75.16 Lenguajes de Programación
Trabajo Práctico: Compilador de PL/0
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Índice

1. Objetivo

Implementar un compilador de `PL/0` que encuentre errores y genere código ejecutable según se describe en el apunte de la cátedra.

2. Descripción del Compilador

El compilador fue implementado en Python[1]. Para dicha implementación, se realizaron 5 módulos:

- Analizador Léxico: Se encarga de hacer el análisis léxico, devolviendo tokens a medida que se van pidiendo lecturas del archivo fuente.

- Analizador Sintáctico: Se encarga de hacer el análisis sintáctico. El tipo de compilador implementado es de tipo *guiado por el parser*, por lo que será quien orqueste pidiendo los servicios del analizador sintáctico y semántico. Se basa en el grafo de sintáxis BNF[2] (o mejor dicho, el BNF-Extendido) del lenguaje de PL/0.

- Analizador Semántico: Se encarga de realizar el análisis semántico del archivo fuente. Almacena los identificadores en una tabla para analizar que los identificadores utilizados existan en el contexto indicado, y se utilicen de forma correcta según su tipo.

- Generador de Código: se encarga de transformar las distintas instrucciones en código ejecutable, dependiendo del sistema operativo utilizado.

- Compilador (llamado `comPiLad0r.py`): simplemente ejecuta el código de los demás módulos generando las conexiones entre éstos, y determinando el archivo fuente de origen, y la ruta destino.

En cada uno de los primeros 3 módulos, es importante recalcar que ante el primer error no se generará código[1], y se marcarán los errores en un archivo de salida, para poder realizar las correcciones correspondientes, tratando de ser dichos mensajes lo más explicativos posible.

2.1. Modo de ejecución

Para poder realizar la compilación, sólo es necesario tener instalado el intérprete de Python (que viene incluido en cualquier distribución de Linux).

Ejecutar el comando:

```
~$ ./comPiLad0r.py path/to/sourceFile path/to/execFile
```

En caso de no indicarse ruta (y nombre) del archivo ejecutable, tomará por defecto el nombre `ejec` (guardándose en el directorio actual).

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[1]Se crea un generado de código nulo, que no realiza operaciones, para no tener que llenar de condicionales el código.

3. Programas Correctos

3.1. BIEN-00

3.1.1. Código Fuente

```
var X, Y;

procedure INICIAR;
  const Y = 2;
  procedure ASIGNAR;
    X := Y;
  call ASIGNAR;

begin
  write ('NUM='); readln (Y);
  call INICIAR;
  writeln ('NUM*2=',Y*X)
end.
```

3.1.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 050c 0000 050c 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 2c00 0004 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
```

```
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
```

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```
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 04bf 0485 e908 0017 0000 0ce9 0000 b800
0000490 0002 0000 8789 0000 0000 e8c3 ffef ffff
00004a0 b9c3 84b5 0804 04ba 0000 e800 fcc0 ffff
00004b0 05e9 0000 4e00 4d55 003d 51e8 fffe 89ff
00004c0 0487 0000 e800 ffc0 ffff deb9 0484 ba08
00004d0 0006 0000 97e8 fffc e9ff 0007 0000 554e
00004e0 2a4d 3d32 8b00 0487 0000 5000 878b 0000
00004f0 0000 f75b e8eb fc96 ffff 81e8 fffc e9ff
0000500 fdfc ffff 0000 0000 0000 0000
000050c
```

3.1.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-00:      formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
       ...
 8048480:       bf 04 85 04 08          mov    edi,0x8048504
 8048485:       e9 17 00 00 00          jmp    0x80484a1
 804848a:       e9 0c 00 00 00          jmp    0x804849b
 804848f:       b8 02 00 00 00          mov    eax,0x2
 8048494:       89 87 00 00 00 00       mov    DWORD PTR [edi+0x0],eax
 804849a:       c3                      ret
 804849b:       e8 ef ff ff ff          call   0x804848f
 80484a0:       c3                      ret
 80484a1:       b9 b5 84 04 08          mov    ecx,0x80484b5
 80484a6:       ba 04 00 00 00          mov    edx,0x4
 80484ab:       e8 c0 fc ff ff          call   0x8048170
 80484b0:       e9 05 00 00 00          jmp    0x80484ba
 80484b5:       4e                      dec    esi
 80484b6:       55                      push   ebp
 80484b7:       4d                      dec    ebp
 80484b8:       3d 00 e8 51 fe          cmp    eax,0xfe51e800
 80484bd:       ff                      (bad)
 80484be:       ff 89 87 04 00 00       dec    DWORD PTR [ecx+0x487]
 80484c4:       00 e8                   add    al,ch
 80484c6:       c0 ff ff                sar    bh,0xff
 80484c9:       ff                      (bad)
 80484ca:       b9 de 84 04 08          mov    ecx,0x80484de
 80484cf:       ba 06 00 00 00          mov    edx,0x6
 80484d4:       e8 97 fc ff ff          call   0x8048170
 80484d9:       e9 07 00 00 00          jmp    0x80484e5
```

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```
80484de:        4e                          dec     esi
80484df:        55                          push    ebp
80484e0:        4d                          dec     ebp
80484e1:        2a 32                       sub     dh,BYTE PTR [edx]
80484e3:        3d 00 8b 87 04              cmp     eax,0x4878b00
80484e8:        00 00                       add     BYTE PTR [eax],al
80484ea:        00 50 8b                    add     BYTE PTR [eax-0x75],dl
80484ed:        87 00                       xchg    DWORD PTR [eax],eax
80484ef:        00 00                       add     BYTE PTR [eax],al
80484f1:        00 5b f7                    add     BYTE PTR [ebx-0x9],bl
80484f4:        eb e8                       jmp     0x80484de
80484f6:        96                          xchg    esi,eax
80484f7:        fc                          cld
80484f8:        ff                          (bad)
80484f9:        ff                          (bad)
80484fa:        e8 81 fc ff ff              call    0x8048180
80484ff:        e9 fc fd ff ff              jmp     0x8048300
        ...
```

3.2. BIEN-01

3.2.1. Código Fuente

```
VAR BASE, EXPO, RESU;

PROCEDURE POT;
IF EXPO > 0 THEN
   BEGIN
        RESU := RESU * BASE;
        EXPO := EXPO - 1;
        CALL POT
   END;

BEGIN
    WRITE ('BASE: '); READLN(BASE);
    WRITE ('EXPONENTE: '); READLN(EXPO);
    RESU := 1;
    CALL POT;
    IF EXPO < 0 THEN RESU := 0;
    WRITELN ('RESULTADO: ', RESU);
    WRITELN
END.
```

3.2.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
```

```
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 059a 0000 059a 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 ba00 0004 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
```

```
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 8ebf 0485 e908 0048 0000 878b 0004 0000
0000490 b850 0000 0000 395b 7fc3 e905 0031 0000
00004a0 878b 0008 0000 8b50 0087 0000 5b00 ebf7
00004b0 8789 0008 0000 878b 0004 0000 b850 0001
00004c0 0000 935b d829 8789 0004 0000 b9e8 ffff
00004d0 c3ff e6b9 0484 ba08 0006 0000 8fe8 fffc
00004e0 e9ff 0007 0000 4142 4553 203a e800 fe1e
00004f0 ffff 8789 0000 0000 0cb9 0485 ba08 000b
0000500 0000 69e8 fffc e9ff 000c 0000 5845 4f50
0000510 454e 544e 3a45 0020 f3e8 fffd 89ff 0487
0000520 0000 b800 0001 0000 8789 0008 0000 57e8
0000530 ffff 8bff 0487 0000 5000 00b8 0000 5b00
0000540 c339 057c 0be9 0000 b800 0000 0000 8789
0000550 0008 0000 68b9 0485 ba08 000b 0000 0de8
0000560 fffc e9ff 000c 0000 4552 5553 544c 4441
0000570 3a4f 0020 878b 0008 0000 11e8 fffc e8ff
0000580 fbfc ffff f7e8 fffb e9ff fd72 ffff 0000
0000590 0000 0000 0000 0000 0000
000059a
```

3.2.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-01:     formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
         ...
 8048480:       bf 8e 85 04 08          mov     edi,0x804858e
 8048485:       e9 48 00 00 00          jmp     0x80484d2
 804848a:       8b 87 04 00 00 00       mov     eax,DWORD PTR [edi+0x4]
 8048490:       50                      push    eax
 8048491:       b8 00 00 00 00          mov     eax,0x0
 8048496:       5b                      pop     ebx
 8048497:       39 c3                   cmp     ebx,eax
 8048499:       7f 05                   jg      0x80484a0
 804849b:       e9 31 00 00 00          jmp     0x80484d1
 80484a0:       8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
 80484a6:       50                      push    eax
 80484a7:       8b 87 00 00 00 00       mov     eax,DWORD PTR [edi+0x0]
 80484ad:       5b                      pop     ebx
 80484ae:       f7 eb                   imul    ebx
 80484b0:       89 87 08 00 00 00       mov     DWORD PTR [edi+0x8],eax
 80484b6:       8b 87 04 00 00 00       mov     eax,DWORD PTR [edi+0x4]
 80484bc:       50                      push    eax
 80484bd:       b8 01 00 00 00          mov     eax,0x1
 80484c2:       5b                      pop     ebx
 80484c3:       93                      xchg    ebx,eax
 80484c4:       29 d8                   sub     eax,ebx
 80484c6:       89 87 04 00 00 00       mov     DWORD PTR [edi+0x4],eax
 80484cc:       e8 b9 ff ff ff          call    0x804848a
 80484d1:       c3                      ret
 80484d2:       b9 e6 84 04 08          mov     ecx,0x80484e6
 80484d7:       ba 06 00 00 00          mov     edx,0x6
 80484dc:       e8 8f fc ff ff          call    0x8048170
 80484e1:       e9 07 00 00 00          jmp     0x80484ed
 80484e6:       42                      inc     edx
 80484e7:       41                      inc     ecx
 80484e8:       53                      push    ebx
 80484e9:       45                      inc     ebp
 80484ea:       3a 20                   cmp     ah,BYTE PTR [eax]
 80484ec:       00 e8                   add     al,ch
 80484ee:       1e                      push    ds
 80484ef:       fe                      (bad)
 80484f0:       ff                      (bad)
```

```
80484f1:      ff 89 87 00 00 00        dec     DWORD PTR [ecx+0x87]
80484f7:      00 b9 0c 85 04 08        add     BYTE PTR [ecx+0x804850c],bh
80484fd:      ba 0b 00 00 00           mov     edx,0xb
8048502:      e8 69 fc ff ff           call    0x8048170
8048507:      e9 0c 00 00 00           jmp     0x8048518
804850c:      45                       inc     ebp
804850d:      58                       pop     eax
804850e:      50                       push    eax
804850f:      4f                       dec     edi
8048510:      4e                       dec     esi
8048511:      45                       inc     ebp
8048512:      4e                       dec     esi
8048513:      54                       push    esp
8048514:      45                       inc     ebp
8048515:      3a 20                    cmp     ah,BYTE PTR [eax]
8048517:      00 e8                    add     al,ch
8048519:      f3 fd                    repz std
804851b:      ff                       (bad)
804851c:      ff 89 87 04 00 00        dec     DWORD PTR [ecx+0x487]
8048522:      00 b8 01 00 00 00        add     BYTE PTR [eax+0x1],bh
8048528:      89 87 08 00 00 00        mov     DWORD PTR [edi+0x8],eax
804852e:      e8 57 ff ff ff           call    0x804848a
8048533:      8b 87 04 00 00 00        mov     eax,DWORD PTR [edi+0x4]
8048539:      50                       push    eax
804853a:      b8 00 00 00 00           mov     eax,0x0
804853f:      5b                       pop     ebx
8048540:      39 c3                    cmp     ebx,eax
8048542:      7c 05                    jl      0x8048549
8048544:      e9 0b 00 00 00           jmp     0x8048554
8048549:      b8 00 00 00 00           mov     eax,0x0
804854e:      89 87 08 00 00 00        mov     DWORD PTR [edi+0x8],eax
8048554:      b9 68 85 04 08           mov     ecx,0x8048568
8048559:      ba 0b 00 00 00           mov     edx,0xb
804855e:      e8 0d fc ff ff           call    0x8048170
8048563:      e9 0c 00 00 00           jmp     0x8048574
8048568:      52                       push    edx
8048569:      45                       inc     ebp
804856a:      53                       push    ebx
804856b:      55                       push    ebp
804856c:      4c                       dec     esp
804856d:      54                       push    esp
804856e:      41                       inc     ecx
804856f:      44                       inc     esp
8048570:      4f                       dec     edi
8048571:      3a 20                    cmp     ah,BYTE PTR [eax]
8048573:      00 8b 87 08 00 00        add     BYTE PTR [ebx+0x887],cl
```

```
8048579:        00 e8                           add    al,ch
804857b:        11 fc                           adc    esp,edi
804857d:        ff                              (bad)
804857e:        ff                              (bad)
804857f:        e8 fc fb ff ff                  call   0x8048180
8048584:        e8 f7 fb ff ff                  call   0x8048180
8048589:        e9 72 fd ff ff                  jmp    0x8048300
        ...
```

3.3. BIEN-02

3.3.1. Código Fuente

```
var X, Y, Z;

procedure MULTIPLICAR;
var A, B;
begin
    A := X;
    B := Y;
    Z := 0;
    if X < 0 then A := -A;
    if Y < 0 then B := -B;
    while B > 0 do
       begin
         if odd B then Z:= Z + A;
         A := A * 2;
         B := B / 2
       end;
    if X < 0 then Z:= -Z;
    if Y < 0 then Z:= -Z
end;

Begin
    write ('X: '); readLn (X);
    write ('Y: '); readLn (Y);
    call MULTIPLICAR;
    writeLn ('X*Y=', Z);
end.
```

3.3.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 0637 0000 0637 0000 0007 0000
```

```
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 5700 0005 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
```

```
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 23bf 0486 e908 0120 0000 878b 0000 0000
0000490 8789 000c 0000 878b 0004 0000 8789 0010
00004a0 0000 00b8 0000 8900 0887 0000 8b00 0087
00004b0 0000 5000 00b8 0000 5b00 c339 057c 0ee9
00004c0 0000 8b00 0c87 0000 f700 89d8 0c87 0000
00004d0 8b00 0487 0000 5000 00b8 0000 5b00 c339
00004e0 057c 0ee9 0000 8b00 1087 0000 f700 89d8
00004f0 1087 0000 8b00 1087 0000 5000 00b8 0000
0000500 5b00 c339 057f 56e9 0000 8b00 1087 0000
0000510 a800 7b01 e905 0016 0000 878b 0008 0000
0000520 8b50 0c87 0000 5b00 d801 8789 0008 0000
0000530 878b 000c 0000 b850 0002 0000 f75b 89eb
0000540 0c87 0000 8b00 1087 0000 5000 02b8 0000
0000550 5b00 9993 fbf7 8789 0010 0000 94e9 ffff
0000560 8bff 0087 0000 5000 00b8 0000 5b00 c339
0000570 057c 0ee9 0000 8b00 0887 0000 f700 89d8
0000580 0887 0000 8b00 0487 0000 5000 00b8 0000
0000590 5b00 c339 057c 0ee9 0000 8b00 0887 0000
00005a0 f700 89d8 0887 0000 c300 beb9 0485 ba08
00005b0 0003 0000 b7e8 fffb e9ff 0004 0000 3a58
00005c0 0020 49e8 fffd 89ff 0087 0000 b900 85e1
00005d0 0804 03ba 0000 e800 fb94 ffff 04e9 0000
00005e0 5900 203a e800 fd26 ffff 8789 0004 0000
00005f0 95e8 fffe b9ff 8609 0804 04ba 0000 e800
0000600 fb6c ffff 05e9 0000 5800 592a 003d 878b
```

```
0000610 0008 0000 77e8 fffb e8ff fb62 ffff dde9
0000620 fffc 00ff 0000 0000 0000 0000 0000 0000
0000630 0000 0000 0000 0000
0000637
```

3.3.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-02:     formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
         ...
 8048480:       bf 23 86 04 08          mov    edi,0x8048623
 8048485:       e9 20 01 00 00          jmp    0x80485aa
 804848a:       8b 87 00 00 00 00       mov    eax,DWORD PTR [edi+0x0]
 8048490:       89 87 0c 00 00 00       mov    DWORD PTR [edi+0xc],eax
 8048496:       8b 87 04 00 00 00       mov    eax,DWORD PTR [edi+0x4]
 804849c:       89 87 10 00 00 00       mov    DWORD PTR [edi+0x10],eax
 80484a2:       b8 00 00 00 00          mov    eax,0x0
 80484a7:       89 87 08 00 00 00       mov    DWORD PTR [edi+0x8],eax
 80484ad:       8b 87 00 00 00 00       mov    eax,DWORD PTR [edi+0x0]
 80484b3:       50                      push   eax
 80484b4:       b8 00 00 00 00          mov    eax,0x0
 80484b9:       5b                      pop    ebx
 80484ba:       39 c3                   cmp    ebx,eax
 80484bc:       7c 05                   jl     0x80484c3
 80484be:       e9 0e 00 00 00          jmp    0x80484d1
 80484c3:       8b 87 0c 00 00 00       mov    eax,DWORD PTR [edi+0xc]
 80484c9:       f7 d8                   neg    eax
 80484cb:       89 87 0c 00 00 00       mov    DWORD PTR [edi+0xc],eax
 80484d1:       8b 87 04 00 00 00       mov    eax,DWORD PTR [edi+0x4]
 80484d7:       50                      push   eax
 80484d8:       b8 00 00 00 00          mov    eax,0x0
 80484dd:       5b                      pop    ebx
 80484de:       39 c3                   cmp    ebx,eax
 80484e0:       7c 05                   jl     0x80484e7
 80484e2:       e9 0e 00 00 00          jmp    0x80484f5
 80484e7:       8b 87 10 00 00 00       mov    eax,DWORD PTR [edi+0x10]
 80484ed:       f7 d8                   neg    eax
 80484ef:       89 87 10 00 00 00       mov    DWORD PTR [edi+0x10],eax
 80484f5:       8b 87 10 00 00 00       mov    eax,DWORD PTR [edi+0x10]
 80484fb:       50                      push   eax
 80484fc:       b8 00 00 00 00          mov    eax,0x0
 8048501:       5b                      pop    ebx
```

```
8048502:        39 c3                       cmp     ebx,eax
8048504:        7f 05                       jg      0x804850b
8048506:        e9 56 00 00 00              jmp     0x8048561
804850b:        8b 87 10 00 00 00           mov     eax,DWORD PTR [edi+0x10]
8048511:        a8 01                       test    al,0x1
8048513:        7b 05                       jnp     0x804851a
8048515:        e9 16 00 00 00              jmp     0x8048530
804851a:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
8048520:        50                          push    eax
8048521:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
8048527:        5b                          pop     ebx
8048528:        01 d8                       add     eax,ebx
804852a:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
8048530:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
8048536:        50                          push    eax
8048537:        b8 02 00 00 00              mov     eax,0x2
804853c:        5b                          pop     ebx
804853d:        f7 eb                       imul    ebx
804853f:        89 87 0c 00 00 00           mov     DWORD PTR [edi+0xc],eax
8048545:        8b 87 10 00 00 00           mov     eax,DWORD PTR [edi+0x10]
804854b:        50                          push    eax
804854c:        b8 02 00 00 00              mov     eax,0x2
8048551:        5b                          pop     ebx
8048552:        93                          xchg    ebx,eax
8048553:        99                          cdq
8048554:        f7 fb                       idiv    ebx
8048556:        89 87 10 00 00 00           mov     DWORD PTR [edi+0x10],eax
804855c:        e9 94 ff ff ff              jmp     0x80484f5
8048561:        8b 87 00 00 00 00           mov     eax,DWORD PTR [edi+0x0]
8048567:        50                          push    eax
8048568:        b8 00 00 00 00              mov     eax,0x0
804856d:        5b                          pop     ebx
804856e:        39 c3                       cmp     ebx,eax
8048570:        7c 05                       jl      0x8048577
8048572:        e9 0e 00 00 00              jmp     0x8048585
8048577:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
804857d:        f7 d8                       neg     eax
804857f:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
8048585:        8b 87 04 00 00 00           mov     eax,DWORD PTR [edi+0x4]
804858b:        50                          push    eax
804858c:        b8 00 00 00 00              mov     eax,0x0
8048591:        5b                          pop     ebx
8048592:        39 c3                       cmp     ebx,eax
8048594:        7c 05                       jl      0x804859b
8048596:        e9 0e 00 00 00              jmp     0x80485a9
804859b:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
```

```
80485a1:        f7 d8                    neg     eax
80485a3:        89 87 08 00 00 00        mov     DWORD PTR [edi+0x8],eax
80485a9:        c3                       ret
80485aa:        b9 be 85 04 08           mov     ecx,0x80485be
80485af:        ba 03 00 00 00           mov     edx,0x3
80485b4:        e8 b7 fb ff ff           call    0x8048170
80485b9:        e9 04 00 00 00           jmp     0x80485c2
80485be:        58                       pop     eax
80485bf:        3a 20                    cmp     ah,BYTE PTR [eax]
80485c1:        00 e8                    add     al,ch
80485c3:        49                       dec     ecx
80485c4:        fd                       std
80485c5:        ff                       (bad)
80485c6:        ff 89 87 00 00 00        dec     DWORD PTR [ecx+0x87]
80485cc:        00 b9 e1 85 04 08        add     BYTE PTR [ecx+0x80485e1],bh
80485d2:        ba 03 00 00 00           mov     edx,0x3
80485d7:        e8 94 fb ff ff           call    0x8048170
80485dc:        e9 04 00 00 00           jmp     0x80485e5
80485e1:        59                       pop     ecx
80485e2:        3a 20                    cmp     ah,BYTE PTR [eax]
80485e4:        00 e8                    add     al,ch
80485e6:        26                       es
80485e7:        fd                       std
80485e8:        ff                       (bad)
80485e9:        ff 89 87 04 00 00        dec     DWORD PTR [ecx+0x487]
80485ef:        00 e8                    add     al,ch
80485f1:        95                       xchg    ebp,eax
80485f2:        fe                       (bad)
80485f3:        ff                       (bad)
80485f4:        ff                       (bad)
80485f5:        b9 09 86 04 08           mov     ecx,0x8048609
80485fa:        ba 04 00 00 00           mov     edx,0x4
80485ff:        e8 6c fb ff ff           call    0x8048170
8048604:        e9 05 00 00 00           jmp     0x804860e
8048609:        58                       pop     eax
804860a:        2a 59 3d                 sub     bl,BYTE PTR [ecx+0x3d]
804860d:        00 8b 87 08 00 00        add     BYTE PTR [ebx+0x887],cl
8048613:        00 e8                    add     al,ch
8048615:        77 fb                    ja      0x8048612
8048617:        ff                       (bad)
8048618:        ff                       (bad)
8048619:        e8 62 fb ff ff           call    0x8048180
804861e:        e9 dd fc ff ff           jmp     0x8048300
        ...
```

