

Dasturlash asoslari

Hello world

Iqtibos

Butun dunyo sizga qarshi bo'lib
tuyulganida, samolyot shamol esish
yo'nalishida emas, balki unga
qarshi ko'tarilishini unutmang

Genri Ford. Ford avtokonserni
asoschisi.

Data representation

Kompyuter ma'lumotlarni qanday ko'rinishda ko'radi?

Oʻnlik sanoq sistemasi

Decimal digit

Odamsod sanashda ishlatuvchi tizim

O'nlik sanoq sistemasi qanday ishlaydi?

- BASE 10
- Decimal digit
- Raqamning har bir xonasi o'z o'rni, qiymati va nomiga ega
- 10ta raqam sanab bo'lingach yangi xona qo'shiladi

| | |
|--------|---------|
| 000000 | 000100 |
| 000001 | 000101 |
| 000002 | 000199 |
| 000003 | 000200 |
| 000004 | 000999 |
| 000005 | 001000 |
| 000006 | 009999 |
| 000007 | 010000 |
| 000008 | 099999 |
| 000009 | 100000 |
| 000010 | 199999 |
| 000011 | 200000 |
| 000020 | 999999 |
| 000099 | 1000000 |

0 (nol) o'nlik sanoq sistemasida

- Nullus – (lotin tilidan) hech qanday
- + va – operatsiyalari jarayonida o'zgarish bermaydi
- 0ga / (bo'lish) mumkin emas
- 0ga * (ko'paytirish) 0 beradi
- Ungacha manfiy sonlar
- Undan so'ng musbat sonlar

-2 -1 0 1 2

Kasr sonlar

- Ikki butun son oralig'ida bo'ladi
- Nuqta belgisidan keyin yoziladi
- Xonalar to'ldirilishi faqat belgilangan xona va nuqta orasida **0** bo'lganda amalga oshiriladi

1.000000

1.100000

1.200000

1.300000

1.400000

1.500000

1.600000

1.700000

1.800000

1.900000

1.010000

1.090000

1.100000

1.001000

1.099000

1.100000

1.000100

1.099900

1.100000

1.999999

Ikkilik sanoq sistemasi

Binary digit

Eng universal ma'lumotlarni kodlash tizimi

Nima uchun ikkilik?

- Ishlab chiqariluvchi qurilma faqat elektr tokida ishlay olishi kerak
- Ma'lumotlarni qurilmada saqlanishi uchun ular sodda bo'lishi shart
- Odamlar orasida ishlatiluvchi xohlagan belgi va harfni ifodalash qulayligi bo'lishi kerak

1 2 3 4 5 6 7 8
9 0

a b c d e f g h k l m n o p
q r s t u v w x y z

а б в г д е ё ж з и й к л м н о п р с т
у ф х ц ч ш щ ъ ы ь э ю я

. , ! ? + - * / = @ # \$ % ^ & (
) { } []

Binary digit

- Faqat ikki son 1 va 0
- Ularni hayotdagi ikki holatdan biri deb qabul qilsa bo'ladi
 - **HA / YO'Q**
 - **HAQIQAT / YOLG'ON**
 - **TRUE / FALSE**
 - **ON / OFF**
- Ikkitagina holat bo'lgani uchun xohlagan murakkablikdagi tizimlarni yasash mumkin
- Qurilmada faqat **ON** va **OFF** holatlarni oladi
- Xatoliklar chiqishi ehtimoli juda kam

| BASE 2 | BASE 10 |
|----------|----------|
| 00000000 | 00000000 |
| 00000001 | 00000001 |
| 00000010 | 00000002 |
| 00000011 | 00000003 |
| 00000100 | 00000004 |
| 00000101 | 00000005 |
| 00000110 | 00000006 |
| 00000111 | 00000007 |
| 00001000 | 00000008 |
| 00001001 | 00000009 |
| 00001010 | 00000010 |

