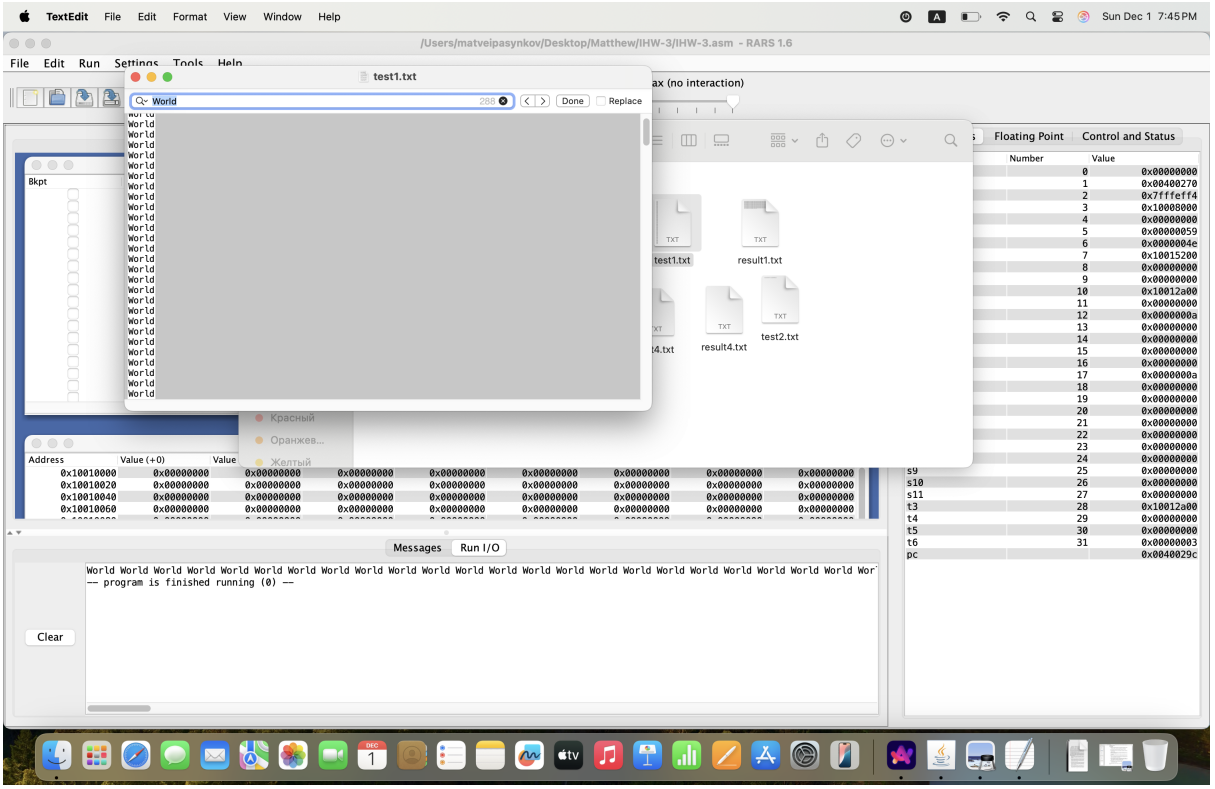
Отчёт по ИДЗ-3

Пасынков Матвей Евгеньевич, БПИ237, Вариант 30

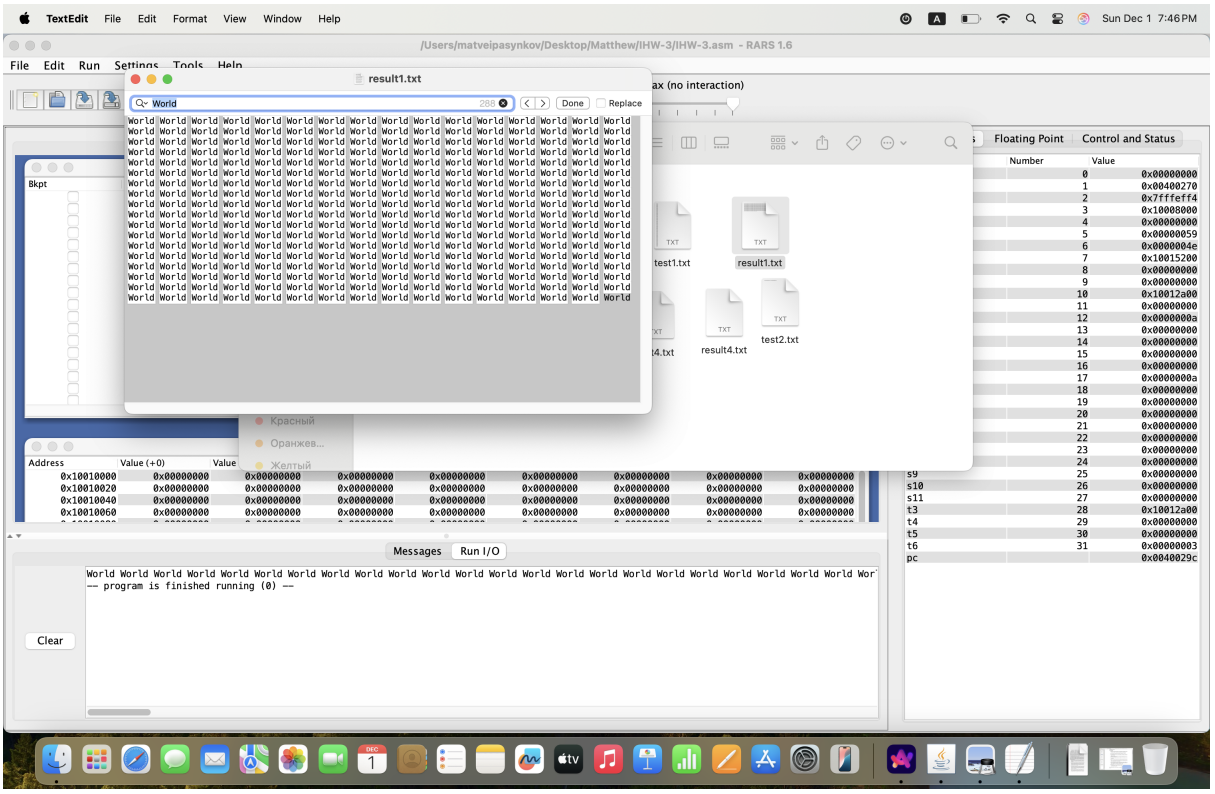
Осуществление тестовых прогонов, которое требуется для 4 - 5 баллов (ввод осуществляется через графические окна, а не консоль из-за критериев на 10, о которых я расскажу позднее).

Тест первый (test1.txt, результат будем сохранять в result1.txt)

test1.txt (файл состоит из одних слов World - их 288 штук).

