Universidade Estadual de Santa Cruz – UESC

Relatórios de Implementações de p-code Machine para o Proj1d

Docente César Alberto Bravo Pariente

Discente Matheus Miranda Brandão

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P-Code Machine

O projeto consiste na implementação em C++ de um algoritmo fornecido pelo docente, o mesmo se encontra no site: http://th.cpp.sh/9nsyz.

A execução do código segue a regra dos comandos da p-code machine e sua tabela de operações.

Comandos válidos:

LIT 0, a : carrega uma constante a.

OPR 0, a : executa uma operação delimitada entre os intervalos [0,13]..

LOD l, a : Carrega uma variável para o nível l

STO l, a : Armazena uma variável no nível l

CAL l, a : Chama um procedimento no nível l;

INT 0, a : Incrementa o registrador t em a;

JMP 0, a : Pula para a instrução a;

JPC 0, a : Pulo condicional para a instrução a (Se '0' pular, senão ignorar).

Tabela de operações:

Foi considerada a seguinte codificação de operações

Código	Símbolo	Semântica
0	Return	Realiza o retorno de uma subrotina
1	Negate	x=pop(); push(-x)
2	Add	x=pop();y=pop();push(y+x).
3	Subtract	x=pop();y=pop();push(y-x).
4	Multiply	x=pop();y=pop();push(y*x).
5	Divide	x=pop();y=pop();push(y/x).
6	Odd?	Testa se o valor no topo da pilha é ímpar.
7	Equal?	x=pop();y=pop();push(y==x).
8	Not equal?	x=pop();y=pop();push(y!=x).
9	Less then?	x=pop();y=pop();push(y<x).
10	Bigger or equal then?	x=pop();y=pop();push(y>=x).
11	Bigger then?	x=pop();y=pop();push(y>x)
12	Less or equal then?	x=pop();y=pop();push(y<=x)

Compilando e Executando

Para a execução não é necessário o uso de nenhuma dependência, basta compila-lo normalmente.

Fatorial(4):

$ g++ fat4_rec.cpp -o fat4_rec

$ ./fat4_rec

Fibonacci(5):

$ g++ fib5_rec.cpp -o fib5_rec

$ ./fib5_rec

Exercícios e Testes

Fatorial(4):

int fat (int n) {	void main (){

if (n <= 1){
return 1;
}
else{
return (n*fat(n-1));
}
	int value;
	value = fat(4);
	return;

}	}

Inputs:

code[0].f = INT; code[0].l = 0; code[0].a = 4;

code[1].f = LIT; code[1].l = 0; code[1].a = 4;

code[2].f = STO; code[2].l = 0; code[2].a = 4 + 3;

code[3].f = CAL; code[3].l = 0; code[3].a = 6;

code[4].f = LOD; code[4].l = 0; code[4].a = 4 + 3;

code[5].f = OPR; code[5].l = 0; code[5].a = 0;

code[6].f = INT; code[6].l = 0; code[6].a = 4;

code[7].f = LOD; code[7].l = 0; code[7].a = 3;

code[8].f = LIT; code[8].l = 0; code[8].a = 1;

code[9].f = OPR; code[9].l = 0; code[9].a = 12;

code[10].f = JPC; code[10].l = 0; code[10].a = 13;

code[11].f = STO; code[11].l = 0; code[11].a = 3;

code[12].f = OPR; code[12].l = 0; code[12].a = 0;

```
code[13].f = LOD; code[13].l = 0; code[13].a = 3;
code[14].f = LIT; code[14].l = 0; code[14].a = 1;
code[15].f = OPR; code[15].l = 0; code[15].a = 3;
code[16].f = STO; code[16].l = 0; code[16].a = 4 + 3;
code[17].f = CAL; code[17].l = 0; code[17].a = 6;
code[18].f = LOD; code[18].l = 0; code[18].a = 4 + 3;

code[19].f = LOD; code[19].l = 0; code[19].a = 3;
code[20].f = OPR; code[20].l = 0; code[20].a = 4;
code[21].f = STO; code[21].l = 0; code[21].a = 3;
code[22].f = OPR; code[22].l = 0; code[22].a = 0;
```

