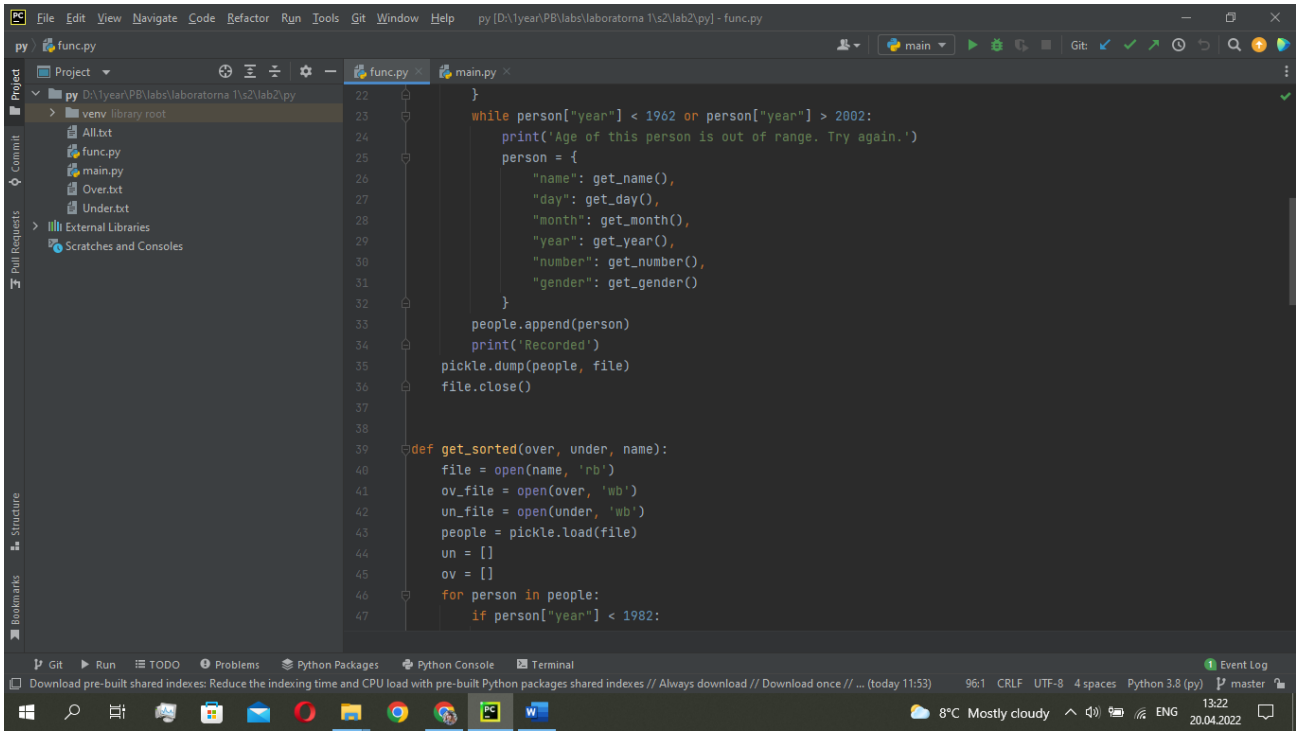

File Edit View Navigate Code Refactor Build Run Tools Git Window Help c__ - main.cpp
main.cpp
c__ | Debug
Project
CMakeLists.txt main.cpp functions.cpp functions.h
Run: c__
"D:\1year\PB\labs\laboratorna 1\s2\lab2\c++\cmake-build-debug\c__.exe"
Would you like to rewrite information (Y/N)? y
Enter number of workers to add: 3
Full name (up to 20 symbols): Lila Maria
Employee number (8 digits): 12312312
Gender (M/F): f
Day of birth: 2
Month of birth (number): 2
Enter year of birth: 1979
Recorded
Full name (up to 20 symbols): Popa Lapop
Employee number (8 digits): 32132132
Gender (M/F): m
Day of birth: 6
Month of birth (number): 6
Enter year of birth: 1990
Recorded
Full name (up to 20 symbols): Tin Tom
Employee number (8 digits): 65465465
Gender (M/F): m
Day of birth: 3
Month of birth (number): 5
Enter year of birth: 1998
Recorded
List of all workers:
Lila Maria 02.02.1979 12312312 female
Popa Lapop 06.06.1990 32132132 male
Git Run TODO Messages Problems Terminal CMake Python Packages
Event Log
Build finished in 1 sec, 63 ms (a minute ago)
36:1 LF UTF-8 4 spaces C++: c__ | Debug master 652 of 2000M
0°C Mostly clear ENG 06:56 14.04.2022



Виконання на Python




File Edit View Navigate Code Refactor Run Tools Git Window Help
py [D:\1year\PB\labs\laboratorna 1\s2\lab2\py] - func.py
func.py
main
Git:
Project
func.py
main.py
py D:\1year\PB\labs\laboratorna 1\s2\lab2\py
venv library root
All.txt
func.py
main.py
Over.txt
Under.txt
External Libraries
Scratches and Consoles
import pickle
def create_file(name):
ch = input('Would you like to rewrite text in file (Y/N)? ').lower()
while ch != 'y' and ch != 'n':
ch = input('Wrong input. Enter "Y" or "N": ')
if ch == 'y':
file = open(name, 'wb')
else:
file = open(name, 'ab')
n = get_amount()
people = []
for i in range(n):
person = {
"name": get_name(),
"day": get_day(),
"month": get_month(),
"year": get_year(),
"number": get_number(),
"gender": get_gender()
}
while person["year"] < 1962 or person["year"] > 2002:
print('Age of this person is out of range. Try again.')