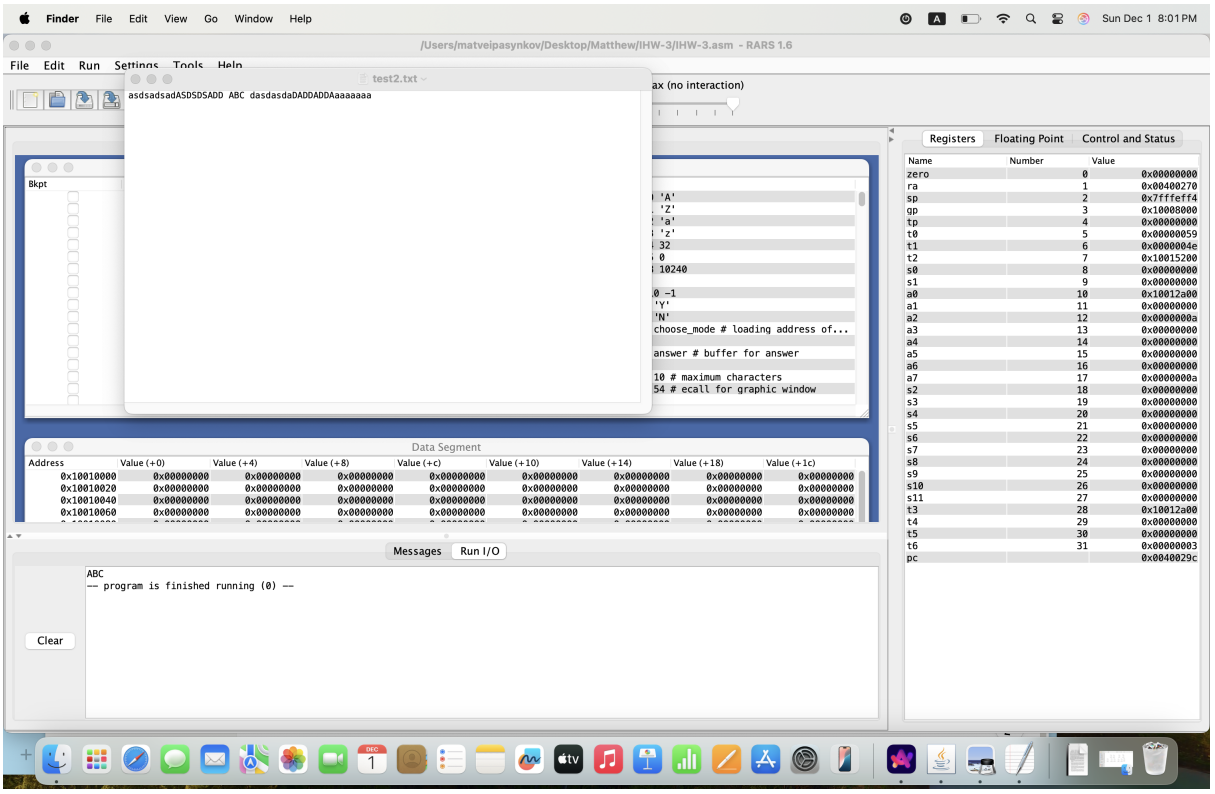


result1.txt (получаем 288 слов World)

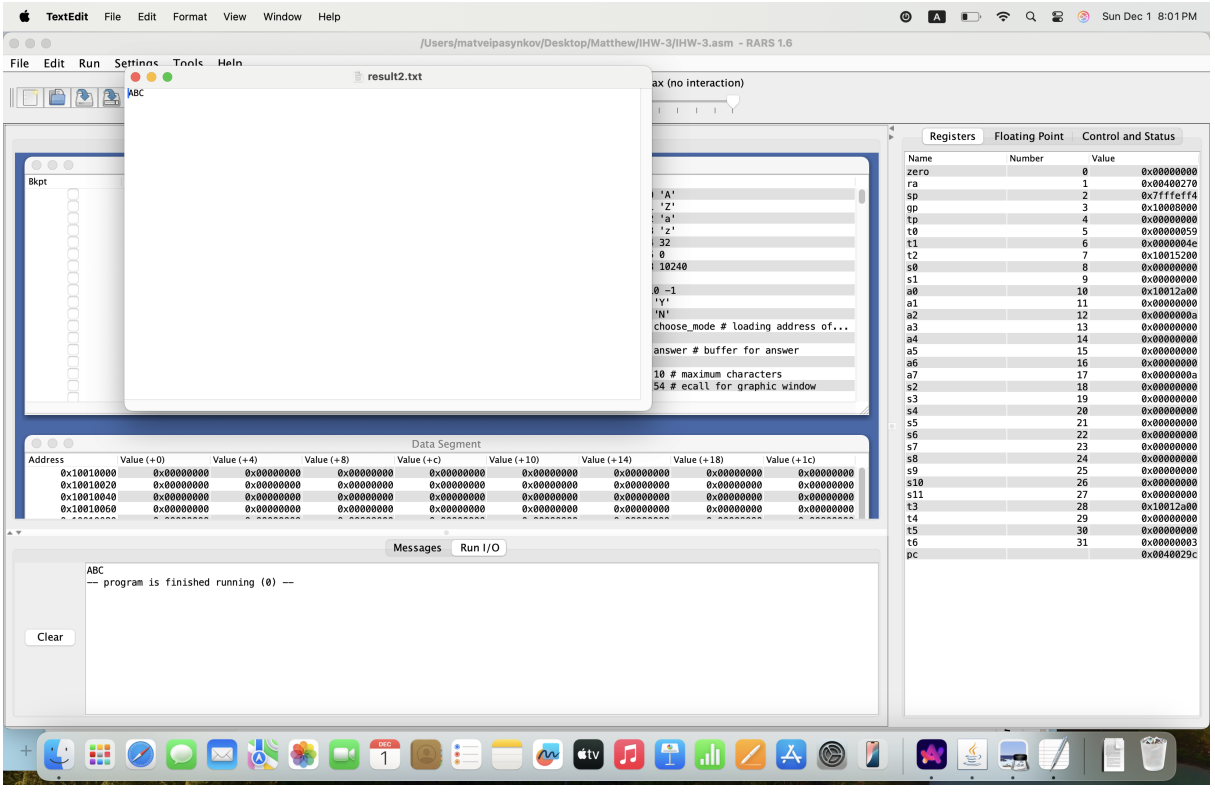


Тест второй (test2.txt, результат будем сохранять в result2.txt)

test2.txt (файл состоит трёх слов, где только одно из них начинается с большой буквы)

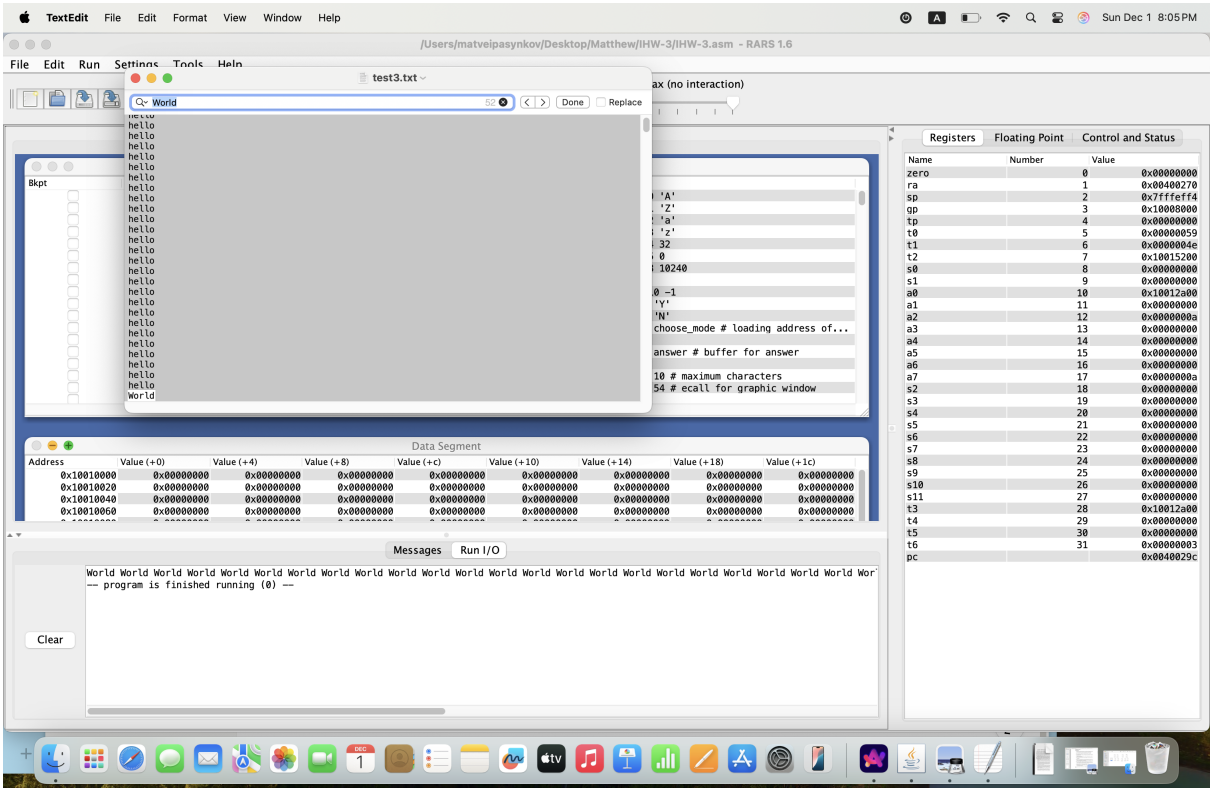


result2.txt (как раз получаем нужное одно слово)

