

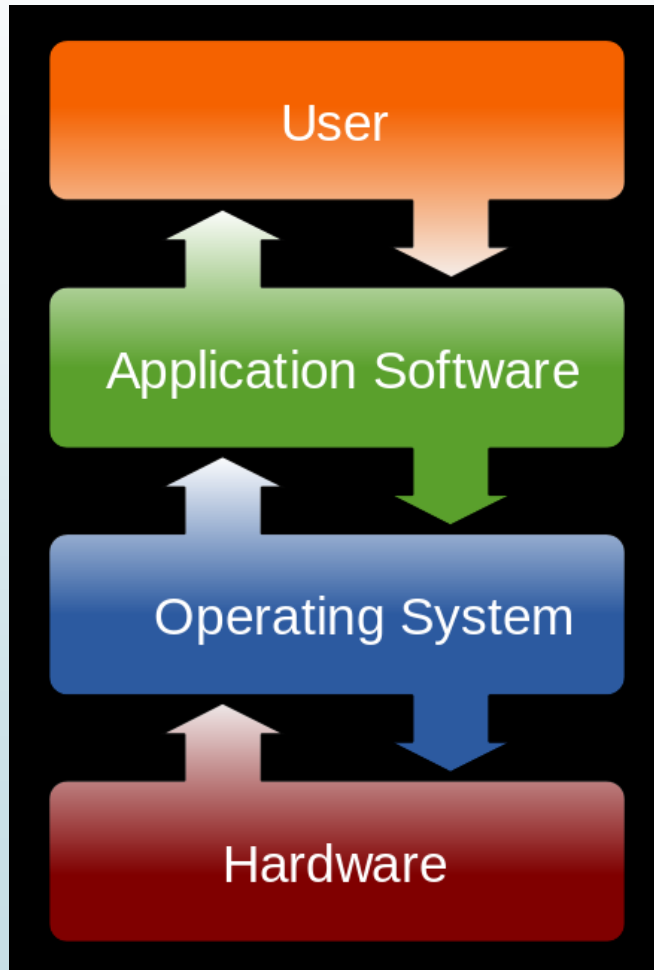


Software

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Class SE62 (Software Engineering)

What is software ?

