**PROGRAM0**

BEGIN

INTEGER a;

INTEGER b;

b := 5;

a := 20;

WRITE("a is : ");

WRITELN(a);

WRITE("b is : ");

WRITELN(b);

INTEGER c;

WHILE a != 0 DO

BEGIN

b := a \* a;

c := a REM 2;

IF c = 0

THEN WRITELN("a is Even Number.");

WRITE("b inside while loop is : ");

WRITELN(b);

a := a-1;

END;

END.

**OUTPUT:**

.text

main:

la $a0 ProgBegin

li $v0 4

syscall

li $t0 5

sw $t0 4($sp)

lw $t0 4($sp)

sw $t0 -4($sp)

li $t0 20

sw $t0 8($sp)

lw $t0 8($sp)

sw $t0 0($sp)

la $a0 lable0

li $v0 4

syscall

lw $t1 0($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable1

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

loop0:

li $t0 0

sw $t0 12($sp)

lw $t1 12($sp)

lw $t2 0($sp)

bne $t1, $t2 ,ConditionLableW0

lw $t1 0($sp)

lw $t2 0($sp)

mult $t1, $t2

mflo $t3

sw $t3 16($sp)

lw $t0 16($sp)

sw $t0 -4($sp)

li $t0 2

sw $t0 20($sp)

lw $t1 20($sp)

lw $t2 0($sp)

div $t1, $t2

mfhi $t3

sw $t3 24($sp)

lw $t0 24($sp)

sw $t0 -8($sp)

li $t0 0

sw $t0 28($sp)

lw $t1 -8($sp)

lw $t2 28($sp)

bne $t1, $t2 ,ConditionLable0

la $a0 lable2

li $v0 4

syscall

la $a0 newline

li $v0 4

syscall

ConditionLable0:

la $a0 lable3

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

li $t0 1

sw $t0 32($sp)

lw $t1 0($sp)

lw $t2 32($sp)

sub $t0, $t1, $t2

sw $t0 36($sp)

lw $t0 36($sp)

sw $t0 0($sp)

j loop0

ConditionLableW0:

la $a0 ProgEnd

li $v0 4

syscall

li $v0 10

syscall

.data

ProgBegin: .asciiz "Program Begin\n"

ProgEnd: .asciiz "\nProgram End\n"

newline : .asciiz "\n"

lable0: .asciiz "a is : "

lable1: .asciiz "b is : "

lable2: .asciiz "a is Even Number."

lable3: .asciiz "b inside while loop is : "

**Little Algol Output:**

Program Begin

a is : 20

b is : 5

a is Even Number.

b inside while loop is : 400

b inside while loop is : 361

a is Even Number.

b inside while loop is : 324

b inside while loop is : 289

a is Even Number.

b inside while loop is : 256

b inside while loop is : 225

a is Even Number.

b inside while loop is : 196

b inside while loop is : 169

a is Even Number.

b inside while loop is : 144

b inside while loop is : 121

a is Even Number.

b inside while loop is : 100

b inside while loop is : 81

a is Even Number.

b inside while loop is : 64

b inside while loop is : 49

a is Even Number.

b inside while loop is : 36

b inside while loop is : 25

a is Even Number.

b inside while loop is : 16

b inside while loop is : 9

a is Even Number.

b inside while loop is : 4

b inside while loop is : 1

Program End

-- program is finished running --

**PROGRAM1:**

BEGIN

INTEGER a;

INTEGER b;

b := 5;

a := 2;

WRITE("a is : ");

WRITELN(a);

WRITE("b is : ");

WRITELN(b);

INTEGER c;

c := a + b \* a;

WRITE("c := a + b \* a := ");

WRITELN(c);

c := 2 + b / a \* (b-2);

WRITE("c := 2 + b / a \* (b-2) := ");

WRITELN(c);

c := a OR b AND a;

WRITE("c := a OR b AND a := ");

WRITELN(c);

END.