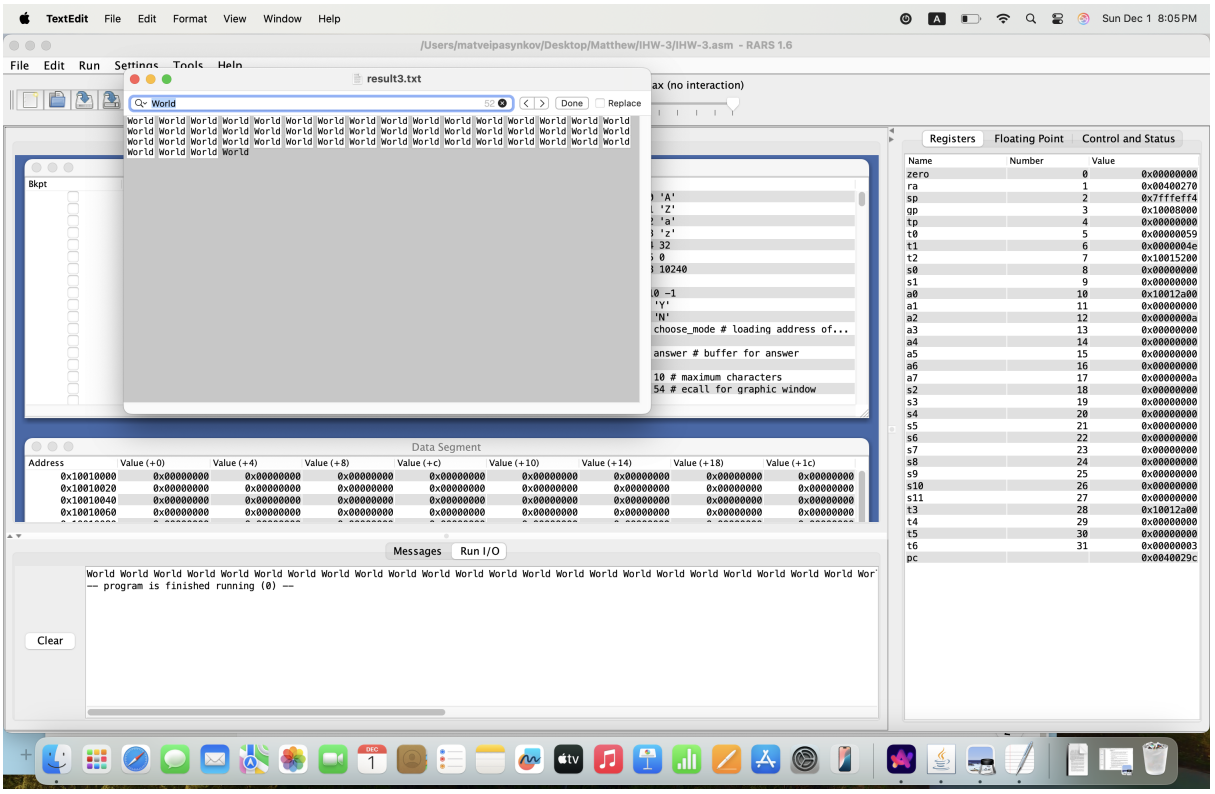


Тест третий (test3.txt, результат будем сохранять в result3.txt)

test3.txt (файл состоит в основном из двух слов: World (52 штуки) и hello)



result3.txt (получаем 52 слова World)



Дополнение программы критериями на 6 - 7 баллов

Все перечисленные критерии выполнены в данных файлах:
IHW-3.asm

```
# Pasynkov Matvei Evgenievich, Variant 30
.include "macros.inc"
.include "data.asm"

.text
.globl prog_start, manual

prog_start:
    load_constants # loading necessary constants.
    li t0 'Y'
    li t1 'N'

    la a0 choose_mode # loading address of message with quest
    la a1 answer # buffer for answer
    li a2 10 # maximum characters
```

```
    li a7 54 # ecall for graphic window
    ecall
    li a0 0

    lb a0 answer # loading first character from answer.

    beq a0 t0 manual # if answer is yes => we are going to ma
    # otherwise, we are going to autotests.

auto_tests:
    la a0 test_path_1 # loading first test
    la a1 data
    run_test_read a0 a1 # program for reading test file

    la a0 data
    la a1 output_data
    process_string a0 a1 # program for solving task.

    la a0 output_test_path1
    la a1 output_data
    run_test_write a0 a1 # program for writing test file

    la a0 data
    la a1 output_data
    clear_data a0 a1 # program for cleating buffers

    la a1 data
    la a0 test_path_2 # loading second test
    run_test_read a0 a1

    la a0 data
    la a1 output_data
    process_string a0 a1

    la a0 output_test_path2
    la a1 output_data
    run_test_write a0 a1
```

```
    la a0 data
    la a1 output_data
    clear_data a0 a1

    la a0 test_path_3 # loading third test
    la a1 data
    run_test_read a0 a1

    la a0 data
    la a1 output_data
    process_string a0 a1

    la a0 output_test_path3
    la a1 output_data
    run_test_write a0 a1

    la a0 data
    la a1 output_data
    clear_data a0 a1

    li a7 10 # stopping program.
    ecall

manual:
    la a0 data # loading buffer for saving input data
    input a0 # reading file

    bgtz a0 end_main # if the filname is incorrect, stop the

    la a0, data
    la a1, output_data
    process_string a0 a1  # program for solving task.

    la a0 output_data
    print a0 # saving result

    la a0 output_data
    print_in_console a0 # program for printing in console.
```

```
    bgtz a0 end_main

end_main:
    # Завершение программы
    clear_constants # clearing constants.
    li a7, 10                # syscall for stopping program.
    ecall
```