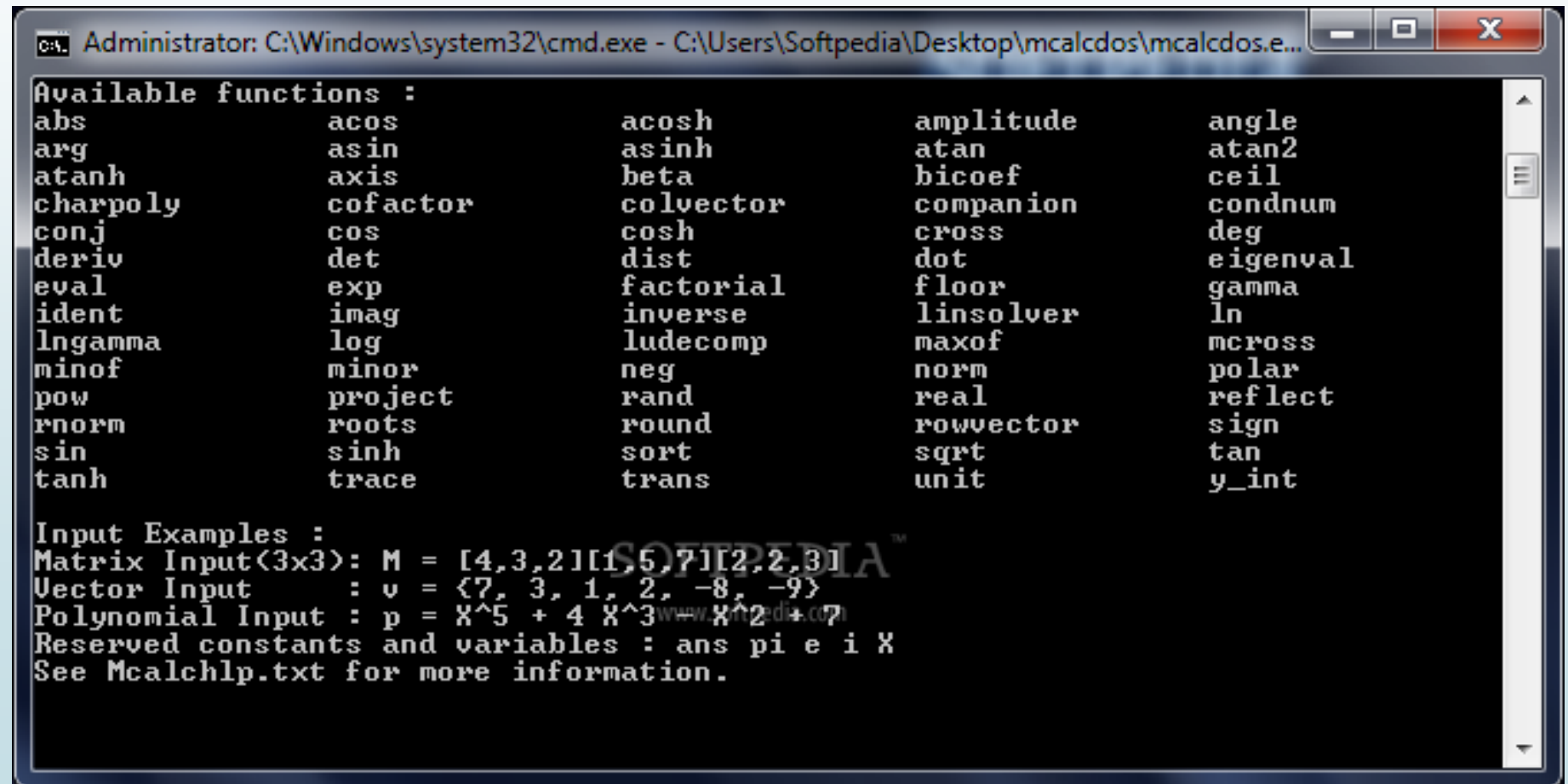


Computer software, or simply **software**, is that part of a computer system that **consists of encoded information or computer instructions**, in contrast to the physical hardware from which the system is built.

What is software ?

For example:

Command-line program



```
Administrator: C:\Windows\system32\cmd.exe - C:\Users\Softpedia\Desktop\mcalcdos\mcalcdos.e...

Available functions :
abs          acos          acosh         amplitude    angle
arg          asin          asinh         atan         atan2
atanh        axis          beta          bicoef       ceil
charpoly     cofactor     colvector     companion    condnum
conj         cos          cosh          cross        deg
deriv        det          dist          dot          eigenvall
eval         exp          factorial     floor        gamma
ident        imag         inverse       linsolver    ln
lngamma     log          ludecomp      maxof        mcross
minof        minor        neg           norm         polar
pow          project     rand          real         reflect
rnorm        roots       round         rowvector    sign
sin          sinh        sort          sqrt         tan
tanh         trace       trans         unit         y_int

Input Examples :
Matrix Input(3x3): M = [4,3,2][1,5,7][2,2,3]
Vector Input      : v = {7, 3, 1, 2, -8, -9}
Polynomial Input  : p = X^5 + 4 X^3 + X^2 + 7
Reserved constants and variables : ans pi e i X
See Mcalchlp.txt for more information.
```

What is software ?

For example:

Office-software



What is software ?

For example:

Games



What is software ?

For example:

System software



How to classify software ?



