

2nd Home Assignment – Structural Modeling

Schedule Support for Transportation System

Based on a meeting with the project customer, the lead system architect highlighted the most important functional components of the *Scheduling System*: a *Smart Train Controller* component is responsible for maintaining the schedules (e.g. dynamically adapt the frequency of lines to the actual number of passengers and type of cargo to be transported; recalculating the route of a train in case an obstacle appears on any segment) and a *Scheduling Manager* that is responsible for interacting with the stakeholders (clients requesting new schedules, passengers reserving seats for a schedule, etc.). These components have to be integrated into the design of the “Intelligent Cargo Transportation” system. In addition, all the functional requirements identified during requirement analysis have to be covered by the system.

Tasks

Extend the initial model by completing the following tasks:

- a. Extend the existing Block Definition Diagrams (BDD) to include the smart train controlling and the schedule managing functions. (Hint: The new functions can reuse or overwrite existing functions e.g. the *Scheduling Manager* can reuse the *Route Planner* component.)
- b. Decompose these functions with at least one more level of hierarchy (you may use another diagram for this).
- c. Extend the new and/or existing BDDs (including the result of the previous tasks) to cover all the function requirements that were identified during the requirement analysis phase. (Hint: This task also requires the integration of the new functions with existing functions.)
- d. Define the communication and data flow connections between the new functional blocks on Internal Block Diagrams (IBD). (Hint: This task may require to create new ports on the blocks of existing functions.)
- e. Define the required and provided services of each port.
- f. Select and elaborate at least three of the interfaces in connection with the previous subtask.
- g. *Extra* Specify well-formedness constraints for the system in English or in any of the known constraint languages (e.g. ViatraQuery, OCL).