person = {
"name": get_name(),
Git Run TODO Problems Python Packages Python Console Terminal
Event Log
Download pre-built shared indexes: Reduce the indexing time and CPU load with pre-built Python packages shared indexes // Always download // Download once // ... (today 11:53)
96:1 CRLF UTF-8 4 spaces Python 3.8 (py) master
8°C Mostly cloudy
ENG
13:22
20.04.2022


File Edit View Navigate Code Refactor Run Tools Git Window Help
py [D:\1year\PB\labs\laboratorna 1\s2\lab2\py] - func.py
func.py
main
Git:
Project
func.py
main.py
py D:\1year\PB\labs\laboratorna 1\s2\lab2\py
venv library root
All.txt
func.py
main.py
Over.txt
Under.txt
External Libraries
Scratches and Consoles
}
while person["year"] < 1962 or person["year"] > 2002:
print('Age of this person is out of range. Try again.')
person = {
"name": get_name(),
"day": get_day(),
"month": get_month(),
"year": get_year(),
"number": get_number(),
"gender": get_gender()
}
people.append(person)
print('Recorded')
pickle.dump(people, file)
file.close()
def get_sorted(over, under, name):
file = open(name, 'rb')
ov_file = open(over, 'wb')
un_file = open(under, 'wb')
people = pickle.load(file)
un = []
ov = []
for person in people:
if person["year"] < 1982:
Git Run TODO Problems Python Packages Python Console Terminal
Event Log
Download pre-built shared indexes: Reduce the indexing time and CPU load with pre-built Python packages shared indexes // Always download // Download once // ... (today 11:53)
96:1 CRLF UTF-8 4 spaces Python 3.8 (py) master
8°C Mostly cloudy
ENG
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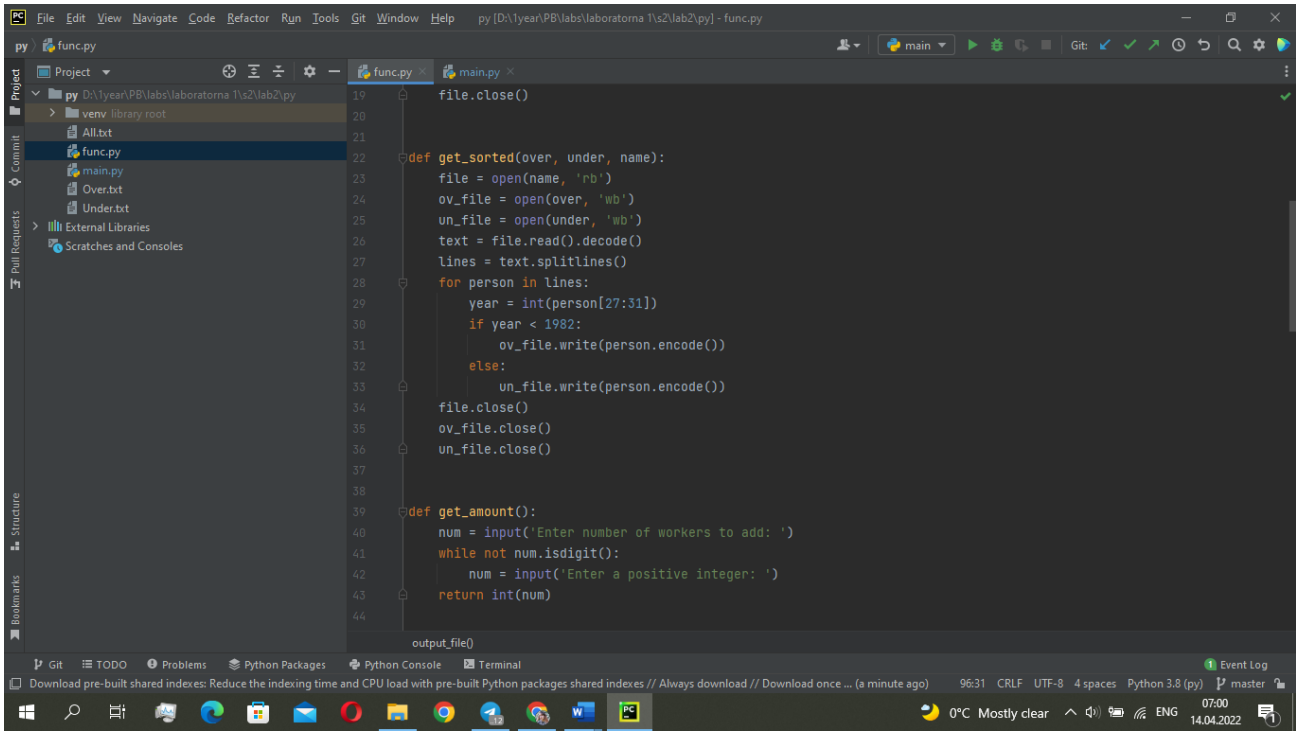
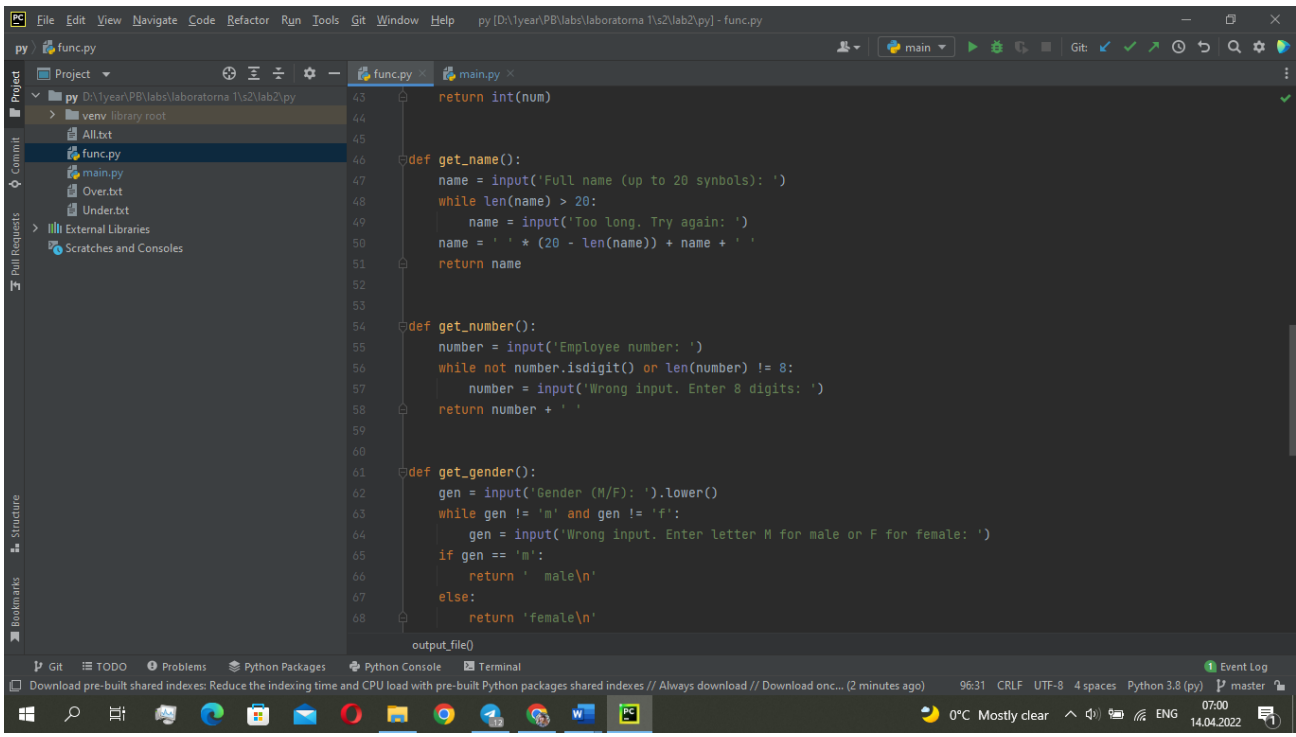
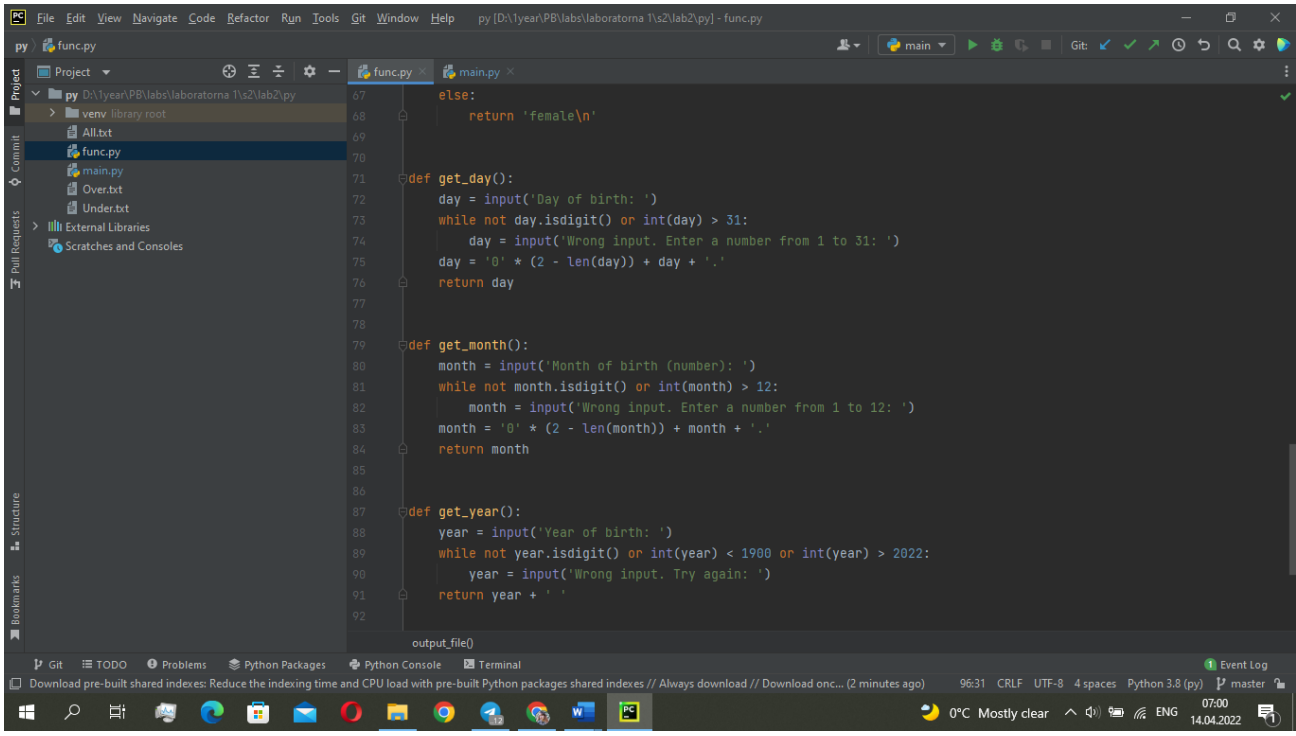
20.04.2022



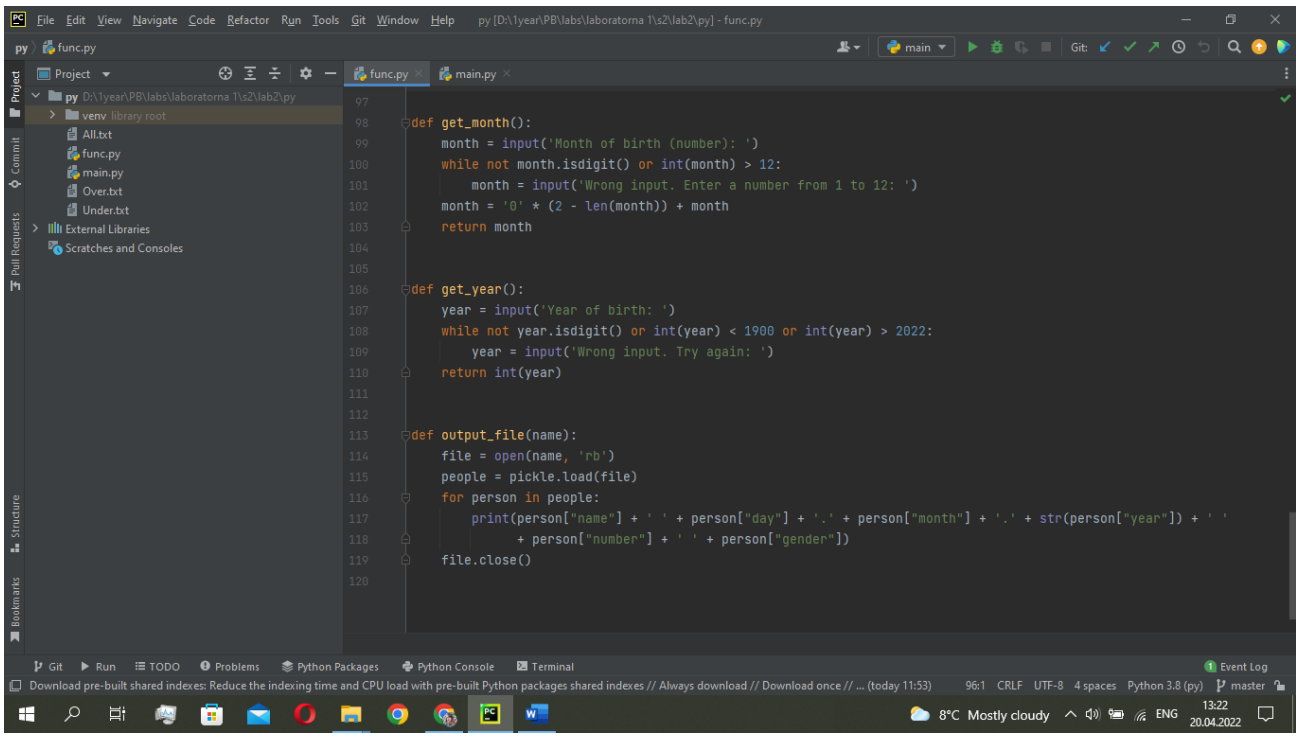
```
    file.close()


def get_sorted(over, under, name):
    file = open(name, 'rb')
    ov_file = open(over, 'wb')
    un_file = open(under, 'wb')
    text = file.read().decode()
    lines = text.splitlines()
    for person in lines:
        year = int(person[27:31])
