

ZERO: A PERSISTENT, INTERACTIVE, OBJECTORIENTED SYSTEM FOR EDUCATION

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Abstract

The research project Zero was started to serve as a vehicle for learning object-oriented programming in advanced courses. It currently consists of a virtual machine, assembler, disassembler and macroassembler; compilers for two high-level programming languages, and an educational programming environment. The educational environment presents to the user a main window in which the container explorer is shown. This explorer allows the user to explore objects and navigate among containers (large-grained objects that store persistent fine-grained objects). The structural reflection capabilities of the VM are central to the programming environment, as actually the environment is just a Zero VM with a graphic user interface. The tools presented to the user are implemented the same way the user would employ in any program outside the environment. Moreover, any member of a given object can be explored by doubleclicking it. Also, rightclicking it displays a contextual menu that allows to perform other operations, such as executing a method or change the object an attribute is pointing to. The objectives of this environment is to be easy to use and highly interactive. Objects can be created just clicking in the new button below the container explorer, or executing the copy method of any object. Methods and attributes can then be easily added, and modified (methods are presented to the user and recompiled on demand). Objects are stored in the Exe container, and can be made persistent by storing them in a persistent container once the user considers that they are finished (Exe is always transient). Once objects are persistent, they will be available in their containers transparently, without user intervention in the save or restore process. We the authors claim that supporting persistence and a simple programming model enhances the understanding of object-oriented programming.