Variabili e memoria

Corso di Laboratorio di Calcolo

Variabili e costanti

```
a = 2;
b = 3.5;
c = 2.;
```

0xffffa000	
0xffffa001	
0xffffa002	00000010
0xffffa003	
0xffffa004	
0xffffa005	
0xffffa006	
0xffffa007	

Variabili e costanti

```
a = 2;
b = 3.5;
c = 2.;
```

Nota: per brevità le variabili intere sono rappresentate usando solo 8 bit

0xffffa000	
0xffffa001	
0xffffa002	00000010
0xffffa003	
0xffffa004	
0xffffa005	
0xffffa006	
0xffffa007	

Variabili e costanti

```
a = 2;
b = 3.5;
c = 2.;
```

0xffffa000	
0xffffa001	
0xffffa002	00000010
0xffffa003	01000000
0xffffa004	11100000
0xffffa005	00000000
0xffffa006	00000000
0xffffa007	

$3.5 = (1 + 0.75)*2^1$

NOTA: l'esponente è rappresentato in eccesso (cap.1,p.19)

Variabili e costanti

```
a = 2;
b = 3.5;
c = 2.;
```

$2. = (1 + 0)*2^1$

0xffffa002	00000010
0xffffa003	01000000
0xffffa004	11100000
0xffffa005	00000000
0xffffa006	00000000
0xffffa007	01000000
0xffffa008	10000000
0xffffa009	00000000
0xffffa00a	00000000

Variabili e costanti

```
a = 2;
b = 3.5;
c = 2.;
d = 'f';
```

$f \leftrightarrow 102\ (66_{16})$

0xffffa003	01000000
0xffffa004	11100000
0xffffa005	00000000
0xffffa006	00000000
0xffffa007	01000000
0xffffa008	10000000
0xffffa009	00000000
0xffffa00a	00000000
0xffffa00b	01100110

Operatori matematici

```
c = a + b;
```

0xffffa002	00000010
0xffffa003	01000000
0xffffa004	11100000
0xffffa005	00000000
0xffffa006	00000000
0xffffa007	11000000
0xffffa008	00000000
0xffffa009	00000000
0xffffa00a	00000000

Operatori matematici

```
c = a + b;
```

Nota: nel registro della CPU il numero 2 viene “promosso” a `float`

0xffffa002	00000010
0xffffa003	01000000
0xffffa004	11100000
0xffffa005	00000000
0xffffa006	00000000
0xffffa007	01000000
0xffffa008	10000000
0xffffa009	00000000
0xffffa00a	00000000

Operatori matematici

```
c = a + b;
```

0xffffa002	00000010
0xffffa003	01000000
0xffffa004	11100000
0xffffa005	00000000
0xffffa006	00000000
0xffffa007	01000000
0xffffa008	10000000
0xffffa009	00000000
0xffffa00a	00000000

Operatori matematici

```
c = a + b;
```

$5.5 = (1 + 0.375)*2^2$

0xffffa002	00000010
0xffffa003	01000000
0xffffa004	11100000
0xffffa005	00000000
0xffffa006	00000000
0xffffa007	01000001
0xffffa008	00110000
0xffffa009	00000000
0xffffa00a	00000000

Operatori speciali

```
a = 2;
b = ++a;
```

0xffffa002	00000010
0xffffa003	

Operatori speciali

```
a = 2;
b = ++a;
```

0xffffa002	00000011
0xffffa003	00000011

Operatori speciali

```
a = 2;
b = ++a;
```

0xffffa002	00000010
0xffffa003	

```
a = 2;
b = a++;
```

Operatori speciali

```
a = 2;
b = ++a;
```

0xffffa002	00000011
0xffffa003	00000010

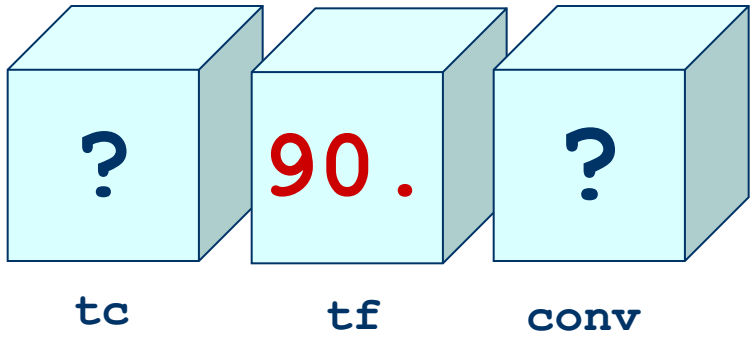
```
a = 2;
b = a++;
```

Caratteristiche del C

- (strong) typing → tutte le variabili vanno dichiarate
- ogni istruzione è terminata dal "**;**"
- parole riservate: **`char, double, float, int,long, short, unsigned, while, for, do, if, then, else, void`**
- Tokens: parole chiave, identificatori/variabili, costanti, operatori, simboli di interpunzione
  Es: **`int main (void) { }`**
- Gli identificatori devono cominciare con "_" o con una lettera, NON con un numero

