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C++, Objected-Oriented Programming, and Astronomical Data Models

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Contemporary astronomy is characterized by increasingly complex instruments and observational techniques, higher data collection rates, and large data archives, placing severe stress on software analysis systems. The object-oriented paradigm represents a significant new approach to software design and implementation that holds great promise for dealing with this increased complexity. The basic concepts of this approach will be characterized in contrast to more traditional procedure-oriented approaches. The fundamental features of objected-oriented programming will be discussed from a C++ programming language perspective, using examples familiar to astronomers. This discussion will focus on objects, classes and their relevance to the data type system; the principle of information hiding; and the use of inheritance to implement generalization/specialization relationships. Drawing on the object-oriented approach, features of a new database model to support astronomical data analysis will be presented.