Compilation Scheme of Multiple Inheritance in Object-Oriented Languages

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Abstract. Inheritance is the most important of the concepts introduced by object-oriented languages. The complexity of a mechanism used by a compiler differs based on a type of inheritance. Languages with a simple inheritance that creates hierarchies of trees or forests are resolved by relatively straightforward mechanisms in comparison with directed acyclic graph hierarchies created by a multiple inheritance. The multiple inheritance simplifies construction of complex classes by inheriting from small base classes and therefore it allows integration of several specifications (represented by abstract classes) into a new specification (i.e. an inheriting class). However, inheriting from multiple classes leads to several problems that need to be handled by a compiler including resolution of conflicts and contradictions between inherited classes as well as a repeated inheritance. While all problems surrounding the multiple inheritance are yet to be settled one of the more successful approaches includes splitting the method table and, for dependent multiple inheritance, an addition of an extra indexing structure. The aim of the presentation is to explain the basic concept of implementing compilers equipped to handle the multiple inheritance and the difficulties that come with it. Finally, the presentation also includes introduction into compiling genericity in object-oriented languages.

References

[1995] Wilhelm, R., Maurer, D.: Compiler Design. Addison-Wesley, 1st edition, 1995, pages 182–214.