        if year < 1982:
            ov_file.write(person.encode())
        else:
            un_file.write(person.encode())
    file.close()
    ov_file.close()
    un_file.close()


def get_amount():
    num = input('Enter number of workers to add: ')
    while not num.isdigit():
        num = input('Enter a positive integer: ')
    return int(num)


output_file()
```



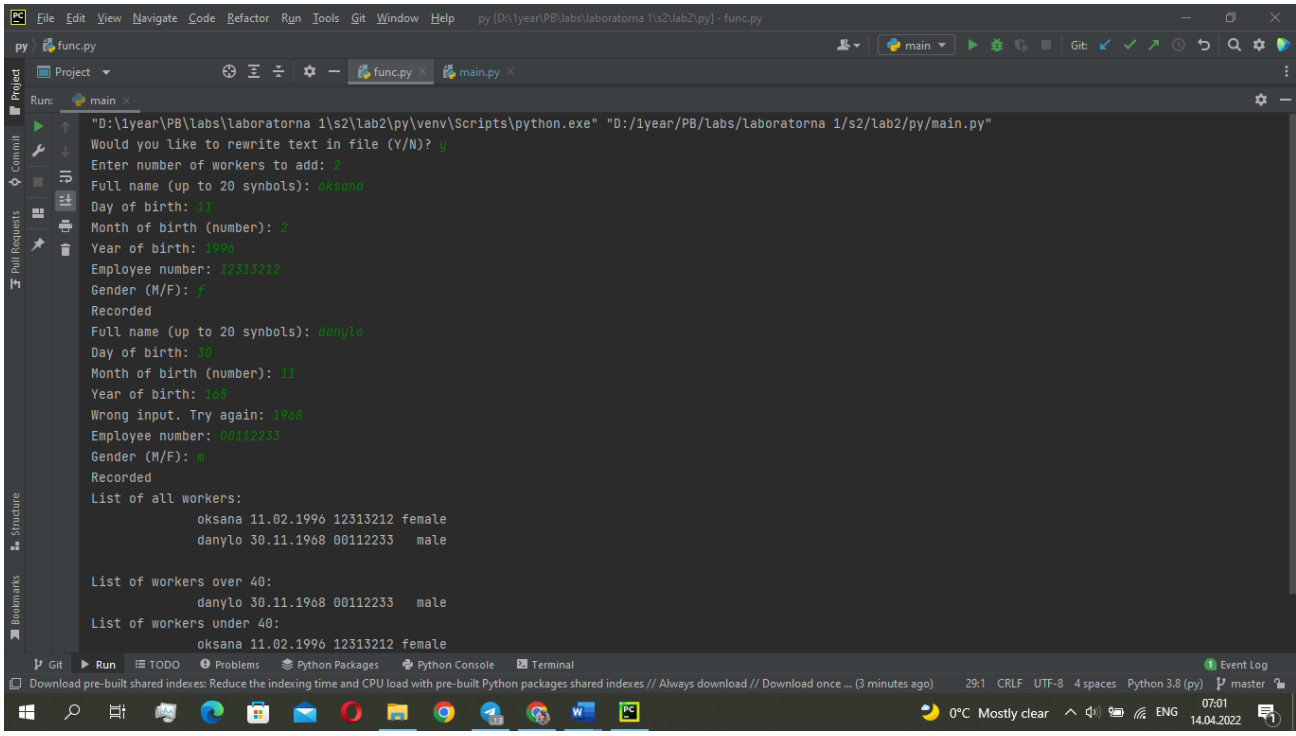
```
    return int(num)


def get_name():
    name = input('Full name (up to 20 synbols): ')
    while len(name) > 20:
        name = input('Too long. Try again: ')
    name = ' ' * (20 - len(name)) + name + ' '
    return name


def get_number():
    number = input('Employee number: ')
    while not number.isdigit() or len(number) != 8:
        number = input('Wrong input. Enter 8 digits: ')
    return number + ' '


def get_gender():
    gen = input('Gender (M/F): ').lower()
    while gen != 'm' and gen != 'f':
        gen = input('Wrong input. Enter letter M for male or F for female: ')
