

# FORMAL SPECIFICATION

A formal software specification is a statement expressed in a language whose vocabulary, syntax, and semantics are formally defined. The need for a formal semantic definition means that the specification languages cannot be based on natural language; it must be based on mathematics.

The advantages of a formal language are:

- The development of a formal specification provides insights and understanding of the software requirements and the software design.
- Given a formal system specification and a complete formal programming language definition, it may be possible to prove that a program conforms to its specifications.
- Formal specification may be automatically processed. Software tools can be built to assist with their development, understanding, and debugging.

- Depending on the formal specification language being used, it may be possible to animate a formal system specification to provide a prototype system.
- Formal specifications are mathematical entities and may be studied and analyzed using mathematical methods.
- Formal specifications may be used as a guide to the tester of a component in identifying appropriate test cases.