Matematik amallar

- BASE 10 qonunlaridan foydalanadi

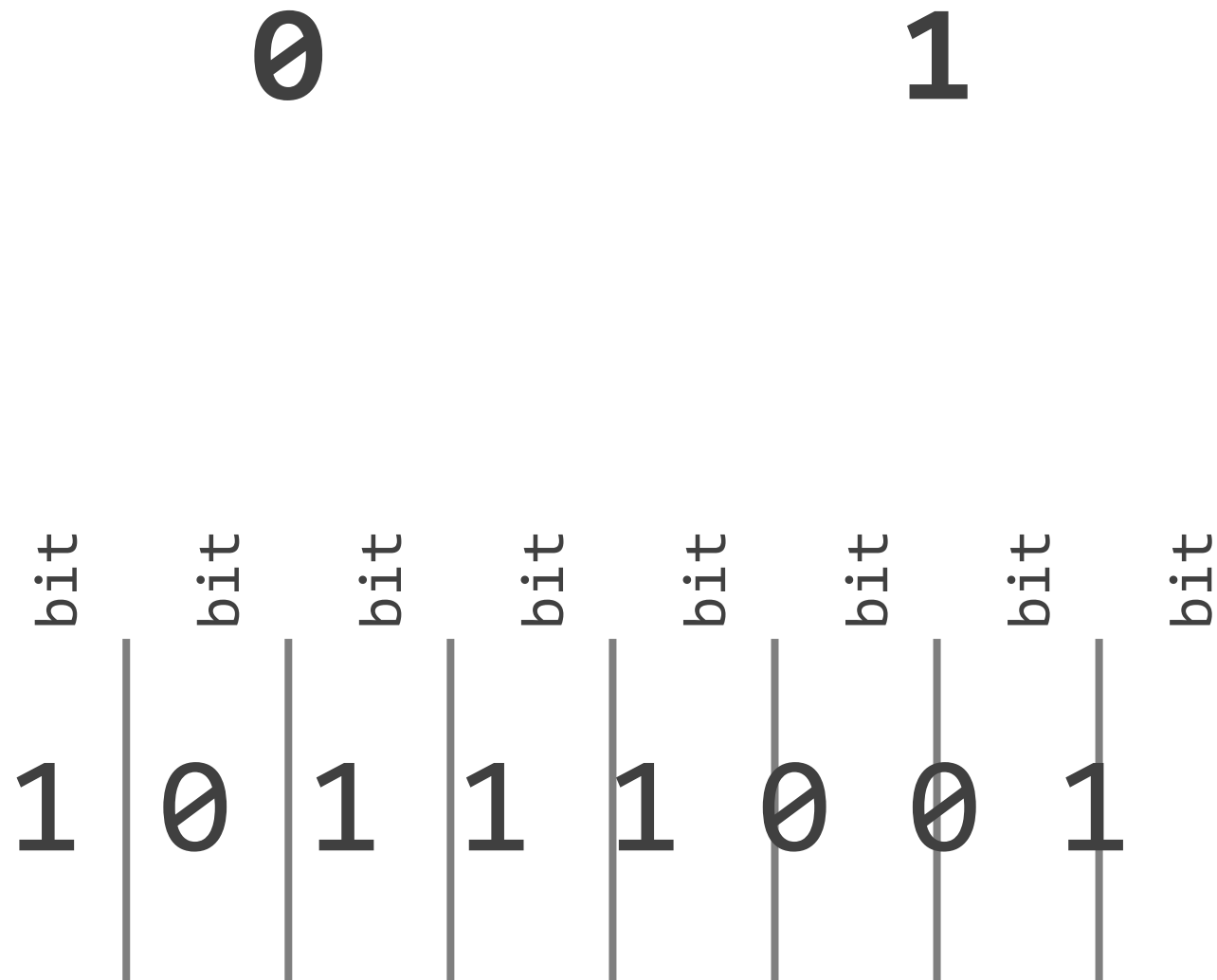
| | | | | | |
|--------------|--------|-----------|-------|-----------|----------------|
| + | | - | | * | / |
| 00 + 00 = 00 | | 00 - 00 = | | 0 * 0 = | |
| 01 + 00 = 01 | | 00 | | 0 | |
| 00 + 01 = 01 | | 01 - 00 = | | 1 * 0 = | |
| 01 + 01 = 10 | | 01 | | 0 | |
| | | 10 - 01 = | | 0 * 1 = | |
| | 1101 | 01 | 1110 | 0 | 1110 10 |
| | + 0101 | 01 - 01 = | | 1 **1 =10 | ----- |
| | ----- | 00 | 0101 | 1 | ----- 10 111 |
| | 10010 | | ----- | + 0000 | ----- |
| | | | 1001 | | 1110 11 |
| | | | | | ----- 10 |
| | | | | | 11100 ----- |
| | | | | | 10 |
| | | | | | -10- |
| | | | | | 0 |