**OUTPUT:**

.text

main:

la $a0 ProgBegin

li $v0 4

syscall

li $t0 5

sw $t0 4($sp)

lw $t0 4($sp)

sw $t0 -4($sp)

li $t0 2

sw $t0 8($sp)

lw $t0 8($sp)

sw $t0 0($sp)

la $a0 lable0

li $v0 4

syscall

lw $t1 0($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable1

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

lw $t1 -4($sp)

lw $t2 0($sp)

mult $t1, $t2

mflo $t3

sw $t3 12($sp)

lw $t1 0($sp)

lw $t2 12($sp)

add $t0, $t1, $t2

sw $t0 16($sp)

lw $t0 16($sp)

sw $t0 -8($sp)

la $a0 lable2

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

li $t0 2

sw $t0 20($sp)

li $t0 2

sw $t0 24($sp)

lw $t1 -4($sp)

lw $t2 24($sp)

sub $t0, $t1, $t2

sw $t0 28($sp)

lw $t1 0($sp)

lw $t2 28($sp)

mult $t1, $t2

mflo $t3

sw $t3 32($sp)

lw $t1 -4($sp)

lw $t2 32($sp)

div $t1, $t2

mflo $t3

sw $t3 36($sp)

lw $t1 20($sp)

lw $t2 36($sp)

add $t0, $t1, $t2

sw $t0 40($sp)

lw $t0 40($sp)

sw $t0 -8($sp)

la $a0 lable3

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

lw $t1 -4($sp)

lw $t2 0($sp)

and $t0, $t1, $t2

sw $t0 44($sp)

lw $t1 0($sp)

lw $t2 44($sp)

or $t0, $t1, $t2

sw $t0 48($sp)

lw $t0 48($sp)

sw $t0 -8($sp)

la $a0 lable4

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 ProgEnd

li $v0 4

syscall

li $v0 10

syscall

.data

ProgBegin: .asciiz "Program Begin\n"

ProgEnd: .asciiz "\nProgram End\n"

newline : .asciiz "\n"

lable0: .asciiz "a is : "

lable1: .asciiz "b is : "

lable2: .asciiz "c := a + b \* a := "

lable3: .asciiz "c := 2 + b / a \* (b-2) := "

lable4: .asciiz "c := a OR b AND a := "

**Little Algol Output:**

Program Begin

a is : 2

b is : 5

c := a + b \* a := 12

c := 2 + b / a \* (b-2) := 2

c := a OR b AND a := 2

Program End

-- program is finished running -

**PROGRAM2:**

BEGIN

INTEGER a;

INTEGER b;

b := 5;

a := 1;

WRITE("a is : ");

WRITELN(a);

WRITE("b is : ");

WRITELN(b);

INTEGER c;

WRITE("a < b : ");

IF a < b

THEN WRITELN(a+b);

WRITE("a > b : ");

IF a > b

THEN WRITELN(a-b);

WRITE("a = b : ");

IF a = b

THEN WRITELN(a OR b);

WRITE("a != b : ");

IF a != b

THEN WRITELN(a + 2);

END.

**OUTPUT:**

.text

main:

la $a0 ProgBegin

li $v0 4

syscall

li $t0 5

sw $t0 4($sp)

lw $t0 4($sp)

sw $t0 -4($sp)

li $t0 1

sw $t0 8($sp)

lw $t0 8($sp)

sw $t0 0($sp)

la $a0 lable0

li $v0 4

syscall

lw $t1 0($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable1

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable2

li $v0 4

syscall

lw $t1 0($sp)

lw $t2 -4($sp)

bgt $t1, $t2 ,ConditionLable0

lw $t1 0($sp)

lw $t2 -4($sp)

add $t0, $t1, $t2

sw $t0 12($sp)

lw $t1 12($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

ConditionLable0:

la $a0 lable3

li $v0 4

syscall

lw $t1 0($sp)