lib.asm

```
.include "data.asm"
.include "macros.inc"

.text
.globl _input, _print, _process_string, _remove_newline_prog,
# Program for taking input data from user's file.
# input: a0 - address of data, which stores input from user.
# output: nothing.
_input:
    mv t2 a0
    addi sp sp -4
    sw ra (sp)

    la a0 write_input_path
    la a1 input_path
    li a2 512
    li a7 54
    ecall

    la a0, input_path
    lb t0, 0(a0)
    li t1, 10

    la a0 input_path
    li a1 0
    remove_newline_prog a0 a1
```

```
    li   a7, 1024
    la   a0, input_path
    li   a1, 0
    ecall
    mv   t6, a0

    beq a0 s10 error_reading

    li t0 0

read_loop:
    mv a0 t6
    la a1 buffer
    li a2 512
    li a7 63
    ecall

    bltz a0 error_reading
    beqz a0 end_loop

    add t0 t0 a0
    mv t1 a0

    la t3 buffer
    bge t0 s8 end_loop
saving_data_loop:
    beqz t1 read_loop
    lb t4 (t3)
    sb t4 (t2)

    addi t3 t3 1
    addi t2 t2 1
    addi t1 t1 -1
    j saving_data_loop
error_reading: # if error occured.
    la a0 error_path
    li a1 0
```

```
    li a7 55
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 1

    ret
end_loop:
    li   a7, 57
    mv   a0, t6
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 0

    ret
# Program for printing result data and saving in user's file.
# input: a0 - address of data, which stores result.
# output: nothing.
_print:
    mv t2 a0
    addi sp sp -4
    sw ra (sp)

    la a0 write_output_path
    la a1 output_path
    li a2 512
    li a7 54
    ecall

    la a0 output_path
    li a1 1
    remove_newline_prog a0 a1
```

```
    li   a7, 1024
    la   a0, output_path
    li   a1, 1
    ecall
    mv   t6, a0

    beq a0 s10 error_writing

    li t0 0
    li t1 512
    la t3 buffer
    mv t5 s8
loading_data_loop:
    beqz t1 write_loop
    beqz t5 write_loop

    lb t4 (t2)
    sb t4 (t3)

    addi t3 t3 1
    addi t2 t2 1
    addi t1 t1 -1
    addi t5 t5 -1
    j loading_data_loop
write_loop:
    mv a0 t6
    la a1 buffer
    li a2 512
    li a7 64
    ecall

    bltz a0 error_writing
    beqz a0 end_write_loop

    li t1 512
    la t3 buffer

    blez t5 end_write_loop
```

```
    j loading_data_loop
error_writing: # if error occured.
    la a0 error_path
    li a1 0
    li a7 55
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 1

    ret
end_write_loop:
    li a7 57
    mv a0 t6
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 0

    ret

# Program for solving task.
# input: a0 - address of data, which stores input from user, a
# output: nothing.
_process_string:
    addi sp sp -4
    sw ra (sp)

    li t3 0
    li t4 0
process_loop:
    addi t3 t3 1
    lb t1, 0(a0)
```

```
    beq t1, zero, finish

    blt t1 s2 else
    ble t1 s3 if_word_started
    j else
if_word_started:
    li t4 1
    j continue_loop
else:
    blt t1 s0 continue_else
    ble t1 s1 continue_loop
continue_else:
    li t4 0
continue_loop:
    # checking the letter
    blt t1, s0, not_letter   # if symbol is less than 'A' - i
    bgt t1, s1, not_letter   # if symbol is greater than 'Z'
    bgtz t4 not_letter # if word started -> skip

    # copy word
    beqz zero, copy_word
    bge t3 s8 finish

    j next_char

not_letter:
    j next_char

copy_word:
copy_loop:
    addi t3 t3 1

    sb t1, 0(a1)
    addi a1, a1, 1
    addi a0, a0, 1
    lb t1, 0(a0)

    blt t1, s0, word_end
```

```
    ble t1, s1, copy_loop
    bgt t1, s3, word_end
    blt t1, s2, word_end
    bge t3 s8 finish
    j copy_loop

word_end:
    sb s4, 0(a1)
    addi a1, a1, 1
    j process_loop

next_char:
    addi a0, a0, 1
    j process_loop

finish:
    addi a1, a1, -1
    sb s5, 0(a1)

    lw ra (sp)
    addi sp sp 4

    ret
# Program for removing '\n' from user's name of file
# input: a0 - user's path, a1 - type of file (0 - input, 1 - 
# output: nothing.
_remove_newline_prog:
    addi sp sp -4
    sw ra (sp)
remove_newline:
    beq t0, t1, end_remove_newline
    addi a0, a0, 1
    lb t0, 0(a0)
    bnez t0, remove_newline
end_remove_newline:
    beqz a1 remove_newline_from_input
    sb zero -1(a0)
    j return_from_remove_newline
```

```
remove_newline_from_input:
    sb zero, (a0)
return_from_remove_newline:
    lw ra (sp)
    addi sp sp 4

    ret
# Program for printing result in console.
# input: a0 - result's data.
# output: nothing.
_print_in_console:
    mv t3 a0
    addi sp sp -4
    sw ra (sp)

    li t0 'Y'
    li t1 'N'

    la a0 ask_to_display_results
    la a1 answer
    li a2 10
    li a7 54
    ecall

    li a0 0

    lb a0 answer

    beq a0 t0 agree_to_print
    beq a0 t1 end_display_on_console

    la a0 incorrect_answer
    li a7 4
    ecall
    j end_display_on_console

agree_to_print:
    mv a0 t3
```

```
    li a7 4
    ecall

end_display_on_console:
    lw ra (sp)
    addi sp sp -4
    ret
# Program for reading test file.
# input: a0 - test's path, a1 - address of data, which will s
# output: nothing.
_run_test_read:
    mv t2 a1

    addi sp sp -4
    sw ra (sp)

    li   a7, 1024
    li   a1, 0
    ecall
    mv   t6, a0

    beq a0 s10 run_test_error_reading

    li t0 0

run_test_read_loop:
    mv a0 t6
    la a1 buffer
    li a2 512
    li a7 63
    ecall

    bltz a0 run_test_error_reading
    beqz a0 run_test_end_loop

    add t0 t0 a0
    mv t1 a0
```

```
    la t3 buffer
    bge t0 s8 run_test_end_loop
run_test_saving_data_loop:
    beqz t1 run_test_read_loop
    lb t4 (t3)
    sb t4 (t2)

    addi t3 t3 1
    addi t2 t2 1
    addi t1 t1 -1
    j run_test_saving_data_loop
run_test_error_reading:
    la a0 error_path
    li a7 4
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 1

    ret
run_test_end_loop:
    li   a7, 57
    mv   a0, t6
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 0

    ret
# Program for solving task.
# input: a0 - path for saving data, a1 - address of data, whi
# output: nothing.
_run_test_write:
    mv t2 a1
```

```
    addi sp sp -4
    sw ra (sp)

    li   a7, 1024
    li   a1, 1
    ecall
    mv   t6, a0

    beq a0 s10 run_test_error_writing

    li t0 0
    li t1 512
    la t3 buffer
    mv t5 s8
run_test_loading_data_loop:
    beqz t1 run_test_write_loop
    beqz t5 run_test_write_loop

    lb t4 (t2)
    sb t4 (t3)

    addi t3 t3 1
    addi t2 t2 1
    addi t1 t1 -1
    addi t5 t5 -1
    j run_test_loading_data_loop
run_test_write_loop:
    mv a0 t6
    la a1 buffer
    li a2 512
    li a7 64
    ecall

    bltz a0 run_test_error_writing
    beqz a0 run_test_end_write_loop

    li t1 512
```

```
    la t3 buffer

    blez t5 run_test_end_write_loop

    j run_test_loading_data_loop
run_test_error_writing:
    la a0 error_path
    li a7 4
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 1

    ret
run_test_end_write_loop:
    li a7 57
    mv a0 t6
    ecall

    lw ra (sp)
    addi sp sp 4

    li a0 0

    ret
# Program for clearing data.
# input: a0 - address of data, which stores input from user, a
# output: nothing.
_clear_data:
    addi sp sp -4
    sw ra (sp)

    mv t0 s8
    mv t1 a0
    mv t2 a1
clear_loop:
```

```
    beqz t0 end_clear_loop

    sb zero (t1)
    sb zero (t2)

    addi t1 t1 1
    addi t2 t2 1
    addi t0 t0 -1

    j clear_loop
end_clear_loop:

    lw ra (sp)
    addi sp sp 4

    ret
```

macros.inc

```
# Macro for _input
# input - register, which stores data's address.
# output - nothing.
.macro input %reg_data
    mv a0 %reg_data
    jal _input
.end_macro

# Macro for _print
# input - register, which stores result data's address
# output - nothing.
.macro print %reg_data
    mv a0 %reg_data
    jal _print
.end_macro

# Macro for _process_string
# input - two registers: first stores data's address,
```

```
# second stores output_data's address.
# output - nothing.
.macro process_string %data_reg %output_data_reg
    mv a0 %data_reg
    mv a1 %output_data_reg
    jal _process_string
.end_macro

# Macro for _remove_newline_prog
# input - two registers: first stores data's address,
# second stores type of data.
# output = nothing.
.macro remove_newline_prog %data_reg %type
    mv a0 %data_reg
    mv a1 %type
    jal _remove_newline_prog
.end_macro

# Macro for _print_in_console
# input - register, which stores result data's address.
# output - nothing.
.macro print_in_console %data_reg
    mv a0 %data_reg
    jal _print_in_console
.end_macro

# Macro for _run_test_read
# input - register, which stores path for test data and
# second register, which stores data's address.
# output - nothing.
.macro run_test_read %reg_path %data_reg
    mv a0 %reg_path
    mv a1 %data_reg
    jal _run_test_read
.end_macro

# Macro for _run_test_write
# input - register, which stores path for result of test and
```

```
# second register, which stores result data's address.
# output - nothing.
.macro run_test_write %reg_path %data_reg
    mv a0 %reg_path
    mv a1 %data_reg
    jal _run_test_write
.end_macro

# Macro for _clear_data
# input - register, which stores data's address and
# second register, which stores output data's address.
.macro clear_data %reg_data %reg_output_data
    mv a0 %reg_data
    mv a1 %reg_output_data
    jal _clear_data
.end_macro

# Macro, which loads necessary constants.
# input - nothing.
# output - nothing.
.macro load_constants
    li s0 'A'
    li s1 'Z'
    li s2 'a'
    li s3 'z'
    li s4 32
    li s5 0
    li s8 10240
    li s10 -1
.end_macro

# Macro, which clears necessary constants.
# input - nothing.
# output - nothing.
.macro clear_constants
    li s0 0
    li s1 0
    li s2 0
```