Output:

```
start pl/0
t   b   p     f   l   a                0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
=== === ===   === === ===            === === === === === === === === === === === === === === ===
 -1   0   0   INT   0   4       s[] :    0   0   0   0
  3   0   1   LIT   0   4       s[] :    0   0   0   0   4
  4   0   2   STO   0   7       s[] :    0   0   0   0
  3   0   3   CAL   0   6       s[] :    0   0   0   0
  3   4   6   INT   0   4       s[] :    0   0   0   0   0   0   4   4
  7   4   7   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4
  8   4   8   LIT   0   1       s[] :    0   0   0   0   0   0   4   4   4   1
  9   4   9   OPR   0  12       s[] :    0   0   0   0   0   0   4   4   1
  8   4  10   JPC   0  13       s[] :    0   0   0   0   0   0   4   4
  7   4  13   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4
  8   4  14   LIT   0   1       s[] :    0   0   0   0   0   0   4   4   4   1
  9   4  15   OPR   0   3       s[] :    0   0   0   0   0   0   4   4   3
  8   4  16   STO   0   7       s[] :    0   0   0   0   0   0   4   4
  7   4  17   CAL   0   6       s[] :    0   0   0   0   0   0   4   4
  7   8   6   INT   0   4       s[] :    0   0   0   0   0   0   4   4   4   4  18   3
 11   8   7   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   3
 12   8   8   LIT   0   1       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   3   1
 13   8   9   OPR   0  12       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   1
 12   8  10   JPC   0  13       s[] :    0   0   0   0   0   0   4   4   4   4  18   3
 11   8  13   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   3
 12   8  14   LIT   0   1       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   3   1
 13   8  15   OPR   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   2
 12   8  16   STO   0   7       s[] :    0   0   0   0   0   0   4   4   4   4  18   3
 11   8  17   CAL   0   6       s[] :    0   0   0   0   0   0   4   4   4   4  18   3
 11  12   6   INT   0   4       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2
 15  12   7   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   2
 16  12   8   LIT   0   1       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   2   1
 17  12   9   OPR   0  12       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   1
 16  12  10   JPC   0  13       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2
 15  12  13   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   2
 16  12  14   LIT   0   1       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   2   1
 17  12  15   OPR   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   1
 16  12  16   STO   0   7       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2
 15  12  17   CAL   0   6       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2
 15  16   6   INT   0   4       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2  12  12  18   1
 19  16   7   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2  12  12  18   1   1
 20  16   8   LIT   0   1       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2  12  12  18   1   1   1
 21  16   9   OPR   0  12       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2  12  12  18   1   0
 20  16  10   JPC   0  13       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2  12  12  18   1
 19  16  11   STO   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2  12  12  18
 18  16  12   OPR   0   0       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2
 15  12  18   LOD   0   7       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   1
 16  12  19   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   1   2
 17  12  20   OPR   0   4       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2   2
 16  12  21   STO   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   8   8  18   2
 15  12  22   OPR   0   0       s[] :    0   0   0   0   0   0   4   4   4   4  18   3
 11   8  18   LOD   0   7       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   2
 12   8  19   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   2   3
 13   8  20   OPR   0   4       s[] :    0   0   0   0   0   0   4   4   4   4  18   3   6
 12   8  21   STO   0   3       s[] :    0   0   0   0   0   0   4   4   4   4  18   6
 11   8  22   OPR   0   0       s[] :    0   0   0   0   0   0   4   4
  7   4  18   LOD   0   7       s[] :    0   0   0   0   0   0   4   4   6
  8   4  19   LOD   0   3       s[] :    0   0   0   0   0   0   4   4   6   4
  9   4  20   OPR   0   4       s[] :    0   0   0   0   0   0   4   4  24
  8   4  21   STO   0   3       s[] :    0   0   0   0   0   0   4  24
  7   4  22   OPR   0   0       s[] :    0   0   0   0
  3   0   4   LOD   0   7       s[] :    0   0   0   0  24
  4   0   5   OPR   0   0       s[] :
=== === ===   === === ===            === === === === === === === === === === === === === === ===
t   b   p     f   l   a                0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
end pl/0
```

Fibonacci(5):

int fib (int n) {	void main (){

if (n <= 1){
return n;
}
else{
return (fib(n-1) + fib(n-2));
}
	int value;
	value = fib(5);
	return;