    if gen == 'm':
        return '  male\n'
    else:
        return 'female\n'


output_file()
```



```
    else:
        return 'female\n'


def get_day():
    day = input('Day of birth: ')
    while not day.isdigit() or int(day) > 31:
        day = input('Wrong input. Enter a number from 1 to 31: ')
    day = '0' * (2 - len(day)) + day + '.'
    return day


def get_month():
    month = input('Month of birth (number): ')
    while not month.isdigit() or int(month) > 12:
        month = input('Wrong input. Enter a number from 1 to 12: ')
    month = '0' * (2 - len(month)) + month + '.'
    return month


def get_year():
    year = input('Year of birth: ')
    while not year.isdigit() or int(year) < 1900 or int(year) > 2022:
        year = input('Wrong input. Try again: ')
    return year + ' '

output_file()
```



```
def get_month():
    month = input('Month of birth (number): ')
    while not month.isdigit() or int(month) > 12:
        month = input('Wrong input. Enter a number from 1 to 12: ')
    month = '0' * (2 - len(month)) + month
    return month


def get_year():
    year = input('Year of birth: ')
    while not year.isdigit() or int(year) < 1900 or int(year) > 2022:
        year = input('Wrong input. Try again: ')
    return int(year)


def output_file(name):
    file = open(name, 'rb')
    people = pickle.load(file)
    for person in people:
        print(person["name"] + ' ' + person["day"] + '.' + person["month"] + '.' + str(person["year"]) + ' '
              + person["number"] + ' ' + person["gender"])
    file.close()
```



Висновки

Протягом лабораторної робити було розглянуто роботу з бінарними файлами та використано отримані навички під час написання програм. В результаті роботи було створену програму, яка створює новий файл, що містить інформацію про співробітників, перевіряє на коректність введені дані, записує дані у файл, якщо вік співробітника від 20 до 60 років, а також створює 2 нових файли – зв співробітниками старше та молодше 40 років.