BILISH SHART

BASE 2 kompyuter ichida

Eng kichik ma'lumot hajmi

- O'zida faqat bir holatni oladi:
0 yoki 1
- **Binary digit**
- bit



Byte

- 8 bit = 1 Byte
- $2^8 = 256$
- Asosiy hamma belgilarni aynan 256 xil kombinatsiya orqali belgilash mumkin

00000000
00000001
00000010
00000011
00000100
00000101
...
11111110
11111111

Ma'lumot o'lchov birliklari

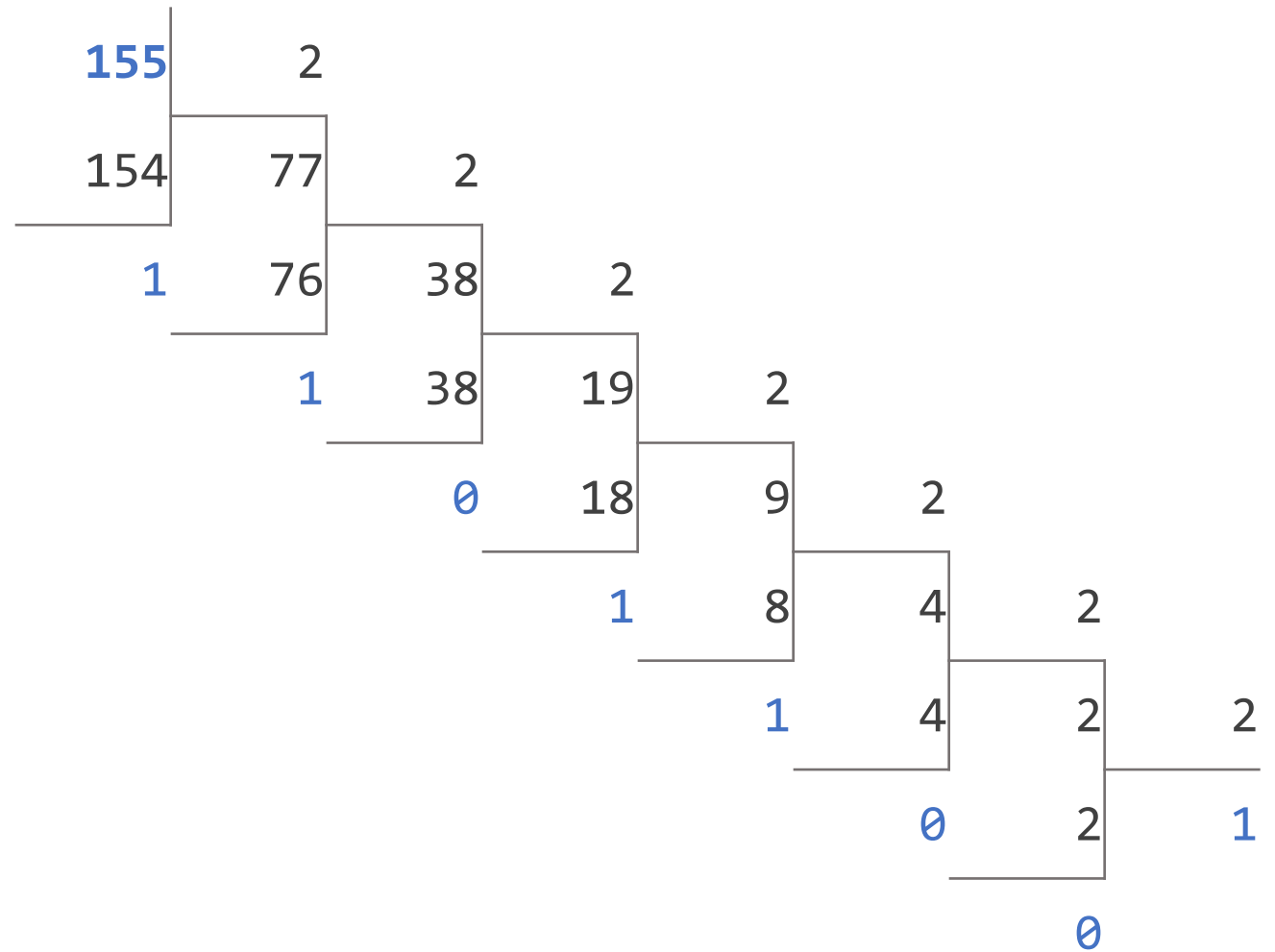
| Binary (BASE 2) | | | Decimal (BASE 10) | | |
|-----------------|--------|----------|-------------------|--------|-----------|
| Name | Symbol | Value | Name | Symbol | Value |
| kibibyte | KiB | 2^{10} | kilobyte | KB | 10^3 |
| mebibyte | MiB | 2^{20} | megabyte | MB | 10^6 |
| gibibyte | GiB | 2^{30} | gigabyte | GB | 10^9 |
| tebibyte | TiB | 2^{40} | terabyte | TB | 10^{12} |
| pebibyte | PiB | 2^{50} | petabyte | PB | 10^{15} |
| exbibyte | EiB | 2^{60} | exabyte | EB | 10^{18} |

