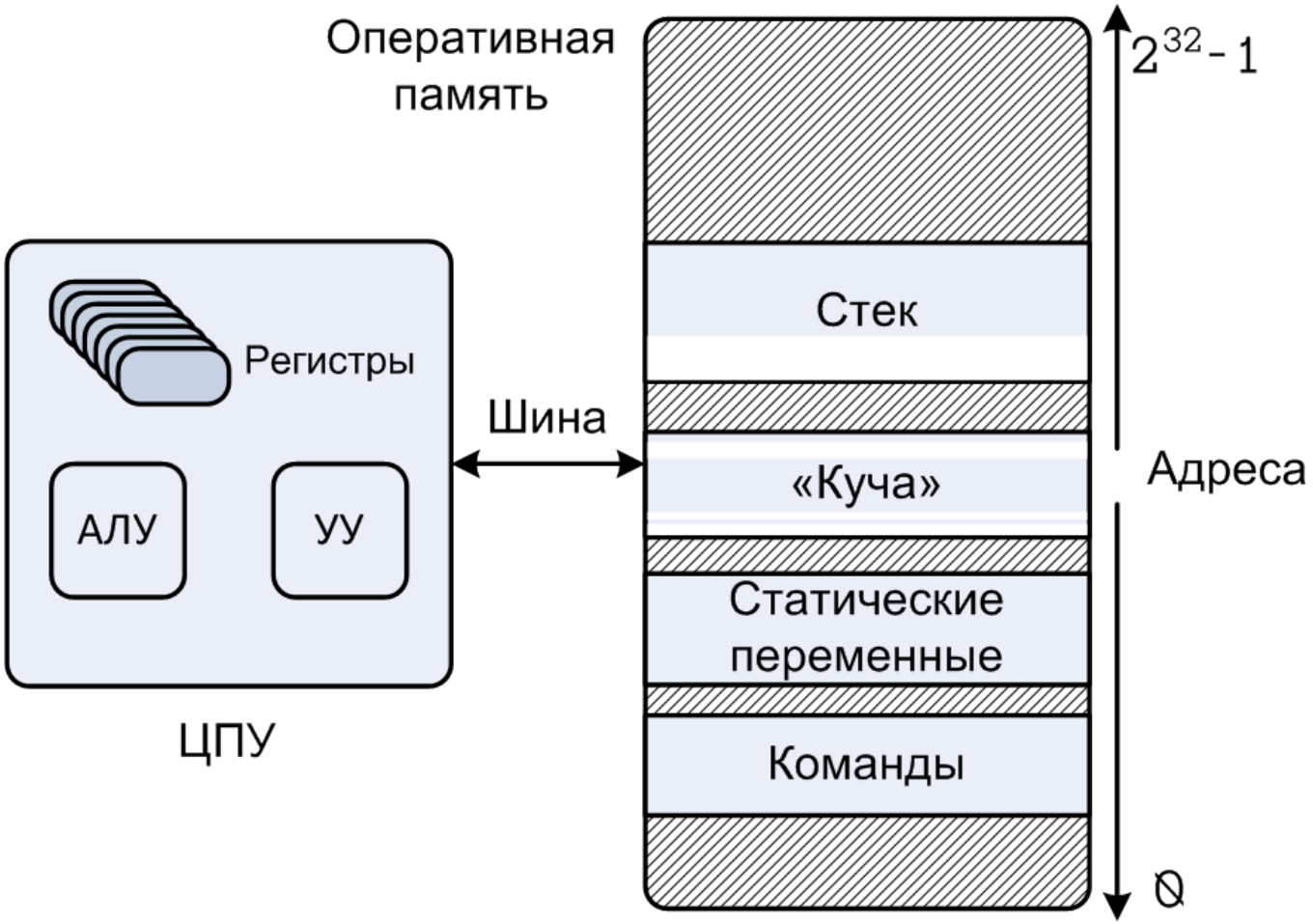
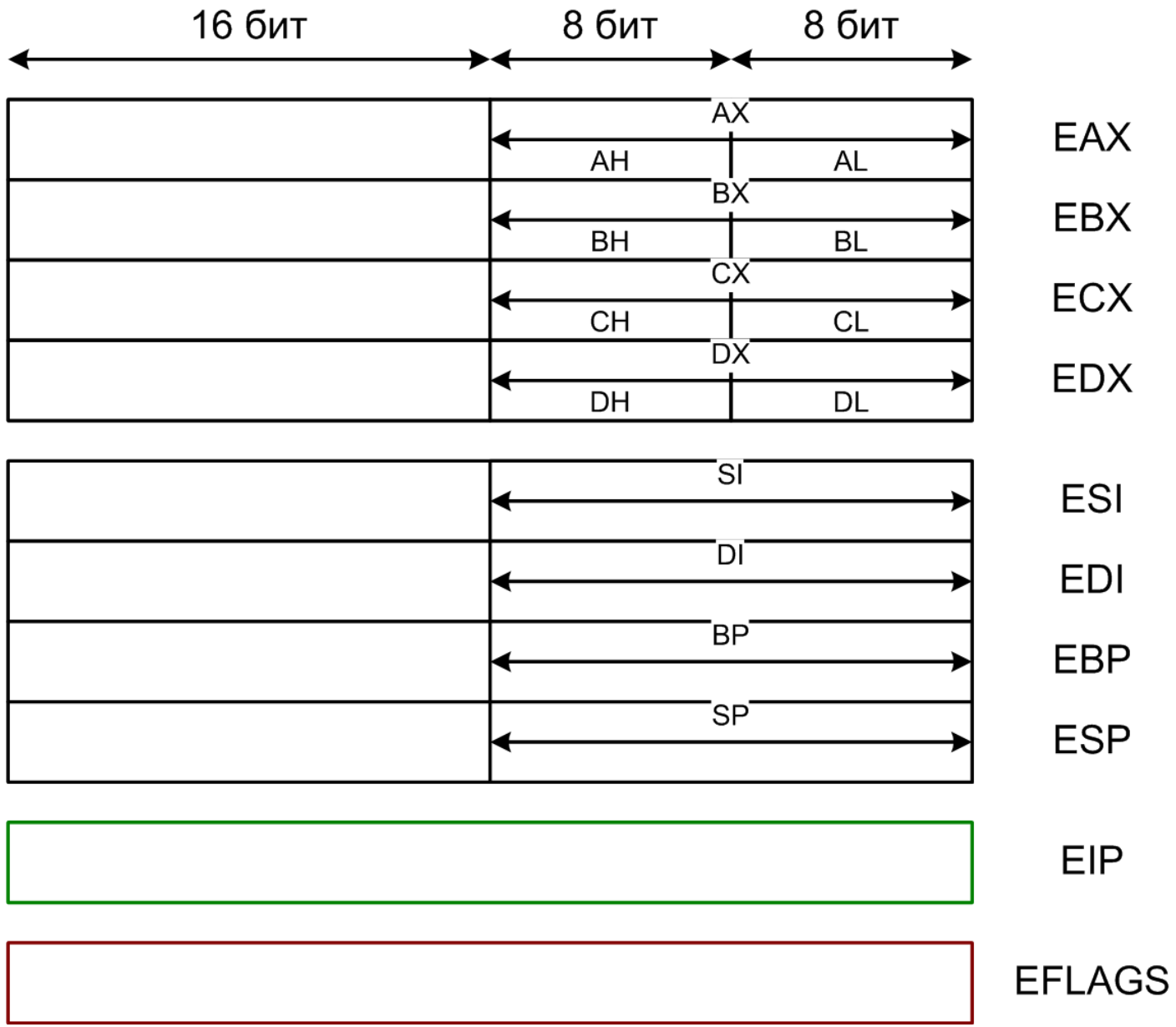
Лекция 2

13 февраля

Машина, на которой работает пользовательская программа (архитектура IA-32)



Вспоминаем Си-машину…



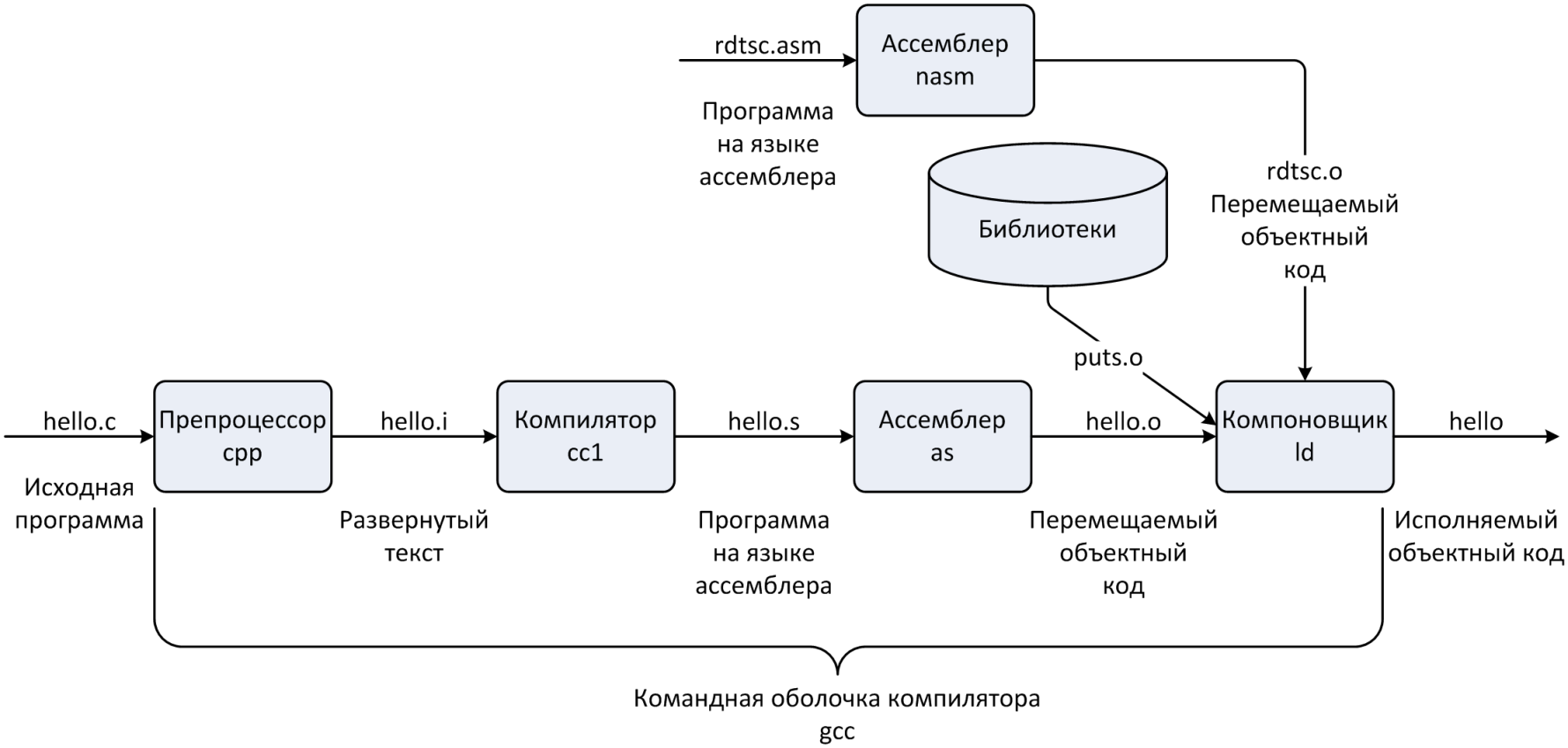
```
void f() {
   static int cntr = 0;      // 1
   int x = 2, y = 1, z = 0; // 2
   unsigned short w = 282;  // 3
   signed char q = 13;       // 4
   ++cntr;                   // 5
   z = -x + q * w *y - w;    // 6
}
```

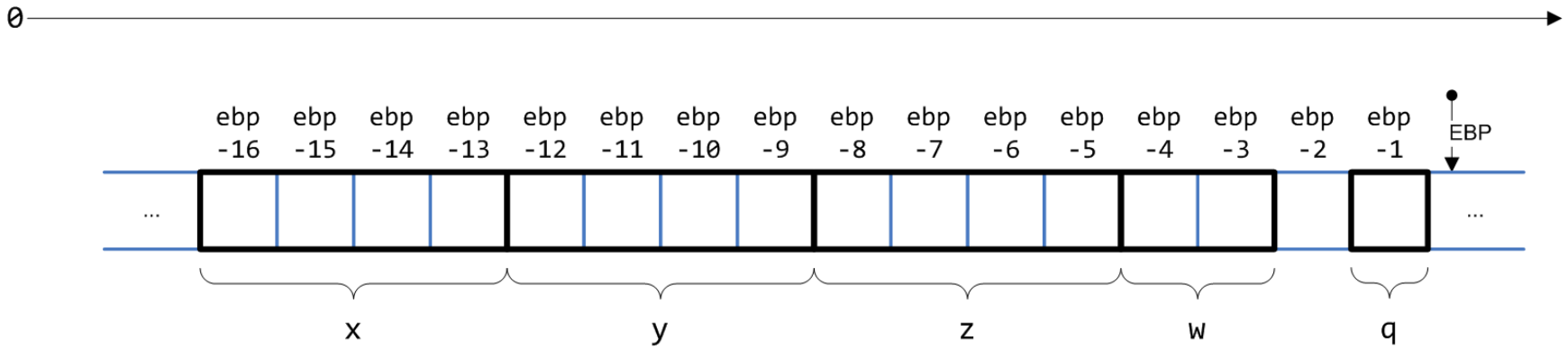
```
section .bss
; Резервирование 4 байт памяти