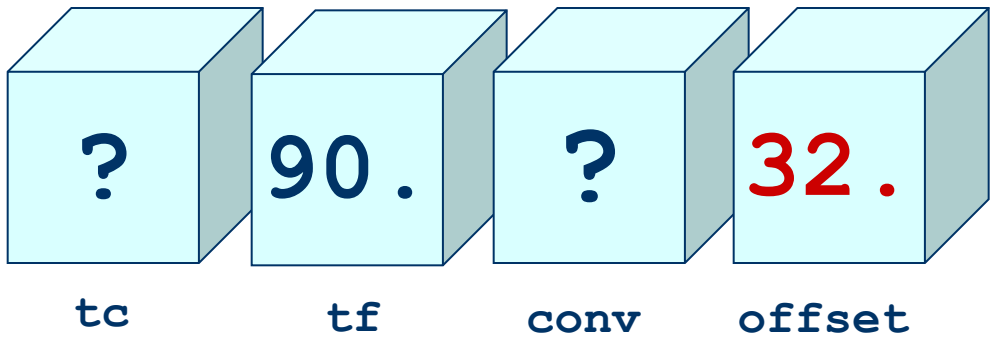
Programmi e variabili

```
main() {
    float tc, tf = 90., conv;
    float offset = 32.;
    conv = 5./9.;
    tc = (tf - offset) * conv;
}
```



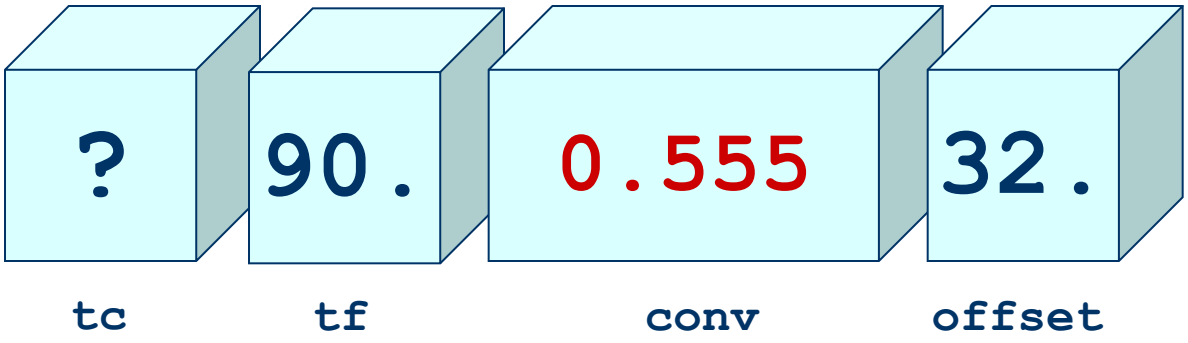
Programmi e variabili

```
main() {
    float tc, tf = 90., conv;
    float offset = 32.;
    conv = 5./9.;
    tc = (tf - offset) * conv;
}
```



Programmi e variabili

```
main() {
    float tc, tf = 90., conv;
    float offset = 32.;
    conv = 5./9.;
    tc = (tf - offset) * conv;
}
```



Programmi e variabili

```
main() {
    float tc, tf = 90., conv;
    float offset = 32.;
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}
```

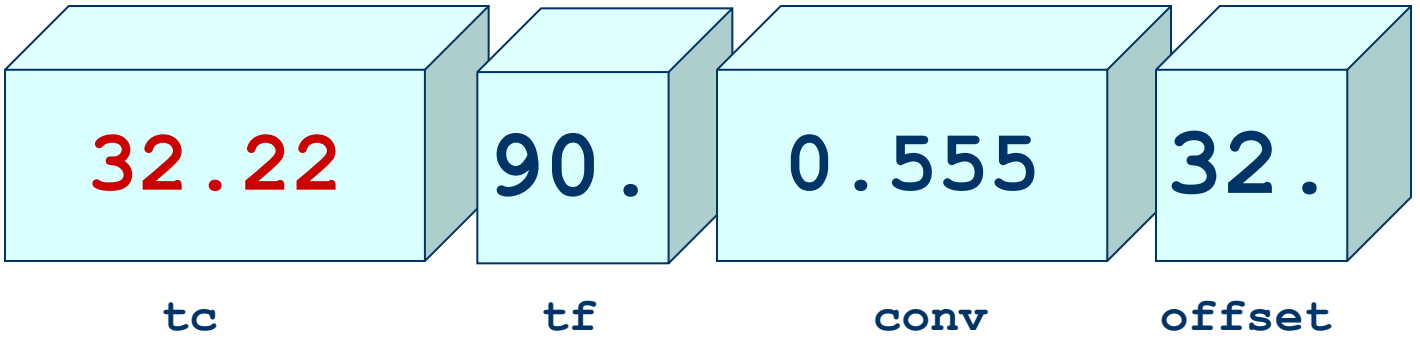

Test

- Cosa accade se eseguo il programma?
- Nulla, perché non ci sono istruzioni di *output*!

