Evaluate Various Graph Representations of a Complex Software System

Goals and motivation for the assignment: The purpose of this assignment is to stimulate critical thinking about the value of various graphical software representation approaches. The assignment asks you to use various representations as vehicles for specifying one or more aspects of the complex system that you proposed in your last assignment. In doing this, you are being asked not only to specify aspects of the system, but also to comment on how well the various representations met your needs, commenting especially on the ways in which they fell short. Thus the assignment is designed to both improve your sense of the utility of the different representation approaches, and sharpen your skills at evaluation of different software representations in general.

What is the assignment?:
In the previous assignment you described a complex software system of interest to you. In this assignment you will go further and use the software representation approaches presented in the lectures to develop more precise and detailed specifications.

In particular, you must identify some aspect or aspects of your system, and then use dataflow graphs (DFGs), Finite State Machines (FSMs), Message Sequence Charts (MSCs), or Petri Nets (PNs) to specify the identified aspect(s). As noted in lecture, there are many possible different kinds of DFGs, FSAs, MSCs, and PNs, and the different kinds have different semantics. Thus you must define the semantics of the different graphs that you will use in this assignment. Having defined the graph semantics, you must then use them to develop graphs that specify important characteristics and features of your example system. Having done this, you must then indicate the strengths and weaknesses of the different kinds of graphs that you have used. Indicate ways in which each graph helped you specify what you wanted, and ways in which the graphs were balky or inadequate for your needs and wishes.

For your completed assignment you must select some different graph types to define, use, and evaluate. You should select your graph types from the following choices—DFG, FSA, MSC, and PN. 520 students must select at least two different graph types, and 620 students must select at least three different graph types. For each graph type selected you must:

• Create at least a few non-trivial graphs that are intended to specify precisely and in detail some aspect(s) of your system. You may use different graph types to specify different features or aspects of your system.

• Provide a definition of the semantics of each graph type.
• Write an analysis of the strengths and weaknesses of the graph type. This analysis should refer to specific details of your graphs to support the points that you make in this discussion.

FOR 520 STUDENTS:
• Select at least two different kinds of graphs from among DFG, FSM, MSC, and PN.
• The definition of the semantics of your graph types must be precise. It can be in natural language English, but care must be taken for the specification to be very precise and complete.

FOR EXTRA CREDIT: Use a mathematical notation such as Predicate Calculus (e.g. as was done in the class presentation materials) for your graph type semantic definitions.

Anticipated length: 8-12 pages

FOR 620 STUDENTS:
• Select at least three different kinds of graphs from among DFG, FSM, MSC, and PN.
• The specification of the semantics of your graph types must be in a mathematical notation such as Predicate Calculus (as was done in the class presentation materials).

Anticipated length: 10-20 pages