3.4. BIEN-03

3.4.1. Código Fuente

```
var X, Y, Q, R;

procedure DIVIDIR;
var V, W;
begin
  Q := 0;
  R := X; if R < 0 then R := -R;
  W := Y; if W < 0 then W := -W;
  V := Y; if V < 0 then V:= -V;
  while W <= R do W := W * 2;
  while W > V do
    begin
      Q := Q * 2; W := W / 2;
      if W <= R then
        begin
          R := R - W; Q := Q + 1
        end
    end;
  if X < 0 then R:= -R;
  if X < 0 then Q:= -Q;
  if Y < 0 then Q:= -Q;
end;

procedure OTRO;
  procedure DIVIDIR;
  begin
    Q := X / Y; R := X - Y * Q
  end;
call DIVIDIR;

procedure SALIDA;
begin
  write ('Cociente: ', Q); writeln;
  write ('Resto: ', R); writeln;
end;

begin
  write ('Dividendo: '); readln (X);
  write ('Divisor: '); readln (Y);
  writeln;
  if Y <> 0 then
    begin
      write ('Metodo 1'); writeln;
      call DIVIDIR;
      call SALIDA; writeln;
```

```
    write ('Metodo 2'); writeln;
    call OTRO;
    call SALIDA;
  end
end.
```

3.4.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 07d8 0000 07d8 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 f800 0006 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
```

```
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 c0bf 0487 e908 0265 0000 00b8 0000 8900
0000490 0887 0000 8b00 0087 0000 8900 0c87 0000
00004a0 8b00 0c87 0000 5000 00b8 0000 5b00 c339
00004b0 057c 0ee9 0000 8b00 0c87 0000 f700 89d8
00004c0 0c87 0000 8b00 0487 0000 8900 1487 0000
00004d0 8b00 1487 0000 5000 00b8 0000 5b00 c339
00004e0 057c 0ee9 0000 8b00 1487 0000 f700 89d8
00004f0 1487 0000 8b00 0487 0000 8900 1087 0000
0000500 8b00 1087 0000 5000 00b8 0000 5b00 c339
0000510 057c 0ee9 0000 8b00 1087 0000 f700 89d8
0000520 1087 0000 8b00 1487 0000 5000 878b 000c
0000530 0000 395b 7ec3 e905 001a 0000 878b 0014
```

```
0000540 0000 b850 0002 0000 f75b 89eb 1487 0000
0000550 e900 ffcf ffff 878b 0014 0000 8b50 1087
0000560 0000 5b00 c339 057f 74e9 0000 8b00 0887
0000570 0000 5000 02b8 0000 5b00 ebf7 8789 0008
0000580 0000 878b 0014 0000 b850 0002 0000 935b
0000590 f799 89fb 1487 0000 8b00 1487 0000 5000
00005a0 878b 000c 0000 395b 7ec3 e905 002c 0000
00005b0 878b 000c 0000 8b50 1487 0000 5b00 2993
00005c0 89d8 0c87 0000 8b00 0887 0000 5000 01b8
00005d0 0000 5b00 d801 8789 0008 0000 75e9 ffff
00005e0 8bff 0087 0000 5000 00b8 0000 5b00 c339
00005f0 057c 0ee9 0000 8b00 0c87 0000 f700 89d8
0000600 0c87 0000 8b00 0087 0000 5000 00b8 0000
0000610 5b00 c339 057c 0ee9 0000 8b00 0887 0000
0000620 f700 89d8 0887 0000 8b00 0487 0000 5000
0000630 00b8 0000 5b00 c339 057c 0ee9 0000 8b00
0000640 0887 0000 f700 89d8 0887 0000 c300 3ae9
0000650 0000 8b00 0087 0000 5000 878b 0004 0000
0000660 935b f799 89fb 0887 0000 8b00 0087 0000
0000670 5000 878b 0004 0000 8b50 0887 0000 5b00
0000680 ebf7 935b d829 8789 000c 0000 e8c3 ffc1
0000690 ffff b9c3 86a7 0804 0aba 0000 e800 face
00006a0 ffff 0be9 0000 4300 636f 6569 746e 3a65
00006b0 0020 878b 0008 0000 d3e8 fffa e8ff fabe
00006c0 ffff d6b9 0486 ba08 0007 0000 9fe8 fffa
00006d0 e9ff 0008 0000 6552 7473 3a6f 0020 878b
00006e0 000c 0000 a7e8 fffa e8ff fa92 ffff b9c3
00006f0 8703 0804 0bba 0000 e800 fa72 ffff 0ce9
0000700 0000 4400 7669 6469 6e65 6f64 203a e800
0000710 fbfc ffff 8789 0000 0000 2eb9 0487 ba08
0000720 0009 0000 47e8 fffa e9ff 000a 0000 6944
0000730 6976 6f73 3a72 0020 d3e8 fffb 89ff 0487
0000740 0000 e800 fa38 ffff 878b 0004 0000 b850
0000750 0000 0000 395b 75c3 e905 005d 0000 72b9
0000760 0487 ba08 0008 0000 03e8 fffa e9ff 0009
0000770 0000 654d 6f74 6f64 3120 e800 fa00 ffff
0000780 05e8 fffd e8ff ff09 ffff f1e8 fff9 b9ff
0000790 87a3 0804 08ba 0000 e800 f9d2 ffff 09e9
00007a0 0000 4d00 7465 646f 206f 0032 cfe8 fff9
00007b0 e8ff fe98 ffff d8e8 fffe e9ff fb40 ffff
00007c0 0000 0000 0000 0000 0000 0000 0000 0000
*
00007d8
```

3.4.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-03:     formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
        ...
 8048480:       bf c0 87 04 08          mov    edi,0x80487c0
 8048485:       e9 65 02 00 00          jmp    0x80486ef
 804848a:       b8 00 00 00 00          mov    eax,0x0
 804848f:       89 87 08 00 00 00       mov    DWORD PTR [edi+0x8],eax
 8048495:       8b 87 00 00 00 00       mov    eax,DWORD PTR [edi+0x0]
 804849b:       89 87 0c 00 00 00       mov    DWORD PTR [edi+0xc],eax
 80484a1:       8b 87 0c 00 00 00       mov    eax,DWORD PTR [edi+0xc]
 80484a7:       50                      push   eax
 80484a8:       b8 00 00 00 00          mov    eax,0x0
 80484ad:       5b                      pop    ebx
 80484ae:       39 c3                   cmp    ebx,eax
 80484b0:       7c 05                   jl     0x80484b7
 80484b2:       e9 0e 00 00 00          jmp    0x80484c5
 80484b7:       8b 87 0c 00 00 00       mov    eax,DWORD PTR [edi+0xc]
 80484bd:       f7 d8                   neg    eax
 80484bf:       89 87 0c 00 00 00       mov    DWORD PTR [edi+0xc],eax
 80484c5:       8b 87 04 00 00 00       mov    eax,DWORD PTR [edi+0x4]
 80484cb:       89 87 14 00 00 00       mov    DWORD PTR [edi+0x14],eax
 80484d1:       8b 87 14 00 00 00       mov    eax,DWORD PTR [edi+0x14]
 80484d7:       50                      push   eax
 80484d8:       b8 00 00 00 00          mov    eax,0x0
 80484dd:       5b                      pop    ebx
 80484de:       39 c3                   cmp    ebx,eax
 80484e0:       7c 05                   jl     0x80484e7
 80484e2:       e9 0e 00 00 00          jmp    0x80484f5
 80484e7:       8b 87 14 00 00 00       mov    eax,DWORD PTR [edi+0x14]
 80484ed:       f7 d8                   neg    eax
 80484ef:       89 87 14 00 00 00       mov    DWORD PTR [edi+0x14],eax
 80484f5:       8b 87 04 00 00 00       mov    eax,DWORD PTR [edi+0x4]
 80484fb:       89 87 10 00 00 00       mov    DWORD PTR [edi+0x10],eax
 8048501:       8b 87 10 00 00 00       mov    eax,DWORD PTR [edi+0x10]
 8048507:       50                      push   eax
 8048508:       b8 00 00 00 00          mov    eax,0x0
 804850d:       5b                      pop    ebx
 804850e:       39 c3                   cmp    ebx,eax
 8048510:       7c 05                   jl     0x8048517
 8048512:       e9 0e 00 00 00          jmp    0x8048525
```

```
8048517:        8b 87 10 00 00 00        mov     eax,DWORD PTR [edi+0x10]
804851d:        f7 d8                    neg     eax
804851f:        89 87 10 00 00 00        mov     DWORD PTR [edi+0x10],eax
8048525:        8b 87 14 00 00 00        mov     eax,DWORD PTR [edi+0x14]
804852b:        50                       push    eax
804852c:        8b 87 0c 00 00 00        mov     eax,DWORD PTR [edi+0xc]
8048532:        5b                       pop     ebx
8048533:        39 c3                    cmp     ebx,eax
8048535:        7e 05                    jle     0x804853c
8048537:        e9 1a 00 00 00           jmp     0x8048556
804853c:        8b 87 14 00 00 00        mov     eax,DWORD PTR [edi+0x14]
8048542:        50                       push    eax
8048543:        b8 02 00 00 00           mov     eax,0x2
8048548:        5b                       pop     ebx
8048549:        f7 eb                    imul    ebx
804854b:        89 87 14 00 00 00        mov     DWORD PTR [edi+0x14],eax
8048551:        e9 cf ff ff ff           jmp     0x8048525
8048556:        8b 87 14 00 00 00        mov     eax,DWORD PTR [edi+0x14]
804855c:        50                       push    eax
804855d:        8b 87 10 00 00 00        mov     eax,DWORD PTR [edi+0x10]
8048563:        5b                       pop     ebx
8048564:        39 c3                    cmp     ebx,eax
8048566:        7f 05                    jg      0x804856d
8048568:        e9 74 00 00 00           jmp     0x80485e1
804856d:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048573:        50                       push    eax
8048574:        b8 02 00 00 00           mov     eax,0x2
8048579:        5b                       pop     ebx
804857a:        f7 eb                    imul    ebx
804857c:        89 87 08 00 00 00        mov     DWORD PTR [edi+0x8],eax
8048582:        8b 87 14 00 00 00        mov     eax,DWORD PTR [edi+0x14]
8048588:        50                       push    eax
8048589:        b8 02 00 00 00           mov     eax,0x2
804858e:        5b                       pop     ebx
804858f:        93                       xchg    ebx,eax
8048590:        99                       cdq
8048591:        f7 fb                    idiv    ebx
8048593:        89 87 14 00 00 00        mov     DWORD PTR [edi+0x14],eax
8048599:        8b 87 14 00 00 00        mov     eax,DWORD PTR [edi+0x14]
804859f:        50                       push    eax
80485a0:        8b 87 0c 00 00 00        mov     eax,DWORD PTR [edi+0xc]
80485a6:        5b                       pop     ebx
80485a7:        39 c3                    cmp     ebx,eax
80485a9:        7e 05                    jle     0x80485b0
80485ab:        e9 2c 00 00 00           jmp     0x80485dc
80485b0:        8b 87 0c 00 00 00        mov     eax,DWORD PTR [edi+0xc]
```

```
80485b6:        50                          push    eax
80485b7:        8b 87 14 00 00 00           mov     eax,DWORD PTR [edi+0x14]
80485bd:        5b                          pop     ebx
80485be:        93                          xchg    ebx,eax
80485bf:        29 d8                       sub     eax,ebx
80485c1:        89 87 0c 00 00 00           mov     DWORD PTR [edi+0xc],eax
80485c7:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
80485cd:        50                          push    eax
80485ce:        b8 01 00 00 00              mov     eax,0x1
80485d3:        5b                          pop     ebx
80485d4:        01 d8                       add     eax,ebx
80485d6:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
80485dc:        e9 75 ff ff ff              jmp     0x8048556
80485e1:        8b 87 00 00 00 00           mov     eax,DWORD PTR [edi+0x0]
80485e7:        50                          push    eax
80485e8:        b8 00 00 00 00              mov     eax,0x0
80485ed:        5b                          pop     ebx
80485ee:        39 c3                       cmp     ebx,eax
80485f0:        7c 05                       jl      0x80485f7
80485f2:        e9 0e 00 00 00              jmp     0x8048605
80485f7:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
80485fd:        f7 d8                       neg     eax
80485ff:        89 87 0c 00 00 00           mov     DWORD PTR [edi+0xc],eax
8048605:        8b 87 00 00 00 00           mov     eax,DWORD PTR [edi+0x0]
804860b:        50                          push    eax
804860c:        b8 00 00 00 00              mov     eax,0x0
8048611:        5b                          pop     ebx
8048612:        39 c3                       cmp     ebx,eax
8048614:        7c 05                       jl      0x804861b
8048616:        e9 0e 00 00 00              jmp     0x8048629
804861b:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
8048621:        f7 d8                       neg     eax
8048623:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
8048629:        8b 87 04 00 00 00           mov     eax,DWORD PTR [edi+0x4]
804862f:        50                          push    eax
8048630:        b8 00 00 00 00              mov     eax,0x0
8048635:        5b                          pop     ebx
8048636:        39 c3                       cmp     ebx,eax
8048638:        7c 05                       jl      0x804863f
804863a:        e9 0e 00 00 00              jmp     0x804864d
804863f:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
8048645:        f7 d8                       neg     eax
8048647:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
804864d:        c3                          ret
804864e:        e9 3a 00 00 00              jmp     0x804868d
8048653:        8b 87 00 00 00 00           mov     eax,DWORD PTR [edi+0x0]
```

```
8048659:        50                      push    eax
804865a:        8b 87 04 00 00 00       mov     eax,DWORD PTR [edi+0x4]
8048660:        5b                      pop     ebx
8048661:        93                      xchg    ebx,eax
8048662:        99                      cdq
8048663:        f7 fb                   idiv    ebx
8048665:        89 87 08 00 00 00       mov     DWORD PTR [edi+0x8],eax
804866b:        8b 87 00 00 00 00       mov     eax,DWORD PTR [edi+0x0]
8048671:        50                      push    eax
8048672:        8b 87 04 00 00 00       mov     eax,DWORD PTR [edi+0x4]
8048678:        50                      push    eax
8048679:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
804867f:        5b                      pop     ebx
8048680:        f7 eb                   imul    ebx
8048682:        5b                      pop     ebx
8048683:        93                      xchg    ebx,eax
8048684:        29 d8                   sub     eax,ebx
8048686:        89 87 0c 00 00 00       mov     DWORD PTR [edi+0xc],eax
804868c:        c3                      ret
804868d:        e8 c1 ff ff ff          call    0x8048653
8048692:        c3                      ret
8048693:        b9 a7 86 04 08          mov     ecx,0x80486a7
8048698:        ba 0a 00 00 00          mov     edx,0xa
804869d:        e8 ce fa ff ff          call    0x8048170
80486a2:        e9 0b 00 00 00          jmp     0x80486b2
80486a7:        43                      inc     ebx
80486a8:        6f                      outs    dx,DWORD PTR ds:[esi]
80486a9:        63 69 65                arpl    WORD PTR [ecx+0x65],bp
80486ac:        6e                      outs    dx,BYTE PTR ds:[esi]
80486ad:        74 65                   je      0x8048714
80486af:        3a 20                   cmp     ah,BYTE PTR [eax]
80486b1:        00 8b 87 08 00 00       add     BYTE PTR [ebx+0x887],cl
80486b7:        00 e8                   add     al,ch
80486b9:        d3 fa                   sar     edx,cl
80486bb:        ff                      (bad)
80486bc:        ff                      (bad)
80486bd:        e8 be fa ff ff          call    0x8048180
80486c2:        b9 d6 86 04 08          mov     ecx,0x80486d6
80486c7:        ba 07 00 00 00          mov     edx,0x7
80486cc:        e8 9f fa ff ff          call    0x8048170
80486d1:        e9 08 00 00 00          jmp     0x80486de
80486d6:        52                      push    edx
80486d7:        65                      gs
80486d8:        73 74                   jae     0x804874e
80486da:        6f                      outs    dx,DWORD PTR ds:[esi]
80486db:        3a 20                   cmp     ah,BYTE PTR [eax]
```

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```
80486dd:        00 8b 87 0c 00 00       add     BYTE PTR [ebx+0xc87],cl
80486e3:        00 e8                   add     al,ch
80486e5:        a7                      cmps    DWORD PTR ds:[esi],DWORD PTR es:[ed
80486e6:        fa                      cli
80486e7:        ff                      (bad)
80486e8:        ff                      (bad)
80486e9:        e8 92 fa ff ff          call    0x8048180
80486ee:        c3                      ret
80486ef:        b9 03 87 04 08          mov     ecx,0x8048703
80486f4:        ba 0b 00 00 00          mov     edx,0xb
80486f9:        e8 72 fa ff ff          call    0x8048170
80486fe:        e9 0c 00 00 00          jmp     0x804870f
8048703:        44                      inc     esp
8048704:        69 76 69 64 65 6e 64    imul    esi,DWORD PTR [esi+0x69],0x646e6564
804870b:        6f                      outs    dx,DWORD PTR ds:[esi]
804870c:        3a 20                   cmp     ah,BYTE PTR [eax]
804870e:        00 e8                   add     al,ch
8048710:        fc                      cld
8048711:        fb                      sti
8048712:        ff                      (bad)
8048713:        ff 89 87 00 00 00       dec     DWORD PTR [ecx+0x87]
8048719:        00 b9 2e 87 04 08       add     BYTE PTR [ecx+0x804872e],bh
804871f:        ba 09 00 00 00          mov     edx,0x9
8048724:        e8 47 fa ff ff          call    0x8048170
8048729:        e9 0a 00 00 00          jmp     0x8048738
804872e:        44                      inc     esp
804872f:        69 76 69 73 6f 72 3a    imul    esi,DWORD PTR [esi+0x69],0x3a726f73
8048736:        20 00                   and     BYTE PTR [eax],al
8048738:        e8 d3 fb ff ff          call    0x8048310
804873d:        89 87 04 00 00 00       mov     DWORD PTR [edi+0x4],eax
8048743:        e8 38 fa ff ff          call    0x8048180
8048748:        8b 87 04 00 00 00       mov     eax,DWORD PTR [edi+0x4]
804874e:        50                      push    eax
804874f:        b8 00 00 00 00          mov     eax,0x0
8048754:        5b                      pop     ebx
8048755:        39 c3                   cmp     ebx,eax
8048757:        75 05                   jne     0x804875e
8048759:        e9 5d 00 00 00          jmp     0x80487bb
804875e:        b9 72 87 04 08          mov     ecx,0x8048772
8048763:        ba 08 00 00 00          mov     edx,0x8
8048768:        e8 03 fa ff ff          call    0x8048170
804876d:        e9 09 00 00 00          jmp     0x804877b
8048772:        4d                      dec     ebp
8048773:        65                      gs
8048774:        74 6f                   je      0x80487e5
8048776:        64 6f                   outs    dx,DWORD PTR fs:[esi]
```

```
8048778:        20 31              and    BYTE PTR [ecx],dh
804877a:        00 e8              add    al,ch
804877c:        00 fa              add    dl,bh
804877e:        ff                 (bad)
804877f:        ff                 (bad)
8048780:        e8 05 fd ff ff     call   0x804848a
8048785:        e8 09 ff ff ff     call   0x8048693
804878a:        e8 f1 f9 ff ff     call   0x8048180
804878f:        b9 a3 87 04 08     mov    ecx,0x80487a3
8048794:        ba 08 00 00 00     mov    edx,0x8
8048799:        e8 d2 f9 ff ff     call   0x8048170
804879e:        e9 09 00 00 00     jmp    0x80487ac
80487a3:        4d                 dec    ebp
80487a4:        65                 gs
80487a5:        74 6f              je     0x8048816
80487a7:        64 6f              outs   dx,DWORD PTR fs:[esi]
80487a9:        20 32              and    BYTE PTR [edx],dh
80487ab:        00 e8              add    al,ch
80487ad:        cf                 iret
80487ae:        f9                 stc
80487af:        ff                 (bad)
80487b0:        ff                 (bad)
80487b1:        e8 98 fe ff ff     call   0x804864e
80487b6:        e8 d8 fe ff ff     call   0x8048693
80487bb:        e9 40 fb ff ff     jmp    0x8048300
        ...
```

3.5.   BIEN-04

3.5.1.   Código Fuente

```
var X, Y, Z;

procedure MCD;
var F,G;
begin
  F := X; G := Y;
  while F <> G do
    begin
      if F < G then G := G - F;
      IF G < F then F := F - G
    end;
  Z:= F
end;

begin
  write ('X: '); readln (X);
```

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```
  if X > 0 then
    begin
      write ('Y: '); readln (Y);
      if Y > 0 then
        begin
          call MCD;
          writeln ('MCD: ', Z); writeln
        end
    end
end.
```

3.5.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 05e6 0000 05e6 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 0600 0005 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
```

```
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 d2bf 0485 e908 009d 0000 878b 0000 0000
0000490 8789 000c 0000 878b 0004 0000 8789 0010
00004a0 0000 878b 000c 0000 8b50 1087 0000 5b00
00004b0 c339 0575 61e9 0000 8b00 0c87 0000 5000
00004c0 878b 0010 0000 395b 7cc3 e905 0017 0000
00004d0 878b 0010 0000 8b50 0c87 0000 5b00 2993
00004e0 89d8 1087 0000 8b00 1087 0000 5000 878b
```

