4 Structured data types

1. Arrays. The data type array. Multidimensional arrays. Arrays as parameters
2. String of chars. The data type string. Strings as parameters.
3. **Struct**. The data type struct. Structs as parameters.
4. Multidimensional arrays
5. Examples

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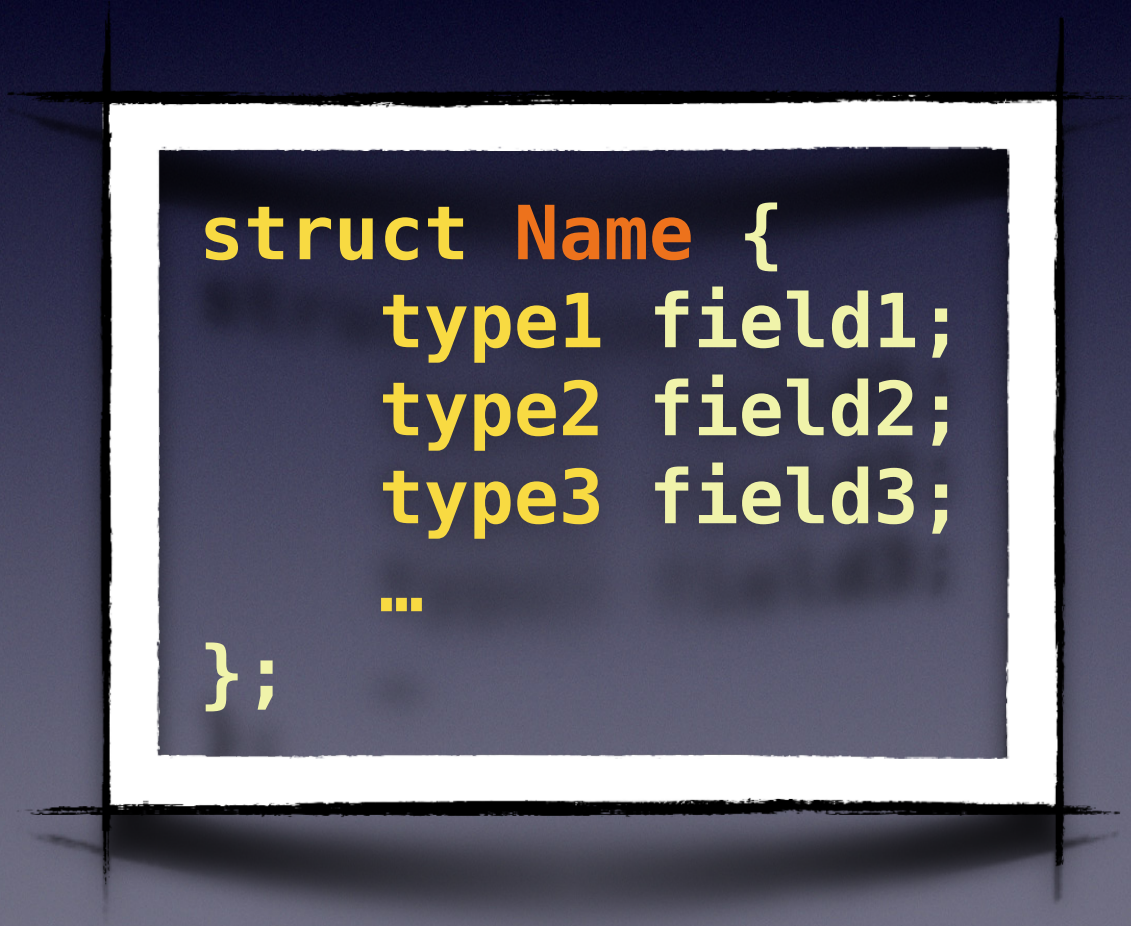
Structures

It is a collection, a binder, of distinct data types under a unique name



Example

```
#include <iostream>
using namespace std;

// types
typedef string TMonth;

struct TDate {
    int day;
    TMonth month;
    int year;
};

const TDate TODAY = {16,"Dec", 2010};

int main()
{
    TDate birthD, currD;

    return 0;
}
```

Access to members

Use the dot notation:


```
theStruct.member
```

```
struct TComplex {
  float re;
  float im;
};

TComplex b;
b.re = 3;
cout << b.im << endl;
```

Structs can be copied!

```
struct TComplex {
        float re;
        float im;
};
TComplex a = {1, 0}, b;

b = a;

cout << "values: "
     << b.re << ", "
     << b.im << endl;
```

exercise

- Write a **function** that converts a number of seconds (int) to a structure TTime returning it

```
struct TTime {
    int hours, mins, secs;
};
```

as parameters

```
struct TTime {
    int hours, mins, secs;
};

int toSecs(TTime t);

int main()
{
    TTime atime = {23, 30, 12};
    cout << "Secs: " << toSecs(atime) << endl;
    return 0;
}

int toSecs(TTime t)
{
    return t.hours * 3600 +
           t.mins * 60 +
           t.secs;
}
```

returning structs

- Write a function that returns a TTime read from the keyboard

but...

```
TComplex a, b;
```

✔ `a = b`

👎 `a == b`

👎 `a > b`

They can't be compared with each other

nesting

```
struct TDate {
    int day;
    TMonth month;
    int year;
};
```

```
struct TEmployee {
    int code;
    float salary;
    TDate joiningDate;
};
```

initialisation

```
TEmployee empl = {101, 2000, {19, "Aug", 1960}};
```

access

```
empl.joiningDate.year++;
printMonth(empl.joiningDate.month);
```

Exercices 1

- Build structs to contain:

1. A personal file, with: age, enrolment date
2. A monomial containing coefficient and grade
3. A polynomial of N monomials

Exercices 2

- Build a structure to contain the students of a class (NMAXST=55) if we want:

1. Name and age
2. Name, age, and the name of each of the enrolled subjects (`NOMAXSUBJECTS = 20`)
3. … + marks in every subject
4. etc etc