CHAPTER 11: DATA FLOW DIAGRAMS (DFD)

11.1 Introduction to Logical and Physical Data Flow Diagrams

Data flow diagrams (DFDs) are categorized as either logical or physical. A logical DFD focuses on the business and how the business operates. It describes the business events that take place and the data required and produced by each event. On the other hand, a physical DFD shows how the system will be implemented as we mentioned before. The chart shown in Fig. 11.1 contrasts the features of logical and physical models. Notice that the logical model reflects the business, while the physical model depicts the system.

Design Feature	Logical	Physical
What the model depicts	How the business operates	How hue system will be implemented (or how the current system operates)
What the processes represent	Business activities	Programs, program modules and manual procedures
What the data stores represent	Collections of data, regardless of how the data is stored	Physical files and databases, manual files
Type of data stores	Show data stores representing permanent data collections	Master files, transaction files. Any processes that operate at two different times must be connected by a data store
System controls	Show business controls	Show controls for validating input data, for obtaining a record (record found status), for ensuring successful completion of a process and for system security (example: journal records)

Figure 11.1: Features common of logical and physical data flow diagrams.

Ideally, systems are developed by analyzing the current system (the current logical DFD), then adding features that the new system should include (the proposed logical DFD). Finally the best methods to implement the new system should be developed (the physical DFD).
After the logical model for the new system has been developed, it may be used to create a physical data flow diagram for the new system. The progression of these models is illustrated in Figure 11.2.

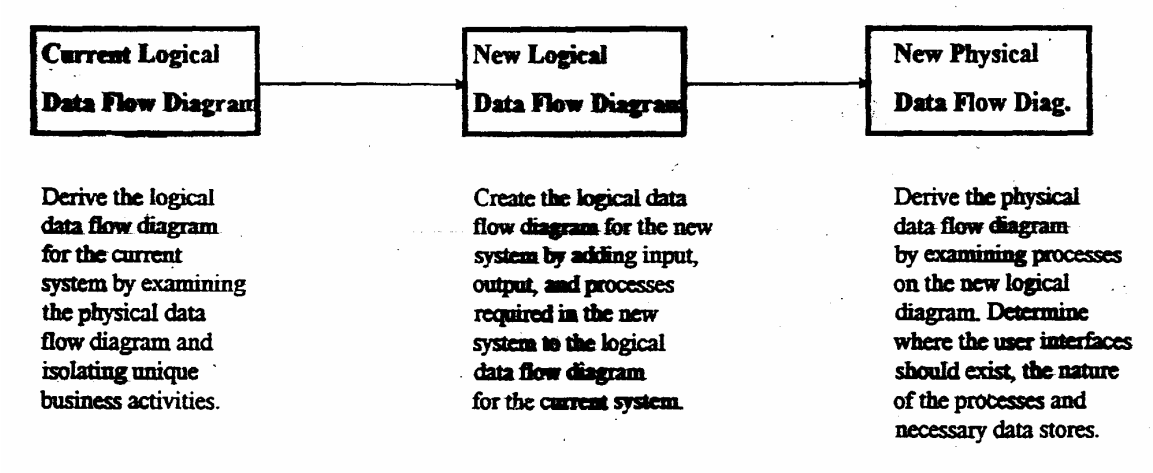

Figure 11.2: The progression of models from logical to physical.

Figure 11.3 shows a logical DFD and a physical DFD for a grocery store cashier. The CUSTOMER brings the ITEMS to the register; PRICES for all ITEMS are LOOKED UP, and then totaled; next, PAYMENT is given to the cashier finally, the CUSTOMER is given a receipt. The logical DFD illustrates the processes involved without going into detail about the physical implementation of activities. The physical DFD shows that a bar code-the UPC PRICE code found on most grocery store items- is used. In addition, the physical DFD mentions manual processes such as scanning, explains that a temporary file is used to keep a subtotal of items, and indicates that the PAYMENT could be made by CASH, CHECK, or DEBIT CARD. Finally, it refers to the receipt by its name, CASH REGISTER RECEIPT.