   cntr  resd  1
section .text
   global f
; Точка входа в программу
f:
     push    ebp
     mov     ebp, esp
     sub     esp, 16
     mov     dword [ebp-16], 2     ; (1)
     mov     dword [ebp-12], 1     ; (2)
     mov     dword [ebp-8], 0      ; (3)
     mov     word  [ebp-4], 282    ; (4)
     mov     byte  [ebp-1], 13     ; (5)
     add     dword [cntr], 1       ; (6)
     movsx   eax, byte [ebp-1]     ; (7)
     movzx   edx, word [ebp-4]     ; (8)
     imul    eax, edx              ; (9)
     imul    eax, dword [ebp-12]   ; (10)
     sub     eax, dword [ebp-16]   ; (11)
     sub     eax, edx              ; (12)
     mov     dword [ebp-8], eax    ; (13)
     leave
     ret
```

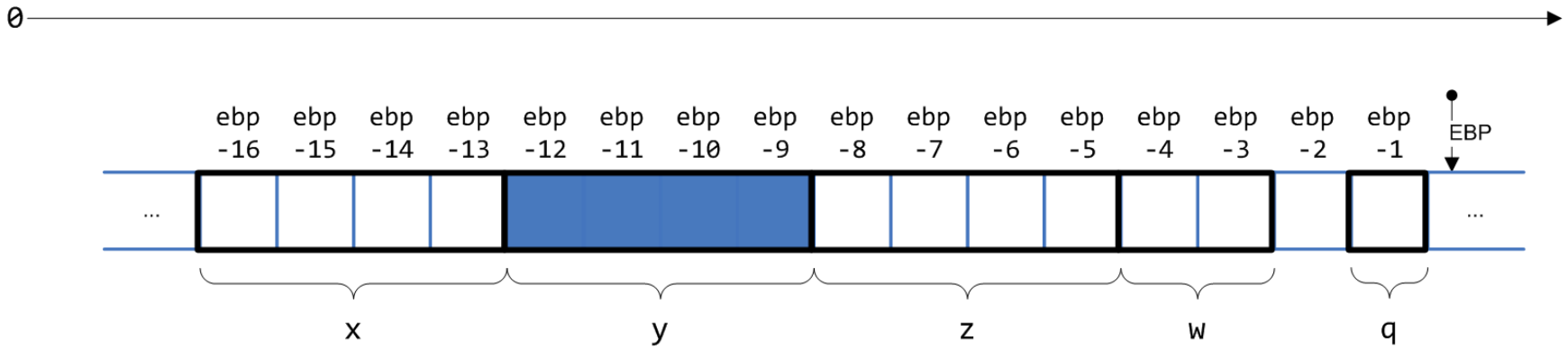
```
snoop@earth:~/samples$ nasm -f elf -o sample1.o sample1.asm
snoop@earth:~/samples$ objdump -M intel -d sample1.o
```

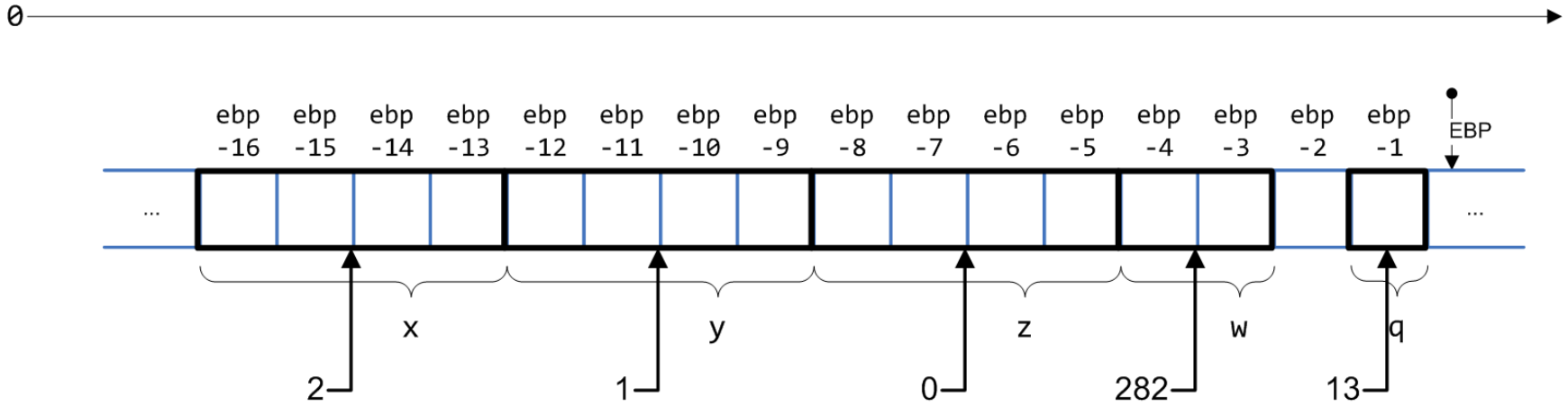
```
 0:   55                      push   ebp
 1:   89 e5                   mov    ebp,esp
 3:   81 ec 10 00 00 00       sub    esp,0x10
 9:   c7 45 f0 02 00 00 00    mov    DWORD PTR [ebp-0x10],0x2
