Lab 1

Functional Decomposition and Data Flow Diagrams

Consider the following problem description:

The department of public works for a large city has decided to develop a Web-based pothole tracking and repair system (PHTRS). A description follows:

Citizens can log onto a Web site and report the location and severity of potholes.

As potholes are reported they are logged within a public works department repair system. In response to such reports, work crews are assigned pothole repair jobs. The work order data associated with each potholes created by the system and given to one of the department’s work crews. The work crew proceeds with repairs periodically submitting report on the status of the repair job: hours applied to repair, hole status (work in progress, repaired, temporary repair, not repaired), amount of filler material used and cost of repair (computed from hours applied, number of people, material and equipment used). This information is entered into the system.

Department management periodically requests from the system comprehensive reports about the potholes and pothole repair crews.

Using Visible Analyst (VA) complete the following modeling steps. Underlined words correspond to the VA commands and options with the same name.

1. Create an FDD.
   (a) Create a functional decomposition diagram (FDD) showing all the functions and processes of PHTRS.
   (b) Analyze this diagram and review the error messages and warnings.

2. Create a complete level 0 DFD and an incomplete level 1 DFD.
   (a) Create the top-level [Level 0, a.k.a. Context Diagram] data flow diagram (DFD) for the system showing only one process. Show only one input, and one output data flow connected to each external entity in the diagram and give appropriate names to these flows. Do not include any data stores in this diagram, as they are internal to the system.

   (b) Explode the process in your top-level (level 0) data flow diagram (DFD) to generate the next level of data flow diagram (level 1). Show processes that correspond to the second-level functions of the FDD in this diagram but DO NOT CONNECT the net data flows to the process symbols as yet. Analyze this diagram and review the error messages and warnings. [There is no need to correct the errors at this stage since the diagram is not complete].

3. Create level 2 DFD (incomplete) from the FDD.
   (a) Spawn each of the three functions at level 2 in your functional decomposition diagram (FDD) to create new sets of data flow diagrams. Select your level 1 DFD created in the previous step as
the parent of the data flow diagrams created in this step. Update your diagrams with each selection.

(b) Again analyze your functional decomposition diagram (FDD), and note down the errors or warnings generated by the system. There should be no errors or warnings if you have successfully completed these steps.

4. Establish correspondence between level 1 DFD and level 2 DFD.

(a) Explode each process shown in your level 1 data flow diagram as follows:

   Explode a process, select the appropriate existing diagram from the diagrams spawned in step (3a) above, and use the selected diagram as the child diagram for the process you are exploding.

5. Test DFD process hierarchy.

   Decompose the process shown in your top-level data flow diagram and create an unstructured process decomposition diagram. This diagram shows the hierarchy of processes derived from the hierarchy of the Data Flow Diagrams.