lw $t2 -4($sp)

blt $t1, $t2 ,ConditionLable1

lw $t1 0($sp)

lw $t2 -4($sp)

sub $t0, $t1, $t2

sw $t0 16($sp)

lw $t1 16($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

ConditionLable1:

la $a0 lable4

li $v0 4

syscall

lw $t1 0($sp)

lw $t2 -4($sp)

bne $t1, $t2 ,ConditionLable2

lw $t1 0($sp)

lw $t2 -4($sp)

or $t0, $t1, $t2

sw $t0 20($sp)

lw $t1 20($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

ConditionLable2:

la $a0 lable5

li $v0 4

syscall

lw $t1 0($sp)

lw $t2 -4($sp)

beq $t1, $t2 ,ConditionLable3

li $t0 2

sw $t0 24($sp)

lw $t1 0($sp)

lw $t2 24($sp)

add $t0, $t1, $t2

sw $t0 28($sp)

la $a0 newline

li $v0 4

syscall

ConditionLable3:

la $a0 ProgEnd

li $v0 4

syscall

li $v0 10

syscall

.data

ProgBegin: .asciiz "Program Begin\n"

ProgEnd: .asciiz "\nProgram End\n"

newline : .asciiz "\n"

lable0: .asciiz "a is : "

lable1: .asciiz "b is : "

lable2: .asciiz "a < b : "

lable3: .asciiz "a > b : "

lable4: .asciiz "a = b : "

lable5: .asciiz "a != b : "

**Little Algol Output:**

Program Begin

a is : 1

b is : 5

a < b : 6

a > b : a = b : a != b : 3

Program End

-- program is finished running --

**PROGRAM3:**

BEGIN

INTEGER a;

INTEGER b;

b := 5;

a := 1;

WRITE("a is : ");

WRITELN(a);

WRITE("b is : ");

WRITELN(b);

WRITELN("While Loop Operation:");

WHILE b = 0 DO

BEGIN

b := b - 1;

WRITE("b inside while loop is : ");

WRITELN(b);

END;

END.

**OUTPUT:**

.text

main:

la $a0 ProgBegin

li $v0 4

syscall

li $t0 5

sw $t0 4($sp)

lw $t0 4($sp)

sw $t0 -4($sp)

li $t0 1

sw $t0 8($sp)

lw $t0 8($sp)

sw $t0 0($sp)

la $a0 lable0

li $v0 4

syscall

lw $t1 0($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable1

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable2

li $v0 4

syscall

la $a0 newline

li $v0 4

syscall

loop0:

li $t0 0

sw $t0 12($sp)

lw $t1 12($sp)

lw $t2 -4($sp)

beq $t1, $t2 ,ConditionLableW0

li $t0 1

sw $t0 16($sp)

lw $t1 -4($sp)

lw $t2 16($sp)

sub $t0, $t1, $t2

sw $t0 20($sp)

lw $t0 20($sp)

sw $t0 -4($sp)

la $a0 lable3

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

j loop0

ConditionLableW0:

la $a0 ProgEnd

li $v0 4

syscall

li $v0 10

syscall

.data

ProgBegin: .asciiz "Program Begin\n"

ProgEnd: .asciiz "\nProgram End\n"

newline : .asciiz "\n"

lable0: .asciiz "a is : "

lable1: .asciiz "b is : "

lable2: .asciiz "While Loop Operation:"

lable3: .asciiz "b inside while loop is : "

**Little Algol Output:**

Program Begin

a is : 1

b is : 5

While Loop Operation:

b inside while loop is : 4

b inside while loop is : 3

b inside while loop is : 2

b inside while loop is : 1

b inside while loop is : 0

Program End

-- program is finished running --

**PROGRAM4:**

BEGIN

INTEGER a;

INTEGER b;

b := 5;

a := 1;

WRITE("a is : ");

WRITELN(a);

WRITE("b is : ");

WRITELN(b);

WRITELN("While Loop Operation:");

INTEGER c;

WHILE a < 10 DO

BEGIN

c := 5 \* a;

a := a + 1;

WRITE("c = ");

WRITELN(c);

END;

END.

