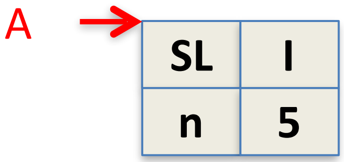
Ambiente
Run-time & Run-time Simulation

Un esempio

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack

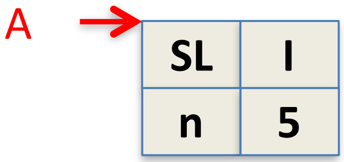


A

SL	l
n	5

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
             if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack: simulation



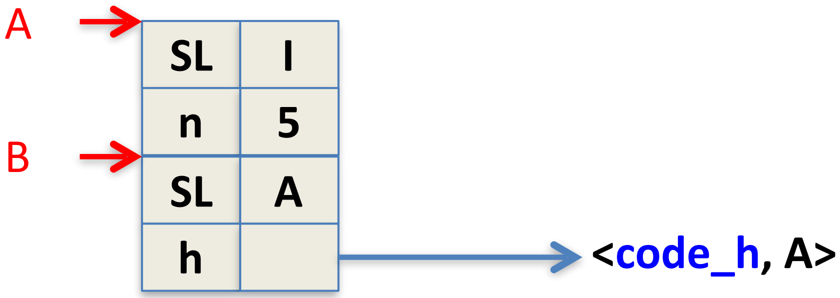
A

SL	I
n	5

Env_A(n) = 5
Env_A(m) = unbound
for all m != n

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
              if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack



A

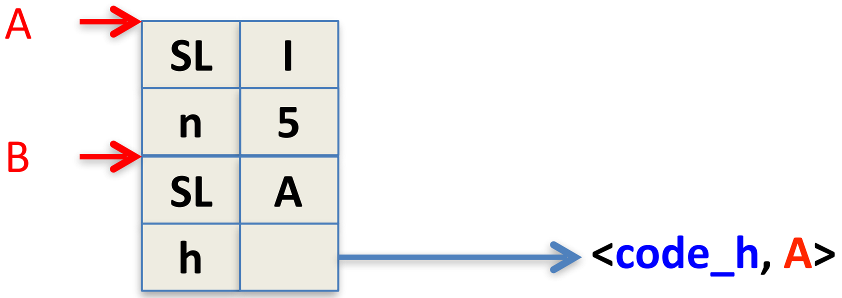
B

SL	I
n	5
SL	A
h	

<code_h, A>

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack: simulation



A

B

SL	I
n	5
SL	A
h	

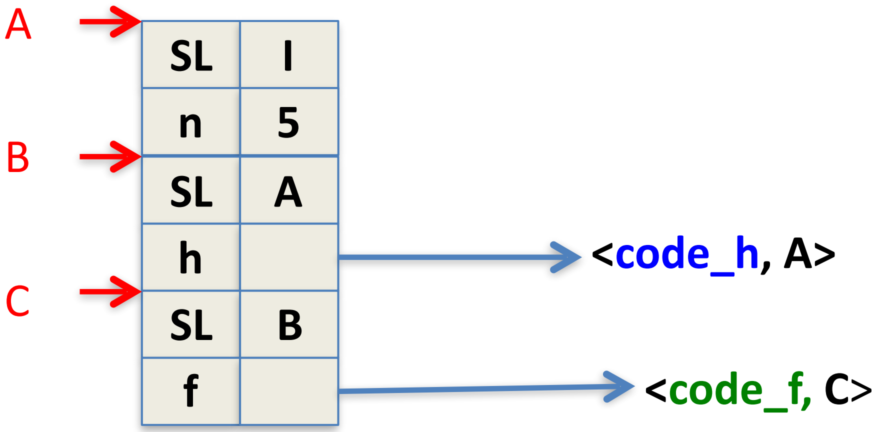
<code_h, A>

Env_A(n) = 5
Env_A(m) = unbound
for all m != n

Env_B (n) = 5
Env_B(h) = <code_h, A>

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
      if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack



A

B

C

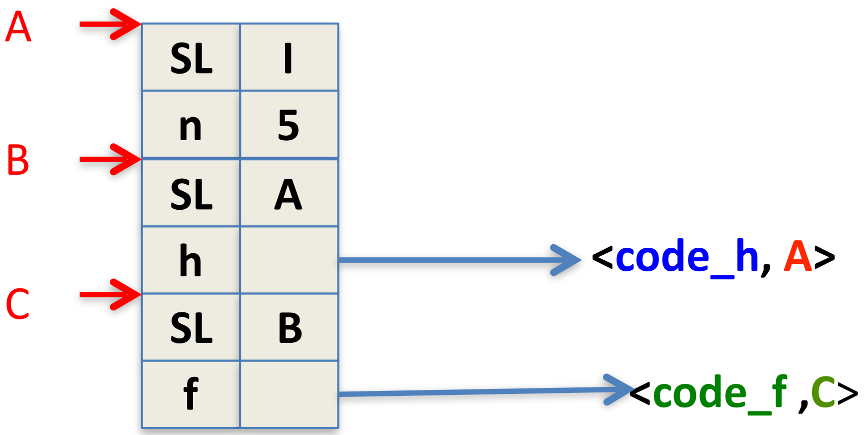
SL	I
n	5
SL	A
h	
SL	B
f	

<code_h, A>

<code_f, C>

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack: simulation



A

SL	I
n	5

B

SL	A
h	

C

SL	B
f	

<code_h, A>

<code_f ,C>

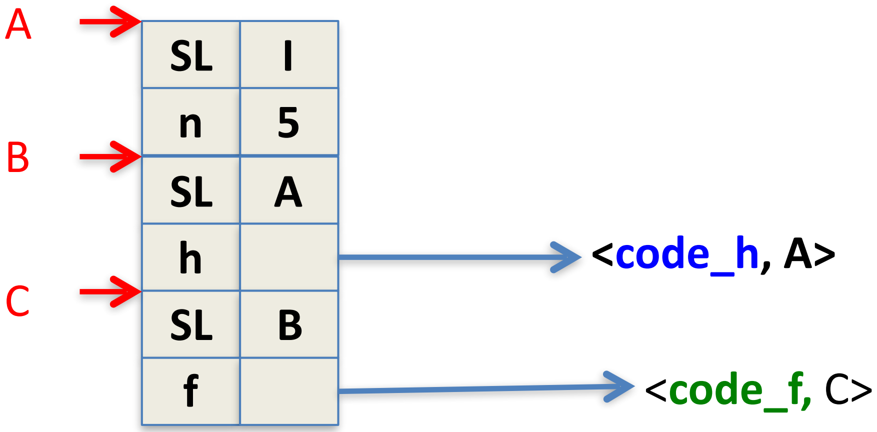
Env_A(n) = 5
Env_A(m) = unbound
for all m != n

Env_B (n) = 5
Env_B(h) = <code_h, A>

Env_C(f) = <code_f, Env_C>
Env_C(h) = <code_h, Env_A>
Env_C(n) = 5

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack: simulation



SL	I
n	5
SL	A
h	
SL	B
f	

Env_A(n) = 5
Env_A(m) = unbound
for all m != n

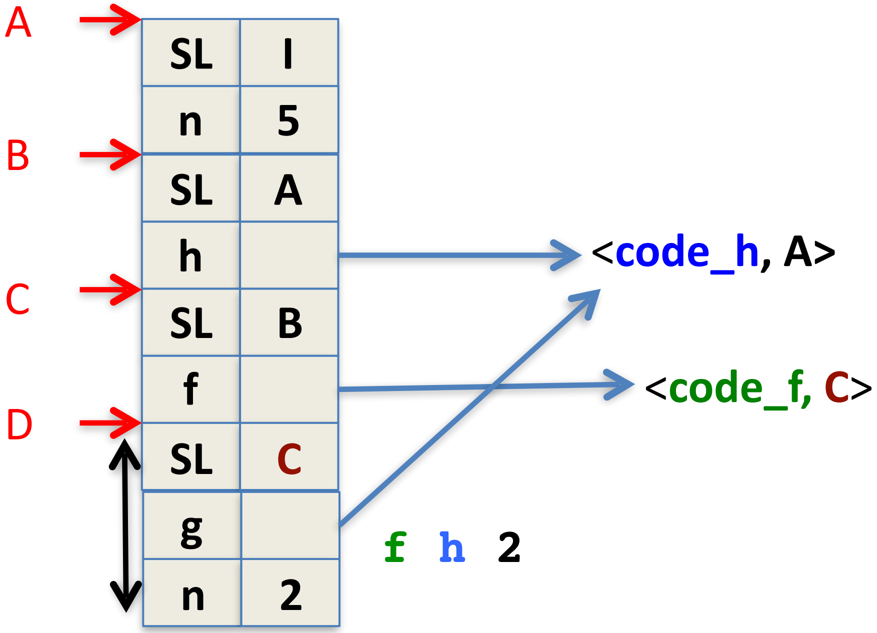
Env_B (n) = 5
Env_B(h) = <code_h, A>

Env_C(f) = <code_f, Env_C>
Env_C(h) = <code_h, Env_A>
Env_C(n) = 5

Definizione ricorsiva!!!!