Software

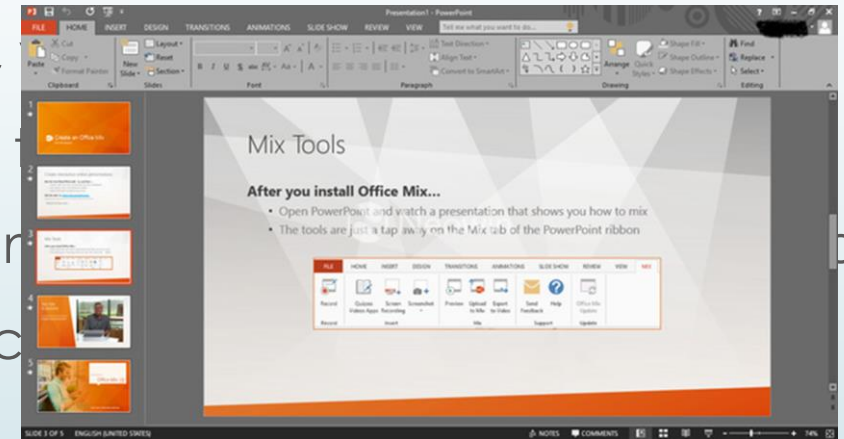
- Application software**, which is software that uses the computer system to perform special functions or provide entertainment functions beyond the basic operation of the computer itself.
- System software**, which is software that directly operates the computer hardware, to provide basic functionality needed by users and other software, and to provide a platform for running application software.

How to classify software ?

Software

Application software,

computer system that
provide entertainment
operation of the computer



System software, which is

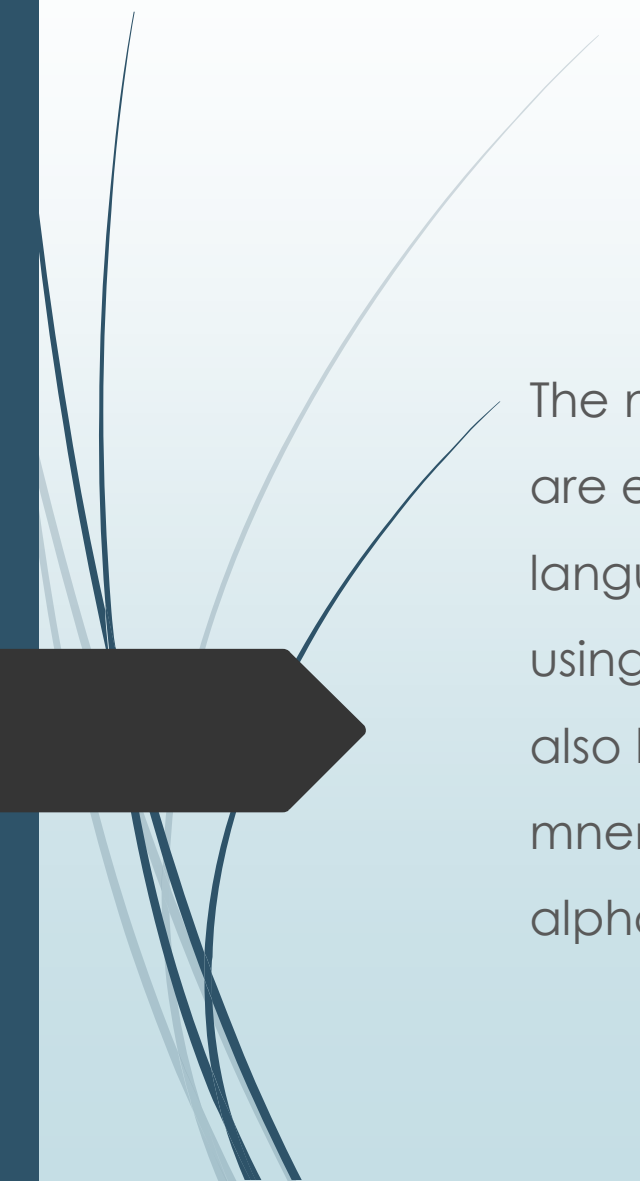
operates the computer
functionality needed
and to provide a platform
software.



basic
ware,
tion

How to program ?

Use a programming language!



The majority of software is written in **high-level programming languages** that are easier and more efficient for programmers, meaning closer to a natural language.[1] High-level languages are translated into **machine language** using a compiler or an interpreter or a combination of the two. Software may also be written in a low-level **assembly language**, essentially, a vaguely mnemonic representation of a machine language using a natural language alphabet, which is translated into machine language using an assembler.