**OUTPUT:**

.text

main:

la $a0 ProgBegin

li $v0 4

syscall

li $t0 5

sw $t0 4($sp)

lw $t0 4($sp)

sw $t0 -4($sp)

li $t0 1

sw $t0 8($sp)

lw $t0 8($sp)

sw $t0 0($sp)

la $a0 lable0

li $v0 4

syscall

lw $t1 0($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable1

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

la $a0 lable2

li $v0 4

syscall

la $a0 newline

li $v0 4

syscall

loop0:

li $t0 10

sw $t0 12($sp)

lw $t1 12($sp)

lw $t2 0($sp)

blt $t1, $t2 ,ConditionLableW0

li $t0 5

sw $t0 16($sp)

lw $t1 16($sp)

lw $t2 0($sp)

mult $t1, $t2

mflo $t3

sw $t3 20($sp)

lw $t0 20($sp)

sw $t0 -8($sp)

li $t0 1

sw $t0 24($sp)

lw $t1 0($sp)

lw $t2 24($sp)

add $t0, $t1, $t2

sw $t0 28($sp)

lw $t0 28($sp)

sw $t0 0($sp)

la $a0 lable3

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 newline

li $v0 4

syscall

j loop0

ConditionLableW0:

la $a0 ProgEnd

li $v0 4

syscall

li $v0 10

syscall

.data

ProgBegin: .asciiz "Program Begin\n"

ProgEnd: .asciiz "\nProgram End\n"

newline : .asciiz "\n"

lable0: .asciiz "a is : "

lable1: .asciiz "b is : "

lable2: .asciiz "While Loop Operation:"

lable3: .asciiz "c = "

**Little Algol Output:**

Program Begin

a is : 1

b is : 5

While Loop Operation:

c = 5

c = 10

c = 15

c = 20

c = 25

c = 30

c = 35

c = 40

c = 45

c = 50

Program End

-- program is finished running --

**PROGRAM5:**

BEGIN

INTEGER a;

INTEGER b;

INTEGER c;

b := 5;

a := 2;

c := a\*b;

WRITE("a is: ");

WRITELN(a);

WRITE("b is: ");

WRITELN(b);

WRITE("c = a\*b is: ");

WRITELN(c);

c := b/a;

WRITE("c = b/a is: ");

WRITELN(c);

c := b AND a;

WRITE("c = b AND a is: ");

WRITELN(c);

c := a REM b;

WRITE("c = b REM a is: ");

WRITELN(c);

END.

**OUTPUT:**

.text

main:

la $a0 ProgBegin

li $v0 4

syscall

li $t0 5

sw $t0 4($sp)

lw $t0 4($sp)

sw $t0 -4($sp)

li $t0 2

sw $t0 8($sp)

lw $t0 8($sp)

sw $t0 0($sp)

lw $t1 0($sp)

lw $t2 -4($sp)

mult $t1, $t2

mflo $t3

sw $t3 12($sp)

lw $t0 12($sp)

sw $t0 -8($sp)

la $a0 lable0

li $v0 4

syscall

lw $t1 0($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable1

li $v0 4

syscall

la $a0 lable2

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable3

li $v0 4

syscall

la $a0 lable4

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable5

li $v0 4

syscall

lw $t1 -4($sp)

lw $t2 0($sp)

div $t1, $t2

mflo $t3

sw $t3 16($sp)

lw $t0 16($sp)

sw $t0 -8($sp)

la $a0 lable6

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable7

li $v0 4

syscall

lw $t1 -4($sp)

lw $t2 0($sp)

and $t0, $t1, $t2

sw $t0 20($sp)

lw $t0 20($sp)

sw $t0 -8($sp)

la $a0 lable8

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable9

li $v0 4

syscall

lw $t1 -4($sp)

lw $t2 0($sp)

div $t1, $t2

mfhi $t3

sw $t3 24($sp)

lw $t0 24($sp)

sw $t0 -8($sp)

la $a0 lable10

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable11

li $v0 4

syscall

la $a0 ProgEnd

li $v0 4

syscall

li $v0 10

syscall

.data

ProgBegin: .asciiz "Program Begin\n"