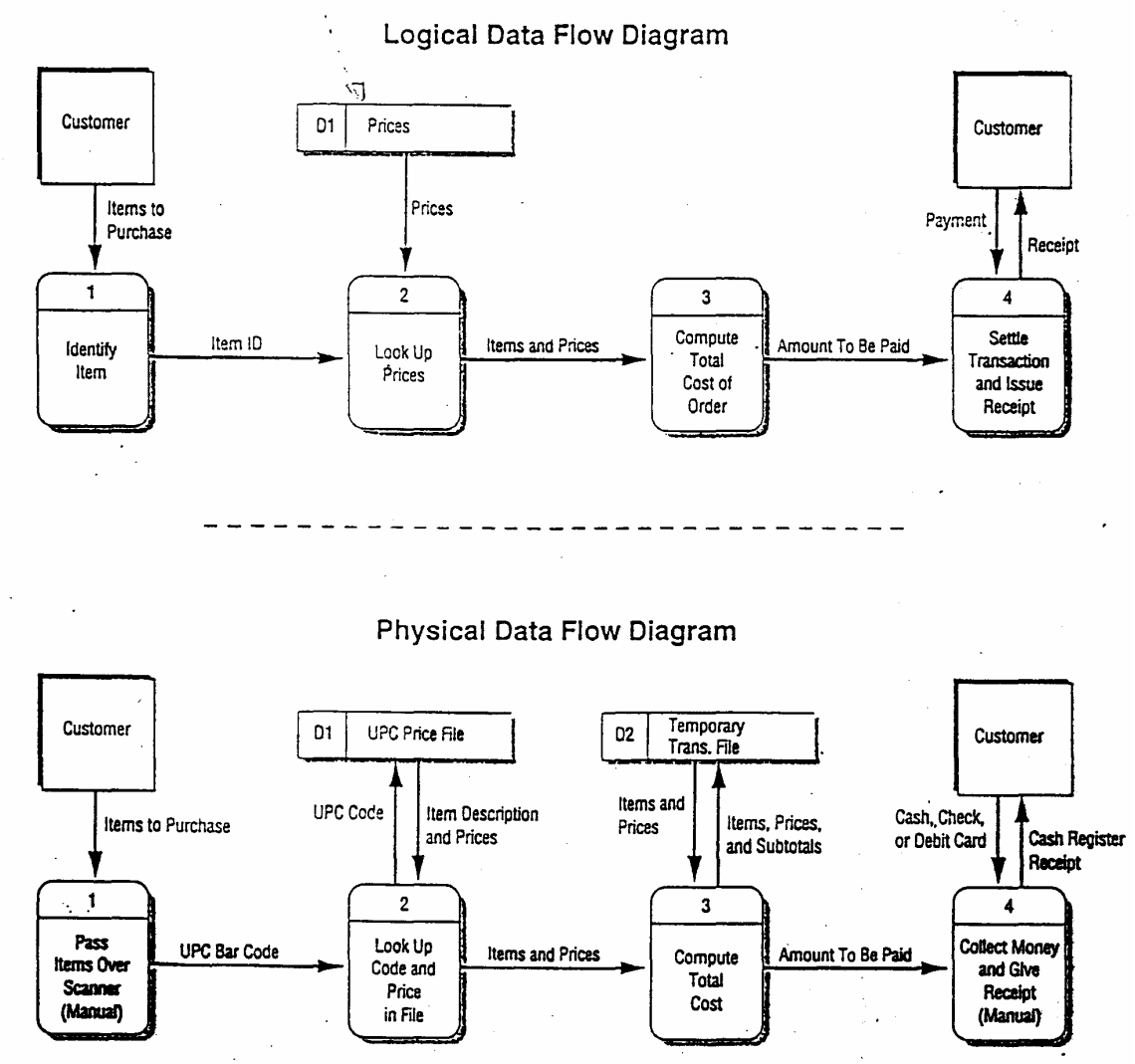

Figure 11.3: The physical data flow diagram shows certain details not found on the logical data flow diagram.

11.2 Steps of Developing DFD

Before drawing DPI) first we need to conceptualize data flows from a top-down perspective. To begin with we made a list of business activities and use it to determine various

- External entities
- Data flows
- Process
- Data stores

Then we created a context diagram (Fig. 11.4) to show external entities and data flows to and from the system. And then, we draw diagram shown in Fig.11.5 to show process.

