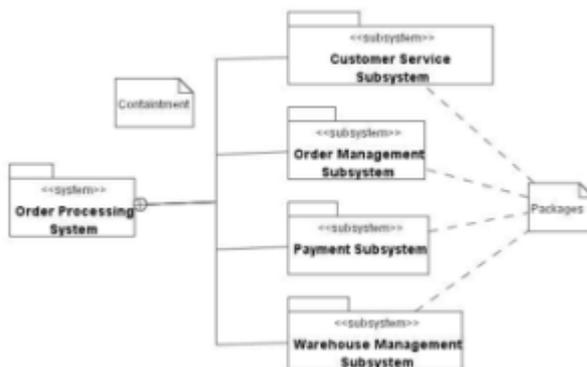(last updated September 6, 2021)
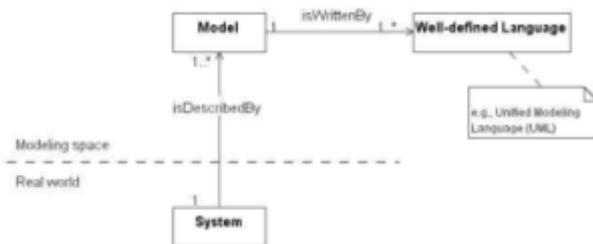
4.

4.1 (Software Modeling)

- To develop software is to build a MACHINE, simply by describing.[1]
- A software engineer needs only make a description of the required machine. Describing the required machine is usually not a simple task.
- A system is "a set or arrangement of elements that are organized to accomplish some predefined goal by processing information."[2]
  - ○
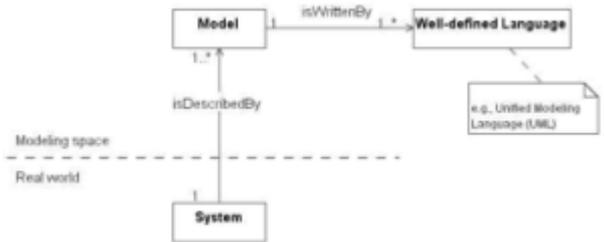- (System) (Subsystem)

Fig. 1:

- A model is a simplified representation of (part of) a system. It is written in a language with well-defined syntax and semantics, and represents certain specific aspects of a system.
- A model is a simplification of reality.
- We build models so that we can better understand the system we are developing.
- We build models of complex systems because we cannot comprehend such system in its entirely.
- The choice of what models to create has a profound influence on how a problem is attacked and how a solution is shaped.
- Every model may be expressed at difference levels of precision.
- The best models are connected to reality.
- No single model is sufficient. Every nontrivial system is best approached through a small set of nearly independent models.
- Models are not right or wrong; they are more or less useful. [3]

Fig. 2:

-

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Fig. 3:

- Modeling(   )
    - ○
    - ○
- Modeling   [4]
    - ○
    - ○   "things"   "action" " processing"
    - ○ Modeling allows us to use something that is simpler, safer or cheaper than reality instead of reality for some purpose. A model represents reality for the given purpose; the model is an abstraction of reality in the sense that it cannot represent all aspects of reality. This allows us to deal with the world in a simplified manner, avoiding the complexity, danger and irreversibility of reality.[5]
    - ○ So, modeling is a means for dealing with the complexity. Complex systems are generally described by more than one model from the various kinds of views. Modeling then means constructing an abstraction of a system that focuses on interesting aspects and ignore irrelevant details.

[1]

Michael Jackson, "The World and the Machine", ICSE, pp. 283-292, 1995.

[2]

Webster Dictionary

[3]

Martin Fowler, "Analysis Patterns: Reusable Object Models", Addison-Wesley, ISBN 0-201-89542-0, 1997.

[4]

John Daniels, "Models and Abstraction", Object Expert, Vol.1(3), Mar./Apr. 1998.

[5]

Jeff Rothenberg, "The Nature of Modeling", Artificial Intelligence, Simulation, and Modeling, John Wiley & Sons, New York, pp. 75-92, 1989.

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