ProgEnd: .asciiz "\nProgram End\n"

lable0: .asciiz "a is: "

lable1: .asciiz "\n"

lable2: .asciiz "b is: "

lable3: .asciiz "\n"

lable4: .asciiz "c = a\*b is: "

lable5: .asciiz "\n"

lable6: .asciiz "c = b/a is: "

lable7: .asciiz "\n"

lable8: .asciiz "c = b AND a is: "

lable9: .asciiz "\n"

lable10: .asciiz "c = b REM a is: "

lable11: .asciiz "\n"

**Little Algol Output:**

Program Begin

a is: 2

b is: 5

c = a\*b is: 10

c = b/a is: 2

c = b AND a is: 0

c = b REM a is: 1

Program End

-- program is finished running --

**PROGRAM6:**

BEGIN

INTEGER a;

INTEGER b;

INTEGER c;

b := 2;

a := 1;

c := a+b;

WRITE("a is: ");

WRITELN(a);

WRITE("b is: ");

WRITELN(b);

WRITE("c = a+b is: ");

WRITELN(c);

c := b-a;

WRITE("c = b-a is: ");

WRITELN(c);

c := b OR a;

WRITE("c = b OR a is: ");

WRITELN(c);

END.

**OUTPUT:**

.text

main:

la $a0 ProgBegin

li $v0 4

syscall

li $t0 2

sw $t0 4($sp)

lw $t0 4($sp)

sw $t0 -4($sp)

li $t0 1

sw $t0 8($sp)

lw $t0 8($sp)

sw $t0 0($sp)

lw $t1 0($sp)

lw $t2 -4($sp)

add $t0, $t1, $t2

sw $t0 12($sp)

lw $t0 12($sp)

sw $t0 -8($sp)

la $a0 lable0

li $v0 4

syscall

lw $t1 0($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable1

li $v0 4

syscall

la $a0 lable2

li $v0 4

syscall

lw $t1 -4($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable3

li $v0 4

syscall

la $a0 lable4

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable5

li $v0 4

syscall

lw $t1 -4($sp)

lw $t2 0($sp)

sub $t0, $t1, $t2

sw $t0 16($sp)

lw $t0 16($sp)

sw $t0 -8($sp)

la $a0 lable6

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable7

li $v0 4

syscall

lw $t1 -4($sp)

lw $t2 0($sp)

or $t0, $t1, $t2

sw $t0 20($sp)

lw $t0 20($sp)

sw $t0 -8($sp)

la $a0 lable8

li $v0 4

syscall

lw $t1 -8($sp)

move $a0 $t1

li $v0 1

syscall

la $a0 lable9

li $v0 4

syscall

la $a0 ProgEnd

li $v0 4

syscall

li $v0 10

syscall

.data

ProgBegin: .asciiz "Program Begin\n"

ProgEnd: .asciiz "\nProgram End\n"

lable0: .asciiz "a is: "

lable1: .asciiz "\n"

lable2: .asciiz "b is: "

lable3: .asciiz "\n"

lable4: .asciiz "c = a+b is: "

lable5: .asciiz "\n"

lable6: .asciiz "c = b-a is: "

lable7: .asciiz "\n"

lable8: .asciiz "c = b OR a is: "

lable9: .asciiz "\n"

**Little Algol Output:**

Program Begin

a is: 1

b is: 2

c = a+b is: 3

c = b-a is: 1

c = b OR a is: 3

Program End

-- program is finished running --