As a final step, we created two child diagrams for two of the processes in diagram 0.

11.2.1 Creating the Context Diagram

The context diagram is the highest level in a data flow diagram and contains only one process, representing the entire system. The process is given the numb external entities are shown on the context diagram, as well as major data flow to and from them. The diagram does not contain any data stores

As our concern is Toyota Plaza, it is necessary to define it before showing its DFD. TOYOTA PLAZA is an independent institution established on its own budget, but is a part of TOYOTA / TOYOTASA. The Plaza sells all Toyota vehicles, original components, and is responsible of the maintenance and all repairs. The main mission of Plaza is to satisfy customer with its services and with other business it deals with.

Now you will see the Context Diagram of Toyota Plaza. A list of process activities for Toyota Plaza is seen in Fig. 11.4. In this fl you can see External Entities like Toyotasa, Customers, Other Plazas, Material Supplier and Bank. It shows the Context Diagram as Automobile Plaza and five external entities around it. You can also see the data flow that come and go to the external entities as well.

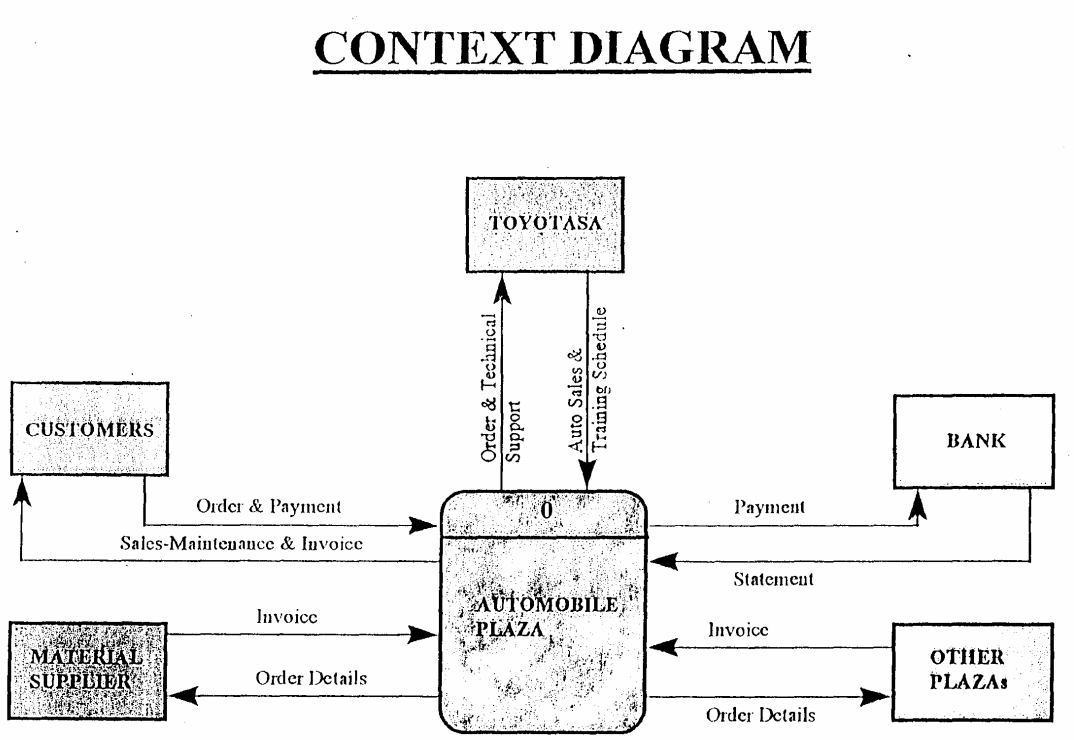

Figure 11.4: The context diagram of the automobile plaza.