```
00004f0 000c 0000 395b 7cc3 e905 0017 0000 878b
0000500 000c 0000 8b50 1087 0000 5b00 2993 89d8
0000510 0c87 0000 e900 ff88 ffff 878b 000c 0000
0000520 8789 0008 0000 b9c3 853b 0804 03ba 0000
0000530 e800 fc3a ffff 04e9 0000 5800 203a e800
0000540 fdcc ffff 8789 0000 0000 878b 0000 0000
0000550 b850 0000 0000 395b 7fc3 e905 006d 0000
0000560 74b9 0485 ba08 0003 0000 01e8 fffc e9ff
0000570 0004 0000 3a59 0020 93e8 fffd 89ff 0487
0000580 0000 8b00 0487 0000 5000 00b8 0000 5b00
0000590 c339 057f 34e9 0000 e800 feec ffff b2b9
00005a0 0485 ba08 0005 0000 c3e8 fffb e9ff 0006
00005b0 0000 434d 3a44 0020 878b 0008 0000 cde8
00005c0 fffb e8ff fbb8 ffff b3e8 fffb e9ff fd2e
00005d0 ffff 0000 0000 0000 0000 0000 0000 0000
00005e0 0000 0000 0000
00005e6
```

3.5.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-04:      formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
        ...
 8048480:       bf d2 85 04 08            mov     edi,0x80485d2
 8048485:       e9 9d 00 00 00            jmp     0x8048527
 804848a:       8b 87 00 00 00 00         mov     eax,DWORD PTR [edi+0x0]
 8048490:       89 87 0c 00 00 00         mov     DWORD PTR [edi+0xc],eax
 8048496:       8b 87 04 00 00 00         mov     eax,DWORD PTR [edi+0x4]
 804849c:       89 87 10 00 00 00         mov     DWORD PTR [edi+0x10],eax
 80484a2:       8b 87 0c 00 00 00         mov     eax,DWORD PTR [edi+0xc]
 80484a8:       50                        push    eax
 80484a9:       8b 87 10 00 00 00         mov     eax,DWORD PTR [edi+0x10]
 80484af:       5b                        pop     ebx
 80484b0:       39 c3                     cmp     ebx,eax
 80484b2:       75 05                     jne     0x80484b9
 80484b4:       e9 61 00 00 00            jmp     0x804851a
 80484b9:       8b 87 0c 00 00 00         mov     eax,DWORD PTR [edi+0xc]
 80484bf:       50                        push    eax
 80484c0:       8b 87 10 00 00 00         mov     eax,DWORD PTR [edi+0x10]
 80484c6:       5b                        pop     ebx
 80484c7:       39 c3                     cmp     ebx,eax
 80484c9:       7c 05                     jl      0x80484d0
```

```
80484cb:        e9 17 00 00 00              jmp     0x80484e7
80484d0:        8b 87 10 00 00 00           mov     eax,DWORD PTR [edi+0x10]
80484d6:        50                          push    eax
80484d7:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
80484dd:        5b                          pop     ebx
80484de:        93                          xchg    ebx,eax
80484df:        29 d8                       sub     eax,ebx
80484e1:        89 87 10 00 00 00           mov     DWORD PTR [edi+0x10],eax
80484e7:        8b 87 10 00 00 00           mov     eax,DWORD PTR [edi+0x10]
80484ed:        50                          push    eax
80484ee:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
80484f4:        5b                          pop     ebx
80484f5:        39 c3                       cmp     ebx,eax
80484f7:        7c 05                       jl      0x80484fe
80484f9:        e9 17 00 00 00              jmp     0x8048515
80484fe:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
8048504:        50                          push    eax
8048505:        8b 87 10 00 00 00           mov     eax,DWORD PTR [edi+0x10]
804850b:        5b                          pop     ebx
804850c:        93                          xchg    ebx,eax
804850d:        29 d8                       sub     eax,ebx
804850f:        89 87 0c 00 00 00           mov     DWORD PTR [edi+0xc],eax
8048515:        e9 88 ff ff ff              jmp     0x80484a2
804851a:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
8048520:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
8048526:        c3                          ret
8048527:        b9 3b 85 04 08              mov     ecx,0x804853b
804852c:        ba 03 00 00 00              mov     edx,0x3
8048531:        e8 3a fc ff ff              call    0x8048170
8048536:        e9 04 00 00 00              jmp     0x804853f
804853b:        58                          pop     eax
804853c:        3a 20                       cmp     ah,BYTE PTR [eax]
804853e:        00 e8                       add     al,ch
8048540:        cc                          int3
8048541:        fd                          std
8048542:        ff                          (bad)
8048543:        ff 89 87 00 00 00           dec     DWORD PTR [ecx+0x87]
8048549:        00 8b 87 00 00 00           add     BYTE PTR [ebx+0x87],cl
804854f:        00 50 b8                    add     BYTE PTR [eax-0x48],dl
8048552:        00 00                       add     BYTE PTR [eax],al
8048554:        00 00                       add     BYTE PTR [eax],al
8048556:        5b                          pop     ebx
8048557:        39 c3                       cmp     ebx,eax
8048559:        7f 05                       jg      0x8048560
804855b:        e9 6d 00 00 00              jmp     0x80485cd
8048560:        b9 74 85 04 08              mov     ecx,0x8048574
```

```
8048565:        ba 03 00 00 00              mov     edx,0x3
804856a:        e8 01 fc ff ff              call    0x8048170
804856f:        e9 04 00 00 00              jmp     0x8048578
8048574:        59                          pop     ecx
8048575:        3a 20                       cmp     ah,BYTE PTR [eax]
8048577:        00 e8                       add     al,ch
8048579:        93                          xchg    ebx,eax
804857a:        fd                          std
804857b:        ff                          (bad)
804857c:        ff 89 87 04 00 00           dec     DWORD PTR [ecx+0x487]
8048582:        00 8b 87 04 00 00           add     BYTE PTR [ebx+0x487],cl
8048588:        00 50 b8                    add     BYTE PTR [eax-0x48],dl
804858b:        00 00                       add     BYTE PTR [eax],al
804858d:        00 00                       add     BYTE PTR [eax],al
804858f:        5b                          pop     ebx
8048590:        39 c3                       cmp     ebx,eax
8048592:        7f 05                       jg      0x8048599
8048594:        e9 34 00 00 00              jmp     0x80485cd
8048599:        e8 ec fe ff ff              call    0x804848a
804859e:        b9 b2 85 04 08              mov     ecx,0x80485b2
80485a3:        ba 05 00 00 00              mov     edx,0x5
80485a8:        e8 c3 fb ff ff              call    0x8048170
80485ad:        e9 06 00 00 00              jmp     0x80485b8
80485b2:        4d                          dec     ebp
80485b3:        43                          inc     ebx
80485b4:        44                          inc     esp
80485b5:        3a 20                       cmp     ah,BYTE PTR [eax]
80485b7:        00 8b 87 08 00 00           add     BYTE PTR [ebx+0x887],cl
80485bd:        00 e8                       add     al,ch
80485bf:        cd fb                       int     0xfb
80485c1:        ff                          (bad)
80485c2:        ff                          (bad)
80485c3:        e8 b8 fb ff ff              call    0x8048180
80485c8:        e8 b3 fb ff ff              call    0x8048180
80485cd:        e9 2e fd ff ff              jmp     0x8048300
        ...
```

3.6.   BIEN-05

3.6.1.   Código Fuente

```
VAR R, N;

PROCEDURE INICIALIZAR;
CONST UNO = 1;
R := -(-UNO);
```

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```
PROCEDURE RAIZ;
BEGIN
  CALL INICIALIZAR;
  WHILE R * R < N DO R := R + 1
END;

BEGIN
  WRITE ('N: '); READLN (N);
  WRITE ('RAIZ CUADRADA DE ', N, ': ');
  IF N < 0 THEN WRITE ('ERROR');
  IF N = 0 THEN WRITE (0);
  IF N > 0 THEN
    BEGIN
      CALL RAIZ;
      IF R*R<>N THEN WRITE (R - 1, '..');
      WRITE (R);
    END;
  WRITELN
END.
```

3.6.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 061b 0000 061b 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 3b00 0005 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
```

```
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
```

```
0000470  840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480  13bf 0486 e908 0051 0000 01b8 0000 f700
0000490  f7d8 89d8 0087 0000 c300 ebe8 ffff 8bff
00004a0  0087 0000 5000 878b 0000 0000 f75b 50eb
00004b0  878b 0004 0000 395b 7cc3 e905 001a 0000
00004c0  878b 0000 0000 b850 0001 0000 015b 89d8
00004d0  0087 0000 e900 ffc5 ffff b9c3 84ef 0804
00004e0  03ba 0000 e800 fc86 ffff 04e9 0000 4e00
00004f0  203a e800 fe18 ffff 8789 0004 0000 12b9
0000500  0485 ba08 0011 0000 63e8 fffc e9ff 0012
0000510  0000 4152 5a49 4320 4155 5244 4441 2041
0000520  4544 0020 878b 0004 0000 61e8 fffc b9ff
0000530  8543 0804 02ba 0000 e800 fc32 ffff 03e9
0000540  0000 3a00 0020 878b 0004 0000 b850 0000
0000550  0000 395b 7cc3 e905 001a 0000 70b9 0485
0000560  ba08 0005 0000 05e8 fffc e9ff 0006 0000
0000570  5245 4f52 0052 878b 0004 0000 b850 0000
0000580  0000 395b 74c3 e905 000a 0000 00b8 0000
0000590  e800 fbfa ffff 878b 0004 0000 b850 0000
00005a0  0000 395b 7fc3 e905 005d 0000 e9e8 fffe
00005b0  8bff 0087 0000 5000 878b 0000 0000 f75b
00005c0  50eb 878b 0004 0000 395b 75c3 e905 002c
00005d0  0000 878b 0000 0000 b850 0001 0000 935b
00005e0  d829 a9e8 fffb b9ff 85fb 0804 02ba 0000
00005f0  e800 fb7a ffff 03e9 0000 2e00 002e 878b
0000600  0000 0000 87e8 fffb e8ff fb72 ffff ede9
0000610  fffc 00ff 0000 0000 0000 0000
000061b
```

3.6.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-05:     formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
        ...
 8048480:       bf 13 86 04 08              mov    edi,0x8048613
 8048485:       e9 51 00 00 00              jmp    0x80484db
 804848a:       b8 01 00 00 00              mov    eax,0x1
 804848f:       f7 d8                       neg    eax
 8048491:       f7 d8                       neg    eax
 8048493:       89 87 00 00 00 00           mov    DWORD PTR [edi+0x0],eax
 8048499:       c3                          ret
 804849a:       e8 eb ff ff ff              call   0x804848a
```

```
804849f:        8b 87 00 00 00 00        mov     eax,DWORD PTR [edi+0x0]
80484a5:        50                       push    eax
80484a6:        8b 87 00 00 00 00        mov     eax,DWORD PTR [edi+0x0]
80484ac:        5b                       pop     ebx
80484ad:        f7 eb                    imul    ebx
80484af:        50                       push    eax
80484b0:        8b 87 04 00 00 00        mov     eax,DWORD PTR [edi+0x4]
80484b6:        5b                       pop     ebx
80484b7:        39 c3                    cmp     ebx,eax
80484b9:        7c 05                    jl      0x80484c0
80484bb:        e9 1a 00 00 00           jmp     0x80484da
80484c0:        8b 87 00 00 00 00        mov     eax,DWORD PTR [edi+0x0]
80484c6:        50                       push    eax
80484c7:        b8 01 00 00 00           mov     eax,0x1
80484cc:        5b                       pop     ebx
80484cd:        01 d8                    add     eax,ebx
80484cf:        89 87 00 00 00 00        mov     DWORD PTR [edi+0x0],eax
80484d5:        e9 c5 ff ff ff           jmp     0x804849f
80484da:        c3                       ret
80484db:        b9 ef 84 04 08           mov     ecx,0x80484ef
80484e0:        ba 03 00 00 00           mov     edx,0x3
80484e5:        e8 86 fc ff ff           call    0x8048170
80484ea:        e9 04 00 00 00           jmp     0x80484f3
80484ef:        4e                       dec     esi
80484f0:        3a 20                    cmp     ah,BYTE PTR [eax]
80484f2:        00 e8                    add     al,ch
80484f4:        18 fe                    sbb     dh,bh
80484f6:        ff                       (bad)
80484f7:        ff 89 87 04 00 00        dec     DWORD PTR [ecx+0x487]
80484fd:        00 b9 12 85 04 08        add     BYTE PTR [ecx+0x8048512],bh
8048503:        ba 11 00 00 00           mov     edx,0x11
8048508:        e8 63 fc ff ff           call    0x8048170
804850d:        e9 12 00 00 00           jmp     0x8048524
8048512:        52                       push    edx
8048513:        41                       inc     ecx
8048514:        49                       dec     ecx
8048515:        5a                       pop     edx
8048516:        20 43 55                 and     BYTE PTR [ebx+0x55],al
8048519:        41                       inc     ecx
804851a:        44                       inc     esp
804851b:        52                       push    edx
804851c:        41                       inc     ecx
804851d:        44                       inc     esp
804851e:        41                       inc     ecx
804851f:        20 44 45 20              and     BYTE PTR [ebp+eax*2+0x20],al
8048523:        00 8b 87 04 00 00        add     BYTE PTR [ebx+0x487],cl
```

```
8048529:        00 e8                      add     al,ch
804852b:        61                         popa
804852c:        fc                         cld
804852d:        ff                         (bad)
804852e:        ff                         (bad)
804852f:        b9 43 85 04 08             mov     ecx,0x8048543
8048534:        ba 02 00 00 00             mov     edx,0x2
8048539:        e8 32 fc ff ff             call    0x8048170
804853e:        e9 03 00 00 00             jmp     0x8048546
8048543:        3a 20                      cmp     ah,BYTE PTR [eax]
8048545:        00 8b 87 04 00 00          add     BYTE PTR [ebx+0x487],cl
804854b:        00 50 b8                   add     BYTE PTR [eax-0x48],dl
804854e:        00 00                      add     BYTE PTR [eax],al
8048550:        00 00                      add     BYTE PTR [eax],al
8048552:        5b                         pop     ebx
8048553:        39 c3                      cmp     ebx,eax
8048555:        7c 05                      jl      0x804855c
8048557:        e9 1a 00 00 00             jmp     0x8048576
804855c:        b9 70 85 04 08             mov     ecx,0x8048570
8048561:        ba 05 00 00 00             mov     edx,0x5
8048566:        e8 05 fc ff ff             call    0x8048170
804856b:        e9 06 00 00 00             jmp     0x8048576
8048570:        45                         inc     ebp
8048571:        52                         push    edx
8048572:        52                         push    edx
8048573:        4f                         dec     edi
8048574:        52                         push    edx
8048575:        00 8b 87 04 00 00          add     BYTE PTR [ebx+0x487],cl
804857b:        00 50 b8                   add     BYTE PTR [eax-0x48],dl
804857e:        00 00                      add     BYTE PTR [eax],al
8048580:        00 00                      add     BYTE PTR [eax],al
8048582:        5b                         pop     ebx
8048583:        39 c3                      cmp     ebx,eax
8048585:        74 05                      je      0x804858c
8048587:        e9 0a 00 00 00             jmp     0x8048596
804858c:        b8 00 00 00 00             mov     eax,0x0
8048591:        e8 fa fb ff ff             call    0x8048190
8048596:        8b 87 04 00 00 00          mov     eax,DWORD PTR [edi+0x4]
804859c:        50                         push    eax
804859d:        b8 00 00 00 00             mov     eax,0x0
80485a2:        5b                         pop     ebx
80485a3:        39 c3                      cmp     ebx,eax
80485a5:        7f 05                      jg      0x80485ac
80485a7:        e9 5d 00 00 00             jmp     0x8048609
80485ac:        e8 e9 fe ff ff             call    0x804849a
80485b1:        8b 87 00 00 00 00          mov     eax,DWORD PTR [edi+0x0]
```

```
80485b7:        50                          push    eax
80485b8:        8b 87 00 00 00 00           mov     eax,DWORD PTR [edi+0x0]
80485be:        5b                          pop     ebx
80485bf:        f7 eb                       imul    ebx
80485c1:        50                          push    eax
80485c2:        8b 87 04 00 00 00           mov     eax,DWORD PTR [edi+0x4]
80485c8:        5b                          pop     ebx
80485c9:        39 c3                       cmp     ebx,eax
80485cb:        75 05                       jne     0x80485d2
80485cd:        e9 2c 00 00 00              jmp     0x80485fe
80485d2:        8b 87 00 00 00 00           mov     eax,DWORD PTR [edi+0x0]
80485d8:        50                          push    eax
80485d9:        b8 01 00 00 00              mov     eax,0x1
80485de:        5b                          pop     ebx
80485df:        93                          xchg    ebx,eax
80485e0:        29 d8                       sub     eax,ebx
80485e2:        e8 a9 fb ff ff              call    0x8048190
80485e7:        b9 fb 85 04 08              mov     ecx,0x80485fb
80485ec:        ba 02 00 00 00              mov     edx,0x2
80485f1:        e8 7a fb ff ff              call    0x8048170
80485f6:        e9 03 00 00 00              jmp     0x80485fe
80485fb:        2e 2e 00 8b 87 00 00        cs add BYTE PTR cs:[ebx+0x87],cl
8048602:        00
8048603:        00 e8                       add     al,ch
8048605:        87 fb                       xchg    ebx,edi
8048607:        ff                          (bad)
8048608:        ff                          (bad)
8048609:        e8 72 fb ff ff              call    0x8048180
804860e:        e9 ed fc ff ff              jmp     0x8048300
        ...
```

3.7.   BIEN-06

3.7.1.   Código Fuente

```
var IMPORTE, BILLETE, VUELTO, PESOS, CENTAVOS, VUELTOPESOS, VUELTOCENTAVOS,
    IMPORTEOK, CENTAVOSOK, PESOSOK, BILLETEOK, VUELTOOK;

procedure ERROR;
begin
  writeln ('VALOR FUERA DE RANGO!')
end;


begin
  WRITELN ('*****************************************');
  writeLn ('VUELTO PARA IMPORTES PAGADOS CON UN BILLETE');
  WRITELN ('*****************************************');
```

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```
writeln;
IMPORTEOK := -1;
while IMPORTEOK <> 0 do
  begin
    writeln ('IMPORTE (min $0.01 y max $100.00)');
    CENTAVOSOK := -1;
    while CENTAVOSOK <> 0 do
      begin
        write ('CENTAVOS: '); readLn (CENTAVOS);
        CENTAVOSOK := 0;
        if CENTAVOS < 0 then CENTAVOSOK := -1;
        if CENTAVOS > 99 then CENTAVOSOK := -1;
        if CENTAVOSOK <> 0 then call ERROR
      end;
    PESOSOK := -1;
    while PESOSOK <> 0 do
      begin
        write ('PESOS: '); readLn (PESOS);
        PESOSOK := 0;
        if PESOS < 0 then PESOSOK := -1;
        if PESOS > 100 then PESOSOK := -1;
        if PESOSOK <> 0 then call ERROR
       end;
    write ('IMPORTE: $', PESOS, '.');
    if CENTAVOS < 10 then write ('0');
    writeLn (CENTAVOS);
    IMPORTE := PESOS * 100 + CENTAVOS;
    IMPORTEOK := 0;
    if IMPORTE < 1 then IMPORTEOK := -1;
    if IMPORTE > 10000 then IMPORTEOK := -1;
    if IMPORTEOK <> 0 then call ERROR
  end;

VUELTOOK := -1;
while VUELTOOK <> 0 do
  begin
    BILLETEOK := -1;
    while BILLETEOK <> 0 do
      begin
        write ('BILLETE (min $2 y max $100): $'); readLn (BILLETE);
        BILLETEOK := -1;
        if BILLETE = 2 then BILLETEOK := 0;
        if BILLETE = 5 then BILLETEOK := 0;
        if BILLETE = 10 then BILLETEOK := 0;
        if BILLETE = 20 then BILLETEOK := 0;
        if BILLETE = 50 then BILLETEOK := 0;
        if BILLETE = 100 then BILLETEOK := 0;
        if BILLETEOK <> 0 then writeln ('BILLETE INEXISTENTE!')
      end;
```

```pascal
      VUELTO := BILLETE * 100 - IMPORTE;
      VUELTOOK := 0;
      if VUELTO < 0 then
        begin
          VUELTOOK := -1;
          writeLn ('BILLETE INSUFICIENTE PARA EL PAGO!')
        end
    end;

VUELTOPESOS := VUELTO / 100;
VUELTOCENTAVOS := VUELTO - VUELTOPESOS * 100;

write ('Su vuelto: $', VUELTOPESOS, '.');
if VUELTOCENTAVOS < 10 then write ('0');
writeLn (VUELTOCENTAVOS);

writeLn;

if VUELTO >= 5000 then
  begin
    writeLn ('1 billete de $50');
    VUELTO := VUELTO - 5000
  end;

if VUELTO >= 2000 then
  begin
    if VUELTO / 2000 = 1 then writeLn ('1 billete de $20');
    if VUELTO / 2000 <> 1 then writeLn ('2 billetes de $20');
    VUELTO := VUELTO - VUELTO / 2000 * 2000
  end;

if VUELTO >= 1000 then
  begin
    writeLn ('1 billete de $10');
    VUELTO := VUELTO - 1000
  end;

if VUELTO >= 500 then
  begin
    writeLn ('1 billete de $5');
    VUELTO := VUELTO - 500
  end;

if VUELTO >= 200 then
  begin
    if VUELTO / 200 = 1 then writeLn ('1 billete de $2');
    if VUELTO / 200 <> 1 then writeLn ('2 billetes de $2');
    VUELTO := VUELTO - VUELTO / 200 * 200
  end;
```

```
  if VUELTO >= 100 then
    begin
      writeLn ('1 moneda de $1');
      VUELTO := VUELTO - 100
    end;

  if VUELTO >= 50 then
    begin
      writeLn ('1 moneda de 50 centavos');
      VUELTO := VUELTO - 50
    end;

  if VUELTO >= 25 then
    begin
      writeLn ('1 moneda de 25 centavos');
      VUELTO := VUELTO - 25
    end;

  if VUELTO >= 10 then
    begin
      if VUELTO / 10 = 1 then writeLn ('1 moneda de 10 centavos');
      if VUELTO / 10 <> 1 then writeLn ('2 monedas de 10 centavos');
      VUELTO := VUELTO - VUELTO / 10 * 10
    end;

  if VUELTO >= 5 then
    begin
      writeLn ('1 moneda de 5 centavos');
      VUELTO := VUELTO - 5
    end;

  if VUELTO > 1 then writeLn (VUELTO, ' monedas de 1 centavo');
  if VUELTO = 1 then writeLn ('1 moneda de 1 centavo')

end.
```

3.7.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 1123 0000 1123 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
```

```
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 4300 0010 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
```