}	}

Inputs:

code[0].f = INT; code[0].l = 0; code[0].a = 4;

code[1].f = LIT; code[1].l = 0; code[1].a = 5;

code[2].f = STO; code[2].l = 0; code[2].a = 4 + 3;

code[3].f = CAL; code[3].l = 0; code[3].a = 6;

code[4].f = LOD; code[4].l = 0; code[4].a = 4 + 4;

code[5].f = OPR; code[5].l = 0; code[5].a = 0;

code[6].f = INT; code[6].l = 0; code[6].a = 5;

code[7].f = LOD; code[7].l = 0; code[7].a = 3;

code[8].f = LIT; code[8].l = 0; code[8].a = 1;

code[9].f = OPR; code[9].l = 0; code[9].a = 12;

code[10].f = JPC; code[10].l = 0; code[10].a = 14;

code[11].f = LOD; code[11].l = 0; code[11].a = 3;

code[12].f = STO; code[12].l = 0; code[12].a = 4;

code[13].f = OPR; code[13].l = 0; code[13].a = 0;

```
code[14].f = LOD; code[14].l = 0; code[14].a = 3;
code[15].f = LIT; code[15].l = 0; code[15].a = 1;
code[16].f = OPR; code[16].l = 0; code[16].a = 3;
code[17].f = STO; code[17].l = 0; code[17].a = 5 + 3;
code[18].f = CAL; code[18].l = 0; code[18].a = 6;
code[19].f = LOD; code[19].l = 0; code[19].a = 5 + 4;
code[20].f = STO; code[20].l = 0; code[20].a = 4;
code[21].f = LOD; code[21].l = 0; code[21].a = 3;
code[22].f = LIT; code[22].l = 0; code[22].a = 2;
code[23].f = OPR; code[23].l = 0; code[23].a = 3;
code[24].f = STO; code[24].l = 0; code[24].a = 5 + 3;
code[25].f = CAL; code[25].l = 0; code[25].a = 6;
code[26].f = LOD; code[26].l = 0; code[26].a = 5 + 4;
code[27].f = LOD; code[27].l = 0; code[27].a = 4;
code[28].f = OPR; code[28].l = 0; code[28].a = 2;
code[29].f = STO; code[29].l = 0; code[29].a = 4;
code[30].f = OPR; code[30].l = 0; code[30].a = 0;
```