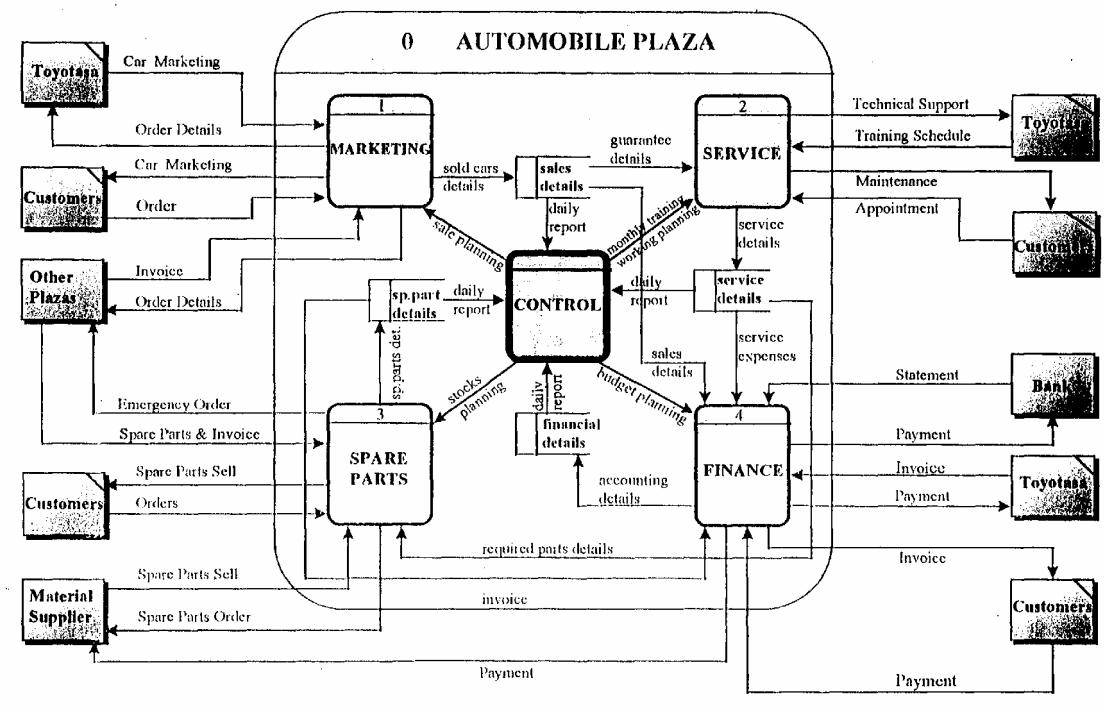

Figure 11.5: Diagram 0 for the Automobile Plaza system shows four major processes.