Binary to decimal

| | 128 | 64 | 32 | 16 | 8 | 4 | 2 | 1 | |
|---------|-----|----|----|------------|---|---|---|---|--|
| BINARY | 1 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | |
| DECIMAL | 128 | 0 | 0 | 16 | 8 | 0 | 2 | 1 | |
| SUM | | | | 155 | | | | | |

Decimal to binary

- 10lik sanoq sistemasidagi son ikkiga to 1 qolmaguncha bo'lib boriladi
- Hisoblash jarayonida 0 va 1 qoldiqlar yig'ib boriladi
- Bo'lish jarayoni tugagach qoldiqlar ohiridan boshlab yozib olinadi
- $155_{10} \Rightarrow 10011011_2$



1 0 0 1 1 0 1 1

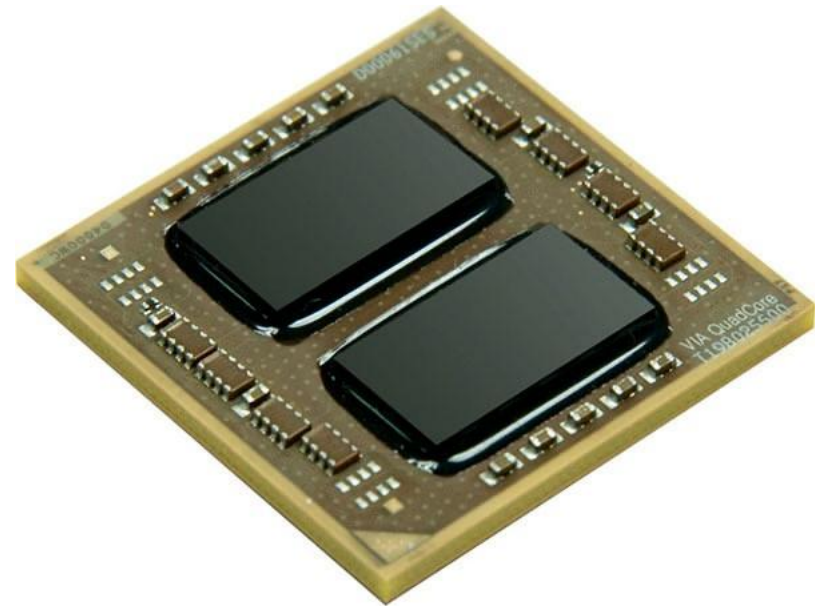
Dasturlash tillari

Kompyuter bilan suhbat

Ma'lumotlar aralashib ketishi ehtimoli

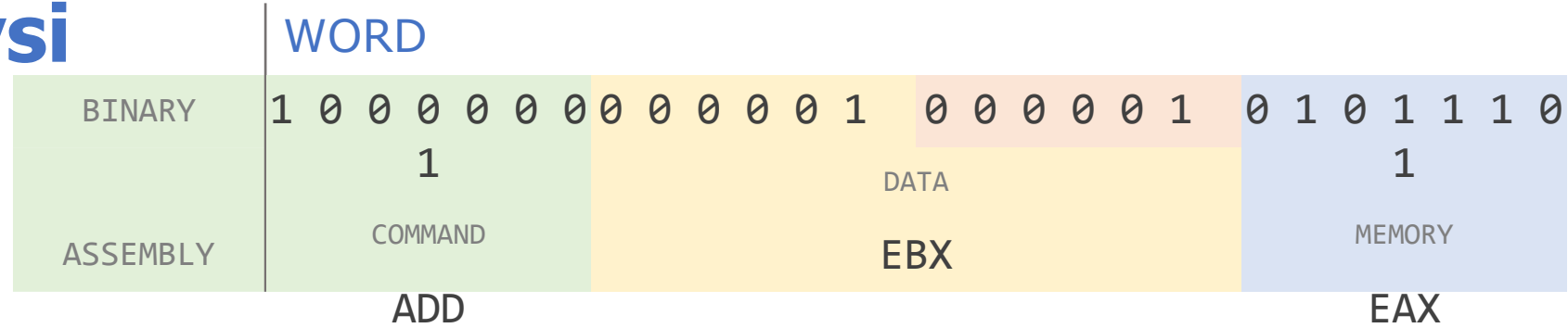
RAM CPU

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 |
| 1 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 | 0 | 1 | 0 | 1 |
| 1 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |



Kompyuter qaysi tilda ishlaydi?

- **Machine code**
- Bloklarga ajratish uslubi
- 32 bit – WORD
- 64 bit – DWORD
- Bir necha 0 va 1:
 - komanda
 - ma'lumot
 - adresni



; Assembly

```
section .text
    global _start
_start:
    ; handles the first input
    mov eax, 4; write
    mov ebx, 1; std_out
    mov ecx, msg1; what to write
```

Assembly -> Language

- Bir necha assembler komandalari birlashtirilib bir tushunarli komanda chiqariladi
- Odam uchun tushunarli so'zlar ishlatiladi
- Xotira va prosessor registrlarini yaxshi bilish talab etilmaydi
- Kod yozish uslubi va tezligi oshiriladi

| Assembly | C |
|--|--------------------------------|
| <pre>push rbp mov rbp, rsp mov DWORD PTR [rbp-4], edi</pre> | <pre>int square(int a) {</pre> |
| <pre>mov eax, DWORD PTR [rbp-4] imul eax, eax</pre> | <pre> return a * a;</pre> |
| <pre>pop rbp ret</pre> | <pre>}</pre> |

Compiler

Interpreter

Dasturchi yozgan kodni kompyuter qanday tushunadi?

Tarjimonlar nima uchun kerak?

- Kompyuter faqat 0 va 1 ni tushunadi
- Soddashtirish jarayoni baʼzida oʻta kuchli boʻladi
 - 100 qator Assembly
 - 1-2 qator Python
- Machine code instruktsiyalari prosessorlar orasida farqli boʻladi