Output:

```
start pl/0
t   b   p     f   l   a               0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
=== === ===   === === ===           === === === === === === === === === === === === === === ===
 -1   0   0   INT   0   4      s[] :   0   0   0   0
  3   0   1   LIT   0   5      s[] :   0   0   0   0   5
  4   0   2   STO   0   7      s[] :   0   0   0   0
  3   0   3   CAL   0   6      s[] :   0   0   0   0
  3   4   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0
  8   4   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   5
  9   4   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   5   1
 10   4   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   1
  9   4  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0
  8   4  14   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   5
  9   4  15   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   5   1
 10   4  16   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4
  9   4  17   STO   0   8      s[] :   0   0   0   0   0   0   4   5   0
  8   4  18   CAL   0   6      s[] :   0   0   0   0   0   0   4   5   0
  8   9   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0
 13   9   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   4
 14   9   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   4   1
 15   9   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   1
 14   9  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0
 13   9  14   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   4
 14   9  15   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   4   1
 15   9  16   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   3
 14   9  17   STO   0   8      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0
 13   9  18   CAL   0   6      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0
 13  14   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0
 18  14   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0   3
 19  14   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0   3   1
 20  14   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0   1
 19  14  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0
 18  14  14   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0   3
 19  14  15   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0   3   1
 20  14  16   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0   2
 19  14  17   STO   0   8      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0
 18  14  18   CAL   0   6      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0
 18  19   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0
 23  19   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0   2
 24  19   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0   2   1
 25  19   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0   1
 24  19  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0
 23  19  14   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0   2
 24  19  15   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0   2   1
 25  19  16   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0   1
 24  19  17   STO   0   8      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0
 23  19  18   CAL   0   6      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0
 23  24   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0  19  19  19   1   0
 28  24   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0  19  19  19   1   0   1
 29  24   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0  19  19  19   1   0   1   1
 30  24   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0  19  19  19   1   0   0
 29  24  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0  19  19  19   1   0
 28  24  11   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0  19  19  19   1   0   1
 29  24  12   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0  19  19  19   1   1
 28  24  13   OPR   0   0      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0
 23  19  19   LOD   0   9      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   0   1
 24  19  20   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1
 23  19  21   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1   2
 24  19  22   LIT   0   2      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1   2   2
 25  19  23   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1   0
```

```
23  24   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1  19  19  26   0   1
28  24   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1  19  19  26   0   1   0
29  24   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1  19  19  26   0   1   0   1
30  24   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1  19  19  26   0   1   0
29  24  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1  19  19  26   0   1
28  24  11   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1  19  19  26   0   1   0
29  24  12   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1  19  19  26   0   0
28  24  13   OPR   0   0      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1
23  19  26   LOD   0   9      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1   0
24  19  27   LOD   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1   0   1
25  19  28   OPR   0   2      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1   1
24  19  29   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0  14  14  19   2   1
23  19  30   OPR   0   0      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0
18  14  19   LOD   0   9      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   0   1
19  14  20   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1
18  14  21   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1   3
19  14  22   LIT   0   2      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1   3   2
20  14  23   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1   1
19  14  24   STO   0   8      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1
18  14  25   CAL   0   6      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1
18  19   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1  14  14  26   1   1
23  19   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1  14  14  26   1   1   1
24  19   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1  14  14  26   1   1   1   1
25  19   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1  14  14  26   1   1   0
24  19  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1  14  14  26   1   1
23  19  11   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1  14  14  26   1   1   1
24  19  12   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1  14  14  26   1   1
23  19  13   OPR   0   0      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1
18  14  26   LOD   0   9      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1   1
19  14  27   LOD   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1   1   1
20  14  28   OPR   0   2      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   1   2
19  14  29   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   9   9  19   3   2
18  14  30   OPR   0   0      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0
13   9  19   LOD   0   9      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   0   2
14   9  20   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2
13   9  21   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   4
14   9  22   LIT   0   2      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   4   2
15   9  23   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   2
14   9  24   STO   0   8      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2
13   9  25   CAL   0   6      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2
13  14   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2
18  14   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2   2
19  14   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2   2   1
20  14   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2   1
19  14  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2
18  14  14   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2   2
19  14  15   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2   2   1
20  14  16   OPR   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2   1
19  14  17   STO   0   8      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2
18  14  18   CAL   0   6      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2
18  19   6   INT   0   5      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2  14  14  19   1   1
23  19   7   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2  14  14  19   1   1   1
24  19   8   LIT   0   1      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2  14  14  19   1   1   1   1
25  19   9   OPR   0  12      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2  14  14  19   1   1   0
24  19  10   JPC   0  14      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2  14  14  19   1   1
23  19  11   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2  14  14  19   1   1   1
24  19  12   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2  14  14  19   1   1
23  19  13   OPR   0   0      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2
