# Question 8: Struct

**Q8.1: Date information includes:**

* **Day of week : 0 for Sunday and 6 for Saturday (unsigned char)**
* **Day: 0..31 (unsigned char)**
* **Month: 0..12 (unsigned char)**
* **Year: xxxx (unsigned int)**

**Implement:**

* **Define struct of date**
* **Get date of system and save to a struct instance**
* **Print struct information as format:** 
  + **dow, dd-mm-yyyy**
  + **dd/mm/yyyy**
  + **mm-dd-yyyy**

**dow dd.mm.yy**

**code:**

#include<iostream>

#include<ctime>

using namespace std;

char \*DoW[] = { "Sunday","Monday","Tuesday","Wednesday","Thursday","Friday","Saturday" };

struct Date {

unsigned char Day0fWeek, Day, Month;

unsigned int Year;

};

void showDate(const Date &date) {

cout << DoW[date.Day0fWeek] << ", "

<<(date.Day<10?"0":"")<<(int) date.Day << "-"

<< (date.Month<10 ? "0" : "") << (int)date.Month+1

<< "-" << date.Year << endl;

cout << (date.Day<10 ? "0" : "") << (int)date.Day

<< "/" << (date.Month<10 ? "0" : "") << (int)date.Month + 1

<< "/" << date.Year << endl;

cout << (date.Day<10 ? "0" : "") << (int)date.Day

<< "-" << (date.Month<10 ? "0" : "") << (int)date.Month + 1

<< "-" << date.Year << endl;

cout << DoW[date.Day0fWeek] << " "

<< (date.Day<10 ? "0" : "") << (int)date.Day

<< "."<< (date.Month<10 ? "0" : "") << (int)date.Month + 1

<< "." << date.Year%100 << endl;

}

#pragma warning(disable: 4996)

int main() {

Date date;

tm \*ptm;

time\_t stime;

stime = time(NULL);

ptm = gmtime(&stime);

date.Day = ptm->tm\_mday;

date.Day0fWeek = ptm->tm\_wday;

date.Month = ptm->tm\_mon;

date.Year = ptm->tm\_year+1900;

showDate(date);

return 0;

}

**Q8.2: Use struct of 8.1. Implement:**

* **Print size of struct.**
* **Declare year in second (dow, year, day, month), and print size of struct. Draw diagrams to explain the result.**
* **Build project with 1 byte alignment, print size of struct in two above cases and explain the result.**

**Code:**

#include<iostream>

#include<ctime>

using namespace std;

struct Date {

unsigned char Day0fWeek, Day, Month;

unsigned int Year;

};

int main() {

Date date = { 1,18,6,2018 };

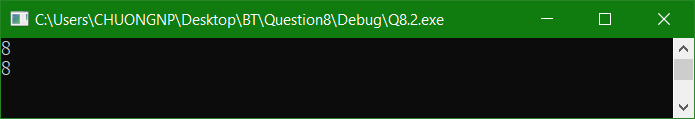
cout<<sizeof(Date) << endl;

cout << sizeof(date) << endl;

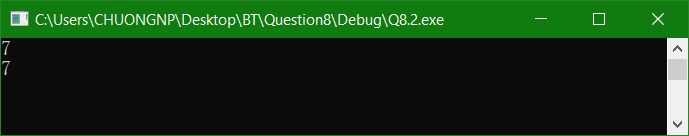
return 0;

}

Mặc định:



Build project với 1 byte alignment:



Trước khi dịch:

|  |  |  |  |
| --- | --- | --- | --- |
| Day0fWeek | Day | Month | Year |

**0 1 2 3**

Căn chỉnh 4 bytes:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Day0fWeek | Day | Month | **pad** | Year |

**0 1 2 3 4**

**=>** sizeof(date) = 8.

Với căn chỉnh 1 byte:

|  |  |  |  |
| --- | --- | --- | --- |
| Day0fWeek | Day | Month | Year |

**0 1 2 3**

=> sizeof(date) = 7.