How to program ?

The same program I wrote to generate a random number

A high-level programming language (c)

```
2  #define _CRT_SECURE_NO_WARNINGS
3  #include<stdio.h>
4  #include<stdlib.h>
5  #include<time.h>
6  int main()
7  {
8      int i;
9      long long int rand_bigger = 0, Num, Num_1;
10     scanf("%lld", &Num); /*input the max*/
11     Num_1 = (Num - 1) / RAND_MAX + 1;
12     srand((unsigned)time(NULL));
13     for(i = 1; i <= Num_1; i++)
14     {
15         rand_bigger += rand();
16     }
17     rand_bigger = Num * (rand_bigger / ((double)Num_1 * RAND_MAX + 1));
18     printf("%lld", rand_bigger);
19     return 0;
20 }
```

How to program ?

The same program I wrote to generate a random number

Assembly language (Part)

```
mov     ebp, esp
sub     esp, 138h
push    ebx
push    esi
push    edi
lea     edi, [ebp+FFFFFFEC8h]
mov     ecx, 4Eh
mov     eax, 0CCCCCCCCh
rep stos dword ptr es:[edi]
mov     eax, dword ptr ds:[00DB9000h]
xor     eax, ebp
mov     dword ptr [ebp-4], eax
xorpd   xmm0, xmm0
movl    qword ptr [ebp-1Ch], xmm0
mov     esi, esp
lea     eax, [ebp-2Ch]
push    eax
push    0DB6868h
call    dword ptr ds:[00DBA2D8h]
add     esp, 8
cmp     esi, esp
call    00DB115E
mov     eax, dword ptr [ebp-2Ch]
sub     eax, 1
mov     ecx, dword ptr [ebp-28h]
sbb     ecx, 0
push    0
push    7FFFh
push    ecx
push    eax
call    00DB1078
add     eax, 1
adc     edx, 0
mov     dword ptr [ebp-3Ch], eax
mov     dword ptr [ebp-38h], edx
push    0
call    00DB1680
add     esp, 4
mov     esi, esp
push    eax
call    dword ptr ds:[00DBA2D0h]
add     esp, 4
cmp     esi, esp
call    00DB115E
mov     dword ptr [ebp-0Ch], 1
jmp     00DB14D1
mov     eax, dword ptr [ebp-0Ch]
add     eax, 1
```

How to program ?

The same program I wrote to generate a random number

Machine language (Part)

	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f
00000000h:	4D	5A	90	00	03	00	00	00	04	00	00	00	FF	FF	00	00
00000010h:	B8	00	00	00	00	00	00	00	40	00	00	00	00	00	00	00
00000020h:	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00000030h:	00	00	00	00	00	00	00	00	00	00	00	00	E8	00	00	00
00000040h:	0E	1F	BA	0E	00	B4	09	CD	21	B8	01	4C	CD	21	54	68
00000050h:	69	73	20	70	72	6F	67	72	61	6D	20	63	61	6E	6E	6F
00000060h:	74	20	62	65	20	72	75	6E	20	69	6E	20	44	4F	53	20
00000070h:	6D	6F	64	65	2E	0D	0D	0A	24	00	00	00	00	00	00	00
00000080h:	2F	A1	AC	20	6B	C0	C2	73	6B	C0	C2	73	6B	C0	C2	73
00000090h:	9A	06	09	73	68	C0	C2	73	9A	06	0F	73	68	C0	C2	73
000000a0h:	9A	06	0C	73	7F	C0	C2	73	9A	06	0D	73	6C	C0	C2	73
000000b0h:	6B	C0	C3	73	56	C0	C2	73	97	B7	7B	73	69	C0	C2	73
000000c0h:	48	2F	0D	73	6A	C0	C2	73	0D	2E	0B	73	6A	C0	C2	73
000000d0h:	0D	2E	0E	73	6A	C0	C2	73	52	69	63	68	6B	C0	C2	73
000000e0h:	00	00	00	00	00	00	00	00	50	45	00	00	4C	01	07	00
000000f0h:	F9	DB	0C	58	00	00	00	00	00	00	00	00	E0	00	02	01
00000100h:	0B	01	0B	00	00	44	00	00	00	3E	00	00	00	00	00	00
00000110h:	27	11	01	00	00	10	00	00	00	10	00	00	00	00	40	00
00000120h:	00	10	00	00	00	02	00	00	06	00	00	00	00	00	00	00
00000130h:	06	00	00	00	00	00	00	00	00	D0	01	00	00	04	00	00
00000140h:	00	00	00	00	03	00	40	81	00	00	10	00	00	10	00	00
00000150h:	00	00	10	00	00	10	00	00	00	00	00	00	10	00	00	00
00000160h:	00	00	00	00	00	00	00	00	A0	01	00	3C	00	00	00	00