18  14  19   LOD   0   9      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   2   1
19  14  20   STO   0   4      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1
18  14  21   LOD   0   3      s[] :   0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1   2
```

```
19  14  24   STO   0   8      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1
18  14  25   CAL   0   6      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1
18  19   6   INT   0   5      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1  14  14  26   0   1
23  19   7   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1  14  14  26   0   1   0
24  19   8   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1  14  14  26   0   1   0   1
25  19   9   OPR   0  12      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1  14  14  26   0   1   0
24  19  10   JPC   0  14      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1  14  14  26   0   1
23  19  11   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1  14  14  26   0   1   0
24  19  12   STO   0   4      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1  14  14  26   0   0
23  19  13   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1
18  14  26   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1   0
19  14  27   LOD   0   4      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1   0   1
20  14  28   OPR   0   2      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1   1
19  14  29   STO   0   4      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   9   9  26   2   1
18  14  30   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2
13   9  26   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   1
14   9  27   LOD   0   4      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   1   2
15   9  28   OPR   0   2      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   2   3
14   9  29   STO   0   4      s[] :    0   0   0   0   0   0   4   5   0   4   4  19   4   3
13   9  30   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   0
 8   4  19   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   0   3
 9   4  20   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3
 8   4  21   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   5
 9   4  22   LIT   0   2      s[] :    0   0   0   0   0   0   4   5   3   5   2
10   4  23   OPR   0   3      s[] :    0   0   0   0   0   0   4   5   3   3
 9   4  24   STO   0   8      s[] :    0   0   0   0   0   0   4   5   3
 8   4  25   CAL   0   6      s[] :    0   0   0   0   0   0   4   5   3
 8   9   6   INT   0   5      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3
13   9   7   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   3
14   9   8   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   3   1
15   9   9   OPR   0  12      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   1
14   9  10   JPC   0  14      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3
13   9  14   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   3
14   9  15   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   3   1
15   9  16   OPR   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   2
14   9  17   STO   0   8      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3
13   9  18   CAL   0   6      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3
13  14   6   INT   0   5      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  14   7   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   2
19  14   8   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   2   1
20  14   9   OPR   0  12      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   1
19  14  10   JPC   0  14      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  14  14   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   2
19  14  15   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   2   1
20  14  16   OPR   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   1
19  14  17   STO   0   8      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  14  18   CAL   0   6      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  19   6   INT   0   5      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  19   1   0
23  19   7   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  19   1   0   1
24  19   8   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  19   1   0   1   1
25  19   9   OPR   0  12      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  19   1   0   0
24  19  10   JPC   0  14      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  19   1   0
23  19  11   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  19   1   0   1
24  19  12   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  19   1   1
23  19  13   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  14  19   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   1
19  14  20   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  14  21   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   2
19  14  22   LIT   0   2      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   2   2
20  14  23   OPR   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   0
19  14  24   STO   0   8      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
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    14  25   CAL   0   6      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
    19   6   INT   0   5      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  26   0   1
23  19   7   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  26   0   1   0
24  19   8   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  26   0   1   0   1
25  19   9   OPR   0  12      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  26   0   1   0
24  19  10   JPC   0  14      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  26   0   1
23  19  11   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  26   0   1   0
24  19  12   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1  14  14  26   0   0
23  19  13   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  14  26   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   0
19  14  27   LOD   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   0   1
20  14  28   OPR   0   2      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1   1
19  14  29   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   9   9  19   2   1
18  14  30   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3
13   9  19   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   3   1
14   9  20   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1
13   9  21   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   3
14   9  22   LIT   0   2      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   3   2
15   9  23   OPR   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   1
14   9  24   STO   0   8      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1
13   9  25   CAL   0   6      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1
13  14   6   INT   0   5      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   9   9  26   1   1
18  14   7   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   9   9  26   1   1   1
19  14   8   LIT   0   1      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   9   9  26   1   1   1   1
20  14   9   OPR   0  12      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   9   9  26   1   1   0
19  14  10   JPC   0  14      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   9   9  26   1   1
18  14  11   LOD   0   3      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   9   9  26   1   1   1
19  14  12   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   9   9  26   1   1
18  14  13   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1
13   9  26   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   1
14   9  27   LOD   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   1   1
15   9  28   OPR   0   2      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   1   2
14   9  29   STO   0   4      s[] :    0   0   0   0   0   0   4   5   3   4   4  26   3   2
13   9  30   OPR   0   0      s[] :    0   0   0   0   0   0   4   5   3
 8   4  26   LOD   0   9      s[] :    0   0   0   0   0   0   4   5   3   2
 9   4  27   LOD   0   4      s[] :    0   0   0   0   0   0   4   5   3   2   3
10   4  28   OPR   0   2      s[] :    0   0   0   0   0   0   4   5   3   5
 9   4  29   STO   0   4      s[] :    0   0   0   0   0   0   4   5   5
 8   4  30   OPR   0   0      s[] :    0   0   0   0
 3   0   4   LOD   0   8      s[] :    0   0   0   0   5
 4   0   5   OPR   0   0      s[] :
=== === ===   === === ===            === === === === === === === === === === === === === === ===
t   b   p     f   l   a              0   1   2   3   4   5   6   7   8   9  10  11  12  13  14
end p1/0
xit code: 0 (normal program termination)
```

Link para download

Código fonte e exemplos encontram-se para download no seguinte link:
https://github.com/MatBrands/Compiladores/tree/master/Atividade%2003

Referências

https://en.wikipedia.org/wiki/P-code_machine

https://homepages.cwi.nl/~steven/pascal/book/10pcode.html

https://blackmesatech.com/2011/12/pl0/pl0.xhtml

http://th.cpp.sh/9nsyz