Human readable code



Assembly



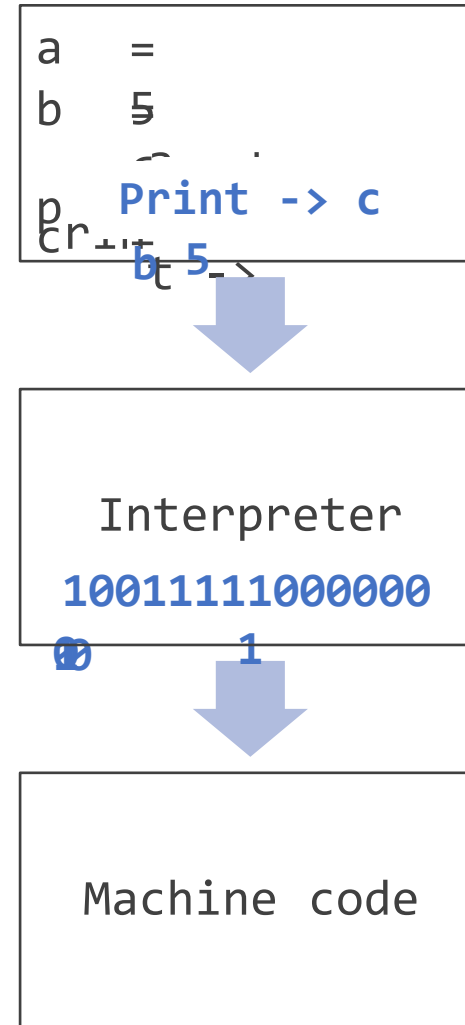
Machine code



Execution

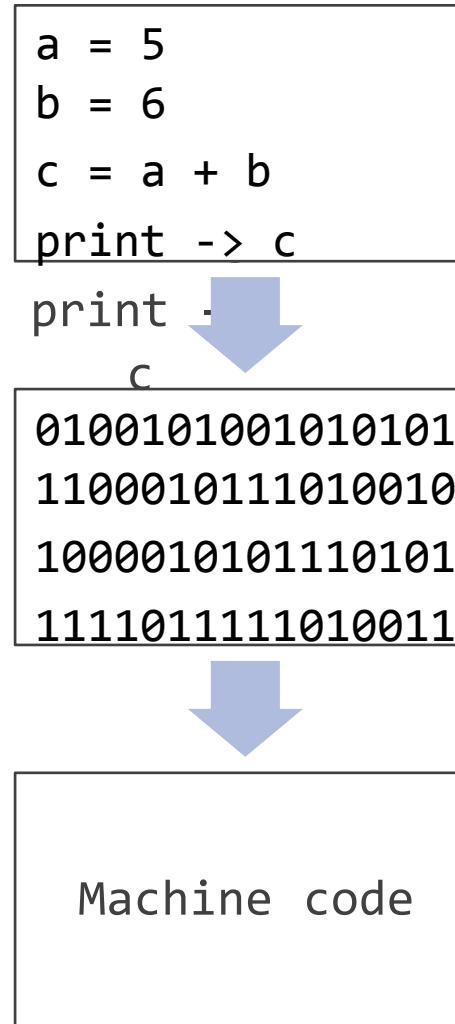
Interpreter

- Kod maxsus muhitda xotiradan chaqirib olinadi
- 1 qator kod o'qib olinib, xatoga tekshiriladi
- Xato bo'lmasa, muhit kodni Machine code'ga tarjima qiladi
- Tarjima qilingan qism Prosesorga bajarilish uchun beriladi
- Bajarilish tugaganidan so'ng, kodning yangi qatori o'qiladi va yuqoridagi ammlar qaytadan bajariladi
- Python, JavaScript, PHP



Compiler

- Kod to'liq o'qib chiqiladi
- Xatolar to'liq tekshiriladi