```
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 f3bf 0490 e908 0030 0000 9eb9 0484 ba08
0000490 0015 0000 d7e8 fffc e9ff 0016 0000 4156
00004a0 4f4c 2052 5546 5245 2041 4544 5220 4e41
00004b0 4f47 0021 c7e8 fffc c3ff ceb9 0484 ba08
00004c0 002b 0000 a7e8 fffc e9ff 002c 0000 2a2a
00004d0 2a2a 2a2a 2a2a 2a2a 2a2a 2a2a 2a2a 2a2a
*
00004f0 2a2a 2a2a 2a2a 2a2a 002a 81e8 fffc b9ff
0000500 8513 0804 2bba 0000 e800 fc62 ffff 2ce9
0000510 0000 5600 4555 544c 204f 4150 4152 4920
0000520 504d 524f 4554 2053 4150 4147 4f44 2053
0000530 4f43 204e 4e55 4220 4c49 454c 4554 e800
0000540 fc3c ffff 58b9 0485 ba08 002b 0000 1de8
0000550 fffc e9ff 002c 0000 2a2a 2a2a 2a2a 2a2a
0000560 2a2a 2a2a 2a2a 2a2a 2a2a 2a2a 2a2a 2a2a
*
0000580 2a2a 002a f7e8 fffb e8ff fbf2 ffff 01b8
0000590 0000 f700 89d8 1c87 0000 8b00 1c87 0000
00005a0 5000 00b8 0000 5b00 c339 0575 c0e9 0002
00005b0 b900 85c5 0804 21ba 0000 e800 fbb0 ffff
00005c0 22e9 0000 4900 504d 524f 4554 2820 696d
00005d0 206e 3024 302e 2031 2079 616d 2078 3124
00005e0 3030 302e 2930 e800 fb94 ffff 01b8 0000
00005f0 f700 89d8 2087 0000 8b00 2087 0000 5000
0000600 00b8 0000 5b00 c339 0575 9be9 0000 b900
0000610 8623 0804 0aba 0000 e800 fb52 ffff 0be9
0000620 0000 4300 4e45 4154 4f56 3a53 0020 dde8
0000630 fffc 89ff 1087 0000 b800 0000 0000 8789
0000640 0020 0000 878b 0010 0000 b850 0000 0000
```

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```
0000650 395b 7cc3 e905 000d 0000 01b8 0000 f700
0000660 89d8 2087 0000 8b00 1087 0000 5000 63b8
0000670 0000 5b00 c339 057f 0de9 0000 b800 0001
0000680 0000 d8f7 8789 0020 0000 878b 0020 0000
0000690 b850 0000 0000 395b 75c3 e905 0005 0000
00006a0 e5e8 fffd e9ff ff4f ffff 01b8 0000 f700
00006b0 89d8 2487 0000 8b00 2487 0000 5000 00b8
00006c0 0000 5b00 c339 0575 98e9 0000 b900 86e1
00006d0 0804 07ba 0000 e800 fa94 ffff 08e9 0000
00006e0 5000 5345 534f 203a e800 fc22 ffff 8789
00006f0 000c 0000 00b8 0000 8900 2487 0000 8b00
0000700 0c87 0000 5000 00b8 0000 5b00 c339 057c
0000710 0de9 0000 b800 0001 0000 d8f7 8789 0024
0000720 0000 878b 000c 0000 b850 0064 0000 395b
0000730 7fc3 e905 000d 0000 01b8 0000 f700 89d8
0000740 2487 0000 8b00 2487 0000 5000 00b8 0000
0000750 5b00 c339 0575 05e9 0000 e800 fd2a ffff
0000760 52e9 ffff b9ff 8779 0804 0aba 0000 e800
0000770 f9fc ffff 0be9 0000 4900 504d 524f 4554
0000780 203a 0024 878b 000c 0000 01e8 fffa b9ff
0000790 87a3 0804 01ba 0000 e800 f9d2 ffff 02e9
00007a0 0000 2e00 8b00 1087 0000 5000 0ab8 0000
00007b0 5b00 c339 057c 16e9 0000 b900 87cf 0804
00007c0 01ba 0000 e800 f9a6 ffff 02e9 0000 3000
00007d0 8b00 1087 0000 e800 f9b4 ffff 9fe8 fff9
00007e0 8bff 0c87 0000 5000 64b8 0000 5b00 ebf7
00007f0 8b50 1087 0000 5b00 d801 8789 0000 0000
0000800 00b8 0000 8900 1c87 0000 8b00 0087 0000
0000810 5000 01b8 0000 5b00 c339 057c 0de9 0000
0000820 b800 0001 0000 d8f7 8789 001c 0000 878b
0000830 0000 0000 b850 2710 0000 395b 7fc3 e905
0000840 000d 0000 01b8 0000 f700 89d8 1c87 0000
0000850 8b00 1c87 0000 5000 00b8 0000 5b00 c339
0000860 0575 05e9 0000 e800 fc1e ffff 2ae9 fffd
0000870 b8ff 0001 0000 d8f7 8789 002c 0000 878b
0000880 002c 0000 b850 0000 0000 395b 75c3 e905
0000890 020c 0000 01b8 0000 f700 89d8 2887 0000
00008a0 8b00 2887 0000 5000 00b8 0000 5b00 c339
00008b0 0575 5ae9 0001 b900 88cb 0804 1eba 0000
00008c0 e800 f8aa ffff 1fe9 0000 4200 4c49 454c
00008d0 4554 2820 696d 206e 3224 7920 6d20 7861
00008e0 2420 3031 2930 203a 0024 21e8 fffa 89ff
00008f0 0487 0000 b800 0001 0000 d8f7 8789 0028
0000900 0000 878b 0004 0000 b850 0002 0000 395b
0000910 74c3 e905 000b 0000 00b8 0000 8900 2887
0000920 0000 8b00 0487 0000 5000 05b8 0000 5b00
```

```
0000930 c339 0574 0be9 0000 b800 0000 0000 8789
0000940 0028 0000 878b 0004 0000 b850 000a 0000
0000950 395b 74c3 e905 000b 0000 00b8 0000 8900
0000960 2887 0000 8b00 0487 0000 5000 14b8 0000
0000970 5b00 c339 0574 0be9 0000 b800 0000 0000
0000980 8789 0028 0000 878b 0004 0000 b850 0032
0000990 0000 395b 74c3 e905 000b 0000 00b8 0000
00009a0 8900 2887 0000 8b00 0487 0000 5000 64b8
00009b0 0000 5b00 c339 0574 0be9 0000 b800 0000
00009c0 0000 8789 0028 0000 878b 0028 0000 b850
00009d0 0000 0000 395b 75c3 e905 002e 0000 f2b9
00009e0 0489 ba08 0014 0000 83e8 fff7 e9ff 0015
00009f0 0000 4942 4c4c 5445 2045 4e49 5845 5349
0000a00 4554 544e 2145 e800 f774 ffff 90e9 fffe
0000a10 8bff 0487 0000 5000 64b8 0000 5b00 ebf7
0000a20 8b50 0087 0000 5b00 2993 89d8 0887 0000
0000a30 b800 0000 0000 8789 002c 0000 878b 0008
0000a40 0000 b850 0000 0000 395b 7cc3 e905 0049
0000a50 0000 01b8 0000 f700 89d8 2c87 0000 b900
0000a60 8a73 0804 22ba 0000 e800 f702 ffff 23e9
0000a70 0000 4200 4c49 454c 4554 4920 534e 4655
0000a80 4349 4549 544e 2045 4150 4152 4520 204c
0000a90 4150 4f47 0021 e5e8 fff6 e9ff fdde ffff
0000aa0 878b 0008 0000 b850 0064 0000 935b f799
0000ab0 89fb 1487 0000 8b00 0887 0000 5000 878b
0000ac0 0014 0000 b850 0064 0000 f75b 5beb 2993
0000ad0 89d8 1887 0000 b900 8aeb 0804 0cba 0000
0000ae0 e800 f68a ffff 0de9 0000 5300 2075 7576
0000af0 6c65 6f74 203a 0024 878b 0014 0000 8de8
0000b00 fff6 b9ff 8b17 0804 01ba 0000 e800 f65e
0000b10 ffff 02e9 0000 2e00 8b00 1887 0000 5000
0000b20 0ab8 0000 5b00 c339 057c 16e9 0000 b900
0000b30 8b43 0804 01ba 0000 e800 f632 ffff 02e9
0000b40 0000 3000 8b00 1887 0000 e800 f640 ffff
0000b50 2be8 fff6 e8ff f626 ffff 878b 0008 0000
0000b60 b850 1388 0000 395b 7dc3 e905 0040 0000
0000b70 84b9 048b ba08 0010 0000 f1e8 fff5 e9ff
0000b80 0011 0000 2031 6962 6c6c 7465 2065 6564
0000b90 2420 3035 e800 f5e6 ffff 878b 0008 0000
0000ba0 b850 1388 0000 935b d829 8789 0008 0000
0000bb0 878b 0008 0000 b850 07d0 0000 395b 7dc3
0000bc0 e905 00c2 0000 878b 0008 0000 b850 07d0
0000bd0 0000 935b f799 50fb 01b8 0000 5b00 c339
0000be0 0574 2ae9 0000 b900 8bfb 0804 10ba 0000
0000bf0 e800 f57a ffff 11e9 0000 3100 6220 6c69
0000c00 656c 6574 6420 2065 3224 0030 6fe8 fff5
```

```
0000c10 8bff 0887 0000 5000 d0b8 0007 5b00 9993
0000c20 fbf7 b850 0001 0000 395b 75c3 e905 002b
0000c30 0000 46b9 048c ba08 0011 0000 2fe8 fff5
0000c40 e9ff 0012 0000 2032 6962 6c6c 7465 7365
0000c50 6420 2065 3224 0030 23e8 fff5 8bff 0887
0000c60 0000 5000 878b 0008 0000 b850 07d0 0000
0000c70 935b f799 50fb d0b8 0007 5b00 ebf7 935b
0000c80 d829 8789 0008 0000 878b 0008 0000 b850
0000c90 03e8 0000 395b 7dc3 e905 0040 0000 b2b9
0000ca0 048c ba08 0010 0000 c3e8 fff4 e9ff 0011
0000cb0 0000 2031 6962 6c6c 7465 2065 6564 2420
0000cc0 3031 e800 f4b8 ffff 878b 0008 0000 b850
0000cd0 03e8 0000 935b d829 8789 0008 0000 878b
0000ce0 0008 0000 b850 01f4 0000 395b 7dc3 e905
0000cf0 003f 0000 08b9 048d ba08 000f 0000 6de8
0000d00 fff4 e9ff 0010 0000 2031 6962 6c6c 7465
0000d10 2065 6564 2420 0035 63e8 fff4 8bff 0887
0000d20 0000 5000 f4b8 0001 5b00 2993 89d8 0887
0000d30 0000 8b00 0887 0000 5000 c8b8 0000 5b00
0000d40 c339 057d c0e9 0000 8b00 0887 0000 5000
0000d50 c8b8 0000 5b00 9993 fbf7 b850 0001 0000
0000d60 395b 74c3 e905 0029 0000 7eb9 048d ba08
0000d70 000f 0000 f7e8 fff3 e9ff 0010 0000 2031
0000d80 6962 6c6c 7465 2065 6564 2420 0032 ede8
0000d90 fff3 8bff 0887 0000 5000 c8b8 0000 5b00
0000da0 9993 fbf7 b850 0001 0000 395b 75c3 e905
0000db0 002a 0000 c8b9 048d ba08 0010 0000 ade8
0000dc0 fff3 e9ff 0011 0000 2032 6962 6c6c 7465
0000dd0 7365 6420 2065 3224 e800 f3a2 ffff 878b
0000de0 0008 0000 8b50 0887 0000 5000 c8b8 0000
0000df0 5b00 9993 fbf7 b850 00c8 0000 f75b 5beb
0000e00 2993 89d8 0887 0000 8b00 0887 0000 5000
0000e10 64b8 0000 5b00 c339 057d 3ee9 0000 b900
0000e20 8e33 0804 0eba 0000 e800 f342 ffff 0fe9
0000e30 0000 3100 6d20 6e6f 6465 2061 6564 2420
0000e40 0031 39e8 fff3 8bff 0887 0000 5000 64b8
0000e50 0000 5b00 2993 89d8 0887 0000 8b00 0887
0000e60 0000 5000 32b8 0000 5b00 c339 057d 47e9
0000e70 0000 b900 8e87 0804 17ba 0000 e800 f2ee
0000e80 ffff 18e9 0000 3100 6d20 6e6f 6465 2061
0000e90 6564 3520 2030 6563 746e 7661 736f e800
0000ea0 f2dc ffff 878b 0008 0000 b850 0032 0000
0000eb0 935b d829 8789 0008 0000 878b 0008 0000
0000ec0 b850 0019 0000 395b 7dc3 e905 0047 0000
0000ed0 e4b9 048e ba08 0017 0000 91e8 fff2 e9ff
0000ee0 0018 0000 2031 6f6d 656e 6164 6420 2065
```

```
0000ef0 3532 6320 6e65 6174 6f76 0073 7fe8 fff2
0000f00 8bff 0887 0000 5000 19b8 0000 5b00 2993
0000f10 89d8 0887 0000 8b00 0887 0000 5000 0ab8
0000f20 0000 5b00 c339 057d d0e9 0000 8b00 0887
0000f30 0000 5000 0ab8 0000 5b00 9993 fbf7 b850
0000f40 0001 0000 395b 74c3 e905 0031 0000 62b9
0000f50 048f ba08 0017 0000 13e8 fff2 e9ff 0018
0000f60 0000 2031 6f6d 656e 6164 6420 2065 3031
0000f70 6320 6e65 6174 6f76 0073 01e8 fff2 8bff
0000f80 0887 0000 5000 0ab8 0000 5b00 9993 fbf7
0000f90 b850 0001 0000 395b 75c3 e905 0032 0000
0000fa0 b4b9 048f ba08 0018 0000 c1e8 fff1 e9ff
0000fb0 0019 0000 2032 6f6d 656e 6164 2073 6564
0000fc0 3120 2030 6563 746e 7661 736f e800 f1ae
0000fd0 ffff 878b 0008 0000 8b50 0887 0000 5000
0000fe0 0ab8 0000 5b00 9993 fbf7 b850 000a 0000
0000ff0 f75b 5beb 2993 89d8 0887 0000 8b00 0887
0001000 0000 5000 05b8 0000 5b00 c339 057d 46e9
0001010 0000 b900 9027 0804 16ba 0000 e800 f14e
0001020 ffff 17e9 0000 3100 6d20 6e6f 6465 2061
0001030 6564 3520 6320 6e65 6174 6f76 0073 3de8
0001040 fff1 8bff 0887 0000 5000 05b8 0000 5b00
0001050 2993 89d8 0887 0000 8b00 0887 0000 5000
0001060 01b8 0000 5b00 c339 057f 3ae9 0000 8b00
0001070 0887 0000 e800 f116 ffff 8eb9 0490 ba08
0001080 0015 0000 e7e8 fff0 e9ff 0016 0000 6d20
0001090 6e6f 6465 7361 6420 2065 2031 6563 746e
00010a0 7661 006f d7e8 fff0 8bff 0887 0000 5000
00010b0 01b8 0000 5b00 c339 0574 2fe9 0000 b900
00010c0 90d3 0804 15ba 0000 e800 f0a2 ffff 16e9
00010d0 0000 3100 6d20 6e6f 6465 2061 6564 3120
00010e0 6320 6e65 6174 6f76 e800 f092 ffff 0de9
00010f0 fff2 00ff 0000 0000 0000 0000 0000 0000
0001100 0000 0000 0000 0000 0000 0000 0000 0000
*
0001123
```

3.7.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-06:     formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
        ...
```

```
8048480:        bf f3 90 04 08              mov     edi,0x80490f3
8048485:        e9 30 00 00 00              jmp     0x80484ba
804848a:        b9 9e 84 04 08              mov     ecx,0x804849e
804848f:        ba 15 00 00 00              mov     edx,0x15
8048494:        e8 d7 fc ff ff              call    0x8048170
8048499:        e9 16 00 00 00              jmp     0x80484b4
804849e:        56                          push    esi
804849f:        41                          inc     ecx
80484a0:        4c                          dec     esp
80484a1:        4f                          dec     edi
80484a2:        52                          push    edx
80484a3:        20 46 55                    and     BYTE PTR [esi+0x55],al
80484a6:        45                          inc     ebp
80484a7:        52                          push    edx
80484a8:        41                          inc     ecx
80484a9:        20 44 45 20                 and     BYTE PTR [ebp+eax*2+0x20],al
80484ad:        52                          push    edx
80484ae:        41                          inc     ecx
80484af:        4e                          dec     esi
80484b0:        47                          inc     edi
80484b1:        4f                          dec     edi
80484b2:        21 00                       and     DWORD PTR [eax],eax
80484b4:        e8 c7 fc ff ff              call    0x8048180
80484b9:        c3                          ret
80484ba:        b9 ce 84 04 08              mov     ecx,0x80484ce
80484bf:        ba 2b 00 00 00              mov     edx,0x2b
80484c4:        e8 a7 fc ff ff              call    0x8048170
80484c9:        e9 2c 00 00 00              jmp     0x80484fa
80484ce:        2a 2a                       sub     ch,BYTE PTR [edx]
80484d0:        2a 2a                       sub     ch,BYTE PTR [edx]
80484d2:        2a 2a                       sub     ch,BYTE PTR [edx]
80484d4:        2a 2a                       sub     ch,BYTE PTR [edx]
80484d6:        2a 2a                       sub     ch,BYTE PTR [edx]
80484d8:        2a 2a                       sub     ch,BYTE PTR [edx]
80484da:        2a 2a                       sub     ch,BYTE PTR [edx]
80484dc:        2a 2a                       sub     ch,BYTE PTR [edx]
80484de:        2a 2a                       sub     ch,BYTE PTR [edx]
80484e0:        2a 2a                       sub     ch,BYTE PTR [edx]
80484e2:        2a 2a                       sub     ch,BYTE PTR [edx]
80484e4:        2a 2a                       sub     ch,BYTE PTR [edx]
80484e6:        2a 2a                       sub     ch,BYTE PTR [edx]
80484e8:        2a 2a                       sub     ch,BYTE PTR [edx]
80484ea:        2a 2a                       sub     ch,BYTE PTR [edx]
80484ec:        2a 2a                       sub     ch,BYTE PTR [edx]
80484ee:        2a 2a                       sub     ch,BYTE PTR [edx]
80484f0:        2a 2a                       sub     ch,BYTE PTR [edx]
```

```
80484f2:        2a 2a                   sub     ch,BYTE PTR [edx]
80484f4:        2a 2a                   sub     ch,BYTE PTR [edx]
80484f6:        2a 2a                   sub     ch,BYTE PTR [edx]
80484f8:        2a 00                   sub     al,BYTE PTR [eax]
80484fa:        e8 81 fc ff ff          call    0x8048180
80484ff:        b9 13 85 04 08          mov     ecx,0x8048513
8048504:        ba 2b 00 00 00          mov     edx,0x2b
8048509:        e8 62 fc ff ff          call    0x8048170
804850e:        e9 2c 00 00 00          jmp     0x804853f
8048513:        56                      push    esi
8048514:        55                      push    ebp
8048515:        45                      inc     ebp
8048516:        4c                      dec     esp
8048517:        54                      push    esp
8048518:        4f                      dec     edi
8048519:        20 50 41                and     BYTE PTR [eax+0x41],dl
804851c:        52                      push    edx
804851d:        41                      inc     ecx
804851e:        20 49 4d                and     BYTE PTR [ecx+0x4d],cl
8048521:        50                      push    eax
8048522:        4f                      dec     edi
8048523:        52                      push    edx
8048524:        54                      push    esp
8048525:        45                      inc     ebp
8048526:        53                      push    ebx
8048527:        20 50 41                and     BYTE PTR [eax+0x41],dl
804852a:        47                      inc     edi
804852b:        41                      inc     ecx
804852c:        44                      inc     esp
804852d:        4f                      dec     edi
804852e:        53                      push    ebx
804852f:        20 43 4f                and     BYTE PTR [ebx+0x4f],al
8048532:        4e                      dec     esi
8048533:        20 55 4e                and     BYTE PTR [ebp+0x4e],dl
8048536:        20 42 49                and     BYTE PTR [edx+0x49],al
8048539:        4c                      dec     esp
804853a:        4c                      dec     esp
804853b:        45                      inc     ebp
804853c:        54                      push    esp
804853d:        45                      inc     ebp
804853e:        00 e8                   add     al,ch
8048540:        3c fc                   cmp     al,0xfc
8048542:        ff                      (bad)
8048543:        ff                      (bad)
8048544:        b9 58 85 04 08          mov     ecx,0x8048558
8048549:        ba 2b 00 00 00          mov     edx,0x2b
```

```
804854e:        e8 1d fc ff ff              call    0x8048170
8048553:        e9 2c 00 00 00              jmp     0x8048584
8048558:        2a 2a                       sub     ch,BYTE PTR [edx]
804855a:        2a 2a                       sub     ch,BYTE PTR [edx]
804855c:        2a 2a                       sub     ch,BYTE PTR [edx]
804855e:        2a 2a                       sub     ch,BYTE PTR [edx]
8048560:        2a 2a                       sub     ch,BYTE PTR [edx]
8048562:        2a 2a                       sub     ch,BYTE PTR [edx]
8048564:        2a 2a                       sub     ch,BYTE PTR [edx]
8048566:        2a 2a                       sub     ch,BYTE PTR [edx]
8048568:        2a 2a                       sub     ch,BYTE PTR [edx]
804856a:        2a 2a                       sub     ch,BYTE PTR [edx]
804856c:        2a 2a                       sub     ch,BYTE PTR [edx]
804856e:        2a 2a                       sub     ch,BYTE PTR [edx]
8048570:        2a 2a                       sub     ch,BYTE PTR [edx]
8048572:        2a 2a                       sub     ch,BYTE PTR [edx]
8048574:        2a 2a                       sub     ch,BYTE PTR [edx]
8048576:        2a 2a                       sub     ch,BYTE PTR [edx]
8048578:        2a 2a                       sub     ch,BYTE PTR [edx]
804857a:        2a 2a                       sub     ch,BYTE PTR [edx]
804857c:        2a 2a                       sub     ch,BYTE PTR [edx]
804857e:        2a 2a                       sub     ch,BYTE PTR [edx]
8048580:        2a 2a                       sub     ch,BYTE PTR [edx]
8048582:        2a 00                       sub     al,BYTE PTR [eax]
8048584:        e8 f7 fb ff ff              call    0x8048180
8048589:        e8 f2 fb ff ff              call    0x8048180
804858e:        b8 01 00 00 00              mov     eax,0x1
8048593:        f7 d8                       neg     eax
8048595:        89 87 1c 00 00 00           mov     DWORD PTR [edi+0x1c],eax
804859b:        8b 87 1c 00 00 00           mov     eax,DWORD PTR [edi+0x1c]
80485a1:        50                          push    eax
80485a2:        b8 00 00 00 00              mov     eax,0x0
80485a7:        5b                          pop     ebx
80485a8:        39 c3                       cmp     ebx,eax
80485aa:        75 05                       jne     0x80485b1
80485ac:        e9 c0 02 00 00              jmp     0x8048871
80485b1:        b9 c5 85 04 08              mov     ecx,0x80485c5
80485b6:        ba 21 00 00 00              mov     edx,0x21
80485bb:        e8 b0 fb ff ff              call    0x8048170
80485c0:        e9 22 00 00 00              jmp     0x80485e7
80485c5:        49                          dec     ecx
80485c6:        4d                          dec     ebp
80485c7:        50                          push    eax
80485c8:        4f                          dec     edi
80485c9:        52                          push    edx
80485ca:        54                          push    esp
```

```
80485cb:        45                              inc     ebp
80485cc:        20 28                           and     BYTE PTR [eax],ch
80485ce:        6d                              ins     DWORD PTR es:[edi],dx
80485cf:        69 6e 20 24 30 2e 30            imul    ebp,DWORD PTR [esi+0x20],0x302e3024
80485d6:        31 20                           xor     DWORD PTR [eax],esp
80485d8:        79 20                           jns     0x80485fa
80485da:        6d                              ins     DWORD PTR es:[edi],dx
80485db:        61                              popa
80485dc:        78 20                           js      0x80485fe
80485de:        24 31                           and     al,0x31
80485e0:        30 30                           xor     BYTE PTR [eax],dh
80485e2:        2e 30 30                        xor     BYTE PTR cs:[eax],dh
80485e5:        29 00                           sub     DWORD PTR [eax],eax
80485e7:        e8 94 fb ff ff                  call    0x8048180
80485ec:        b8 01 00 00 00                  mov     eax,0x1
80485f1:        f7 d8                           neg     eax
80485f3:        89 87 20 00 00 00               mov     DWORD PTR [edi+0x20],eax
80485f9:        8b 87 20 00 00 00               mov     eax,DWORD PTR [edi+0x20]
80485ff:        50                              push    eax
8048600:        b8 00 00 00 00                  mov     eax,0x0
8048605:        5b                              pop     ebx
8048606:        39 c3                           cmp     ebx,eax
8048608:        75 05                           jne     0x804860f
804860a:        e9 9b 00 00 00                  jmp     0x80486aa
804860f:        b9 23 86 04 08                  mov     ecx,0x8048623
8048614:        ba 0a 00 00 00                  mov     edx,0xa
8048619:        e8 52 fb ff ff                  call    0x8048170
804861e:        e9 0b 00 00 00                  jmp     0x804862e
8048623:        43                              inc     ebx
8048624:        45                              inc     ebp
8048625:        4e                              dec     esi
8048626:        54                              push    esp
8048627:        41                              inc     ecx
8048628:        56                              push    esi
8048629:        4f                              dec     edi
804862a:        53                              push    ebx
804862b:        3a 20                           cmp     ah,BYTE PTR [eax]
804862d:        00 e8                           add     al,ch
804862f:        dd fc                           (bad)
8048631:        ff                              (bad)
8048632:        ff 89 87 10 00 00               dec     DWORD PTR [ecx+0x1087]
8048638:        00 b8 00 00 00 00               add     BYTE PTR [eax+0x0],bh
804863e:        89 87 20 00 00 00               mov     DWORD PTR [edi+0x20],eax
8048644:        8b 87 10 00 00 00               mov     eax,DWORD PTR [edi+0x10]
804864a:        50                              push    eax
804864b:        b8 00 00 00 00                  mov     eax,0x0
```