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack



A

B

C

D

SL	l
n	5
SL	A
h	
SL	B
f	
SL	C
g	
n	2

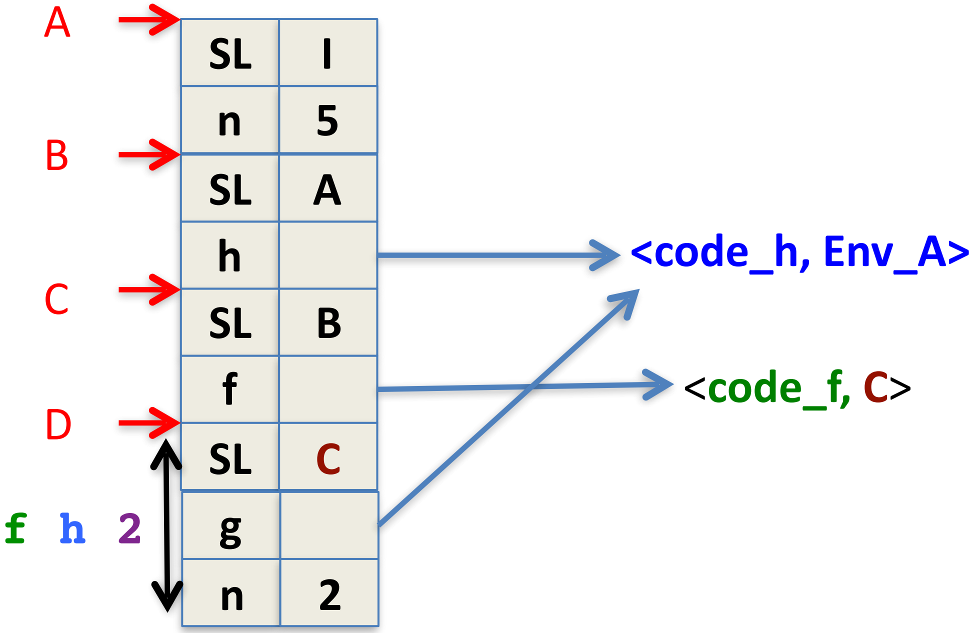
<code_h, A>

<code_f, C>

f h 2

```
let   n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack:simulation



SL	I
n	5
SL	A
h	
SL	B
f	
SL	C
g	
n	2

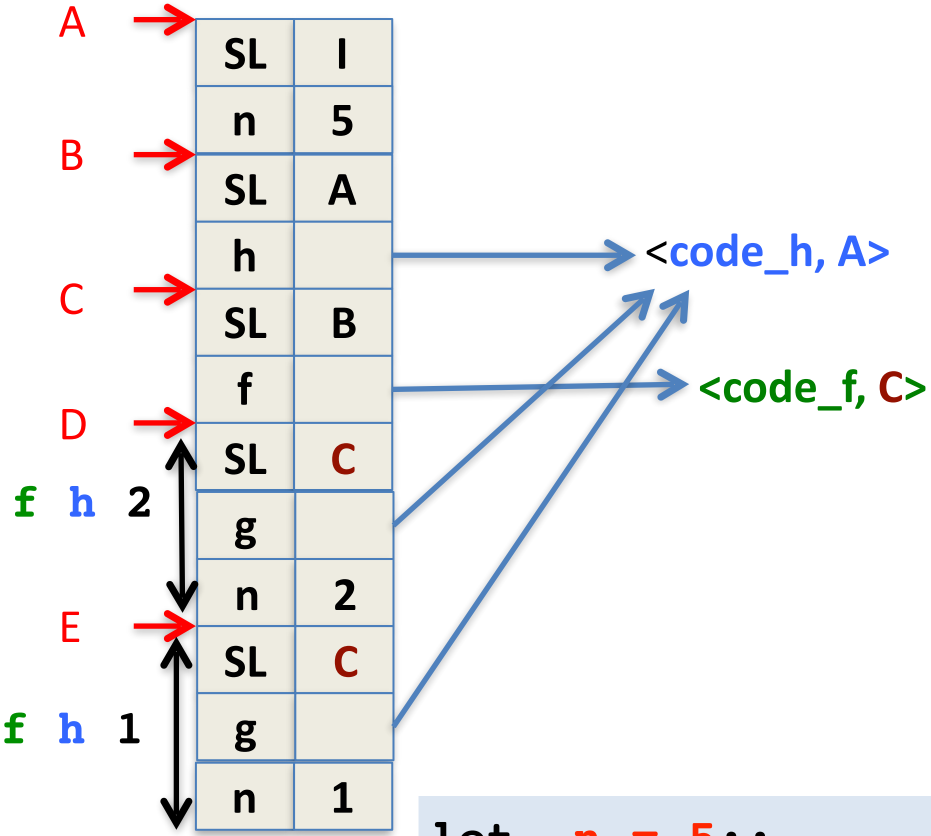
Env_A(n) = 5
Env_A(m) = unbound
for all m != n
Env_B (n) = 5
Env_B(h) = <code_h, A>

Env_C(f) = <code_f, Env_C>
Env_C(h) = <code_h, Env_A>
Env_C(n) = 5

Env_D(g) = <code_h, Env_A>
Env_D(n) = 2
Env_D(f) = <code_f, Env_C>
Env_D(h) =<code_h, Env_A>