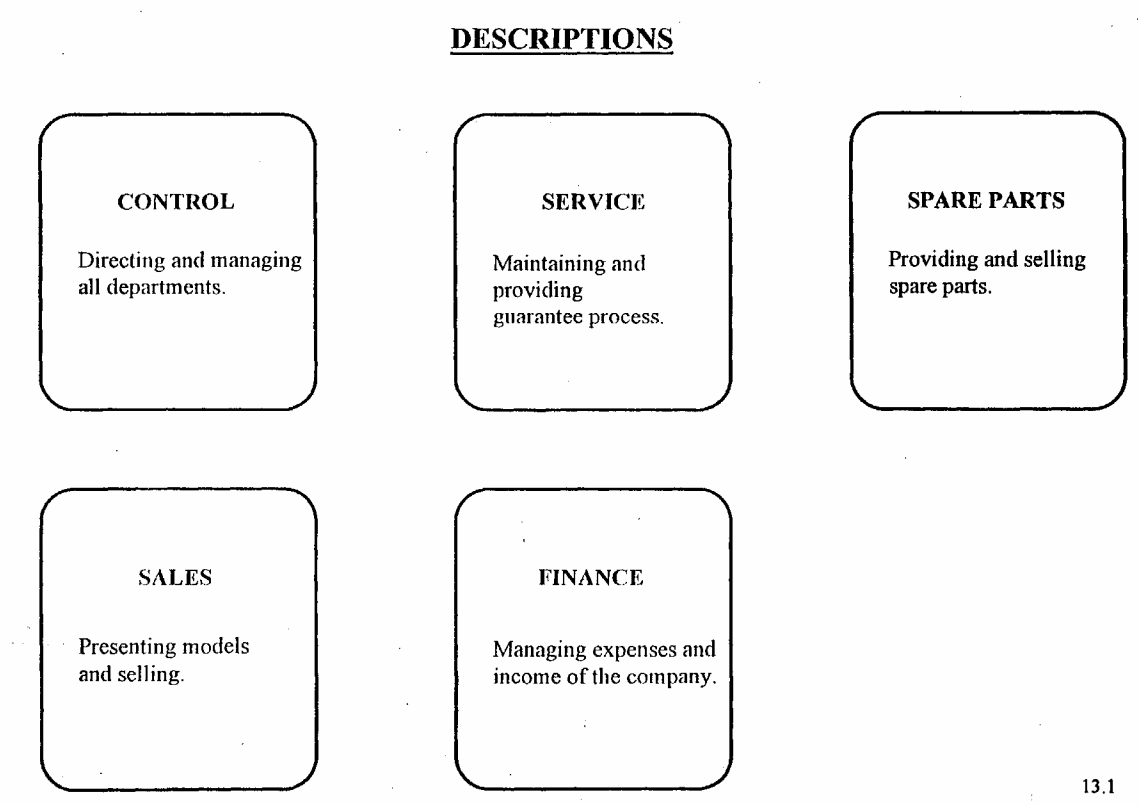

Figure 11.6: Descriptions of major elements of Diagram 0

11.2.2 Creating Child Diagram (More Detailed Level)

Each process on Diagram 0 may in turn be exploded to create a more detailed child diagram. The process on Diagram 0 that is exploded is called the PARENT PROCESS and the diagram that result is called the CHILD DIAGRAM. The child diagram is given the same number as its parent process in diagram 0. For example, process 2 would explode to Diagram 2.

The process on the child diagram is numbered using the parent process number, a decimal point, and a unique number for each child process. On Diagram 2, the process would be numbered 2-1, 2-2, 2-3 and so on.

Now we will have a deeper look to our diagram. This time our concern will be the Service unit, which is shown as Control in figure 11.7. This internal entity has 3 other internal entities around it. From this figure you can see the data flow that come from and go to not only the internal entities but also to external entities as well.

These entities have their functions and duties to perform. These are;

CONTROL: The functions of this unit are:

- to manage and direct the service unit.
- to determine the targets of service and budget and to prepare monthly reports.
- to control the process of the service unit.
- to prepare training programs.
- to provide contact with Toyotasa.
- to prepare reports asked by Tovotasa and to apply administrative, financial and technical matters.

ADVISOR: The duties of the advisor are:

- to start and to provide the Continuous contact between the customers and the service unit authorized in marketing.
- to satisfy the customer with the service.
- to provide the increase in marketing the components and work-force.
- to inform the customers about their inquiries and to arrange appointments for them by checking appointment schedule.
- to contact with spare parts unit to make reservations for the components requested by the customers.
- to contact with the customers to arrange an appropriate time for appointment by means of availability of the components requested.
- to send a monthly report about the work done covering guarantee to Toyotasa.
- to prepare daily report about service done and to send it to Control.
- to prepare reports on customers' complaints.

QUALITY CONTROL: The functions of this unit are:

- to provide the fix-it-right and correct maintenance of the vehicles for the customers.
- to provide the improvement of the performance of the staff.
- to provide the usage of the components and the staff efficiency.
- to prepare quality control reports and schedules and send them to Control.

MAINTENANCE & REPAIRS: The duties of this unit are:

- to receive the details of the work to be done from the Advisor and to maintain and repair the vehicles according to the standards of Toyota.
- to request the necessary components from the Spare Parts Unit.
- to inform the Quality Control unit when the work is completed.