- Xatolar bo'lmasa, kod boshidan oxirigacha Machine code'ga tarjima qilinadi
- Tarjima qilingan kod tayyor dastur sifatida xotirada saqlanadi
- C, C++, C#, Java, Golang

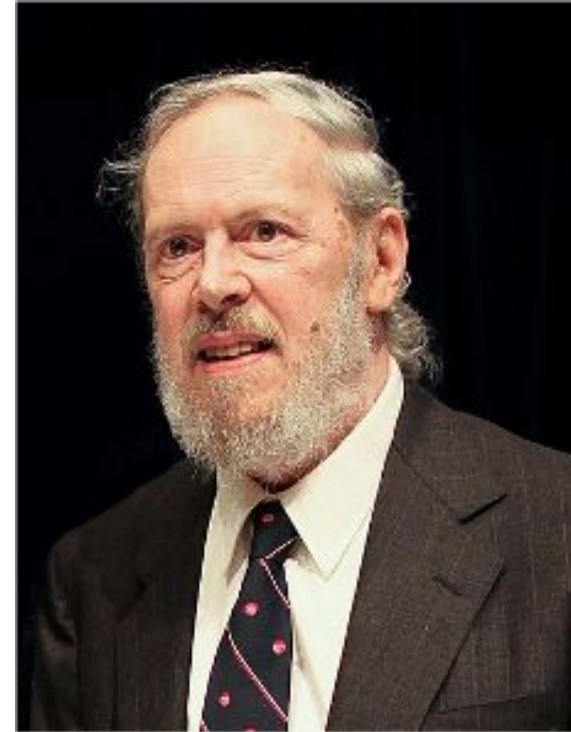


C programming language

The most powerful language

C tili tarixi

- Dennis Ritchie
- 1969– 1973 – yili yaratilgan
- UNIX operatsion tizimi uchun o'ylab topilgan
- Compiled language
 - GCC
 - CLang
 - MINGW
- Statically typed
- Structured, imperative



Compiler install

GNU/ Linux

Manjaro

```
sudo pacman -Syu gcc gdb
```

Ubuntu

```
sudo apt install gcc gdb
```

macOS

```
clang
```

Windows

```
mingw
```