

Assembly language

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AM-28

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Assembly language is a machine-oriented low-level programming language. Its commands directly correspond to individual machine commands or their sequences.

```
0000  2084      call     2084
0005  15CA      jmp     15CA
0010  17B4      call     17B4
0015  7160      mov     si,7160
0020  di,di    xor     di,di
0025  es,[7606]  mov     es,[7606]
0030  bx,800F  mov     bx,800F
0035  cx,cx    xor     cx,cx
```



Advantage

- The ability to make full use of all the features of the hardware platform allows, theoretically, to write the fastest and most compact code possible for this processor.



A skilled programmer, as a rule, is able to significantly optimize a program compared to a translator from a high-level language in one or several parameters and create a code close to Pareto optimal.

- due to a more rational use of processor resources
- due to manual optimization of calculations, the code size can be reduced and the program speed can be increased.



- The ability to directly access the hardware, and in particular the input-output port, a specific memory addresses, CPU registers



512-byte assembly language game



Using assembler has virtually no alternative when creating:

- hardware drivers and the core of the operating system (at least the machine-dependent subsystems of the core of the OS), when it is important to temporarily coordinate the operation of peripheral devices with the central processor;

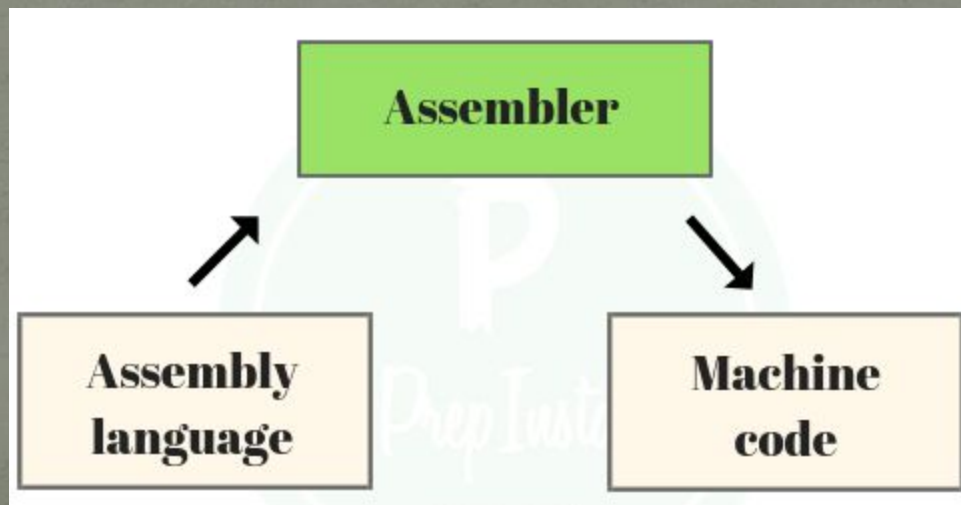


- programs that must be stored in ROM of a limited volume and / or run on devices with limited performance ("firmware" of computers and various electronic devices);
- platform-specific components of compilers and interpreters of high-level languages, system libraries and code that implements platform compatibility.



Limitations

- Due to the machine orientation ("low level") of the assembly language, it is more difficult for a person to read and understand a program on it compared to high-level programming languages.
- A program in assembly language consists of very "small" elements - machine instructions, respectively, the volume of the program in the commands is proportionally larger.
- Programming and debugging are becoming more complicated, the complexity and probability of introducing errors are growing.





Graphic Work
Example

- An advanced programmer qualification is required to obtain high-quality code.
- A program in assembly language on a new platform may lose its speed advantage without manually rewriting the code.
- As a rule, fewer available libraries compared to modern industrial programming languages.
- There is no portability of programs to computers with a different architecture and command system.