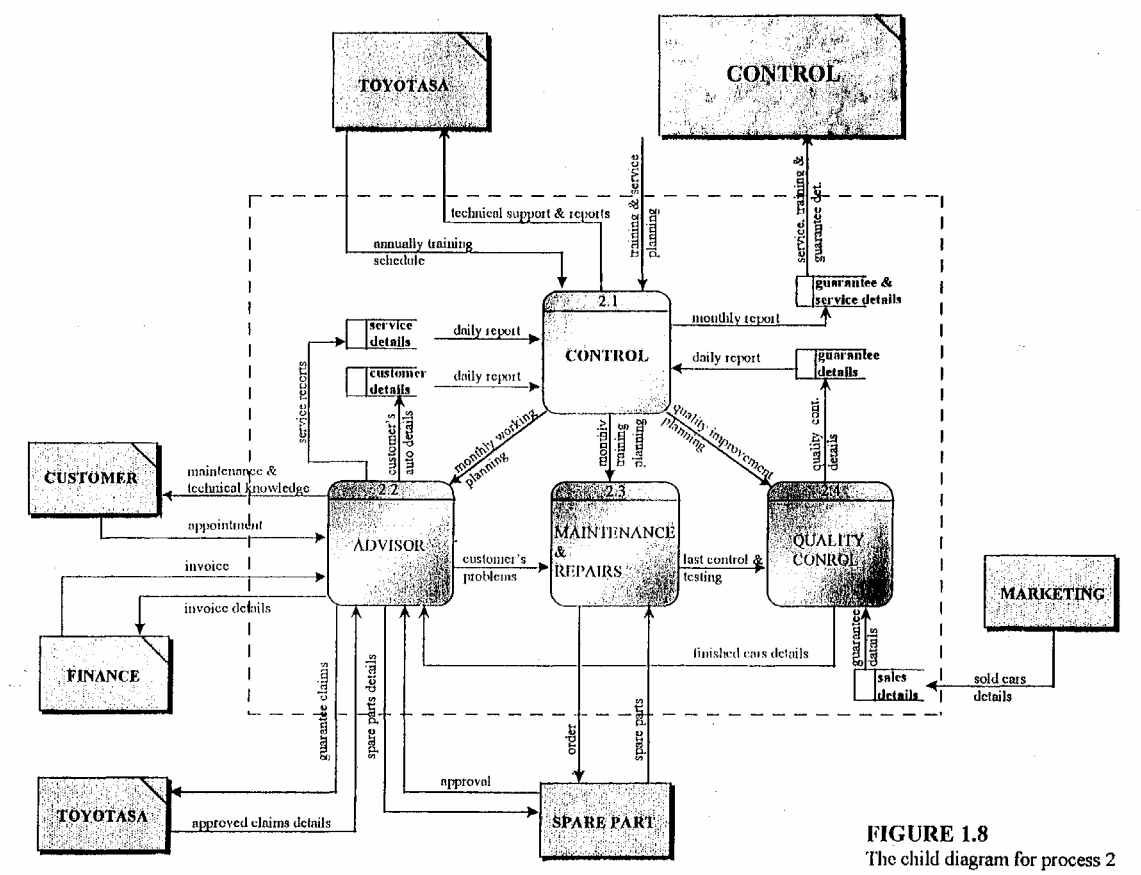

FIGURE 1.8
The child diagram for process 2

Figure 11.7: The child diagram for process 2

Now we are going to show you another child diagram, which explodes process 3 of Diagram 0. This time our concern will be the Spare Parts Unit, which is shown as Control in Fig. 11.8.

This internal entity has 2 other internal entities around it: Stock Control and Spare Parts Sales. From this figure you can see the data flow that come from and go to not only the internal entities but also to external entities as well.

These entities have their functions and duties to perform. These are:

CONTROL: The functions of this unit are:

- to manage and direct the spare parts unit.
- to prepare monthly order plans for stock control.
- to control the process of the spare parts unit.
- to provide contact with Toyotasa and also Other Plaza about urgent order.
- to prepare monthly reports for the Main Control Unit.
- to prepare monthly reports and training programs to Toyotasa.
- to prepare promotion plans twice a year for the Spare Parts Sales Unit.

STOCK CONTROL: The duties of this unit are:

- to supply spare parts for the service unit.
- to get information from other plazas about urgently required components.
- to send the details of orders to Material Supplier.
- to receive information from Spare Parts Sales Unit about components that are out of stock and to check if these components are available or not. To provide the required components if they are available.
- to prepare daily guarantee reports for the Control Unit.

SPARE PARTS SALES: The duties of this unit are:

- to handle customers' orders.
- to inform the Stock Control Unit about spare parts that are out of stock.
- to send invoice detail to Finance Unit.
- to prepare daily marketing reports for the Control Unit.