```
8048650:        5b                              pop     ebx
8048651:        39 c3                           cmp     ebx,eax
8048653:        7c 05                           jl      0x804865a
8048655:        e9 0d 00 00 00                  jmp     0x8048667
804865a:        b8 01 00 00 00                  mov     eax,0x1
804865f:        f7 d8                           neg     eax
8048661:        89 87 20 00 00 00               mov     DWORD PTR [edi+0x20],eax
8048667:        8b 87 10 00 00 00               mov     eax,DWORD PTR [edi+0x10]
804866d:        50                              push    eax
804866e:        b8 63 00 00 00                  mov     eax,0x63
8048673:        5b                              pop     ebx
8048674:        39 c3                           cmp     ebx,eax
8048676:        7f 05                           jg      0x804867d
8048678:        e9 0d 00 00 00                  jmp     0x804868a
804867d:        b8 01 00 00 00                  mov     eax,0x1
8048682:        f7 d8                           neg     eax
8048684:        89 87 20 00 00 00               mov     DWORD PTR [edi+0x20],eax
804868a:        8b 87 20 00 00 00               mov     eax,DWORD PTR [edi+0x20]
8048690:        50                              push    eax
8048691:        b8 00 00 00 00                  mov     eax,0x0
8048696:        5b                              pop     ebx
8048697:        39 c3                           cmp     ebx,eax
8048699:        75 05                           jne     0x80486a0
804869b:        e9 05 00 00 00                  jmp     0x80486a5
80486a0:        e8 e5 fd ff ff                  call    0x804848a
80486a5:        e9 4f ff ff ff                  jmp     0x80485f9
80486aa:        b8 01 00 00 00                  mov     eax,0x1
80486af:        f7 d8                           neg     eax
80486b1:        89 87 24 00 00 00               mov     DWORD PTR [edi+0x24],eax
80486b7:        8b 87 24 00 00 00               mov     eax,DWORD PTR [edi+0x24]
80486bd:        50                              push    eax
80486be:        b8 00 00 00 00                  mov     eax,0x0
80486c3:        5b                              pop     ebx
80486c4:        39 c3                           cmp     ebx,eax
80486c6:        75 05                           jne     0x80486cd
80486c8:        e9 98 00 00 00                  jmp     0x8048765
80486cd:        b9 e1 86 04 08                  mov     ecx,0x80486e1
80486d2:        ba 07 00 00 00                  mov     edx,0x7
80486d7:        e8 94 fa ff ff                  call    0x8048170
80486dc:        e9 08 00 00 00                  jmp     0x80486e9
80486e1:        50                              push    eax
80486e2:        45                              inc     ebp
80486e3:        53                              push    ebx
80486e4:        4f                              dec     edi
80486e5:        53                              push    ebx
80486e6:        3a 20                           cmp     ah,BYTE PTR [eax]
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```
80486e8:        00 e8                           add     al,ch
80486ea:        22 fc                           and     bh,ah
80486ec:        ff                              (bad)
80486ed:        ff 89 87 0c 00 00               dec     DWORD PTR [ecx+0xc87]
80486f3:        00 b8 00 00 00 00               add     BYTE PTR [eax+0x0],bh
80486f9:        89 87 24 00 00 00               mov     DWORD PTR [edi+0x24],eax
80486ff:        8b 87 0c 00 00 00               mov     eax,DWORD PTR [edi+0xc]
8048705:        50                              push    eax
8048706:        b8 00 00 00 00                  mov     eax,0x0
804870b:        5b                              pop     ebx
804870c:        39 c3                           cmp     ebx,eax
804870e:        7c 05                           jl      0x8048715
8048710:        e9 0d 00 00 00                  jmp     0x8048722
8048715:        b8 01 00 00 00                  mov     eax,0x1
804871a:        f7 d8                           neg     eax
804871c:        89 87 24 00 00 00               mov     DWORD PTR [edi+0x24],eax
8048722:        8b 87 0c 00 00 00               mov     eax,DWORD PTR [edi+0xc]
8048728:        50                              push    eax
8048729:        b8 64 00 00 00                  mov     eax,0x64
804872e:        5b                              pop     ebx
804872f:        39 c3                           cmp     ebx,eax
8048731:        7f 05                           jg      0x8048738
8048733:        e9 0d 00 00 00                  jmp     0x8048745
8048738:        b8 01 00 00 00                  mov     eax,0x1
804873d:        f7 d8                           neg     eax
804873f:        89 87 24 00 00 00               mov     DWORD PTR [edi+0x24],eax
8048745:        8b 87 24 00 00 00               mov     eax,DWORD PTR [edi+0x24]
804874b:        50                              push    eax
804874c:        b8 00 00 00 00                  mov     eax,0x0
8048751:        5b                              pop     ebx
8048752:        39 c3                           cmp     ebx,eax
8048754:        75 05                           jne     0x804875b
8048756:        e9 05 00 00 00                  jmp     0x8048760
804875b:        e8 2a fd ff ff                  call    0x804848a
8048760:        e9 52 ff ff ff                  jmp     0x80486b7
8048765:        b9 79 87 04 08                  mov     ecx,0x8048779
804876a:        ba 0a 00 00 00                  mov     edx,0xa
804876f:        e8 fc f9 ff ff                  call    0x8048170
8048774:        e9 0b 00 00 00                  jmp     0x8048784
8048779:        49                              dec     ecx
804877a:        4d                              dec     ebp
804877b:        50                              push    eax
804877c:        4f                              dec     edi
804877d:        52                              push    edx
804877e:        54                              push    esp
804877f:        45                              inc     ebp
```

```
8048780:        3a 20                   cmp     ah,BYTE PTR [eax]
8048782:        24 00                   and     al,0x0
8048784:        8b 87 0c 00 00 00       mov     eax,DWORD PTR [edi+0xc]
804878a:        e8 01 fa ff ff          call    0x8048190
804878f:        b9 a3 87 04 08          mov     ecx,0x80487a3
8048794:        ba 01 00 00 00          mov     edx,0x1
8048799:        e8 d2 f9 ff ff          call    0x8048170
804879e:        e9 02 00 00 00          jmp     0x80487a5
80487a3:        2e 00 8b 87 10 00 00    add     BYTE PTR cs:[ebx+0x1087],cl
80487aa:        00 50 b8                add     BYTE PTR [eax-0x48],dl
80487ad:        0a 00                   or      al,BYTE PTR [eax]
80487af:        00 00                   add     BYTE PTR [eax],al
80487b1:        5b                      pop     ebx
80487b2:        39 c3                   cmp     ebx,eax
80487b4:        7c 05                   jl      0x80487bb
80487b6:        e9 16 00 00 00          jmp     0x80487d1
80487bb:        b9 cf 87 04 08          mov     ecx,0x80487cf
80487c0:        ba 01 00 00 00          mov     edx,0x1
80487c5:        e8 a6 f9 ff ff          call    0x8048170
80487ca:        e9 02 00 00 00          jmp     0x80487d1
80487cf:        30 00                   xor     BYTE PTR [eax],al
80487d1:        8b 87 10 00 00 00       mov     eax,DWORD PTR [edi+0x10]
80487d7:        e8 b4 f9 ff ff          call    0x8048190
80487dc:        e8 9f f9 ff ff          call    0x8048180
80487e1:        8b 87 0c 00 00 00       mov     eax,DWORD PTR [edi+0xc]
80487e7:        50                      push    eax
80487e8:        b8 64 00 00 00          mov     eax,0x64
80487ed:        5b                      pop     ebx
80487ee:        f7 eb                   imul    ebx
80487f0:        50                      push    eax
80487f1:        8b 87 10 00 00 00       mov     eax,DWORD PTR [edi+0x10]
80487f7:        5b                      pop     ebx
80487f8:        01 d8                   add     eax,ebx
80487fa:        89 87 00 00 00 00       mov     DWORD PTR [edi+0x0],eax
8048800:        b8 00 00 00 00          mov     eax,0x0
8048805:        89 87 1c 00 00 00       mov     DWORD PTR [edi+0x1c],eax
804880b:        8b 87 00 00 00 00       mov     eax,DWORD PTR [edi+0x0]
8048811:        50                      push    eax
8048812:        b8 01 00 00 00          mov     eax,0x1
8048817:        5b                      pop     ebx
8048818:        39 c3                   cmp     ebx,eax
804881a:        7c 05                   jl      0x8048821
804881c:        e9 0d 00 00 00          jmp     0x804882e
8048821:        b8 01 00 00 00          mov     eax,0x1
8048826:        f7 d8                   neg     eax
8048828:        89 87 1c 00 00 00       mov     DWORD PTR [edi+0x1c],eax
```

```
804882e:        8b 87 00 00 00 00       mov     eax,DWORD PTR [edi+0x0]
8048834:        50                      push    eax
8048835:        b8 10 27 00 00          mov     eax,0x2710
804883a:        5b                      pop     ebx
804883b:        39 c3                   cmp     ebx,eax
804883d:        7f 05                   jg      0x8048844
804883f:        e9 0d 00 00 00          jmp     0x8048851
8048844:        b8 01 00 00 00          mov     eax,0x1
8048849:        f7 d8                   neg     eax
804884b:        89 87 1c 00 00 00       mov     DWORD PTR [edi+0x1c],eax
8048851:        8b 87 1c 00 00 00       mov     eax,DWORD PTR [edi+0x1c]
8048857:        50                      push    eax
8048858:        b8 00 00 00 00          mov     eax,0x0
804885d:        5b                      pop     ebx
804885e:        39 c3                   cmp     ebx,eax
8048860:        75 05                   jne     0x8048867
8048862:        e9 05 00 00 00          jmp     0x804886c
8048867:        e8 1e fc ff ff          call    0x804848a
804886c:        e9 2a fd ff ff          jmp     0x804859b
8048871:        b8 01 00 00 00          mov     eax,0x1
8048876:        f7 d8                   neg     eax
8048878:        89 87 2c 00 00 00       mov     DWORD PTR [edi+0x2c],eax
804887e:        8b 87 2c 00 00 00       mov     eax,DWORD PTR [edi+0x2c]
8048884:        50                      push    eax
8048885:        b8 00 00 00 00          mov     eax,0x0
804888a:        5b                      pop     ebx
804888b:        39 c3                   cmp     ebx,eax
804888d:        75 05                   jne     0x8048894
804888f:        e9 0c 02 00 00          jmp     0x8048aa0
8048894:        b8 01 00 00 00          mov     eax,0x1
8048899:        f7 d8                   neg     eax
804889b:        89 87 28 00 00 00       mov     DWORD PTR [edi+0x28],eax
80488a1:        8b 87 28 00 00 00       mov     eax,DWORD PTR [edi+0x28]
80488a7:        50                      push    eax
80488a8:        b8 00 00 00 00          mov     eax,0x0
80488ad:        5b                      pop     ebx
80488ae:        39 c3                   cmp     ebx,eax
80488b0:        75 05                   jne     0x80488b7
80488b2:        e9 5a 01 00 00          jmp     0x8048a11
80488b7:        b9 cb 88 04 08          mov     ecx,0x80488cb
80488bc:        ba 1e 00 00 00          mov     edx,0x1e
80488c1:        e8 aa f8 ff ff          call    0x8048170
80488c6:        e9 1f 00 00 00          jmp     0x80488ea
80488cb:        42                      inc     edx
80488cc:        49                      dec     ecx
80488cd:        4c                      dec     esp
```

```
80488ce:        4c                              dec     esp
80488cf:        45                              inc     ebp
80488d0:        54                              push    esp
80488d1:        45                              inc     ebp
80488d2:        20 28                           and     BYTE PTR [eax],ch
80488d4:        6d                              ins     DWORD PTR es:[edi],dx
80488d5:        69 6e 20 24 32 20 79            imul    ebp,DWORD PTR [esi+0x20],0x79203224
80488dc:        20 6d 61                        and     BYTE PTR [ebp+0x61],ch
80488df:        78 20                           js      0x8048901
80488e1:        24 31                           and     al,0x31
80488e3:        30 30                           xor     BYTE PTR [eax],dh
80488e5:        29 3a                           sub     DWORD PTR [edx],edi
80488e7:        20 24 00                        and     BYTE PTR [eax+eax*1],ah
80488ea:        e8 21 fa ff ff                  call    0x8048310
80488ef:        89 87 04 00 00 00               mov     DWORD PTR [edi+0x4],eax
80488f5:        b8 01 00 00 00                  mov     eax,0x1
80488fa:        f7 d8                           neg     eax
80488fc:        89 87 28 00 00 00               mov     DWORD PTR [edi+0x28],eax
8048902:        8b 87 04 00 00 00               mov     eax,DWORD PTR [edi+0x4]
8048908:        50                              push    eax
8048909:        b8 02 00 00 00                  mov     eax,0x2
804890e:        5b                              pop     ebx
804890f:        39 c3                           cmp     ebx,eax
8048911:        74 05                           je      0x8048918
8048913:        e9 0b 00 00 00                  jmp     0x8048923
8048918:        b8 00 00 00 00                  mov     eax,0x0
804891d:        89 87 28 00 00 00               mov     DWORD PTR [edi+0x28],eax
8048923:        8b 87 04 00 00 00               mov     eax,DWORD PTR [edi+0x4]
8048929:        50                              push    eax
804892a:        b8 05 00 00 00                  mov     eax,0x5
804892f:        5b                              pop     ebx
8048930:        39 c3                           cmp     ebx,eax
8048932:        74 05                           je      0x8048939
8048934:        e9 0b 00 00 00                  jmp     0x8048944
8048939:        b8 00 00 00 00                  mov     eax,0x0
804893e:        89 87 28 00 00 00               mov     DWORD PTR [edi+0x28],eax
8048944:        8b 87 04 00 00 00               mov     eax,DWORD PTR [edi+0x4]
804894a:        50                              push    eax
804894b:        b8 0a 00 00 00                  mov     eax,0xa
8048950:        5b                              pop     ebx
8048951:        39 c3                           cmp     ebx,eax
8048953:        74 05                           je      0x804895a
8048955:        e9 0b 00 00 00                  jmp     0x8048965
804895a:        b8 00 00 00 00                  mov     eax,0x0
804895f:        89 87 28 00 00 00               mov     DWORD PTR [edi+0x28],eax
8048965:        8b 87 04 00 00 00               mov     eax,DWORD PTR [edi+0x4]
```

```
804896b:        50                          push    eax
804896c:        b8 14 00 00 00              mov     eax,0x14
8048971:        5b                          pop     ebx
8048972:        39 c3                       cmp     ebx,eax
8048974:        74 05                       je      0x804897b
8048976:        e9 0b 00 00 00              jmp     0x8048986
804897b:        b8 00 00 00 00              mov     eax,0x0
8048980:        89 87 28 00 00 00           mov     DWORD PTR [edi+0x28],eax
8048986:        8b 87 04 00 00 00           mov     eax,DWORD PTR [edi+0x4]
804898c:        50                          push    eax
804898d:        b8 32 00 00 00              mov     eax,0x32
8048992:        5b                          pop     ebx
8048993:        39 c3                       cmp     ebx,eax
8048995:        74 05                       je      0x804899c
8048997:        e9 0b 00 00 00              jmp     0x80489a7
804899c:        b8 00 00 00 00              mov     eax,0x0
80489a1:        89 87 28 00 00 00           mov     DWORD PTR [edi+0x28],eax
80489a7:        8b 87 04 00 00 00           mov     eax,DWORD PTR [edi+0x4]
80489ad:        50                          push    eax
80489ae:        b8 64 00 00 00              mov     eax,0x64
80489b3:        5b                          pop     ebx
80489b4:        39 c3                       cmp     ebx,eax
80489b6:        74 05                       je      0x80489bd
80489b8:        e9 0b 00 00 00              jmp     0x80489c8
80489bd:        b8 00 00 00 00              mov     eax,0x0
80489c2:        89 87 28 00 00 00           mov     DWORD PTR [edi+0x28],eax
80489c8:        8b 87 28 00 00 00           mov     eax,DWORD PTR [edi+0x28]
80489ce:        50                          push    eax
80489cf:        b8 00 00 00 00              mov     eax,0x0
80489d4:        5b                          pop     ebx
80489d5:        39 c3                       cmp     ebx,eax
80489d7:        75 05                       jne     0x80489de
80489d9:        e9 2e 00 00 00              jmp     0x8048a0c
80489de:        b9 f2 89 04 08              mov     ecx,0x80489f2
80489e3:        ba 14 00 00 00              mov     edx,0x14
80489e8:        e8 83 f7 ff ff              call    0x8048170
80489ed:        e9 15 00 00 00              jmp     0x8048a07
80489f2:        42                          inc     edx
80489f3:        49                          dec     ecx
80489f4:        4c                          dec     esp
80489f5:        4c                          dec     esp
80489f6:        45                          inc     ebp
80489f7:        54                          push    esp
80489f8:        45                          inc     ebp
80489f9:        20 49 4e                    and     BYTE PTR [ecx+0x4e],cl
80489fc:        45                          inc     ebp
```

```
80489fd:        58                              pop     eax
80489fe:        49                              dec     ecx
80489ff:        53                              push    ebx
8048a00:        54                              push    esp
8048a01:        45                              inc     ebp
8048a02:        4e                              dec     esi
8048a03:        54                              push    esp
8048a04:        45                              inc     ebp
8048a05:        21 00                           and     DWORD PTR [eax],eax
8048a07:        e8 74 f7 ff ff                  call    0x8048180
8048a0c:        e9 90 fe ff ff                  jmp     0x80488a1
8048a11:        8b 87 04 00 00 00               mov     eax,DWORD PTR [edi+0x4]
8048a17:        50                              push    eax
8048a18:        b8 64 00 00 00                  mov     eax,0x64
8048a1d:        5b                              pop     ebx
8048a1e:        f7 eb                           imul    ebx
8048a20:        50                              push    eax
8048a21:        8b 87 00 00 00 00               mov     eax,DWORD PTR [edi+0x0]
8048a27:        5b                              pop     ebx
8048a28:        93                              xchg    ebx,eax
8048a29:        29 d8                           sub     eax,ebx
8048a2b:        89 87 08 00 00 00               mov     DWORD PTR [edi+0x8],eax
8048a31:        b8 00 00 00 00                  mov     eax,0x0
8048a36:        89 87 2c 00 00 00               mov     DWORD PTR [edi+0x2c],eax
8048a3c:        8b 87 08 00 00 00               mov     eax,DWORD PTR [edi+0x8]
8048a42:        50                              push    eax
8048a43:        b8 00 00 00 00                  mov     eax,0x0
8048a48:        5b                              pop     ebx
8048a49:        39 c3                           cmp     ebx,eax
8048a4b:        7c 05                           jl      0x8048a52
8048a4d:        e9 49 00 00 00                  jmp     0x8048a9b
8048a52:        b8 01 00 00 00                  mov     eax,0x1
8048a57:        f7 d8                           neg     eax
8048a59:        89 87 2c 00 00 00               mov     DWORD PTR [edi+0x2c],eax
8048a5f:        b9 73 8a 04 08                  mov     ecx,0x8048a73
8048a64:        ba 22 00 00 00                  mov     edx,0x22
8048a69:        e8 02 f7 ff ff                  call    0x8048170
8048a6e:        e9 23 00 00 00                  jmp     0x8048a96
8048a73:        42                              inc     edx
8048a74:        49                              dec     ecx
8048a75:        4c                              dec     esp
8048a76:        4c                              dec     esp
8048a77:        45                              inc     ebp
8048a78:        54                              push    esp
8048a79:        45                              inc     ebp
8048a7a:        20 49 4e                        and     BYTE PTR [ecx+0x4e],cl
```

```
8048a7d:        53                      push    ebx
8048a7e:        55                      push    ebp
8048a7f:        46                      inc     esi
8048a80:        49                      dec     ecx
8048a81:        43                      inc     ebx
8048a82:        49                      dec     ecx
8048a83:        45                      inc     ebp
8048a84:        4e                      dec     esi
8048a85:        54                      push    esp
8048a86:        45                      inc     ebp
8048a87:        20 50 41                and     BYTE PTR [eax+0x41],dl
8048a8a:        52                      push    edx
8048a8b:        41                      inc     ecx
8048a8c:        20 45 4c                and     BYTE PTR [ebp+0x4c],al
8048a8f:        20 50 41                and     BYTE PTR [eax+0x41],dl
8048a92:        47                      inc     edi
8048a93:        4f                      dec     edi
8048a94:        21 00                   and     DWORD PTR [eax],eax
8048a96:        e8 e5 f6 ff ff          call    0x8048180
8048a9b:        e9 de fd ff ff          jmp     0x804887e
8048aa0:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048aa6:        50                      push    eax
8048aa7:        b8 64 00 00 00          mov     eax,0x64
8048aac:        5b                      pop     ebx
8048aad:        93                      xchg    ebx,eax
8048aae:        99                      cdq
8048aaf:        f7 fb                   idiv    ebx
8048ab1:        89 87 14 00 00 00       mov     DWORD PTR [edi+0x14],eax
8048ab7:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048abd:        50                      push    eax
8048abe:        8b 87 14 00 00 00       mov     eax,DWORD PTR [edi+0x14]
8048ac4:        50                      push    eax
8048ac5:        b8 64 00 00 00          mov     eax,0x64
8048aca:        5b                      pop     ebx
8048acb:        f7 eb                   imul    ebx
8048acd:        5b                      pop     ebx
8048ace:        93                      xchg    ebx,eax
8048acf:        29 d8                   sub     eax,ebx
8048ad1:        89 87 18 00 00 00       mov     DWORD PTR [edi+0x18],eax
8048ad7:        b9 eb 8a 04 08          mov     ecx,0x8048aeb
8048adc:        ba 0c 00 00 00          mov     edx,0xc
8048ae1:        e8 8a f6 ff ff          call    0x8048170
8048ae6:        e9 0d 00 00 00          jmp     0x8048af8
8048aeb:        53                      push    ebx
8048aec:        75 20                   jne     0x8048b0e
8048aee:        76 75                   jbe     0x8048b65
```

```
8048af0:        65                              gs
8048af1:        6c                              ins     BYTE PTR es:[edi],dx
8048af2:        74 6f                           je      0x8048b63
8048af4:        3a 20                           cmp     ah,BYTE PTR [eax]
8048af6:        24 00                           and     al,0x0
8048af8:        8b 87 14 00 00 00               mov     eax,DWORD PTR [edi+0x14]
8048afe:        e8 8d f6 ff ff                  call    0x8048190
8048b03:        b9 17 8b 04 08                  mov     ecx,0x8048b17
8048b08:        ba 01 00 00 00                  mov     edx,0x1
8048b0d:        e8 5e f6 ff ff                  call    0x8048170
8048b12:        e9 02 00 00 00                  jmp     0x8048b19
8048b17:        2e 00 8b 87 18 00 00            add     BYTE PTR cs:[ebx+0x1887],cl
8048b1e:        00 50 b8                        add     BYTE PTR [eax-0x48],dl
8048b21:        0a 00                           or      al,BYTE PTR [eax]
8048b23:        00 00                           add     BYTE PTR [eax],al
8048b25:        5b                              pop     ebx
8048b26:        39 c3                           cmp     ebx,eax
8048b28:        7c 05                           jl      0x8048b2f
8048b2a:        e9 16 00 00 00                  jmp     0x8048b45
8048b2f:        b9 43 8b 04 08                  mov     ecx,0x8048b43
8048b34:        ba 01 00 00 00                  mov     edx,0x1
8048b39:        e8 32 f6 ff ff                  call    0x8048170
8048b3e:        e9 02 00 00 00                  jmp     0x8048b45
8048b43:        30 00                           xor     BYTE PTR [eax],al
8048b45:        8b 87 18 00 00 00               mov     eax,DWORD PTR [edi+0x18]
8048b4b:        e8 40 f6 ff ff                  call    0x8048190
8048b50:        e8 2b f6 ff ff                  call    0x8048180
8048b55:        e8 26 f6 ff ff                  call    0x8048180
8048b5a:        8b 87 08 00 00 00               mov     eax,DWORD PTR [edi+0x8]
8048b60:        50                              push    eax
8048b61:        b8 88 13 00 00                  mov     eax,0x1388
8048b66:        5b                              pop     ebx
8048b67:        39 c3                           cmp     ebx,eax
8048b69:        7d 05                           jge     0x8048b70
8048b6b:        e9 40 00 00 00                  jmp     0x8048bb0
8048b70:        b9 84 8b 04 08                  mov     ecx,0x8048b84
8048b75:        ba 10 00 00 00                  mov     edx,0x10
8048b7a:        e8 f1 f5 ff ff                  call    0x8048170
8048b7f:        e9 11 00 00 00                  jmp     0x8048b95
8048b84:        31 20                           xor     DWORD PTR [eax],esp
8048b86:        62 69 6c                        bound   ebp,QWORD PTR [ecx+0x6c]
8048b89:        6c                              ins     BYTE PTR es:[edi],dx
8048b8a:        65                              gs
8048b8b:        74 65                           je      0x8048bf2
8048b8d:        20 64 65 20                     and     BYTE PTR [ebp+eiz*2+0x20],ah
8048b91:        24 35                           and     al,0x35
```