00000410h:	AC	1D	00	00	E9	C9	31	00	00	E9	42	19	00	00	E9	CD
00000420h:	08	00	00	E9	02	32	00	00	E9	BF	06	00	00	E9	FE	27
00000430h:	00	00	E9	23	32	00	00	E9	C4	06	00	00	E9	6F	1D	00
00000440h:	00	E9	9A	1D	00	00	E9	D3	31	00	00	E9	F2	31	00	00
00000450h:	E9	8D	28	00	00	E9	48	32	00	00	E9	21	24	00	00	E9
00000460h:	0C	24	00	00	E9	6B	21	00	00	E9	28	32	00	00	E9	4D
00000470h:	27	00	00	E9	DC	31	00	00	E9	F3	08	00	00	E9	CE	1D
00000480h:	00	00	E9	79	28	00	00	E9	5C	31	00	00	E9	AB	31	00
00000490h:	00	E9	BA	07	00	00	E9	25	19	00	00	E9	3C	31	00	00
000004a0h:	E9	C5	23	00	00	E9	C8	31	00	00	E9	3F	28	00	00	E9
000004b0h:	22	31	00	00	E9	67	1A	00	00	E9	F2	24	00	00	E9	5D
000004c0h:	17	00	00	E9	68	1B	00	00	E9	83	08	00	00	E9	0E	21
000004d0h:	00	00	E9	77	31	00	00	E9	82	27	00	00	E9	2F	08	00
000004e0h:	00	E9	FA	12	00	00	E9	45	31	00	00	E9	60	09	00	00
000004f0h:	E9	D5	30	00	00	E9	F6	22	00	00	E9	6D	09	00	00	E9
00000500h:	8C	31	00	00	E9	17	1D	00	00	E9	82	25	00	00	E9	3D
00000510h:	0B	00	00	E9	72	31	00	00	E9	D3	1C	00	00	E9	4E	27
00000520h:	00	00	E9	BF	05	00	00	E9	B4	0E	00	00	E9	9F	30	00
00000530h:	00	E9	DA	1F	00	00	E9	55	20	00	00	E9	26	31	00	00
00000540h:	E9	9B	05	00	00	E9	A4	30	00	00	E9	1D	31	00	00	E9
00000550h:	EC	05	00	00	E9	75	20	00	00	E9	FB	08	00	00	E9	5D
00000560h:	07	00	00	E9	C8	02	00	00	E9	B7	30	00	00	E9	8E	26
00000570h:	00	00	E9	8F	30	00	00	E9	FC	30	00	00	E9	FD	30	00

Why do we need software ?

Software is everywhere.

Rocket launching



Why do we need software ?

Software is everywhere.

