C++ proposal

version 2

New keyword for C++: dynamictype

Jerry Moravec

Unemployed, almost-homeless

Czech Republic

E-mail: j.moravec.email@seznam.cz

**Abstract**

The C++ language is here for more that 36 years and is still under development. Sometimes, C++ borrows some ideas from other programming languages, sometimes works on its own way. Presented proposal try to introduce a new type of basic variable which would be capable to hold a type of a variable or a type of a class or a struct. This variable should be capable to define target new type in type-cast operations such us: static\_cast or dynamic\_cast etc. Both at running time and at compilation time. Type of a variable or a class/struct is usually given by its unique name. Thus, the new basic variable should contain a string – the name of basic datatype or a type of user defined datatype. This name is then used in the type-cast operation at running time. The target type is, of course, well known at compilation time.

**1. Description**

Associated operator with type-cast operations in C++ is usually given inside the angle brackets “<target\_type>” or in the round brackets “(target\_type)”. The type-cast operation which uses the angle brackets is connected with several keywords static\_cast, dynamic\_cast and reinterpret\_cast. Proposed new key-word should be capable to work with both cases of type-case operations.

I would like to propose a new key-word of the C++ language: "dynamictype". It is useful in type-cast operation(s) such us:

int myvariable = 0;
**dynamictype** mytype;
mytype = typeof(float);
std::cout << **dynamic\_cast**< mytype >(myvariable);

The “mytype” is not a standard variable, nor pointer. This variable holds “a type definition”, the float type in this case. It is the type-casting extension. E.g. “dynamic\_cast” has, indeed, in the angle brackets “a variable” which is “a type” not a standard variable such us int or float or pointer. The “mytype“ is a variable, but the type stored into it is well known at compilation time.

**2. Motivation**

Main motivation is a code simplification. The best is a real example, so complex example is listed below. The main important part is on the lines 20 and 50-62.

1. #include <iostream>
2. #include <string>
3. #include <iterator>
4. #include <algorithm>
5. #include <vector>
6.
7. struct Example\_1 {
8.
9. int item1;
10. float item2;
11. };
12.
13. struct Example\_2 {
14. unsigned long item1;
15. int item2;
16. };
17.
18. struct arrItem {
19. int key;
20. **dynamictype Decl;**
21. void\* link;
22. };
23.
24.
25. int main()
26. {
27.
28. arrItem \*item = nullptr;
29.
30. Example\_1 \*e1 = nullptr;
31. Example\_2 \*e2 = nullptr;
32.
33. std::vector<arrItem> DataList;
34.
35. // data type 0 is Example\_1
36. e1 = new Example\_1();
37. e1->item1 = 101;
38. e1->item2 = (float)102.10;
39.
40. DataList.push\_back(arrItem());
41. DataList[0].key = 0;
42. DataList[0].typeDecl = typeof( Example\_1 );
43. DataList[0].link = e1;
44.
45. // data type 1 is Example\_2
46. e2 = new Example\_2();
47. e2->item1 = 201;
48. e2->item2 = (int)202;
49.
50. DataList.push\_back(arrItem());
51. DataList[1].key = 1;
52. DataList[1].typeDecl = typeof( Example\_2 );
53. DataList[0].link = e2;
54.
55. for (int i = 0; i < (int)DataList.size(); i++) {
56.
57. **std::cout << "Example\_1: key: "**
58. **<< DataList[i].key**
59. **<< "; item1: "**
60. **<< dynamic\_cast< DataList[i].typeDecl >( DataList[i].link )->item1;**
61. **<< "; item2: "**
62. **<< dynamic\_cast< DataList[i].typeDecl >( DataList[i].link )->item2;**
63. std::cout << "\n";
64.
65. }// for
66.
67.
68. delete(DataList[0].link);
69. DataList[0].link = nullptr;
70. delete(DataList[1].link);
71. DataList[1].link = nullptr;
72.
73. DataList.clear();
74.
75.
76. }// int main()

If I do not use the expression:

“dynamic\_cast< DataList[i].typeDecl >( DataList[i].link )->item1;”

I have to use a switch-case key-word. Identical example listed above needs to be written is this standard way utilizing switch-case in this way:

#include <iostream>

#include <string>

#include <iterator>

#include <algorithm>

#include <vector>

struct Example\_1 {

 int item1;

 float item2;

};

struct Example\_2 {

 unsigned long item1;

 int item2;

};

struct arrItem {

 int key;

 void \*link;

};

int main()

{

 arrItem \*item = nullptr;

 Example\_1 \*e1 = nullptr;

 Example\_2 \*e2 = nullptr;

 std::vector<arrItem> DataList;

 // data type 0 is Example\_1

 e1 = new Example\_1();

 e1->item1 = 101;

 e1->item2 = (float)102.10;

 DataList.push\_back(arrItem());

 DataList[0].key = 0;

 DataList[0].link = e1;

 // data type 1 is Example\_2

 e2 = new Example\_2();

 e2->item1 = 201;

 e2->item2 = (int)202;

 DataList.push\_back(arrItem());

 DataList[1].key = 1;

 DataList[1].link = e2;

 for (int i = 0; i < (int)DataList.size(); i++) {

 **switch ((int)DataList[i].key)**

 **{**

 **case 0:**

 **{**

 **Example\_1 \*ex1 = (Example\_1\*)DataList[i].link;**

 **std::cout << "Example\_1: key: "**

 **<< DataList[i].key**

 **<< "; item1: "**

 **<< ex1->item1**

 **<< "; item2: "**

 **<< ex1->item2;**

 **std::cout << "\n";**

 **break;**

 **}// case 0:**

 **case 1:**

 **{**

 **Example\_2\* ex2 = (Example\_2\*)DataList[i].link;**

 **std::cout << "Example\_2: key: "**

 **<< DataList[i].key**

 **<< "; item1: "**

 **<< ex2->item1**

 **<< "; item2: "**

 **<< ex2->item2; // e.g. safe\_cast<string>(ex2->item2);**

 **std::cout << "\n";**

 **break;**

 **}// case 1:**

 **}// switch**

 }// for

**3. Consequences**

The consequences for compiler-makers are, unfortunately, really wide, but the illustrative simplified code is above. The compiler will be more complicated 😊. However, the code will be more simplified.

**4. Experience**

The practical example is described in the section 2. of this proposal, but such improvement would be great “gadget” not only for C++ but for many others programming languages such us C# or C++/CLI (ECMA 327) or C++/WinRT etc.

**5. Summary**

This paper proposed the extension of C++ with the keyword „dynamictype“, the keyword enables to change a data-type using classic type-cast operation even inside angle brackets of standard type-case expressions such as dynamic\_cast, reinterpret\_cast. The main advantage of such new thing is a code simplification. The implementation cost is maybe not “small”, but the consequences for existing code are minor or none.