```
8048b93:        30 00                    xor     BYTE PTR [eax],al
8048b95:        e8 e6 f5 ff ff           call    0x8048180
8048b9a:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048ba0:        50                       push    eax
8048ba1:        b8 88 13 00 00           mov     eax,0x1388
8048ba6:        5b                       pop     ebx
8048ba7:        93                       xchg    ebx,eax
8048ba8:        29 d8                    sub     eax,ebx
8048baa:        89 87 08 00 00 00        mov     DWORD PTR [edi+0x8],eax
8048bb0:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048bb6:        50                       push    eax
8048bb7:        b8 d0 07 00 00           mov     eax,0x7d0
8048bbc:        5b                       pop     ebx
8048bbd:        39 c3                    cmp     ebx,eax
8048bbf:        7d 05                    jge     0x8048bc6
8048bc1:        e9 c2 00 00 00           jmp     0x8048c88
8048bc6:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048bcc:        50                       push    eax
8048bcd:        b8 d0 07 00 00           mov     eax,0x7d0
8048bd2:        5b                       pop     ebx
8048bd3:        93                       xchg    ebx,eax
8048bd4:        99                       cdq
8048bd5:        f7 fb                    idiv    ebx
8048bd7:        50                       push    eax
8048bd8:        b8 01 00 00 00           mov     eax,0x1
8048bdd:        5b                       pop     ebx
8048bde:        39 c3                    cmp     ebx,eax
8048be0:        74 05                    je      0x8048be7
8048be2:        e9 2a 00 00 00           jmp     0x8048c11
8048be7:        b9 fb 8b 04 08           mov     ecx,0x8048bfb
8048bec:        ba 10 00 00 00           mov     edx,0x10
8048bf1:        e8 7a f5 ff ff           call    0x8048170
8048bf6:        e9 11 00 00 00           jmp     0x8048c0c
8048bfb:        31 20                    xor     DWORD PTR [eax],esp
8048bfd:        62 69 6c                 bound   ebp,QWORD PTR [ecx+0x6c]
8048c00:        6c                       ins     BYTE PTR es:[edi],dx
8048c01:        65                       gs
8048c02:        74 65                    je      0x8048c69
8048c04:        20 64 65 20              and     BYTE PTR [ebp+eiz*2+0x20],ah
8048c08:        24 32                    and     al,0x32
8048c0a:        30 00                    xor     BYTE PTR [eax],al
8048c0c:        e8 6f f5 ff ff           call    0x8048180
8048c11:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048c17:        50                       push    eax
8048c18:        b8 d0 07 00 00           mov     eax,0x7d0
8048c1d:        5b                       pop     ebx
```

```
8048c1e:        93                      xchg    ebx,eax
8048c1f:        99                      cdq
8048c20:        f7 fb                   idiv    ebx
8048c22:        50                      push    eax
8048c23:        b8 01 00 00 00          mov     eax,0x1
8048c28:        5b                      pop     ebx
8048c29:        39 c3                   cmp     ebx,eax
8048c2b:        75 05                   jne     0x8048c32
8048c2d:        e9 2b 00 00 00          jmp     0x8048c5d
8048c32:        b9 46 8c 04 08          mov     ecx,0x8048c46
8048c37:        ba 11 00 00 00          mov     edx,0x11
8048c3c:        e8 2f f5 ff ff          call    0x8048170
8048c41:        e9 12 00 00 00          jmp     0x8048c58
8048c46:        32 20                   xor     ah,BYTE PTR [eax]
8048c48:        62 69 6c                bound   ebp,QWORD PTR [ecx+0x6c]
8048c4b:        6c                      ins     BYTE PTR es:[edi],dx
8048c4c:        65                      gs
8048c4d:        74 65                   je      0x8048cb4
8048c4f:        73 20                   jae     0x8048c71
8048c51:        64 65 20 24 32          fs and BYTE PTR fs:gs:[edx+esi*1],ah
8048c56:        30 00                   xor     BYTE PTR [eax],al
8048c58:        e8 23 f5 ff ff          call    0x8048180
8048c5d:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048c63:        50                      push    eax
8048c64:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048c6a:        50                      push    eax
8048c6b:        b8 d0 07 00 00          mov     eax,0x7d0
8048c70:        5b                      pop     ebx
8048c71:        93                      xchg    ebx,eax
8048c72:        99                      cdq
8048c73:        f7 fb                   idiv    ebx
8048c75:        50                      push    eax
8048c76:        b8 d0 07 00 00          mov     eax,0x7d0
8048c7b:        5b                      pop     ebx
8048c7c:        f7 eb                   imul    ebx
8048c7e:        5b                      pop     ebx
8048c7f:        93                      xchg    ebx,eax
8048c80:        29 d8                   sub     eax,ebx
8048c82:        89 87 08 00 00 00       mov     DWORD PTR [edi+0x8],eax
8048c88:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048c8e:        50                      push    eax
8048c8f:        b8 e8 03 00 00          mov     eax,0x3e8
8048c94:        5b                      pop     ebx
8048c95:        39 c3                   cmp     ebx,eax
8048c97:        7d 05                   jge     0x8048c9e
8048c99:        e9 40 00 00 00          jmp     0x8048cde
```

```
8048c9e:        b9 b2 8c 04 08          mov     ecx,0x8048cb2
8048ca3:        ba 10 00 00 00          mov     edx,0x10
8048ca8:        e8 c3 f4 ff ff          call    0x8048170
8048cad:        e9 11 00 00 00          jmp     0x8048cc3
8048cb2:        31 20                   xor     DWORD PTR [eax],esp
8048cb4:        62 69 6c                bound   ebp,QWORD PTR [ecx+0x6c]
8048cb7:        6c                      ins     BYTE PTR es:[edi],dx
8048cb8:        65                      gs
8048cb9:        74 65                   je      0x8048d20
8048cbb:        20 64 65 20             and     BYTE PTR [ebp+eiz*2+0x20],ah
8048cbf:        24 31                   and     al,0x31
8048cc1:        30 00                   xor     BYTE PTR [eax],al
8048cc3:        e8 b8 f4 ff ff          call    0x8048180
8048cc8:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048cce:        50                      push    eax
8048ccf:        b8 e8 03 00 00          mov     eax,0x3e8
8048cd4:        5b                      pop     ebx
8048cd5:        93                      xchg    ebx,eax
8048cd6:        29 d8                   sub     eax,ebx
8048cd8:        89 87 08 00 00 00       mov     DWORD PTR [edi+0x8],eax
8048cde:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048ce4:        50                      push    eax
8048ce5:        b8 f4 01 00 00          mov     eax,0x1f4
8048cea:        5b                      pop     ebx
8048ceb:        39 c3                   cmp     ebx,eax
8048ced:        7d 05                   jge     0x8048cf4
8048cef:        e9 3f 00 00 00          jmp     0x8048d33
8048cf4:        b9 08 8d 04 08          mov     ecx,0x8048d08
8048cf9:        ba 0f 00 00 00          mov     edx,0xf
8048cfe:        e8 6d f4 ff ff          call    0x8048170
8048d03:        e9 10 00 00 00          jmp     0x8048d18
8048d08:        31 20                   xor     DWORD PTR [eax],esp
8048d0a:        62 69 6c                bound   ebp,QWORD PTR [ecx+0x6c]
8048d0d:        6c                      ins     BYTE PTR es:[edi],dx
8048d0e:        65                      gs
8048d0f:        74 65                   je      0x8048d76
8048d11:        20 64 65 20             and     BYTE PTR [ebp+eiz*2+0x20],ah
8048d15:        24 35                   and     al,0x35
8048d17:        00 e8                   add     al,ch
8048d19:        63 f4                   arpl    sp,si
8048d1b:        ff                      (bad)
8048d1c:        ff 8b 87 08 00 00       dec     DWORD PTR [ebx+0x887]
8048d22:        00 50 b8                add     BYTE PTR [eax-0x48],dl
8048d25:        f4                      hlt
8048d26:        01 00                   add     DWORD PTR [eax],eax
8048d28:        00 5b 93                add     BYTE PTR [ebx-0x6d],bl
```

```
8048d2b:        29 d8                       sub     eax,ebx
8048d2d:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
8048d33:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
8048d39:        50                          push    eax
8048d3a:        b8 c8 00 00 00              mov     eax,0xc8
8048d3f:        5b                          pop     ebx
8048d40:        39 c3                       cmp     ebx,eax
8048d42:        7d 05                       jge     0x8048d49
8048d44:        e9 c0 00 00 00              jmp     0x8048e09
8048d49:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
8048d4f:        50                          push    eax
8048d50:        b8 c8 00 00 00              mov     eax,0xc8
8048d55:        5b                          pop     ebx
8048d56:        93                          xchg    ebx,eax
8048d57:        99                          cdq
8048d58:        f7 fb                       idiv    ebx
8048d5a:        50                          push    eax
8048d5b:        b8 01 00 00 00              mov     eax,0x1
8048d60:        5b                          pop     ebx
8048d61:        39 c3                       cmp     ebx,eax
8048d63:        74 05                       je      0x8048d6a
8048d65:        e9 29 00 00 00              jmp     0x8048d93
8048d6a:        b9 7e 8d 04 08              mov     ecx,0x8048d7e
8048d6f:        ba 0f 00 00 00              mov     edx,0xf
8048d74:        e8 f7 f3 ff ff              call    0x8048170
8048d79:        e9 10 00 00 00              jmp     0x8048d8e
8048d7e:        31 20                       xor     DWORD PTR [eax],esp
8048d80:        62 69 6c                    bound   ebp,QWORD PTR [ecx+0x6c]
8048d83:        6c                          ins     BYTE PTR es:[edi],dx
8048d84:        65                          gs
8048d85:        74 65                       je      0x8048dec
8048d87:        20 64 65 20                 and     BYTE PTR [ebp+eiz*2+0x20],ah
8048d8b:        24 32                       and     al,0x32
8048d8d:        00 e8                       add     al,ch
8048d8f:        ed                          in      eax,dx
8048d90:        f3 ff                       repz (bad)
8048d92:        ff 8b 87 08 00 00           dec     DWORD PTR [ebx+0x887]
8048d98:        00 50 b8                    add     BYTE PTR [eax-0x48],dl
8048d9b:        c8 00 00 00                 enter   0x0,0x0
8048d9f:        5b                          pop     ebx
8048da0:        93                          xchg    ebx,eax
8048da1:        99                          cdq
8048da2:        f7 fb                       idiv    ebx
8048da4:        50                          push    eax
8048da5:        b8 01 00 00 00              mov     eax,0x1
8048daa:        5b                          pop     ebx
```

```
8048dab:        39 c3                   cmp     ebx,eax
8048dad:        75 05                   jne     0x8048db4
8048daf:        e9 2a 00 00 00          jmp     0x8048dde
8048db4:        b9 c8 8d 04 08          mov     ecx,0x8048dc8
8048db9:        ba 10 00 00 00          mov     edx,0x10
8048dbe:        e8 ad f3 ff ff          call    0x8048170
8048dc3:        e9 11 00 00 00          jmp     0x8048dd9
8048dc8:        32 20                   xor     ah,BYTE PTR [eax]
8048dca:        62 69 6c                bound   ebp,QWORD PTR [ecx+0x6c]
8048dcd:        6c                      ins     BYTE PTR es:[edi],dx
8048dce:        65                      gs
8048dcf:        74 65                   je      0x8048e36
8048dd1:        73 20                   jae     0x8048df3
8048dd3:        64 65 20 24 32          fs and BYTE PTR fs:gs:[edx+esi*1],ah
8048dd8:        00 e8                   add     al,ch
8048dda:        a2 f3 ff ff 8b          mov     ds:0x8bfffff3,al
8048ddf:        87 08                   xchg    DWORD PTR [eax],ecx
8048de1:        00 00                   add     BYTE PTR [eax],al
8048de3:        00 50 8b                add     BYTE PTR [eax-0x75],dl
8048de6:        87 08                   xchg    DWORD PTR [eax],ecx
8048de8:        00 00                   add     BYTE PTR [eax],al
8048dea:        00 50 b8                add     BYTE PTR [eax-0x48],dl
8048ded:        c8 00 00 00             enter   0x0,0x0
8048df1:        5b                      pop     ebx
8048df2:        93                      xchg    ebx,eax
8048df3:        99                      cdq
8048df4:        f7 fb                   idiv    ebx
8048df6:        50                      push    eax
8048df7:        b8 c8 00 00 00          mov     eax,0xc8
8048dfc:        5b                      pop     ebx
8048dfd:        f7 eb                   imul    ebx
8048dff:        5b                      pop     ebx
8048e00:        93                      xchg    ebx,eax
8048e01:        29 d8                   sub     eax,ebx
8048e03:        89 87 08 00 00 00       mov     DWORD PTR [edi+0x8],eax
8048e09:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048e0f:        50                      push    eax
8048e10:        b8 64 00 00 00          mov     eax,0x64
8048e15:        5b                      pop     ebx
8048e16:        39 c3                   cmp     ebx,eax
8048e18:        7d 05                   jge     0x8048e1f
8048e1a:        e9 3e 00 00 00          jmp     0x8048e5d
8048e1f:        b9 33 8e 04 08          mov     ecx,0x8048e33
8048e24:        ba 0e 00 00 00          mov     edx,0xe
8048e29:        e8 42 f3 ff ff          call    0x8048170
8048e2e:        e9 0f 00 00 00          jmp     0x8048e42
```

```
8048e33:        31 20                   xor     DWORD PTR [eax],esp
8048e35:        6d                      ins     DWORD PTR es:[edi],dx
8048e36:        6f                      outs    dx,DWORD PTR ds:[esi]
8048e37:        6e                      outs    dx,BYTE PTR ds:[esi]
8048e38:        65                      gs
8048e39:        64                      fs
8048e3a:        61                      popa
8048e3b:        20 64 65 20             and     BYTE PTR [ebp+eiz*2+0x20],ah
8048e3f:        24 31                   and     al,0x31
8048e41:        00 e8                   add     al,ch
8048e43:        39 f3                   cmp     ebx,esi
8048e45:        ff                      (bad)
8048e46:        ff 8b 87 08 00 00       dec     DWORD PTR [ebx+0x887]
8048e4c:        00 50 b8                add     BYTE PTR [eax-0x48],dl
8048e4f:        64 00 00                add     BYTE PTR fs:[eax],al
8048e52:        00 5b 93                add     BYTE PTR [ebx-0x6d],bl
8048e55:        29 d8                   sub     eax,ebx
8048e57:        89 87 08 00 00 00       mov     DWORD PTR [edi+0x8],eax
8048e5d:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048e63:        50                      push    eax
8048e64:        b8 32 00 00 00          mov     eax,0x32
8048e69:        5b                      pop     ebx
8048e6a:        39 c3                   cmp     ebx,eax
8048e6c:        7d 05                   jge     0x8048e73
8048e6e:        e9 47 00 00 00          jmp     0x8048eba
8048e73:        b9 87 8e 04 08          mov     ecx,0x8048e87
8048e78:        ba 17 00 00 00          mov     edx,0x17
8048e7d:        e8 ee f2 ff ff          call    0x8048170
8048e82:        e9 18 00 00 00          jmp     0x8048e9f
8048e87:        31 20                   xor     DWORD PTR [eax],esp
8048e89:        6d                      ins     DWORD PTR es:[edi],dx
8048e8a:        6f                      outs    dx,DWORD PTR ds:[esi]
8048e8b:        6e                      outs    dx,BYTE PTR ds:[esi]
8048e8c:        65                      gs
8048e8d:        64                      fs
8048e8e:        61                      popa
8048e8f:        20 64 65 20             and     BYTE PTR [ebp+eiz*2+0x20],ah
8048e93:        35 30 20 63 65          xor     eax,0x65632030
8048e98:        6e                      outs    dx,BYTE PTR ds:[esi]
8048e99:        74 61                   je      0x8048efc
8048e9b:        76 6f                   jbe     0x8048f0c
8048e9d:        73 00                   jae     0x8048e9f
8048e9f:        e8 dc f2 ff ff          call    0x8048180
8048ea4:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048eaa:        50                      push    eax
8048eab:        b8 32 00 00 00          mov     eax,0x32
```

```
8048eb0:        5b                       pop     ebx
8048eb1:        93                       xchg    ebx,eax
8048eb2:        29 d8                    sub     eax,ebx
8048eb4:        89 87 08 00 00 00        mov     DWORD PTR [edi+0x8],eax
8048eba:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048ec0:        50                       push    eax
8048ec1:        b8 19 00 00 00           mov     eax,0x19
8048ec6:        5b                       pop     ebx
8048ec7:        39 c3                    cmp     ebx,eax
8048ec9:        7d 05                    jge     0x8048ed0
8048ecb:        e9 47 00 00 00           jmp     0x8048f17
8048ed0:        b9 e4 8e 04 08           mov     ecx,0x8048ee4
8048ed5:        ba 17 00 00 00           mov     edx,0x17
8048eda:        e8 91 f2 ff ff           call    0x8048170
8048edf:        e9 18 00 00 00           jmp     0x8048efc
8048ee4:        31 20                    xor     DWORD PTR [eax],esp
8048ee6:        6d                       ins     DWORD PTR es:[edi],dx
8048ee7:        6f                       outs    dx,DWORD PTR ds:[esi]
8048ee8:        6e                       outs    dx,BYTE PTR ds:[esi]
8048ee9:        65                       gs
8048eea:        64                       fs
8048eeb:        61                       popa
8048eec:        20 64 65 20              and     BYTE PTR [ebp+eiz*2+0x20],ah
8048ef0:        32 35 20 63 65 6e        xor     dh,BYTE PTR ds:0x6e656320
8048ef6:        74 61                    je      0x8048f59
8048ef8:        76 6f                    jbe     0x8048f69
8048efa:        73 00                    jae     0x8048efc
8048efc:        e8 7f f2 ff ff           call    0x8048180
8048f01:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048f07:        50                       push    eax
8048f08:        b8 19 00 00 00           mov     eax,0x19
8048f0d:        5b                       pop     ebx
8048f0e:        93                       xchg    ebx,eax
8048f0f:        29 d8                    sub     eax,ebx
8048f11:        89 87 08 00 00 00        mov     DWORD PTR [edi+0x8],eax
8048f17:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048f1d:        50                       push    eax
8048f1e:        b8 0a 00 00 00           mov     eax,0xa
8048f23:        5b                       pop     ebx
8048f24:        39 c3                    cmp     ebx,eax
8048f26:        7d 05                    jge     0x8048f2d
8048f28:        e9 d0 00 00 00           jmp     0x8048ffd
8048f2d:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
8048f33:        50                       push    eax
8048f34:        b8 0a 00 00 00           mov     eax,0xa
8048f39:        5b                       pop     ebx
```

```
8048f3a:        93                      xchg    ebx,eax
8048f3b:        99                      cdq
8048f3c:        f7 fb                   idiv    ebx
8048f3e:        50                      push    eax
8048f3f:        b8 01 00 00 00          mov     eax,0x1
8048f44:        5b                      pop     ebx
8048f45:        39 c3                   cmp     ebx,eax
8048f47:        74 05                   je      0x8048f4e
8048f49:        e9 31 00 00 00          jmp     0x8048f7f
8048f4e:        b9 62 8f 04 08          mov     ecx,0x8048f62
8048f53:        ba 17 00 00 00          mov     edx,0x17
8048f58:        e8 13 f2 ff ff          call    0x8048170
8048f5d:        e9 18 00 00 00          jmp     0x8048f7a
8048f62:        31 20                   xor     DWORD PTR [eax],esp
8048f64:        6d                      ins     DWORD PTR es:[edi],dx
8048f65:        6f                      outs    dx,DWORD PTR ds:[esi]
8048f66:        6e                      outs    dx,BYTE PTR ds:[esi]
8048f67:        65                      gs
8048f68:        64                      fs
8048f69:        61                      popa
8048f6a:        20 64 65 20             and     BYTE PTR [ebp+eiz*2+0x20],ah
8048f6e:        31 30                   xor     DWORD PTR [eax],esi
8048f70:        20 63 65                and     BYTE PTR [ebx+0x65],ah
8048f73:        6e                      outs    dx,BYTE PTR ds:[esi]
8048f74:        74 61                   je      0x8048fd7
8048f76:        76 6f                   jbe     0x8048fe7
8048f78:        73 00                   jae     0x8048f7a
8048f7a:        e8 01 f2 ff ff          call    0x8048180
8048f7f:        8b 87 08 00 00 00       mov     eax,DWORD PTR [edi+0x8]
8048f85:        50                      push    eax
8048f86:        b8 0a 00 00 00          mov     eax,0xa
8048f8b:        5b                      pop     ebx
8048f8c:        93                      xchg    ebx,eax
8048f8d:        99                      cdq
8048f8e:        f7 fb                   idiv    ebx
8048f90:        50                      push    eax
8048f91:        b8 01 00 00 00          mov     eax,0x1
8048f96:        5b                      pop     ebx
8048f97:        39 c3                   cmp     ebx,eax
8048f99:        75 05                   jne     0x8048fa0
8048f9b:        e9 32 00 00 00          jmp     0x8048fd2
8048fa0:        b9 b4 8f 04 08          mov     ecx,0x8048fb4
8048fa5:        ba 18 00 00 00          mov     edx,0x18
8048faa:        e8 c1 f1 ff ff          call    0x8048170
8048faf:        e9 19 00 00 00          jmp     0x8048fcd
8048fb4:        32 20                   xor     ah,BYTE PTR [eax]
```

```
8048fb6:        6d                          ins    DWORD PTR es:[edi],dx
8048fb7:        6f                          outs   dx,DWORD PTR ds:[esi]
8048fb8:        6e                          outs   dx,BYTE PTR ds:[esi]
8048fb9:        65                          gs
8048fba:        64                          fs
8048fbb:        61                          popa
8048fbc:        73 20                       jae    0x8048fde
8048fbe:        64 65 20 31                 fs and BYTE PTR fs:gs:[ecx],dh
8048fc2:        30 20                       xor    BYTE PTR [eax],ah
8048fc4:        63 65 6e                    arpl   WORD PTR [ebp+0x6e],sp
8048fc7:        74 61                       je     0x804902a
8048fc9:        76 6f                       jbe    0x804903a
8048fcb:        73 00                       jae    0x8048fcd
8048fcd:        e8 ae f1 ff ff             call   0x8048180
8048fd2:        8b 87 08 00 00 00          mov    eax,DWORD PTR [edi+0x8]
8048fd8:        50                          push   eax
8048fd9:        8b 87 08 00 00 00          mov    eax,DWORD PTR [edi+0x8]
8048fdf:        50                          push   eax
8048fe0:        b8 0a 00 00 00             mov    eax,0xa
8048fe5:        5b                          pop    ebx
8048fe6:        93                          xchg   ebx,eax
8048fe7:        99                          cdq
8048fe8:        f7 fb                       idiv   ebx
8048fea:        50                          push   eax
8048feb:        b8 0a 00 00 00             mov    eax,0xa
8048ff0:        5b                          pop    ebx
8048ff1:        f7 eb                       imul   ebx
8048ff3:        5b                          pop    ebx
8048ff4:        93                          xchg   ebx,eax
8048ff5:        29 d8                       sub    eax,ebx
8048ff7:        89 87 08 00 00 00          mov    DWORD PTR [edi+0x8],eax
8048ffd:        8b 87 08 00 00 00          mov    eax,DWORD PTR [edi+0x8]
8049003:        50                          push   eax
8049004:        b8 05 00 00 00             mov    eax,0x5
8049009:        5b                          pop    ebx
804900a:        39 c3                       cmp    ebx,eax
804900c:        7d 05                       jge    0x8049013
804900e:        e9 46 00 00 00             jmp    0x8049059
8049013:        b9 27 90 04 08             mov    ecx,0x8049027
8049018:        ba 16 00 00 00             mov    edx,0x16
804901d:        e8 4e f1 ff ff             call   0x8048170
8049022:        e9 17 00 00 00             jmp    0x804903e
8049027:        31 20                       xor    DWORD PTR [eax],esp
8049029:        6d                          ins    DWORD PTR es:[edi],dx
804902a:        6f                          outs   dx,DWORD PTR ds:[esi]
804902b:        6e                          outs   dx,BYTE PTR ds:[esi]
```