```
let  n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

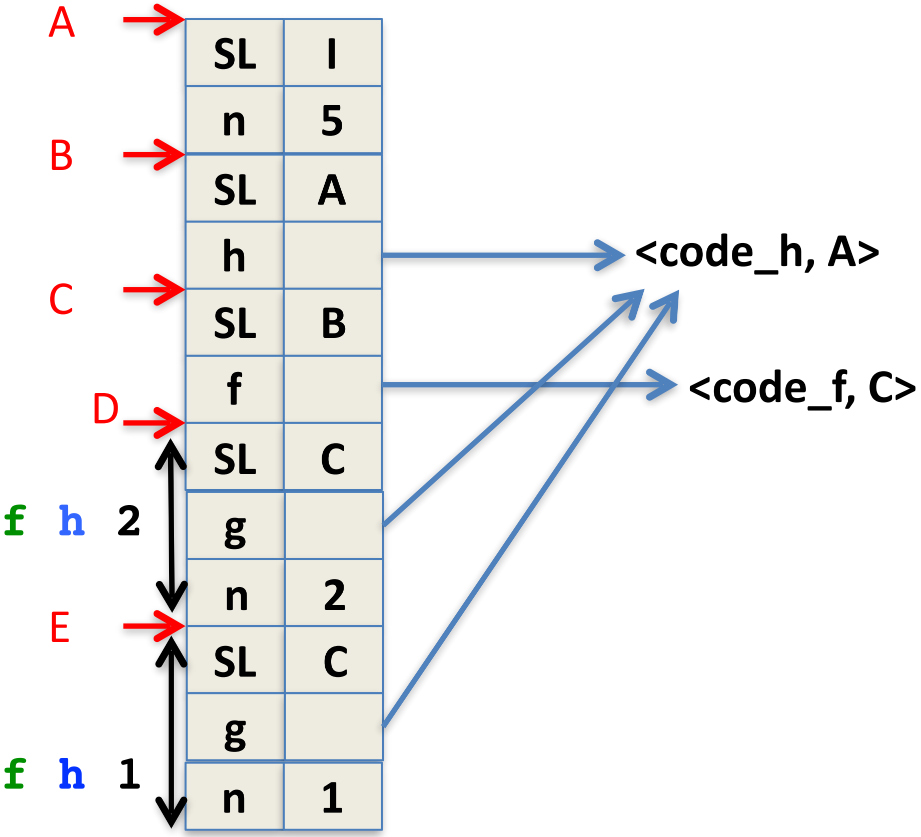
Run-time Stack



SL	I
n	5
SL	A
h	
SL	B
f	
SL	C
g	
n	2
SL	C
g	
n	1

```
let   n = 5;;
let h = fun x -> n + x;;
let rec f g n =
           if n = 1 then g (n) else n * f g (n-1);;
f h  2;;
```

Run-time Stack: simulation



A	SL	I
	n	5
B	SL	A
	h	
C	SL	B
	f	
D	SL	C
f h 2	g	
	n	2
E	SL	C
	g	
f h 1	n	1

<code_h, A>

<code_f, C>

Env_A(n) = 5
Env_A(m) = unbond
for all m != n

Env_B (n) = 5
Env_B(h) = <code_h, A>

Env_C(f) = <code_f, Env_C>
Env_C(h) = <code_h, Env_A>
Env_C(n) = 5

Env_D(g) = <code_h, Env_A>
Env_D(n) = 2
Env_D(f) = <code_f, Env_C>
Env_D(h)= <code_h, Env_A>

Env_E(g) = <code_h, Env_A>
Env_E(n) = 1
Env_E(f) = <code_f, Env_C>
Env_E(h)= <code_h, Env_A>

Manca il RA di `h 1 che ha static link A quindi restituisce 6`