10:   c7 45 f4 01 00 00 00    mov    DWORD PTR [ebp-0xc],0x1
17:   c7 45 f8 00 00 00 00    mov    DWORD PTR [ebp-0x8],0x0
1e:   66 c7 45 fc 1a 01       mov    WORD PTR [ebp-0x4],0x11a
24:   c6 45 ff 0d             mov    BYTE PTR [ebp-0x1],0xd
28:   81 05 00 00 00 00 01    add    DWORD PTR ds:0x0,0x1
2f:   00 00 00
32:   0f be 45 ff             movsx  eax,BYTE PTR [ebp-0x1]
36:   0f b7 55 fc             movzx  edx,WORD PTR [ebp-0x4]
3a:   0f af c2                imul   eax,edx
3d:   0f af 45 f4             imul   eax,DWORD PTR [ebp-0xc]
41:   2b 45 f0                sub    eax,DWORD PTR [ebp-0x10]
44:   29 d0                   sub    eax,edx
46:   89 45 f8                mov    DWORD PTR [ebp-0x8],eax
49:   c9                      leave
4a:   c3                      ret
```

Синтаксис objdump отличается от nasm!









```
%include 'io.inc'

section .data
 a    dw 1
 addr dd $
 var  dd 0x1234F00D

section .bss
   cntr resd 1

section .text
global CMAIN
CMAIN:
   add dword [cntr], 1
   mov eax, [addr]
   PRINT_HEX 4, eax
   NEWLINE
   PRINT_HEX 4, addr
   NEWLINE
   xor eax, eax
```