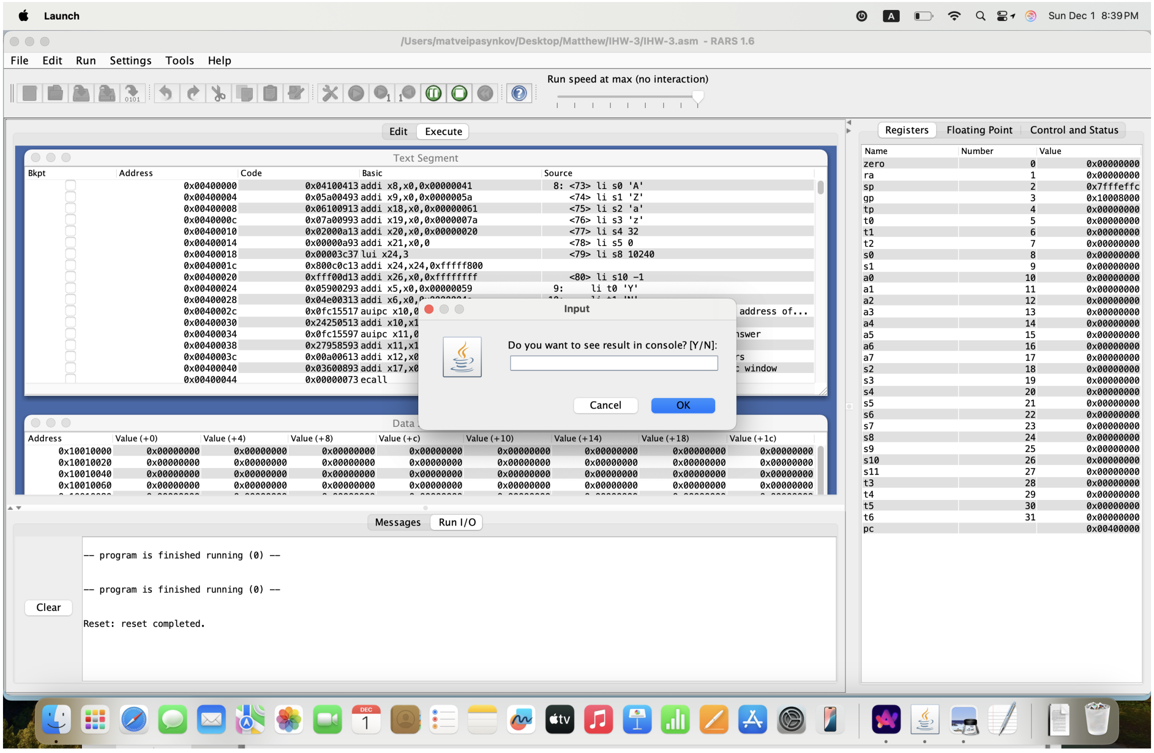
```
    li s3 0
    li s4 0
    li s5 0
    li s8 0
    li s10 0
.end_macro
```

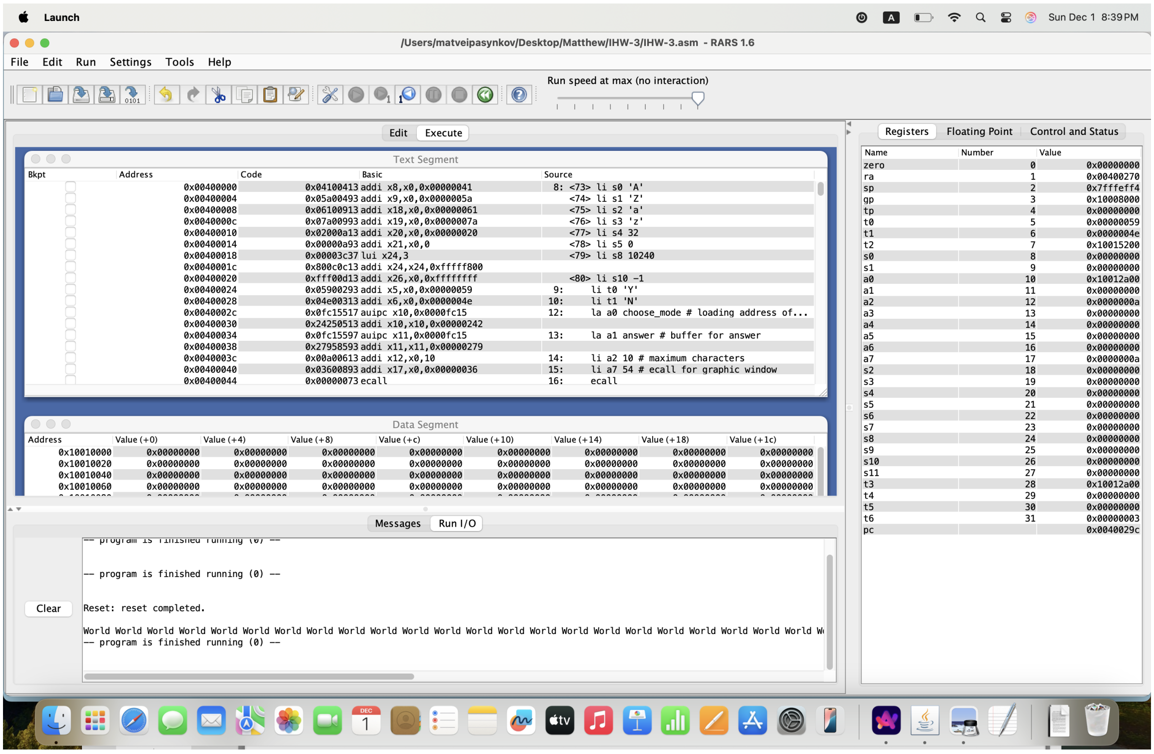
data.asm

```
# Data Segment for program
.data
buffer:  .space 512
data: .space 10240
output_data: .space 10240
space:      .byte 32
null:       .byte 0
error_path: .asciz "Error. Incorrect path."
write_input_path: "Write input path: "
write_output_path: "Write output path: "
ask_to_display_results: "Do you want to see result in console
choose_mode: "Do you want to use program manually? [Y/N]: "
incorrect_answer: "Incorrect answer."
answer: .space 10
test_path_1: .asciz "files/test1.txt"
output_test_path1: .asciz "files/result1.txt"
test_path_2: .asciz "files/test2.txt"
output_test_path2: .asciz "files/result2.txt"
test_path_3: .asciz "files/test3.txt"
output_test_path3: .asciz "files/result3.txt"
input_path: .space 512
output_path: .space 512
```

