A Practical Guide to SysML: The Systems Modeling Language

Solution Guide v1.1

This Solution Guide includes the questions from the end of each chapter 1-18 and the associated answers. In some cases, there is not a single answer. Some of the chapters also include 'Discussion Topics' to aid in the learning process.

The section at the end of the guide contains the questions only to provide to the students.

This version has minor editorial updates to reflect the reprint in August 2009.

Chapter 1

1. What are some of the demands that are driving system development?
Answer:
a) Competitive demands to leverage technological advances to provide continuously increasing capability at reduced costs and shorter delivery cycles
b) Interconnected systems where systems are now part of a larger whole

2. What is the purpose of systems engineering?
Answer:
Develop balanced system solutions that satisfy diverse stakeholder needs?

3. What are the key activities in the system specification and design process?
Answer:
- Elicit and analyze stakeholder needs
- Specify the system
- Synthesize alternative system solutions
- Perform trade-off analysis
- Maintain traceability

4. Who are the typical stakeholders that span a system's life cycle?
Answer:
Operator/user, Manufacturer, Maintainer, Governments, ..

5. What are different types of requirements?
Answer:
Functional, Interface, Performance, Physical, Quality attributes such as reliability and maintainability

6. Why is it important to have a multidisciplinary systems engineering team?
Answer:
To provide the understanding and expertise of the multiple stakeholder and technical and engineering domains

7. What are some of the roles on a typical systems engineering team?
Answer:
Management, Requirements Analyst, Architect, System Analyst, Tester

8. What role do standards play in systems engineering?
Answer:
Help to codify the practice and provide a way for sharing this practice across broad industry domains.

Chapter 2

1. What are some of the primary distinctions between MBSE and a document-based approach?

Answer:

In MBSE, the emphasis is on producing and controlling a coherent system model rather than the documentation

2. What are some of the benefits of MBSE over the document-based approach?

Answer:

- Enhanced communications
- Increased precision of the specification and design
- Enhanced design integration
- Enhanced reuse of system artifacts

3. Where are the model elements of a system model stored?

Answer:

Model repository

4. Which aspects of the model can be used to define the scope of the model?

Answer:

Breadth, depth, and fidelity of the model

5. What constitutes a good model?

Answer:

It meets its intended purpose

6. What are some of the quality attributes of a good model?

Answer:

- Defined scope
- Degree of model completion relative to its scope
- Degree of consistency
- Degree of well-formedness
- Understandability
- Self documenting
- Documented modeling conventions

7. What is the difference between a good model and a good design?

Answer:

Good model accomplishes its purpose. Good design satisfies its requirements

8. What are examples of questions that MBSE metrics can help answer?

Answer:

- What is the design quality?
- What is the progress of the design/development effort?
- What is the estimated effort to complete the design/development?

9. What are possible sizing parameters that could be used to estimate an MBSE effort?

Answer:

- #Use cases
- #Scenarios
- #States
- #System/component interfaces
- #System/component activities or operations
- #System/component properties
- #Components by type (e.g., hardware, software, data, operational procedures)
- #Test cases