```
804902c:        65                          gs
804902d:        64                          fs
804902e:        61                          popa
804902f:        20 64 65 20                 and     BYTE PTR [ebp+eiz*2+0x20],ah
8049033:        35 20 63 65 6e              xor     eax,0x6e656320
8049038:        74 61                       je      0x804909b
804903a:        76 6f                       jbe     0x80490ab
804903c:        73 00                       jae     0x804903e
804903e:        e8 3d f1 ff ff              call    0x8048180
8049043:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
8049049:        50                          push    eax
804904a:        b8 05 00 00 00              mov     eax,0x5
804904f:        5b                          pop     ebx
8049050:        93                          xchg    ebx,eax
8049051:        29 d8                       sub     eax,ebx
8049053:        89 87 08 00 00 00           mov     DWORD PTR [edi+0x8],eax
8049059:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
804905f:        50                          push    eax
8049060:        b8 01 00 00 00              mov     eax,0x1
8049065:        5b                          pop     ebx
8049066:        39 c3                       cmp     ebx,eax
8049068:        7f 05                       jg      0x804906f
804906a:        e9 3a 00 00 00              jmp     0x80490a9
804906f:        8b 87 08 00 00 00           mov     eax,DWORD PTR [edi+0x8]
8049075:        e8 16 f1 ff ff              call    0x8048190
804907a:        b9 8e 90 04 08              mov     ecx,0x804908e
804907f:        ba 15 00 00 00              mov     edx,0x15
8049084:        e8 e7 f0 ff ff              call    0x8048170
8049089:        e9 16 00 00 00              jmp     0x80490a4
804908e:        20 6d 6f                    and     BYTE PTR [ebp+0x6f],ch
8049091:        6e                          outs    dx,BYTE PTR ds:[esi]
8049092:        65                          gs
8049093:        64                          fs
8049094:        61                          popa
8049095:        73 20                       jae     0x80490b7
8049097:        64 65 20 31                 fs and BYTE PTR fs:gs:[ecx],dh
804909b:        20 63 65                    and     BYTE PTR [ebx+0x65],ah
804909e:        6e                          outs    dx,BYTE PTR ds:[esi]
804909f:        74 61                       je      0x8049102
80490a1:        76 6f                       jbe     0x8049112
80490a3:        00 e8                       add     al,ch
80490a5:        d7                          xlat    BYTE PTR ds:[ebx]
80490a6:        f0 ff                       lock (bad)
80490a8:        ff 8b 87 08 00 00           dec     DWORD PTR [ebx+0x887]
80490ae:        00 50 b8                    add     BYTE PTR [eax-0x48],dl
80490b1:        01 00                       add     DWORD PTR [eax],eax
```

```
80490b3:         00 00              add    BYTE PTR [eax],al
80490b5:         5b                 pop    ebx
80490b6:         39 c3              cmp    ebx,eax
80490b8:         74 05              je     0x80490bf
80490ba:         e9 2f 00 00 00     jmp    0x80490ee
80490bf:         b9 d3 90 04 08     mov    ecx,0x80490d3
80490c4:         ba 15 00 00 00     mov    edx,0x15
80490c9:         e8 a2 f0 ff ff     call   0x8048170
80490ce:         e9 16 00 00 00     jmp    0x80490e9
80490d3:         31 20              xor    DWORD PTR [eax],esp
80490d5:         6d                 ins    DWORD PTR es:[edi],dx
80490d6:         6f                 outs   dx,DWORD PTR ds:[esi]
80490d7:         6e                 outs   dx,BYTE PTR ds:[esi]
80490d8:         65                 gs
80490d9:         64                 fs
80490da:         61                 popa
80490db:         20 64 65 20        and    BYTE PTR [ebp+eiz*2+0x20],ah
80490df:         31 20              xor    DWORD PTR [eax],esp
80490e1:         63 65 6e           arpl   WORD PTR [ebp+0x6e],sp
80490e4:         74 61              je     0x8049147
80490e6:         76 6f              jbe    0x8049157
80490e8:         00 e8              add    al,ch
80490ea:         92                 xchg   edx,eax
80490eb:         f0 ff              lock (bad)
80490ed:         ff                 (bad)
80490ee:         e9 0d f2 ff ff     jmp    0x8048300
         ...
```

3.8. BIEN-07

3.8.1. Código Fuente

```
CONST N = 20;

VAR A, B, C;

PROCEDURE TRIANGULO;
VAR A, B;
BEGIN
  WRITELN;
  #A := 15;
  write('ingrese base triangulo: '); readln(A);
  WHILE A > 0 DO
    BEGIN
      B := 0;
      WHILE B < A DO
        BEGIN
```

```
          WRITE ('*');
          B := B + 1
        END;
      WRITELN;
      A := A - 1;
    END
END;

BEGIN
  A := 1;
  WHILE A <= N DO
    BEGIN
      WRITE (A, ' ');
      A := A + 1
    END;

  CALL TRIANGULO;

  B := -N;
  C := 0;
  WHILE B < C DO
    BEGIN
      WRITE (B, ' ');
      B := B + 1
    END;
  WRITELN;

END.
```

3.8.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 0639 0000 0639 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 5900 0005 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
```

```
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
```

```
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 25bf 0486 e908 00c6 0000 f1e8 fffc b9ff
0000490 84a3 0804 18ba 0000 e800 fcd2 ffff 19e9
00004a0 0000 6900 676e 6572 6573 6220 7361 2065
00004b0 7274 6169 676e 6c75 3a6f 0020 4fe8 fffe
00004c0 89ff 0c87 0000 8b00 0c87 0000 5000 00b8
00004d0 0000 5b00 c339 057f 72e9 0000 b800 0000
00004e0 0000 8789 0010 0000 878b 0010 0000 8b50
00004f0 0c87 0000 5b00 c339 057c 30e9 0000 b900
0000500 8513 0804 01ba 0000 e800 fc62 ffff 02e9
0000510 0000 2a00 8b00 1087 0000 5000 01b8 0000
0000520 5b00 d801 8789 0010 0000 b9e9 ffff e8ff
0000530 fc4c ffff 878b 000c 0000 b850 0001 0000
0000540 935b d829 8789 000c 0000 78e9 ffff c3ff
0000550 01b8 0000 8900 0087 0000 8b00 0087 0000
0000560 5000 14b8 0000 5b00 c339 057e 3be9 0000
0000570 8b00 0087 0000 e800 fc14 ffff 90b9 0485
0000580 ba08 0001 0000 e5e8 fffb e9ff 0002 0000
0000590 0020 878b 0000 0000 b850 0001 0000 015b
00005a0 89d8 0087 0000 e900 ffaf ffff d9e8 fffe
00005b0 b8ff 0014 0000 d8f7 8789 0004 0000 00b8
00005c0 0000 8900 0887 0000 8b00 0487 0000 5000
00005d0 878b 0008 0000 395b 7cc3 e905 003b 0000
00005e0 878b 0004 0000 a5e8 fffb b9ff 85ff 0804
00005f0 01ba 0000 e800 fb76 ffff 02e9 0000 2000
0000600 8b00 0487 0000 5000 01b8 0000 5b00 d801
0000610 8789 0004 0000 aee9 ffff e8ff fb60 ffff
0000620 dbe9 fffc 00ff 0000 0000 0000 0000 0000
0000630 0000 0000 0000 0000 0000
0000639
```

3.8.3.   Listado Desensamblado de la sección *.text*

```
text/BIEN-07:     formato del fichero elf32-i386


Desensamblado de la sección .text:
```

```
080480e0 <.text>:
        ...
 8048480:        bf 25 86 04 08              mov     edi,0x8048625
 8048485:        e9 c6 00 00 00              jmp     0x8048550
 804848a:        e8 f1 fc ff ff              call    0x8048180
 804848f:        b9 a3 84 04 08              mov     ecx,0x80484a3
 8048494:        ba 18 00 00 00              mov     edx,0x18
 8048499:        e8 d2 fc ff ff              call    0x8048170
 804849e:        e9 19 00 00 00              jmp     0x80484bc
 80484a3:        69 6e 67 72 65 73 65        imul    ebp,DWORD PTR [esi+0x67],0x65736572
 80484aa:        20 62 61                    and     BYTE PTR [edx+0x61],ah
 80484ad:        73 65                       jae     0x8048514
 80484af:        20 74 72 69                 and     BYTE PTR [edx+esi*2+0x69],dh
 80484b3:        61                          popa
 80484b4:        6e                          outs    dx,BYTE PTR ds:[esi]
 80484b5:        67 75 6c                    addr16 jne 0x8048524
 80484b8:        6f                          outs    dx,DWORD PTR ds:[esi]
 80484b9:        3a 20                       cmp     ah,BYTE PTR [eax]
 80484bb:        00 e8                       add     al,ch
 80484bd:        4f                          dec     edi
 80484be:        fe                          (bad)
 80484bf:        ff                          (bad)
 80484c0:        ff 89 87 0c 00 00           dec     DWORD PTR [ecx+0xc87]
 80484c6:        00 8b 87 0c 00 00           add     BYTE PTR [ebx+0xc87],cl
 80484cc:        00 50 b8                    add     BYTE PTR [eax-0x48],dl
 80484cf:        00 00                       add     BYTE PTR [eax],al
 80484d1:        00 00                       add     BYTE PTR [eax],al
 80484d3:        5b                          pop     ebx
 80484d4:        39 c3                       cmp     ebx,eax
 80484d6:        7f 05                       jg      0x80484dd
 80484d8:        e9 72 00 00 00              jmp     0x804854f
 80484dd:        b8 00 00 00 00              mov     eax,0x0
 80484e2:        89 87 10 00 00 00           mov     DWORD PTR [edi+0x10],eax
 80484e8:        8b 87 10 00 00 00           mov     eax,DWORD PTR [edi+0x10]
 80484ee:        50                          push    eax
 80484ef:        8b 87 0c 00 00 00           mov     eax,DWORD PTR [edi+0xc]
 80484f5:        5b                          pop     ebx
 80484f6:        39 c3                       cmp     ebx,eax
 80484f8:        7c 05                       jl      0x80484ff
 80484fa:        e9 30 00 00 00              jmp     0x804852f
 80484ff:        b9 13 85 04 08              mov     ecx,0x8048513
 8048504:        ba 01 00 00 00              mov     edx,0x1
 8048509:        e8 62 fc ff ff              call    0x8048170
 804850e:        e9 02 00 00 00              jmp     0x8048515
 8048513:        2a 00                       sub     al,BYTE PTR [eax]
```

```
8048515:        8b 87 10 00 00 00       mov     eax,DWORD PTR [edi+0x10]
804851b:        50                      push    eax
804851c:        b8 01 00 00 00          mov     eax,0x1
8048521:        5b                      pop     ebx
8048522:        01 d8                   add     eax,ebx
8048524:        89 87 10 00 00 00       mov     DWORD PTR [edi+0x10],eax
804852a:        e9 b9 ff ff ff          jmp     0x80484e8
804852f:        e8 4c fc ff ff          call    0x8048180
8048534:        8b 87 0c 00 00 00       mov     eax,DWORD PTR [edi+0xc]
804853a:        50                      push    eax
804853b:        b8 01 00 00 00          mov     eax,0x1
8048540:        5b                      pop     ebx
8048541:        93                      xchg    ebx,eax
8048542:        29 d8                   sub     eax,ebx
8048544:        89 87 0c 00 00 00       mov     DWORD PTR [edi+0xc],eax
804854a:        e9 78 ff ff ff          jmp     0x80484c7
804854f:        c3                      ret
8048550:        b8 01 00 00 00          mov     eax,0x1
8048555:        89 87 00 00 00 00       mov     DWORD PTR [edi+0x0],eax
804855b:        8b 87 00 00 00 00       mov     eax,DWORD PTR [edi+0x0]
8048561:        50                      push    eax
8048562:        b8 14 00 00 00          mov     eax,0x14
8048567:        5b                      pop     ebx
8048568:        39 c3                   cmp     ebx,eax
804856a:        7e 05                   jle     0x8048571
804856c:        e9 3b 00 00 00          jmp     0x80485ac
8048571:        8b 87 00 00 00 00       mov     eax,DWORD PTR [edi+0x0]
8048577:        e8 14 fc ff ff          call    0x8048190
804857c:        b9 90 85 04 08          mov     ecx,0x8048590
8048581:        ba 01 00 00 00          mov     edx,0x1
8048586:        e8 e5 fb ff ff          call    0x8048170
804858b:        e9 02 00 00 00          jmp     0x8048592
8048590:        20 00                   and     BYTE PTR [eax],al
8048592:        8b 87 00 00 00 00       mov     eax,DWORD PTR [edi+0x0]
8048598:        50                      push    eax
8048599:        b8 01 00 00 00          mov     eax,0x1
804859e:        5b                      pop     ebx
804859f:        01 d8                   add     eax,ebx
80485a1:        89 87 00 00 00 00       mov     DWORD PTR [edi+0x0],eax
80485a7:        e9 af ff ff ff          jmp     0x804855b
80485ac:        e8 d9 fe ff ff          call    0x804848a
80485b1:        b8 14 00 00 00          mov     eax,0x14
80485b6:        f7 d8                   neg     eax
80485b8:        89 87 04 00 00 00       mov     DWORD PTR [edi+0x4],eax
80485be:        b8 00 00 00 00          mov     eax,0x0
80485c3:        89 87 08 00 00 00       mov     DWORD PTR [edi+0x8],eax
```

```
80485c9:        8b 87 04 00 00 00        mov     eax,DWORD PTR [edi+0x4]
80485cf:        50                       push    eax
80485d0:        8b 87 08 00 00 00        mov     eax,DWORD PTR [edi+0x8]
80485d6:        5b                       pop     ebx
80485d7:        39 c3                    cmp     ebx,eax
80485d9:        7c 05                    jl      0x80485e0
80485db:        e9 3b 00 00 00           jmp     0x804861b
80485e0:        8b 87 04 00 00 00        mov     eax,DWORD PTR [edi+0x4]
80485e6:        e8 a5 fb ff ff           call    0x8048190
80485eb:        b9 ff 85 04 08           mov     ecx,0x80485ff
80485f0:        ba 01 00 00 00           mov     edx,0x1
80485f5:        e8 76 fb ff ff           call    0x8048170
80485fa:        e9 02 00 00 00           jmp     0x8048601
80485ff:        20 00                    and     BYTE PTR [eax],al
8048601:        8b 87 04 00 00 00        mov     eax,DWORD PTR [edi+0x4]
8048607:        50                       push    eax
8048608:        b8 01 00 00 00           mov     eax,0x1
804860d:        5b                       pop     ebx
804860e:        01 d8                    add     eax,ebx
8048610:        89 87 04 00 00 00        mov     DWORD PTR [edi+0x4],eax
8048616:        e9 ae ff ff ff           jmp     0x80485c9
804861b:        e8 60 fb ff ff           call    0x8048180
8048620:        e9 db fc ff ff           jmp     0x8048300
        ...
```

3.9. BIEN-08

3.9.1. Código Fuente

```
var K;
procedure P;
  procedure coma;
  begin
    write (',');
    K := K + 1;
    call P
  end;
begin
  if K < 10 then
    begin
      write (K);
      call coma;
    end
end;

begin
  K := 1;
```

```
  call P;
  writeln (10)
end.
```

3.9.2.   Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 050f 0000 050f 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 2f00 0004 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
```

```
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 0bbf 0485 e908 005d 0000 31e9 0000 b900
0000490 84a3 0804 01ba 0000 e800 fcd2 ffff 02e9
00004a0 0000 2c00 8b00 0087 0000 5000 01b8 0000
00004b0 5b00 d801 8789 0000 0000 cbe8 ffff c3ff
00004c0 878b 0000 0000 b850 000a 0000 395b 7cc3
00004d0 e905 0010 0000 878b 0000 0000 afe8 fffc
00004e0 e8ff ffa9 ffff b8c3 0001 0000 8789 0000
00004f0 0000 93e8 ffff b8ff 000a 0000 8fe8 fffc
0000500 e8ff fc7a ffff f5e9 fffd 00ff 0000 0000
000050f
```

3.9.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-08:     formato del fichero elf32-i386
```

```
Desensamblado de la sección .text:

080480e0 <.text>:
        ...
 8048480:          bf 0b 85 04 08                     mov     edi,0x804850b
 8048485:          e9 5d 00 00 00                     jmp     0x80484e7
 804848a:          e9 31 00 00 00                     jmp     0x80484c0
 804848f:          b9 a3 84 04 08                     mov     ecx,0x80484a3
 8048494:          ba 01 00 00 00                     mov     edx,0x1
 8048499:          e8 d2 fc ff ff                     call    0x8048170
 804849e:          e9 02 00 00 00                     jmp     0x80484a5
 80484a3:          2c 00                              sub     al,0x0
 80484a5:          8b 87 00 00 00 00                  mov     eax,DWORD PTR [edi+0x0]
 80484ab:          50                                 push    eax
 80484ac:          b8 01 00 00 00                     mov     eax,0x1
 80484b1:          5b                                 pop     ebx
 80484b2:          01 d8                              add     eax,ebx
 80484b4:          89 87 00 00 00 00                  mov     DWORD PTR [edi+0x0],eax
 80484ba:          e8 cb ff ff ff                     call    0x804848a
 80484bf:          c3                                 ret
 80484c0:          8b 87 00 00 00 00                  mov     eax,DWORD PTR [edi+0x0]
 80484c6:          50                                 push    eax
 80484c7:          b8 0a 00 00 00                     mov     eax,0xa
 80484cc:          5b                                 pop     ebx
 80484cd:          39 c3                              cmp     ebx,eax
 80484cf:          7c 05                              jl      0x80484d6
 80484d1:          e9 10 00 00 00                     jmp     0x80484e6
 80484d6:          8b 87 00 00 00 00                  mov     eax,DWORD PTR [edi+0x0]
 80484dc:          e8 af fc ff ff                     call    0x8048190
 80484e1:          e8 a9 ff ff ff                     call    0x804848f
 80484e6:          c3                                 ret
 80484e7:          b8 01 00 00 00                     mov     eax,0x1
 80484ec:          89 87 00 00 00 00                  mov     DWORD PTR [edi+0x0],eax
 80484f2:          e8 93 ff ff ff                     call    0x804848a
 80484f7:          b8 0a 00 00 00                     mov     eax,0xa
 80484fc:          e8 8f fc ff ff                     call    0x8048190
 8048501:          e8 7a fc ff ff                     call    0x8048180
 8048506:          e9 f5 fd ff ff                     jmp     0x8048300
 804850b:          00 00                              add     BYTE PTR [eax],al
        ...
```

3.10.   BIEN-09

3.10.1.   Código Fuente

3.10.2. Contenido Hexadecimal Completo

```
0000000 457f 464c 0101 0001 0000 0000 0000 0000
0000010 0002 0003 0001 0000 8480 0804 0034 0000
0000020 0065 0000 0000 0000 0034 0020 0001 0028
0000030 0003 0001 0001 0000 0000 0000 8000 0804
0000040 8000 0804 048a 0000 048a 0000 0007 0000
0000050 1000 0000 2e00 6873 7473 7472 6261 2e00
0000060 6574 7478 0000 0000 0000 0000 0000 0000
0000070 0000 0000 0000 0000 0000 0000 0000 0000
0000080 0000 0000 0000 0000 0000 0000 0100 0000
0000090 0300 0000 0000 0000 0000 0000 5400 0000
00000a0 1100 0000 0000 0000 0000 0000 0100 0000
00000b0 0000 0000 0b00 0000 0100 0000 0600 0000
00000c0 e000 0480 e008 0000 aa00 0003 0000 0000
00000d0 0000 0000 0100 0000 0000 0000 0000 0000
00000e0 5152 5053 04b8 0000 bb00 0001 0000 e189
00000f0 01ba 0000 cd00 5880 595b c35a 8955 81e5
0000100 24ec 0000 5200 5351 36b8 0000 bb00 0000
0000110 0000 01b9 0054 8d00 dc55 80cd 6581 f5e8
0000120 ffff b8ff 0036 0000 00bb 0000 b900 5402
0000130 0000 558d cddc 3180 50c0 03b8 0000 bb00
0000140 0000 0000 e189 01ba 0000 cd00 8180 e84d
0000150 000a 0000 36b8 0000 bb00 0000 0000 02b9
0000160 0054 8d00 dc55 80cd 5b58 5a59 ec89 c35d
0000170 04b8 0000 bb00 0001 0000 80cd 90c3 9090
0000180 0ab0 59e8 ffff c3ff 3004 51e8 ffff c3ff
0000190 003d 0000 7580 b04e e82d ff42 ffff 02b0
00001a0 e3e8 ffff b0ff e801 ffdc ffff 04b0 d5e8
00001b0 ffff b0ff e807 ffce ffff 04b0 c7e8 ffff
00001c0 b0ff e808 ffc0 ffff 03b0 b9e8 ffff b0ff
00001d0 e806 ffb2 ffff 04b0 abe8 ffff b0ff e808
00001e0 ffa4 ffff 3dc3 0000 0000 0b7d b050 e82d
00001f0 feec ffff f758 3dd8 000a 0000 8c0f 00ef
0000200 0000 643d 0000 0f00 d18c 0000 3d00 03e8
0000210 0000 8c0f 00b3 0000 103d 0027 0f00 958c
0000220 0000 3d00 86a0 0001 7b7c 403d 0f42 7c00
0000230 3d61 9680 0098 477c 003d f5e1 7c05 3d2d
0000240 ca00 3b9a 137c 00ba 0000 bb00 ca00 3b9a
0000250 fbf7 e852 ff30 ffff ba58 0000 0000 00bb
0000260 f5e1 f705 52fb 1de8 ffff 58ff 00ba 0000
0000270 bb00 9680 0098 fbf7 e852 ff0a ffff ba58
0000280 0000 0000 40bb 0f42 f700 52fb f7e8 fffe
```

```
0000290 58ff 00ba 0000 bb00 86a0 0001 fbf7 e852
00002a0 fee4 ffff ba58 0000 0000 10bb 0027 f700
00002b0 52fb d1e8 fffe 58ff 00ba 0000 bb00 03e8
00002c0 0000 fbf7 e852 febe ffff ba58 0000 0000
00002d0 64bb 0000 f700 52fb abe8 fffe 58ff 00ba
00002e0 0000 bb00 000a 0000 fbf7 e852 fe98 ffff
00002f0 e858 fe92 ffff 90c3 9090 9090 9090 9090
0000300 01b8 0000 bb00 0000 0000 80cd 9090 9090
0000310 00b9 0000 b300 5103 e853 fdde ffff 595b
0000320 0a3c 840f 0134 0000 7f3c 840f 0094 0000
0000330 2d3c 840f 0109 0000 303c db7c 393c d77f
0000340 302c fb80 7400 80d0 02fb 0c75 f981 0000
0000350 0000 0475 003c bf74 fb80 7503 3c0a 7500
0000360 b304 eb00 b302 8101 ccf9 cccc 7f0c 81a8
0000370 34f9 3333 7cf3 88a0 b8c7 000a 0000 e9f7
0000380 083d 0000 7480 3d11 fff8 7fff 1375 ff80
0000390 7e07 e90e ff7f ffff ff80 0f08 768f ffff
00003a0 b9ff 0000 0000 f988 fb80 7402 0104 ebc1
00003b0 2903 91c8 f888 5351 cbe8 fffd 5bff e959
00003c0 ff53 ffff fb80 0f03 4a84 ffff 51ff b053
00003d0 e808 fd0a ffff 20b0 03e8 fffd b0ff e808
00003e0 fcfc ffff 595b fb80 7500 b307 e903 ff25
00003f0 ffff fb80 7502 810f 00f9 0000 7500 b307
0000400 e903 ff11 ffff c889 0ab9 0000 ba00 0000
0000410 0000 003d 0000 7d00 f708 f7d8 f7f9 ebd8
0000420 f702 89f9 81c1 00f9 0000 0f00 e685 fffe
0000430 80ff 02fb 840f fedd ffff 03b3 d6e9 fffe
0000440 80ff 03fb 850f fecd ffff 2db0 5351 8de8
0000450 fffc 5bff b359 e902 febb ffff fb80 0f03
0000460 b284 fffe 80ff 02fb 0c75 f981 0000 0000
0000470 840f fea1 ffff e851 fd04 ffff 8959 c3c8
0000480 8abf 0484 e908 fe76 ffff
000048a
```

3.10.3. Listado Desensamblado de la sección *.text*

```
text/BIEN-09:      formato del fichero elf32-i386


Desensamblado de la sección .text:

080480e0 <.text>:
       ...
 8048480:        bf 8a 84 04 08              mov     edi,0x804848a
 8048485:        e9 76 fe ff ff              jmp     0x8048300
```

4. Programas Incorrectos

4.1. MAL-00

4.1.1. Código Fuente

```
var X, Y;

procedure INICIAR;
  const Y = 2;
  procedure ASIGNAR;
    X = Y;
  call ASIGNAR;

begin
  write ('NUM=') readln (Y);
  call INICIAR;
  writeln ("NUM*2=",Y*X)
end.
```

4.1.2. Errores de Compilacion

Mensajes de Error	Corrección
6. X = Y; 7. Error Sintactico: Esperada asignacion luego de variable	X := Y;
11. write ('NUM=') readln (Y); 12. Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin	write ('NUM='); readln (Y);
14. writeln ("NUM*2=",Y*X) 15. Error Lexico: comillas de cadena incorrecta	writeln ('NUM*2=',Y*X)

Cuadro 1: Errores MAL-00. Primera compilacion.