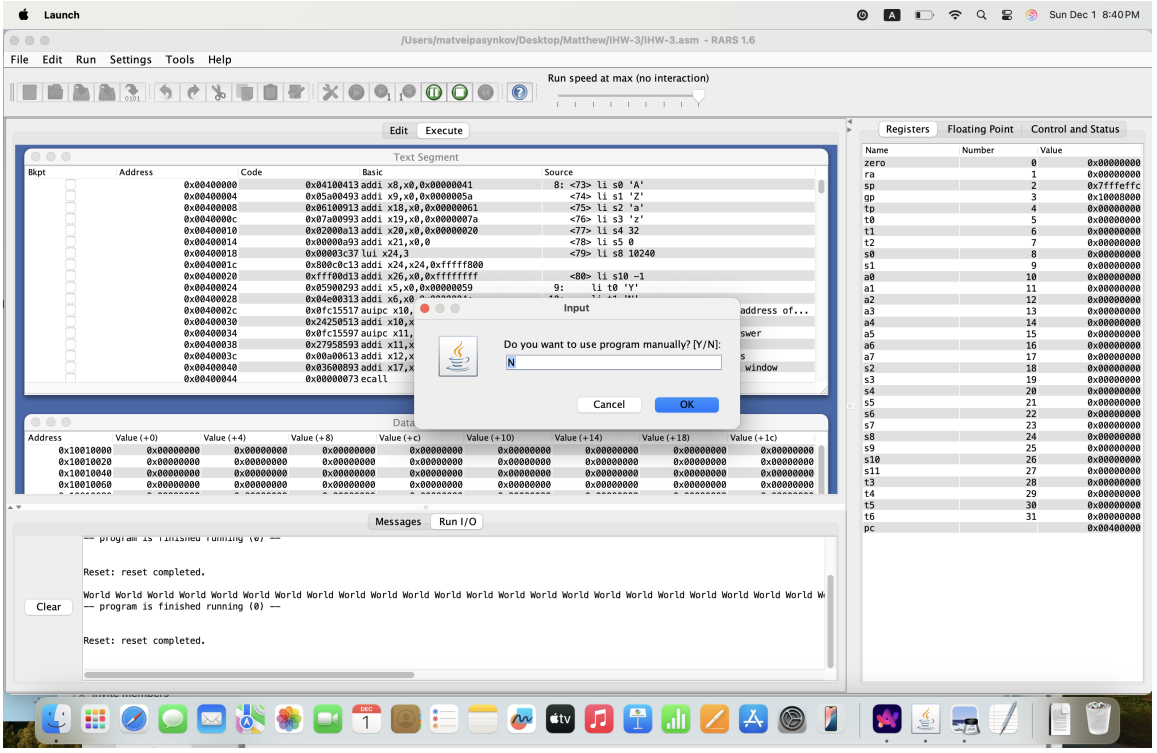
Дополнение программы критериями на 8 баллов

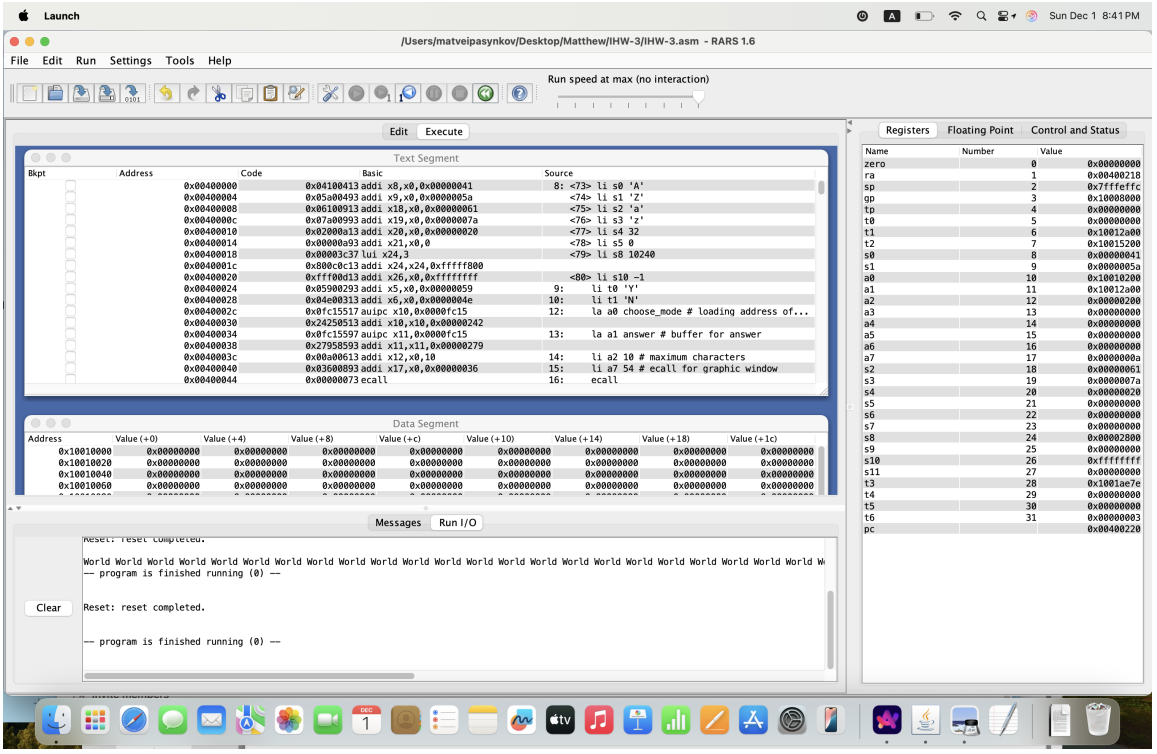
1. Возможность вывести результат в консоль с ответом Y/N





2. Тестовая программа.





Дополнение программы критериями на 9 баллов

1. Макросы

macros.inc

```
# Macro for _input
# input - register, which stores data's address.
# output - nothing.
.macro input %reg_data
    mv a0 %reg_data
    jal _input
.end_macro

# Macro for _print
# input - register, which stores result data's address
# output - nothing.
.macro print %reg_data
    mv a0 %reg_data
    jal _print
.end_macro

# Macro for _process_string
# input - two registers: first stores data's address,
# second stores output_data's address.
# output - nothing.
.macro process_string %data_reg %output_data_reg
    mv a0 %data_reg
    mv a1 %output_data_reg
    jal _process_string
.end_macro

# Macro for _remove_newline_prog
# input - two registers: first stores data's address,
# second stores type of data.
# output = nothing.
.macro remove_newline_prog %data_reg %type
    mv a0 %data_reg
    mv a1 %type
    jal _remove_newline_prog
.end_macro

# Macro for _print_in_console
# input - register, which stores result data's address.
```

```
# output - nothing.
.macro print_in_console %data_reg
    mv a0 %data_reg
    jal _print_in_console
.end_macro

# Macro for _run_test_read
# input - register, which stores path for test data and
# second register, which stores data's address.
# output - nothing.
.macro run_test_read %reg_path %data_reg
    mv a0 %reg_path
    mv a1 %data_reg
    jal _run_test_read
.end_macro

# Macro for _run_test_write
# input - register, which stores path for result of test and
# second register, which stores result data's address.
# output - nothing.
.macro run_test_write %reg_path %data_reg
    mv a0 %reg_path
    mv a1 %data_reg
    jal _run_test_write
.end_macro

# Macro for _clear_data
# input - register, which stores data's address and
# second register, which stores output data's address.
.macro clear_data %reg_data %reg_output_data
    mv a0 %reg_data
    mv a1 %reg_output_data
    jal _clear_data
.end_macro

# Macro, which loads necessary constants.
# input - nothing.
# output - nothing.
```

```
.macro load_constants
    li s0 'A'
    li s1 'Z'
    li s2 'a'
    li s3 'z'
    li s4 32
    li s5 0
    li s8 10240
    li s10 -1
.end_macro

# Macro, which clears necessary constants.
# input - nothing.
# output - nothing.
.macro clear_constants
    li s0 0
    li s1 0
    li s2 0
    li s3 0
    li s4 0
    li s5 0
    li s8 0
    li s10 0
.end_macro
```

2. Тестовая программа использующая макросы.

IHW-3.asm (run_autotests)

```
# Pasynkov Matvei Evgenievich, Variant 30
.include "macros.inc"
.include "data.asm"

.text
.globl prog_start, manual

prog_start:
    load_constants # loading necessary constants.
    li t0 'Y'
```

