Einführung in C - Introduction to C

7. Pointers and memory management

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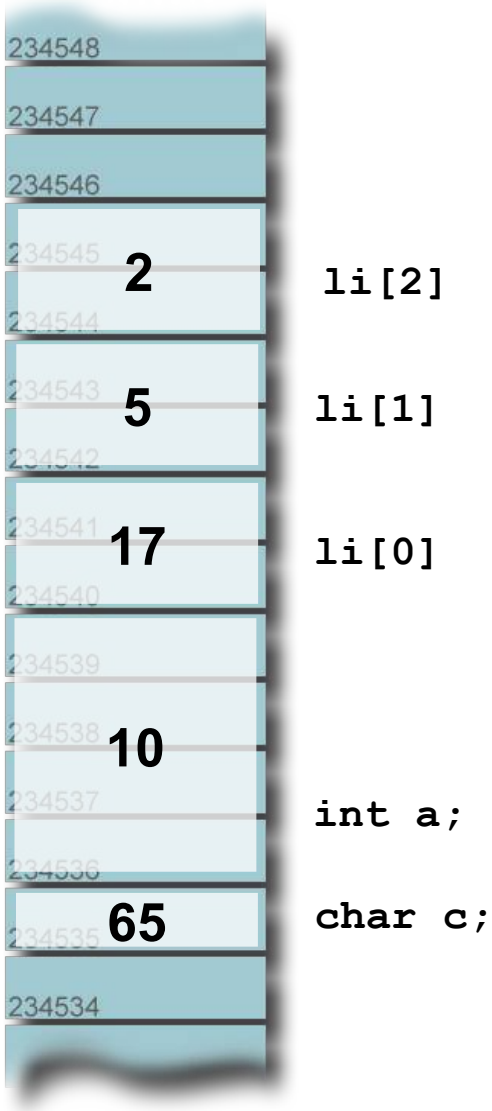
Variables and memory

A Variable is a place in computer memory, where values can be stored.

- The size of required memory depends on the type.
- How and where the memory is reserved is not directly controlled by the programmer.
  - Local variables: memory is reserved when the scope is entered and freed when it is left
  - Static/global variables: memory is reserved throughout the program's lifetime.

```
int a;            // reserves 4 bytes of memory
a=10;             // write 10 into the 4 bytes

char c='A';       // 1 byte
short li[3]={ 17, 5, 2 };  // 3*2 Bytes
```



Sizeof and &

Definition

The **sizeof** operator determines the size (in bytes) a data type or variable is using in memory.

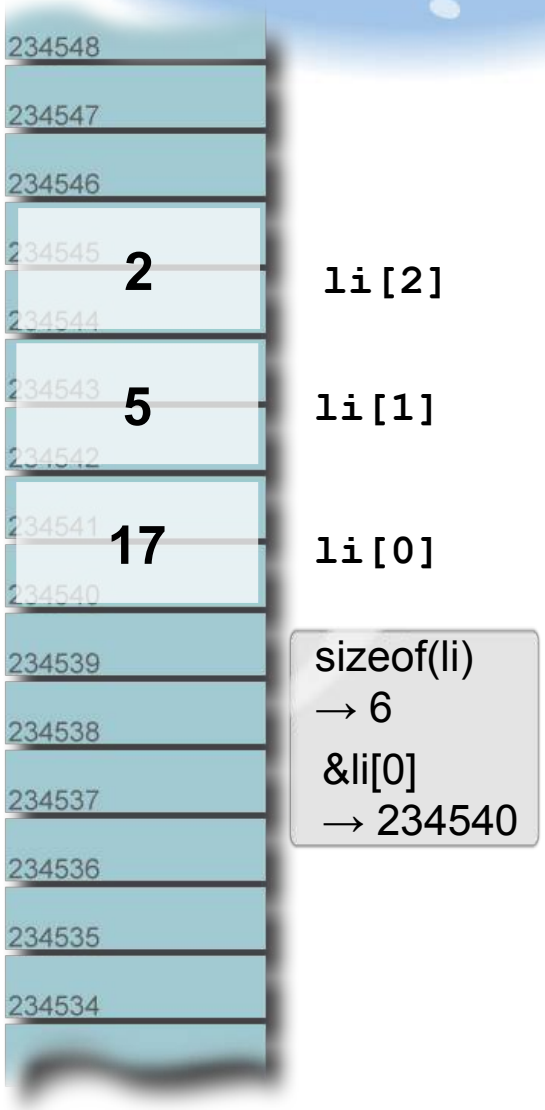
```
short s;
int array[4];

printf("%d", sizeof(short));
printf("%d", sizeof(s));
printf("%d", sizeof(array));
printf("%d", sizeof(array[0]));
printf("%d", sizeof("Hallo"));
```

compile-time vs. run-time evaluation...

The **address operator &** provides the address, where a variable is stored in memory.

```
printf("%d", &s);
printf("%p", &s); // pointer format: hex
printf("%d", &array[0]);
printf("%d", array);  // same as &array[0]
printf("%d", &"Test");
```



Variables and memory

Exercise

`variables_and_memory.c`

Code snippet 701