**Q8.3: Use struct of 8.1. Implement:**

* **Constructor with dow, day, month, year.**
* **Implement function check valid date (valid of dow, day, month year).**

**Code:**

#include<iostream>

#include<ctime>

using namespace std;

char \*DoW[] = { "Sunday","Monday","Tuesday","Wednesday","Thursday","Friday","Saturday" };

struct Date {

unsigned char Day0fWeek, Day, Month;

unsigned int Year;

void showDate();

Date(unsigned char dow = 1, unsigned char day = 1, unsigned char month = 1, int year = 2000);

bool checkValidDate();

};

#pragma warning(disable: 4996)

int main() {

Date date(5, 9, 5, 1997);

if (date.checkValidDate())

date.showDate();

else

cout << "ngay nhap vao khong chinh xac !" << endl;

return 0;

}

void Date::showDate()

{

cout << DoW[Day0fWeek] << ", "

<< (Day < 10 ? "0" : "") << (int)Day << "-"

<< (Month < 10 ? "0" : "") << (int)Month

<< "-" << Year << endl;

cout << (Day < 10 ? "0" : "") << (int)Day

<< "/" << (Month < 10 ? "0" : "") << (int)Month

<< "/" << Year << endl;

cout << (Day < 10 ? "0" : "") << (int)Day

<< "-" << (Month < 10 ? "0" : "") << (int)Month

<< "-" << Year << endl;

cout << DoW[Day0fWeek] << " "

<< (Day < 10 ? "0" : "") << (int)Day

<< "." << (Month < 10 ? "0" : "") << (int)Month

<< "." << (Month < 10 ? "0" : "") << Year % 100 << endl;

}

Date::Date(unsigned char dow, unsigned char day, unsigned char month, int year)

{

Day0fWeek = dow;

Day = day;

Month = month;

Year = year;

}

bool Date::checkValidDate()

{

if (Day0fWeek > 6 || Day > 31 || Month > 12) return false;

return true;

}

**Q8.4: Student information include**

* **name (char \*)**
* **id (int)**
* **score (float) (0 to 10)**

**Implement:**

* **Struct of student.**
* **A class room is included ten students. (List of student is stored in an array).**
* **Implement a function to input the student information (check if duplicated student ID, and value of score must be in range).**
* **Sort list of student by score.**

**Code:**

#include<iostream>

#include<iomanip>

using namespace std;

#define max 10

#pragma warning(disable: 4996)

struct Student {

char Name[30];

int Id;

float Score;

Student(char name[]="", int id=0, float score=0);

void show();

};

void Input(Student s[], int sl);

void sort(Student s[], int sl);

int main() {

Student Class[max];

int sl = 4;

Input(Class, sl);

cout << "\*\*\* Danh sach sinh vien \*\*\*" << endl;

for (int i = 0; i < sl; i++)

Class[i].show();

cout << "sap xep giam dan theo diem " << endl;

sort(Class, sl);

for (int i = 0; i < sl; i++)

Class[i].show();

return 0;

}

void Input(Student s[], int sl)

{

for (int i = 0; i < sl; i++) {

bool check;

do {

check = false;

cout << "Nhap id: ";

cin >> s[i].Id;

for (int j = 0; j < i; j++) {

if (s[j].Id == s[i].Id) {

cout << "id sinh vien da ton tai" << endl;

check = true;

break;

}

}

} while (check);

cout << "Nhap ten: ";

rewind(stdin);

gets\_s(s[i].Name, 30);

do {

cout << "Nhap diem: ";

cin >> s[i].Score;

} while (s[i].Score < 0 || s[i].Score>10);

}

}

Student::Student(char name[], int id, float score)

{

strcpy(Name, name);

Id = id;

Score = score;

}

void Student::show()

{

cout << setw(6) <<left<< Id << setw(30) << left << Name << setw(4) << Score << endl;

}

void sort(Student s[], int sl)

{

for (int i = 0; i < sl - 1; i++) {

for (int j = sl-1; j >i; j--) {

if (s[j].Score > s[j - 1].Score) {

Student a = s[j];

s[j] = s[j - 1];

s[j - 1] = a;

}

}

}

}