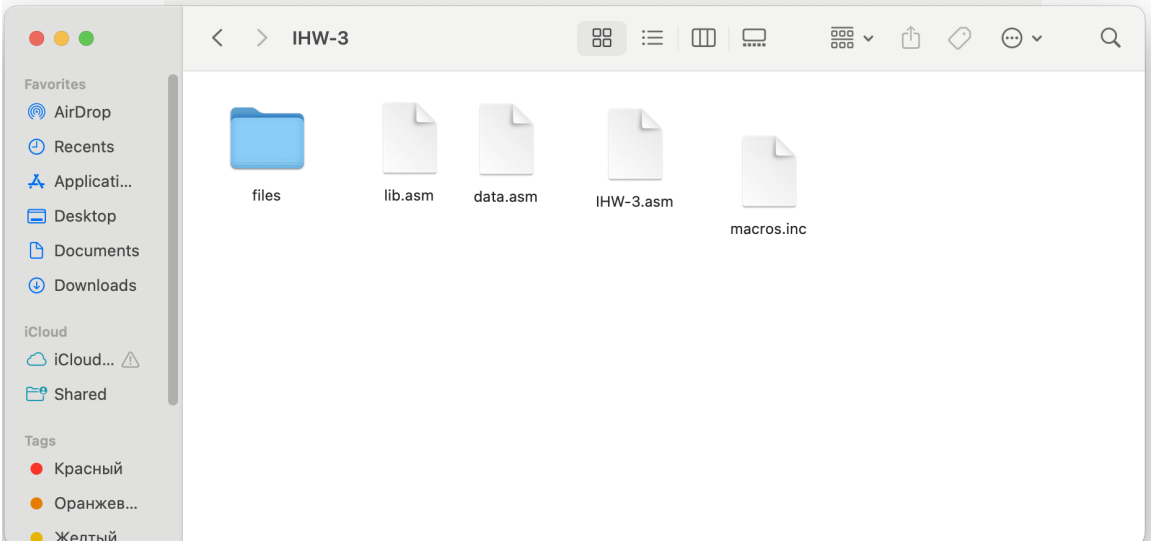
```
    li t1 'N'

    la a0 choose_mode # loading address of message with quest
    la a1 answer # buffer for answer
    li a2 10 # maximum characters
    li a7 54 # ecall for graphic window
    ecall
    li a0 0

    lb a0 answer # loading first character from answer.

    beq a0 t0 manual # if answer is yes => we are going to ma
    # otherwise, we are going to autotests.

auto_tests:
    la a0 test_path_1 # loading first test
    la a1 data
    run_test_read a0 a1 # program for reading test file

    la a0 data
    la a1 output_data
    process_string a0 a1 # program for solving task.

    la a0 output_test_path1
    la a1 output_data
    run_test_write a0 a1 # program for writing test file

    la a0 data
    la a1 output_data
    clear_data a0 a1 # program for cleating buffers

    la a1 data
    la a0 test_path_2 # loading second test
    run_test_read a0 a1

    la a0 data
    la a1 output_data
    process_string a0 a1
```

```
    la a0 output_test_path2
    la a1 output_data
    run_test_write a0 a1

    la a0 data
    la a1 output_data
    clear_data a0 a1

    la a0 test_path_3 # loading third test
    la a1 data
    run_test_read a0 a1

    la a0 data
    la a1 output_data
    process_string a0 a1

    la a0 output_test_path3
    la a1 output_data
    run_test_write a0 a1

    la a0 data
    la a1 output_data
    clear_data a0 a1

    li a7 10 # stopping program.
    ecall

manual:
    la a0 data # loading buffer for saving input data
    input a0 # reading file

    bgtz a0 end_main # if the filname is incorrect, stop the

    la a0, data
    la a1, output_data
    process_string a0 a1  # program for solving task.
```

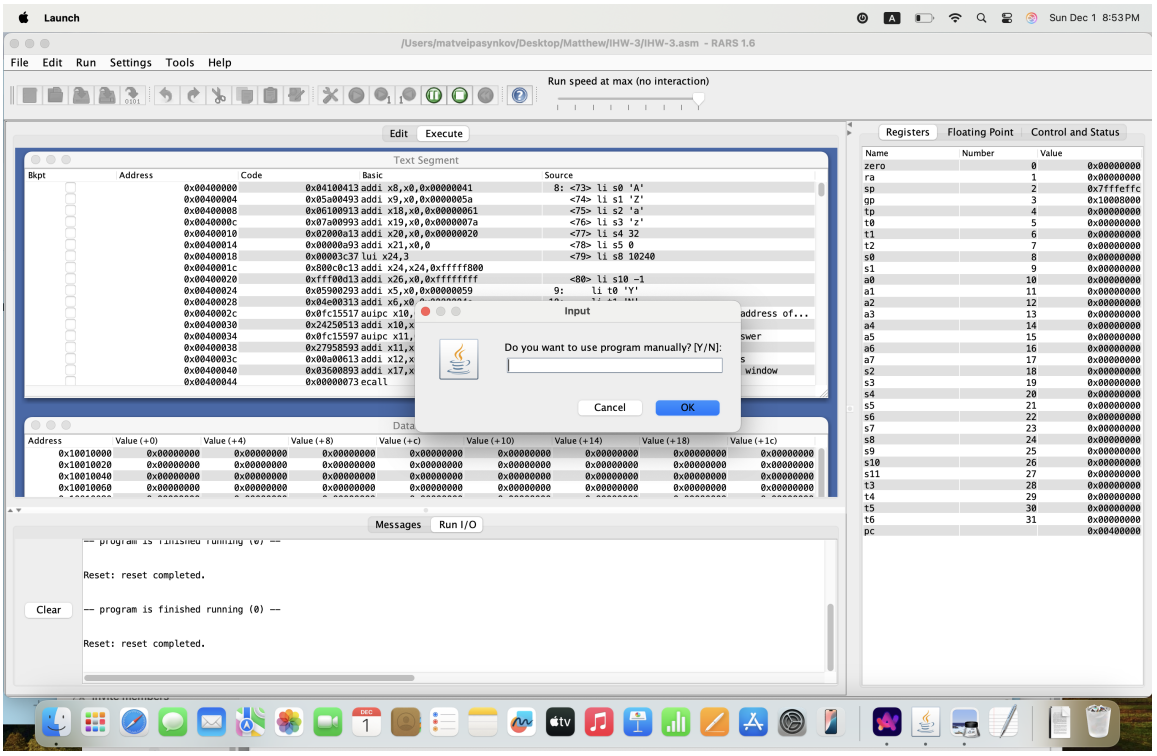
```
    la a0 output_data
    print a0 # saving result

    la a0 output_data
    print_in_console a0 # program for printing in console.

    bgtz a0 end_main

end_main:
    # Завершение программы
    clear_constants # clearing constants.
    li a7, 10                # syscall for stopping program.
    ecall
```

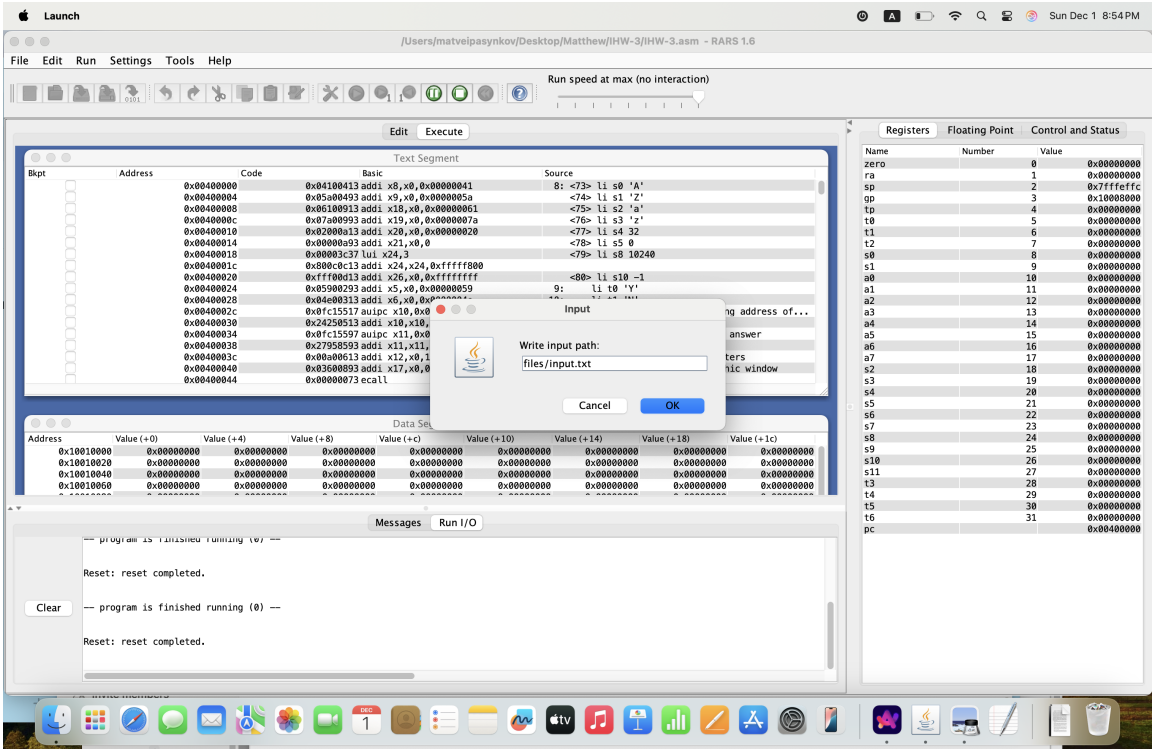
Дополнение программы критериями на 10 баллов

