Requirements and Specifications Modeling

RASSP E&F Module Number: 30

Abstract: The Requirements and Specification (RSM) module provides an introduction to the topic of executable requirements and specifications. Their use leads toward a more formalized listing of requirements and specifications than has been traditionally provided.

The module begins with a discussion on the benefits of incorporating RSM into a system design process. Definitions are provided to ensure that terms are understood within the context of RSM. The module then continues with sections on Requirements Engineering and Analysis and on Specification Modeling Methodologies. In these cases, because of the importance of utilizing RSM methodologies in the design of reactive systems, this type of system is described along with their relevant features.

The module then provides a survey of a number of current illustrative methodologies that incorporate some or all of the described RSM features. These are drawn from both industry and academia work. This is followed with an introduction to a number of tools that can be used to apply RSM in a system design. These are again developed from work performed both in industry and academia. Finally, the module concludes with some brief examples on how RSM can be used in the system definition phase of a design.

Module Objectives:

To introduce Requirements and Specification Modeling methodologies as a mechanism for incorporating executable requirements and specifications into system definitions.

Specific Objectives:

The student shall comprehend and apply:

1) The definitions of executable requirement and executable specification
2) The role of RSM in system design
3) A number of current methodologies incorporating features of an RSM methodology
4) A number of current tools that may be used to implement an RSM methodology into a system design

Prerequisites:

Prerequisite Modules: None

Prerequisite Knowledge Aside from Modules:

Working knowledge of system design principles.

Syllabus:

1) The Motivation for RSM (20 Min.)
   a) Definitions
   b) Testbench Development
   c) System Definition Process

2) Requirements Engineering and Requirements Analysis (10 Min.)
   a) Requirements Engineering Goals
   b) Requirements Analysis
   c) Requirements Validations

3) Specification Modeling Methodologies (SMMs) (45 Min.)
   a) SMM Applied to Reactive Systems
   b) SMM Attributes

4) Methodology Survey (45 Min.)
   a) Ward and Mellor's Methodology (SDRTS or RTSA)
   b) Jackson System Development (JSD)
   c) Software Requirements Engineering Methodology (SREM)
   d) Object Oriented Analysis (OOA)

e) Specification Design Language (SDL)
f) Embedded Computer Systems (ECS)
g) Vienna Development Method (VDM)
h) Language of Temporal Ordering Specification (LOTOS)
i) Electronic Systems Design Methodology (MCSE)
j) Integrated Specification and Performance Modeling Environment (ISPME)

5) Computer Aided Systems Engineering (CASE) (25 Min.)
Tools -- Examples
a) RDD-100
b) DOORS
c) SLATE
d) Requirements and Traceability Management (RTM)
e) Statemate
f) ADEPT

6) Examples of Requirement Capture and Test Planning (30 Min.)
a) FFT Example
b) SAR

7) Summary (5 Min.)

Lab Materials:

Executable Requirements Modeling using VHDL Tutorial (Mentor Graphics and Veribest versions).