Rocket launch

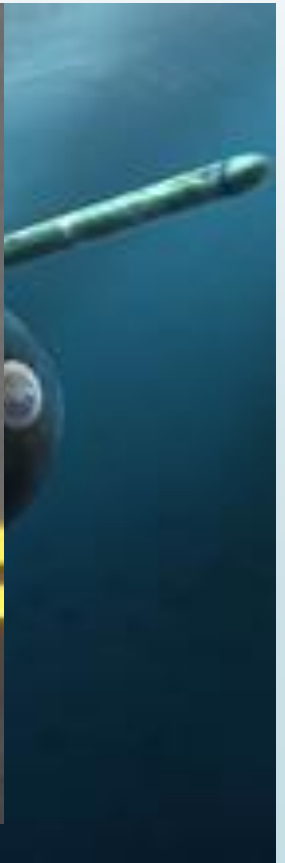


Submarine



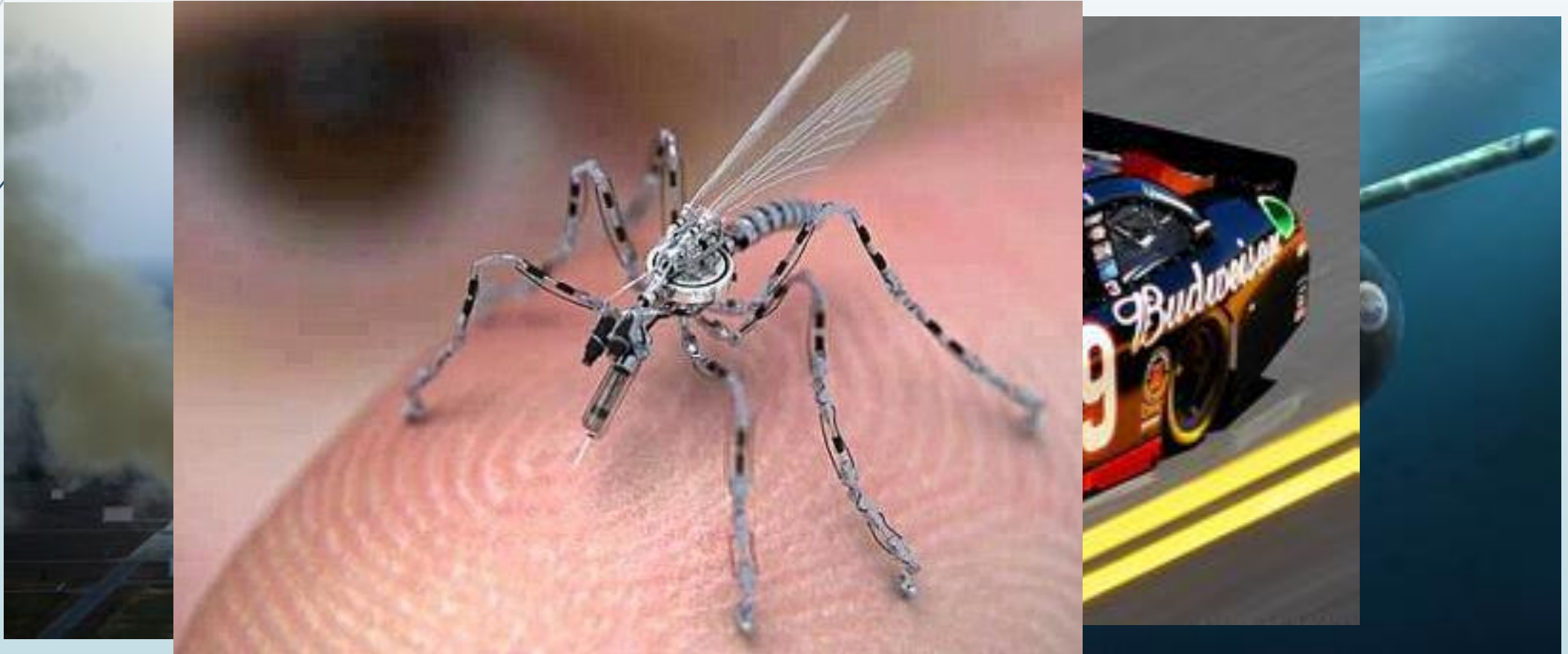
Why do we need software ?

Software is everywhere.



Why do we need software ?

Software is everywhere.



Why do we need software ?

Software makes our life easier.

Movable-type printing



Why do we need software ?

Software makes our life easier.





Thanks for listening!