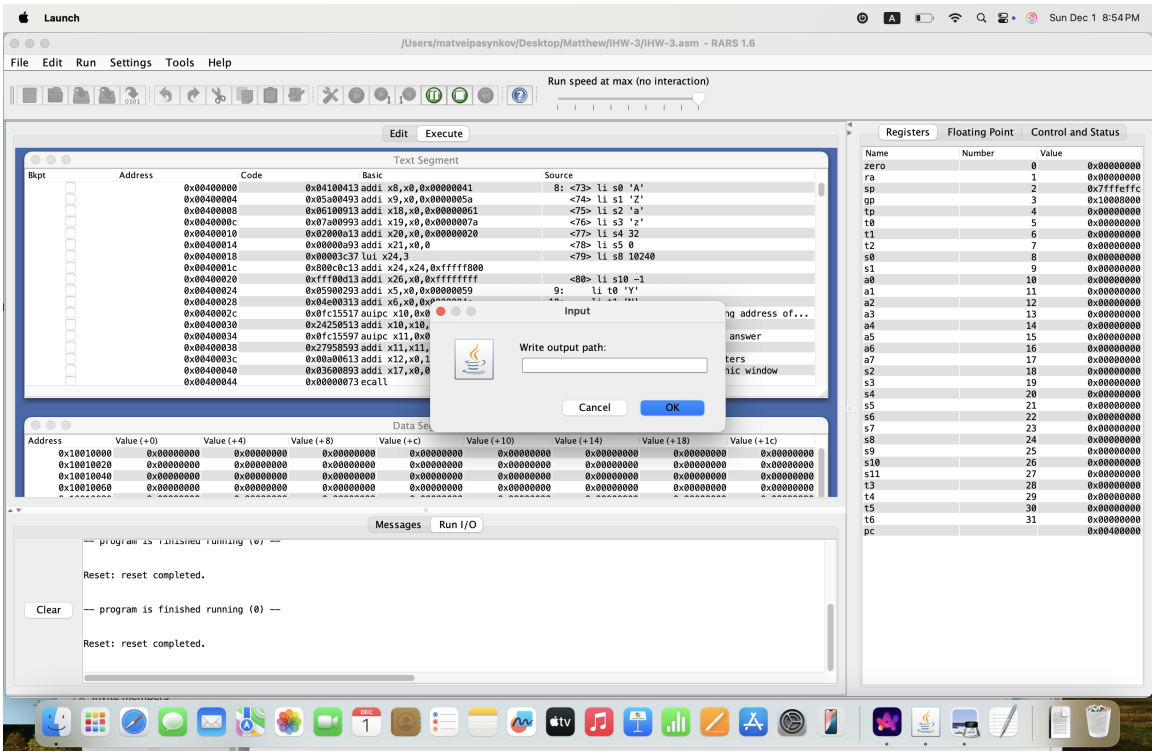
1. Программа разбита на несколько единиц компиляции

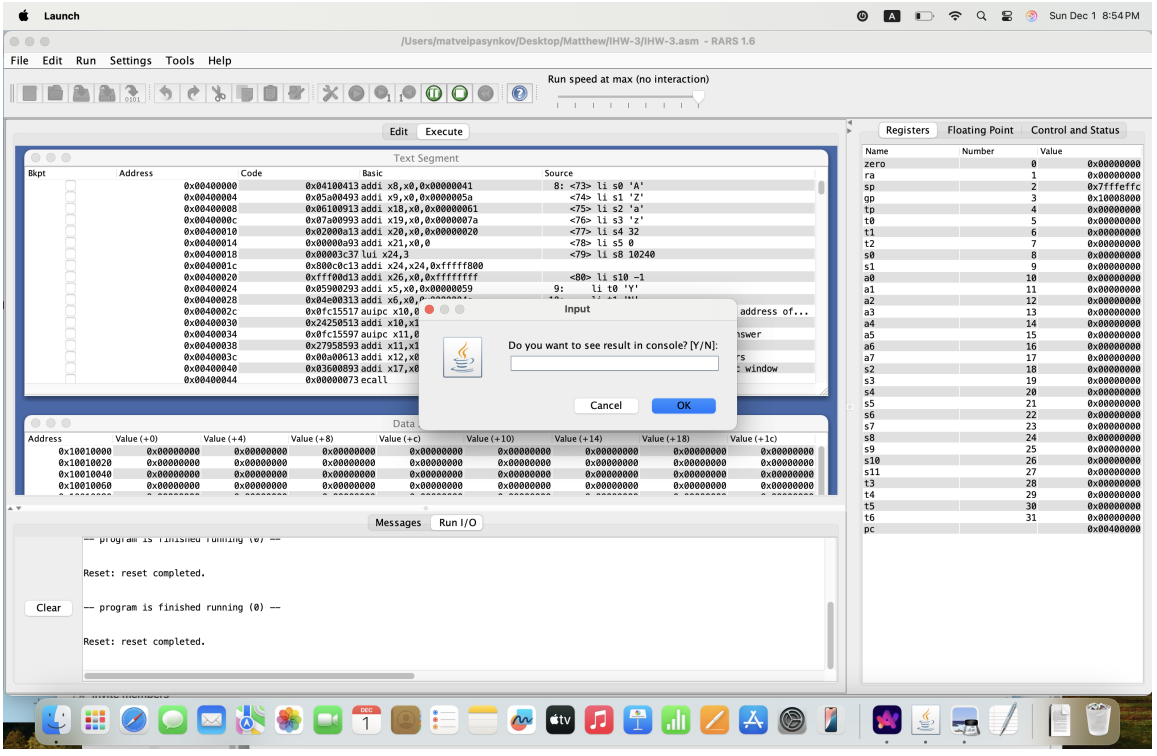


2. Макросы выделены в отдельную библиотеку (файл macros.inc)
3. Использование графических диалоговых окон.


Launch
Sun Dec 1 8:53 PM
/Users/matveipasynkov/Desktop/Matthew/IHW-3/IHW-3.asm - RARS 1.6
File Edit Run Settings Tools Help
Run speed at max (no interaction)
Edit Execute
Text Segment
Registers Floating Point Control and Status
Input
Do you want to use program manually? [Y/N]:
Cancel OK
Messages Run I/O
Reset: reset completed.
Clear
-- program is finished running (0) --
Reset: reset completed.


Launch
Sun Dec 1 8:54 PM
/Users/matveipasynkov/Desktop/Matthew/IHW-3/IHW-3.asm - RARS 1.6
File Edit Run Settings Tools Help
Run speed at max (no interaction)
Edit Execute
Text Segment
Registers Floating Point Control and Status
Input
Write input path:
files/input.txt
Cancel OK
Messages Run I/O
Reset: reset completed.
Clear
-- program is finished running (0) --
Reset: reset completed.


Launch
Sun Dec 1 8:54 PM
/Users/matveipasynkov/Desktop/Matthew/IHW-3/IHW-3.asm - RARS 1.6
File Edit Run Settings Tools Help
Run speed at max (no interaction)
Edit Execute
Text Segment
Registers Floating Point Control and Status
Input
Write output path:
Cancel OK
Messages Run I/O
Reset: reset completed.
Clear
-- program is finished running (0) --
Reset: reset completed.


Launch
Sun Dec 1 8:54 PM
/Users/matveipasynkov/Desktop/Matthew/IHW-3/IHW-3.asm - RARS 1.6
File Edit Run Settings Tools Help
Run speed at max (no interaction)
Edit Execute
Text Segment
Registers Floating Point Control and Status
Input
Do you want to see result in console? [Y/N]:
Cancel OK
Messages Run I/O
Reset: reset completed.
Clear
-- program is finished running (0) --
Reset: reset completed.