

Requirements Specifications

A document describing all of a system's required attributes that can be witnessed externally. It defines what the software will do externally without describing how it will function internally.

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Text Fill Problem Placeholder

Problems With Specs

- **Noise:** text that contains no relevant information; redundancy, remorse
- **Silence:** unspecified feature; lack of definition
- **Overspecification:** solution/program details not problem description
- **Contradiction:** incompatible specifications
- **Ambiguity:** multiple possible interpretations
- **Forward reference:** mention of a feature before it is defined
- **Wishful thinking:** a requirement that cannot be validated

Guidelines For Specifications

- A description or definition (of anything) is a translation between the concept being defined and some other, hopefully simpler or more familiar, concept
- The simpler concepts must be unambiguously expressed
 - Structured English is most often used
 - Mathematical constructs can also be used
 - Sets, sequences, functions, and relations
 - Also popular are simple virtual machines
- A reasonable approach is to define the low-level (fundamental) concepts first using enough precision to avoid ambiguity. Then build up the more complex concepts in terms of the lower level ones
- An alternative approach is to work top-down, adding details as dictated by the need for precision

Formal Specification

- Use of mathematical notation to express functional specifications
 - Predicate logic: OCL
 - Model based: Z, VDM
 - Liveness and safety conditions: temporal logic
 - Interprocess communication: CSP
- Signatures and semantics
 - Pre/post conditions

Sort Exercise Placeholder

Advantages of Formal Specifications

- Alternative viewpoint supporting requirements validation
- Enables completeness and consistency checks
- May be automatically processed
- Increased rigor and precision provide process discipline

Reasons Why Formal Specifications are not Widely Used

- Difficulty in demonstrating cost benefit
- Lack of training
- Limited scope of applicability
- Limited tool support