Input/Output

```
scanf("%f", &tf);
```

Input/Output

```
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```
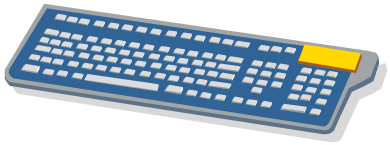
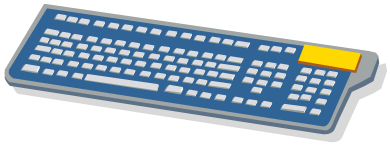



90

Input/Output

```
scanf("%f", &tf);
```



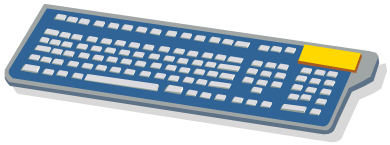
$\Rightarrow 90 = (1+0.40625)2^6$

$\Rightarrow 01000001101101000000000...$

$(1/4 + 1/8 + 1/32)$

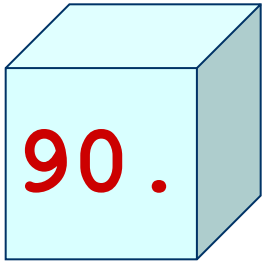
Input/Output

```
scanf("%f", &tf);
```



$90 = (1+0.40625)2^6$

01000001101010000000000...

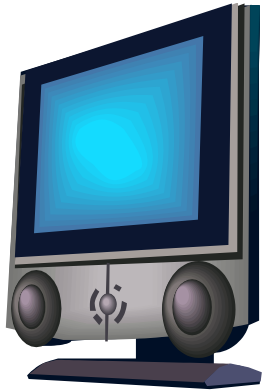


Input/Output

```
printf("%f F = %f C\n", tf, tc);
```

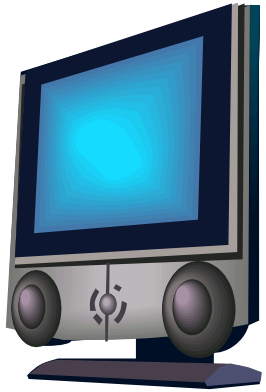
Input/Output

```
printf("%f F = %f C\n", tf, tc);
```



Input/Output

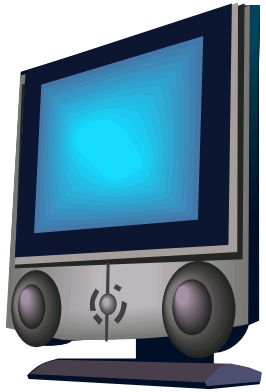
```
printf("%f F = %f C\n", tf, tc);
```



```
90.000000 F = ...
```

Input/Output

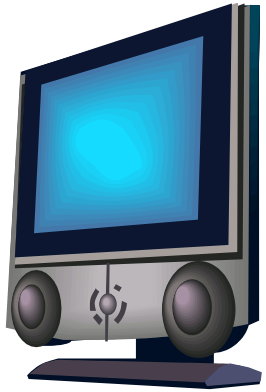
```
printf("%f F = %f C\n", tf, tc);
```



```
90.000000 F = 32.222222 C...
```

Input/Output

```
printf("%f F = %f C\n", tf, tc);
```



```
90.000000 F = 32.222222 C
>
```

Importanza della rappresentazione

```
tf =(tc – offset) * 5./ 9.;
(tc – offset) * 5./ 9;
(tc – offset) * 5 / 9;

tf = 5 / 9 * (tc – offset);
```

Direttive

`#include`

Consente di includere il contenuto di un altro file

`#define`

Definisce un simbolo (Attenzione!!!)

`#ifdef, #ifndef, #else`

Compilazione condizionale

#include

- #include <stdio.h>
  per input/output
- #include <stdlib.h>
  generazione numeri casuali, exit, time
- #include <math.h>
  libreria matematica (con opzione –lm)
  - sin(x), cos(x), sqrt(x), exp(x), pow(x,y), log(x), fabs(x), iabs(x)

  #include
  ”/home/studenti/lclb01/myheader.h”