

Summary

This report will describe the design of a model for the simulation of a lift system in an arbitrary building. The lift system will comprise several lift Algorithms which can be easily tested and compared in the model. The Lift System computer model is a generic model that can be used for any building. The simulation model in this report will be designed in an object-oriented programming device which allows the process interaction approach. Therefore Delphi a basic programming language and Tomas (based on Delphi) is used to design the logistical simulation model.

The systems boundary of the model is the building with its floors and lifts. Persons who want to use the lift enter the system boundary and persons getting outside the lift exit the system boundary.

The objects used in the Lift System computer model are: Person; Floor; Lift and PersonGenerator. The Lift and PersonGenerator are the two processes of the model. Persons are generated in the PersonGenerator and enter the model with a certain arrival time distribution (InterArrTimeDistr). Each Lift created in the model has its own process. The Lift picks up the Persons on any Floor and follows a certain lift algorithm to transport the persons through the building. A distinction between 4 different algorithms is implemented into the model to allow the user to make a comparison between the different algorithms. The four different used algorithms are:

- Algorithm 1: Empty lift goes towards the floor with the longest waiting person;
- Algorithm 2: Empty lift goes directly to the floor with the longest waiting person;
- Algorithm 3: Empty lift goes towards the floor with the longest waiting person queue;
- Algorithm 4: Empty lift goes directly to the floor with the longest waiting person queue.

To allow the Lift system to be generic, the following parameters (with the model used parameters between brackets) can be adjusted before the simulation run with the use of three input files:

- Number of floors (F);
- Number of lifts (L);
- Lift velocity (LiftTime);
- Maximum capacity of the lift (Capacity);
- Passenger destinations from floor (FromFloorDistr);
- Passenger destinations to floor (ToFloorDistr);
- Passenger arrival rate (InterArrTimeDistr):
- Time to get out lift (GetOutTime);
- Time to get inside lift (GetInTime);

At the end of the simulation run, the performance indicators are shown on the form. During the simulation run the performance indicators with respect to the Lifts and Floors are updated and the model shows an up to date animation of the building, the floors, the lifts and persons.

The Lift System computer model is verified and validated with the use of the Tomas step and trace function, to ensure the functioning of the model. All results are validated and correspond veridical to the expectations.