4.2. MAL-01

4.2.1. Código Fuente

```
VAR BASE, EXPO, RESU;

PROCEDUR POT;
IF EXPO > 0 THEN
   BEGIN
       RESU = RESU * BASE;
       EXPO := EXPO - 1;
       CALL POT
   END;
```

```
BEGIN
    WRITE ('BASE: '); READLN(BASE);
    WRITE ('EXPONENTE: '); READLN(EXPO)
    RESU := 1;
    CALL POT;
    IF EXPO < 0 RESU := 0;
    WRITELN ('RESULTADO: ', RESU);
    WRITELN
END.
```

4.2.2. Errores de Compilacion

Mensajes de Error	Corrección
3. PROCEDUR POT;	PROCEDURE POT;
4. Error Semantico: Identificador no encontrado (PROCEDUR)	
5. Error Sintactico: Esperada asignacion luego de variable	
6. Error Sintactico: Simbolo no esperado: ;Error Sintactico:	
Se esperaba punto (.) de finalizacion de programa	

Cuadro 2: Errores MAL-01. Primera compilacion.

Mensajes de Error	Corrección
6.RESU = RESU * BASE;	RESU := RESU * BASE;
7.Error Sintactico: Esperada asignacion luego de variable	
14.READLN(EXPO)	READLN(EXPO);
15.RESU := 1;	
16.Error Sintactico: Se esperaba un END o punto y coma (;)	
luego de una proposicion de un Begin	
IF EXPO ¡0 RESU := 0;	IF EXPO ¡0 THEN RESU := 0;
Error Sintactico: Se esperaba un 'then' luego de la	
condicion de un 'if'	

Cuadro 3: Errores MAL-01. Segunda compilacion.

4.3. MAL-02

4.3.1. Código Fuente

```
var X, Y, Z;

procedure MULTIPLICAR;
var A, B, A;
begin
    A := X;
    B := Y;
    Z := 0;
```

```
        if X < 0 then A := -A;
        if Y ( 0 then B := -B;
        while B > 0 then
            begin
                if odd B then Z:= Z + A;
                A := A * 2;
                B := B / 2
            end;
        if X < 0 then Z:= -Z;
        if Y < 0 then Z:= -Z
end;

Begin
        write ('X: '); readLn X;
        write ('Y: '); readLn (Y);
        MULTIPLICAR;
        writeLn ('X*Y=', Z);
end.
```

4.3.2. Errores de Compilacion

Mensajes de Error	Corrección
4. var A, B, A;	var A, B;
5. Error Semantico: Identificador ya declarado	
10. if Y (0 then B := -B;	if Y < 0 then B := -B;
11. Error Sintactico: Se esperaba simbolo de comparacion en comparacion	
12. Error Sintactico: Cierre de parentesis faltante	
13. while B ¿0 then	while B > 0 do
14. Error Sintactico: Se esperaba un 'do' luego de la condicion de un 'while'	
25. readLn X;	readLn(X);
26. Error Sintactico: Se esperaba un parentesis luego de readln	
27. Error Sintactico: Se esperaba cierre de parentesis luego de readln	
29. MULTIPLICAR;	call MULTIPLICAR;
30. Error Semantico: Solo pueden utilizarse variables del lado izquierdo de una asignacion	
31. Error Sintactico: Esperada asignacion luego de variable writeLn ('X*Y=', Z);	
Error Sintactico: Simbolo no esperado: writeLn	
Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin	

Cuadro 4: Errores MAL-02. Primera compilacion.

4.4. MAL-03

4.4.1. Código Fuente

```
var DO, X, Y, Q, R;

procedure DIVIDIR;
var V W;
begin
  Q := 0;
  R := X; if R < 0 then R := -R;
  W := Y; if W < 0 then W := -W;
  V := Y; if V < 0 then V:= -V;
  while W <= R do W := W * 2;
  while W > V do
    begin
      Q := Q * 2; W := W / 2;
      if W <= R then
        begin
          R := R - W; Q := Q + 1
        end
    end;
  if X < 0 then R:= -R;
  if X < 0 then Q:= -Q;
  if Y < 0 then Q:= -Q;
end;

procedure OTRO;
  procedure DIVIDIR;
  begin
    Q := X / Y; R := X - Y * Q
  end;
call DIVIDIR;

procedure SALIDA;
begin
  write ('Cociente: ', Q); writeln;
  write ('Resto: ', R); writeln;
end;

begin
  write ('Dividendo: '); readln (X);
  write ('Divisor: '); readln (Y);
  writeln;
  if Y <> 0 then
    begin
      write ('Metodo 1'); writeln;
      call DIVIDIR;
      call SALIDA; writeln;
```

```
      write ('Metodo 2'); writeln;
      call OTRO;
      call SALIDA;
    end
end
end
```

4.4.2. Errores de Compilacion

Mensajes de Error	Corrección
1. var DO, X, Y, Q, R; 2. Error Sintactico: declaracion de variable no seguida de un identificador	var X, Y, Q, R;
5. var V W; 6. Error Sintactico: Se esperaba punto y coma (;) o coma (,) luego de declaracion de variable	var V, W;
53. end 54. Error Sintactico: Se esperaba punto (.) de finalizacion de programa	.

Cuadro 5: Errores MAL-03. Primera compilacion.

4.5. MAL-04

4.5.1. Código Fuente

```
var X, Y Z;

procedure MCD
var F,G;
begin
  F := X; G := Y;
  while F <> G do
    begin
      if F < G then G := G - F;
      IF G < F then F := F - G
    end;
  Z:= F
end;

begin
  do write ('X: '); readln (X);
  if X > 0 then
    begin
      write ('Y: '); readln (Y);
      if Y > 0 then
        begin
```

```
            call MCD;
            writeln ('MCD: ', Z); writeln ()
         end
      end
end.
```

4.5.2. Errores de Compilacion

Mensajes de Error	Corrección
1. var X, Y Z; 2. Error Sintactico: Se esperaba punto y coma (;) o coma (,) luego de declaracion de variable	var X, Y, Z;
4. procedure MCD 5. var F,G; 6. Error Sintactico: Luego de la identificacion de un procedimiento se esperaba por punto y coma (;)	procedure MCD;
18. do write ('X: '); readln (X); 19. Error Sintactico: Se esperaba variable en asignacion, se encuentra la palabra reservada: do 20. Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin	write('X: '); readln (X);
27. writeln ('MCD: ', Z); writeln () 28. Error Sintactico: Simbolo no esperado:)	writeln ('MCD: ', Z); writeln

Cuadro 6: Errores MAL-04. Primera compilacion.

4.6. MAL-05

4.6.1. Código Fuente

```
VAR R, N;

PROCEDURE INICIALIZAR;
CONST UNO = ;
R := -(-UNO);

PROCEDURE RAIZ;
BEGIN
  CALL N;
  WHILE R * R < N DO R := R + 1
END;

BEGIN
  WRITE ('N: '); READLN (N);
  WRITE ('RAIZ CUADRADA DE ', N, ': ');
  IF N < 0 THEN WRITE ('ERROR');
```

```
  IF N = 0 THEN WRITE (0);
  IF N > 0 THEN
    BEGIN
      CALL RAIZ;
      IF R* <>N THEN WRITE (R - 1, '..');
      WRITE (R);
    END;
  WRITELN
END.
```

4.6.2. Errores de Compilacion

Mensajes de Error	Corrección
CONST UNO = ; Error Sintactico: asignacion de constante a un valor no numerico	CONST UNO = 1;
CALL N; Error Semantico: Solo pueden invocarse procedimientos	CALL INICIALIZAR;
IF R* <>N THEN WRITE (R - 1, '..'); Error Sintactico: Simbolo no esperado: <>	IF R*R<>N THEN WRITE (R - 1, '..');

Cuadro 7: Errores MAL-05. Primera compilacion.

4.7. MAL-06

4.7.1. Código Fuente

```
CONST K1=1, K2=2, K3=3, K4=4, K5=5, K6=6, K7=7, K8=8, K9=9, K10=10,
K11=11, K12=12, K13=13, K14=14, K15=15, K16=16, K17=17, K18=18, K19=19, K20=20,
K21=21, K22=22, K23=23, K24=24, K25=25, K26=26, K27=27, K28=28, K29=29, K30=30,
K31=31, K32=32, K33=33, K34=34, K35=35, K36=36, K37=37, K38=38, K39=39, K40=40,
K41=41, K42=42, K43=43, K44=44, K45=45, K46=46, K47=47, K48=48, K49=49, K50=50,
K51=51, K52=52, K53=53, K54=54, K55=55, K56=56, K57=57, K58=58, K59=59, K60=60,
K61=61, K62=62, K63=63, K64=64, K65=65, K66=66, K67=67, K68=68, K69=69, K70=70,
K71=71, K72=72, K73=73, K74=74, K75=75, K76=76, K77=77, K78=78, K79=79, K80=80,
K81=81, K82=82, K83=83, K84=84, K85=85, K86=86, K87=87, K88=88, K89=89, K90=90,
K91=91, K92=92, K93=93, K94=94, K95=95, K96=96, K97=97, K98=98, K99=99, K100=100,
K101=101, K102=102, K103=103, K104=104, K105=105, K106=106, K107=107, K108=108,
    K109=109, K110=110,
K111=111, K112=112, K113=113, K114=114, K115=115, K116=116, K117=117, K118=118,
    K119=119, K120=120,
K121=121, K122=122, K123=123, K124=124, K125=125, K126=126, K127=127, K128=128,
    K129=129, K130=130,
K131=131, K132=132, K133=133, K134=134, K135=135, K136=136, K137=137, K138=138,
    K139=139, K140=140,
K141=141, K142=142, K143=143, K144=144, K145=145, K146=146, K147=147, K148=148,
    K149=149, K150=150,
```

```
K151=151, K152=152, K153=153, K154=154, K155=155, K156=156, K157=157, K158=158,
    K159=159, K160=160,
K161=161, K162=162, K163=163, K164=164, K165=165, K166=166, K167=167, K168=168,
    K169=169, K170=170,
K171=171, K172=172, K173=173, K174=174, K175=175, K176=176, K177=177, K178=178,
    K179=179, K180=180,
K181=181, K182=182, K183=183, K184=184, K185=185, K186=186, K187=187, K188=188,
    K189=189, K190=190,
K191=191, K192=192, K193=193, K194=194, K195=195;

var IMPORTE, BILLETE, VUELTO, PESOS, CENTAVOS, VUELTOPESOS, VUELTOCENTAVOS,
    IMPORTEOK, CENTAVOSOK, PESOSOK, BILLETEOK, VUELTOOK,
DEMASIADOLARGO123456789012345678901234567890123456789012345678901234567890,
V1, V2, V3, V4, V5, V6, V7, V8, V9, V10,
V11, V12, V13, V14, V15, V16, V17, V18, V19, V20,
V21, V22, V23, V24, V25, V26, V27, V28, V29, V30,
V31, V32, V33, V34, V35, V36, V37, V38, V39, V40,
V41, V42, V43, V44, V45, V46, V47, V48, V49, V50,
V51, V52, V53, V54, V55, V56, V57, V58, V59, V60,
V61, V62, V63, V64, V65, V66, V67, V68, V69, V70,
V71, V72, V73, V74, V75, V76, V77, V78, V79, V80,
V81, V82, V83, V84, V85, V86, V87, V88, V89, V90,
V91, V92, V93, V94, V95, V96, V97, V98, V99, V100,
V101, V102, V103, V104, V105, V106, V107, V108, V109, V110,
V111, V112, V113, V114, V115, V116, V117, V118, V119, V120,
V121, V122, V123, V124, V125;

procedure ERROR;
begin
  writeln ('VALOR FUERA DE RANGO!')
end;

begin
  WRITELN ('*******************************************');
  writeLn ('VUELTO PARA IMPORTES PAGADOS CON UN BILLETE');
  WRITELN ('*******************************************');
  writeln;
  IMPORTEOK := -1;
  while IMPORTEOK <> 0 do
    begin
      writeln ('IMPORTE (min $0.01 y max $100.00)');
      CENTAVOSOK := -1;
      while CENTAVOSOK <> 0 do
        begin
          write ('CENTAVOS: '); readLn (CENTAVOS);
          CENTAVOSOK := 0;
          if CENTAVOS < 0 then CENTAVOSOK := -1;
          if CENTAVOS > 99 then CENTAVOSOK := -1;
          if CENTAVOSOK <> 0 then call ERROR
```

```
      end;
    PESOSOK := -1;
    while PESOSOK <> 0 do
      begin
        write ('PESOS: '); readLn (PESOS);
        PESOSOK := 0;
        if PESOS < 0 then PESOSOK := -1;
        if PESOS > 100 then PESOSOK := -1;
        if PESOSOK <> 0 then call ERROR
      end;
    write ('IMPORTE: $', PESOS, '.');
    if CENTAVOS < 10 then write ('0');
    writeLn (CENTAVOS);
    IMPORTE := PESOS * 100 + CENTAVOS;
    IMPORTEOK := 0;
    if IMPORTE < 1 then IMPORTEOK := -1;
    if IMPORTE > 10000 then IMPORTEOK := -1;
    if IMPORTEOK <> 0 then call ERROR
  end;

VUELTOOK := -1;
while VUELTOOK <> 0 do
  begin
    BILLETEOK := -1;
    while BILLETEOK <> 0 do
      begin
        write ('BILLETE (min $2 y max $100): $'); readLn (BILLETE);
        BILLETEOK := -1;
        if BILLETE = 2 then BILLETEOK := 0;
        if BILLETE = 5 then BILLETEOK := 0;
        if BILLETE = 10 then BILLETEOK := 0;
        if BILLETE = 20 then BILLETEOK := 0;
        if BILLETE = 50 then BILLETEOK := 0;
        if BILLETE = 100 then BILLETEOK := 0;
        if BILLETEOK <> 0 then writeln ('BILLETE INEXISTENTE!')
      end;
    VUELTO := BILLETE * 100 - IMPORTE;
    VUELTOOK := 0;
    if VUELTO < 0 then
      begin
        VUELTOOK := -1;
        writeLn ('BILLETE INSUFICIENTE PARA EL PAGO!')
      end
  end;

VUELTOPESOS := VUELTO / 100;
VUELTOCENTAVOS := VUELTO - VUELTOPESOS * 100;

write ('Su vuelto: $', VUELTOPESOS, '.');
```

```pascal
if VUELTOCENTAVOS < 10 then write ('0');
writeLn (VUELTOCENTAVOS);

writeLn;

if VUELTO >= 5000 then
  begin
    writeLn ('1 billete de $50');
    VUELTO := VUELTO - 5000
  end;

if VUELTO >= 2000 then
  begin
    if VUELTO / 2000 = 1 then writeLn ('1 billete de $20');
    if VUELTO / 2000 <> 1 then writeLn ('2 billetes de $20');
    VUELTO := VUELTO - VUELTO / 2000 * 2000
  end;

if VUELTO >= 1000 then
  begin
    writeLn ('1 billete de $10');
    VUELTO := VUELTO - 1000
  end;

if VUELTO >= 500 then
  begin
    writeLn ('1 billete de $5');
    VUELTO := VUELTO - 500
  end;

if VUELTO >= 200 then
  begin
    if VUELTO / 200 = 1 then writeLn ('1 billete de $2');
    if VUELTO / 200 <> 1 then writeLn ('2 billetes de $2');
    VUELTO := VUELTO - VUELTO / 200 * 200
  end;

if VUELTO >= 100 then
  begin
    writeLn ('1 moneda de $1');
    VUELTO := VUELTO - 100
  end;

if VUELTO >= 50 then
  begin
    writeLn ('1 moneda de 50 centavos');
    VUELTO := VUELTO - 50
  end;
```

```pascal
  if VUELTO >= 25 then
    begin
      writeLn ('1 moneda de 25 centavos');
      VUELTO := VUELTO - 25
    end;

  if VUELTO >= 10 then
    begin
      if VUELTO / 10 = 1 then writeLn ('1 moneda de 10 centavos');
      if VUELTO / 10 <> 1 then writeLn ('2 monedas de 10 centavos');
      VUELTO := VUELTO - VUELTO / 10 * 10
    end;

  if VUELTO >= 5 then
    begin
      writeLn ('1 moneda de 5 centavos');
      VUELTO := VUELTO - 5
    end;

  if VUELTO > 1 then writeLn (VUELTO, ' monedas de 1 centavo');
  if VUELTO = 1 then writeLn ('1 moneda de 1 centavo');

  WRITELN ('****************************************************************
****************************************************************************
****************************************************************************
*********************************************************************');

  WRITELN
    ('*********************************************************************************

  WRITELN
    ('*********************************************************************************

end.
```

4.7.2. Errores de Compilacion

Mensajes de Error	Corrección
24. DEMASIADOLARGO123456789012345678901234567890123456789012345678901234567890, 25. Error Lexico: Identificador demasiado largo	
189. WRITELN ('*** ** ** ** *********************************) 191. end. 192. Error Lexico: Cadena no finalizada antes que finalice el archivo 193. ERROR LEXICO 194. Error Sintactico: Se esperaba un cierre de parentesis luego de write 194. Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin 195. Error Sintactico: Se esperaba punto (.) de finalizacion de programa	************')

Cuadro 8: Errores MAL-06. Primera compilacion.

4.8. MAL-07

4.8.1. Código Fuente

```
CONST N 20;

VAR A, B, C;

PROCEDURE TRI#NGULO;
VAR A, B;
BEGIN
  WRITELN;
  A := 15;
  WHILE A > O DO
    BEGIN
      B := 0;
      WHILE B < A DO
        BEGIN
          WRITE ('*')
          B := B + 1
        END;
      WRITELN;
      A := A - 1;
    END
```

```
END;

BEGIN
  A := 111111111111111111;
  WHILE A <= N DO
    BEGIN
      WRITE (A, ' ');
      A := A + TRIANGULO
    END;

  CALL TRIANGULO;

  B := -N;
  C := 0;
  WHILE B < C DO
    BEGIN
      WRITE (B, ' ');
      B := B + 1
    END;
  WRITELN;

END.
```

4.8.2. Errores de Compilacion

Mensajes de Error	Corrección
1. CONST N 20;	CONST N = 20;
2. Error Sintactico: asignacion de constante esperada (=)	
6. PROCEDURE TRI#NGULO;	PROCEDURE TRIANGULO;
7. VAR A, B;	VAR A, B;
8. Error Sintactico: Luego de la identificacion de un procedimiento se esperaba por punto y coma (;)	
17. WRITE ('*')	WRITE('*');
18. B := B + 1	B := B + 1
19. Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin	
27. A := 111111111111111111;	A := 1;
28. Error Lexico: Numero demasiado largo	
32. A := A + TRIANGULO	
33. Error Semantico: Identificador no encontrado (TRIANGULO)	

Cuadro 9: Errores MAL-07. Primera compilacion.

Mensajes de Error	Corrección
28. A := A + TRIANGULO	A := A + 1
29. Error Semantico: Solo pueden usarse variables o constantes en una expresion	

Cuadro 10: Errores MAL-07. Segunda compilacion.

4.9. MAL-08

4.9.1. Código Fuente

```
var K;
procedure P;
  procedure coma;
  begin
    write (',')
    K := K + 1;
    call P
  end;
begin
  if K < 10 then
    begin
      write coma;
      call K;
    end
end;

begin
  K := 1;
  call P;
  writeln (10)
```

4.9.2. Errores de Compilacion

Mensajes de Error	Corrección
5. write (',') 6. K := K + 1; 7. Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin	wrtite(','); K := K + 1;
13. write coma; 14. Error Sintactico: Se esperaba un parentesis luego de write 15. Error Semantico: Solo pueden usarse variables o constantes en una expresion 16. Error Sintactico: Se esperaba un cierre de parentesis luego de write	write(K);
17. call K; 18. Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin 19. Error Semantico: Solo pueden invocarse procedimientos	call coma;
28. Error Sintactico: Se esperaba un END o punto y coma (;) luego de una proposicion de un Begin 29. Error Sintactico: Se esperaba punto (.) de finalizacion de programa	end.

Cuadro 11: Errores MAL-08. Primera compilacion.

4.10. MAL-09

4.10.1. Código Fuente

4.10.2. Errores de Compilacion

Mensajes de Error	Corrección
2. Error Sintactico: Se esperaba punto (.) de finalizacion de programa	.

Cuadro 12: Errores MAL-09. Primera compilacion.

Referencias

[1] https://www.python.org/

[2] **BNF**: Backus-Naur Form. https://en.wikipedia.org/wiki/Backus%E2%80%93Naur_Form