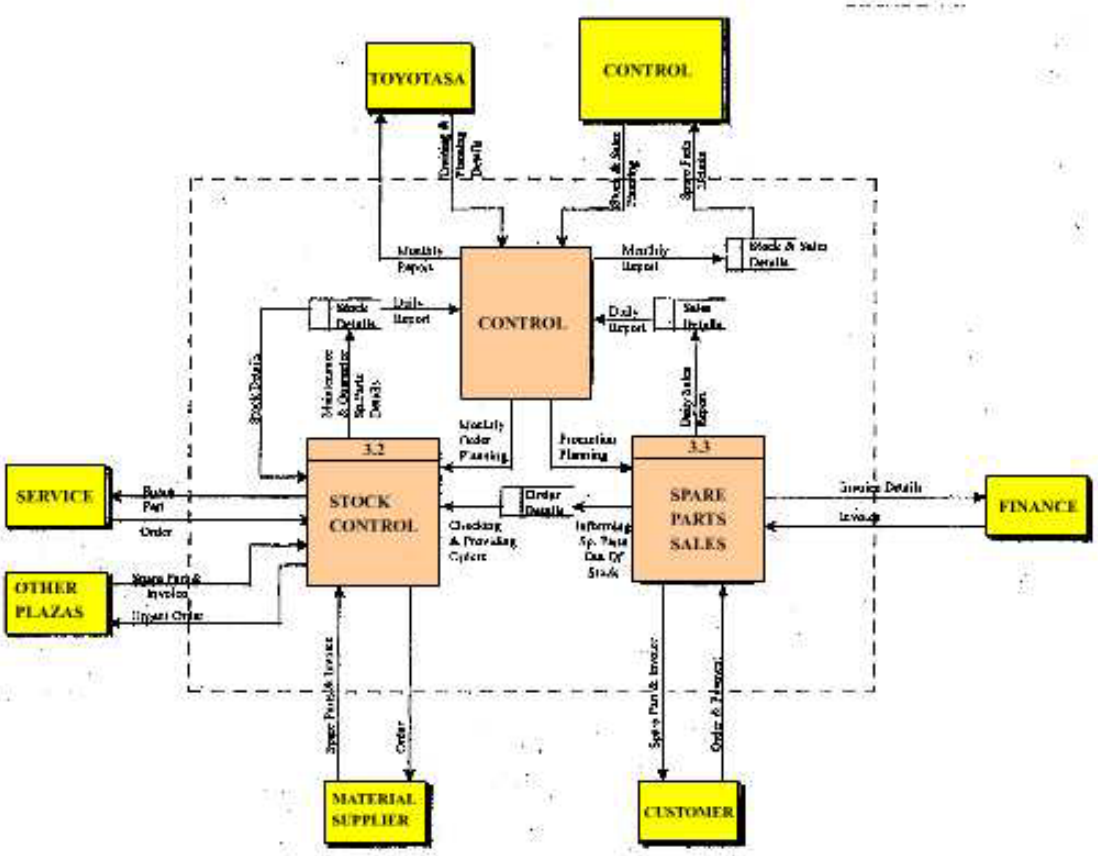

Figure 11.8: The Child Diagram of 0

Now, you might wonder how we created DFD for Toyota Plaza. We have a REFERENCE MODEL to consider that we are going to show you now.
In this figure (Reference Model), the main supplier is called Toyota which is in Japan.
Its main branch in Turkey is called Toyotasa and the other branches Toyotasa has called Toyota Plazas.
And now, you will see the recent model, which is called "AS-IS".
The difference between the Reference Model and AS-IS is that: When Toyotasa was established in Turkey 3 years ago, they started to produce cars. And Toyota did not provide cars for them any more but it easily provides spare parts and technical information for Toyotasa.
As you see here Subcontractors provides urgent maintenance that can not be done at Toyota Plaza such as body repair, and painting.
However, the AS-IS should be developed which is shown in a diagram called "SHOULD.BE" is that: the subcontractor of Toyota Plaza can not be seen here.
Because all maintenance and customer requirements should be provided by Toyota Plaza itself.

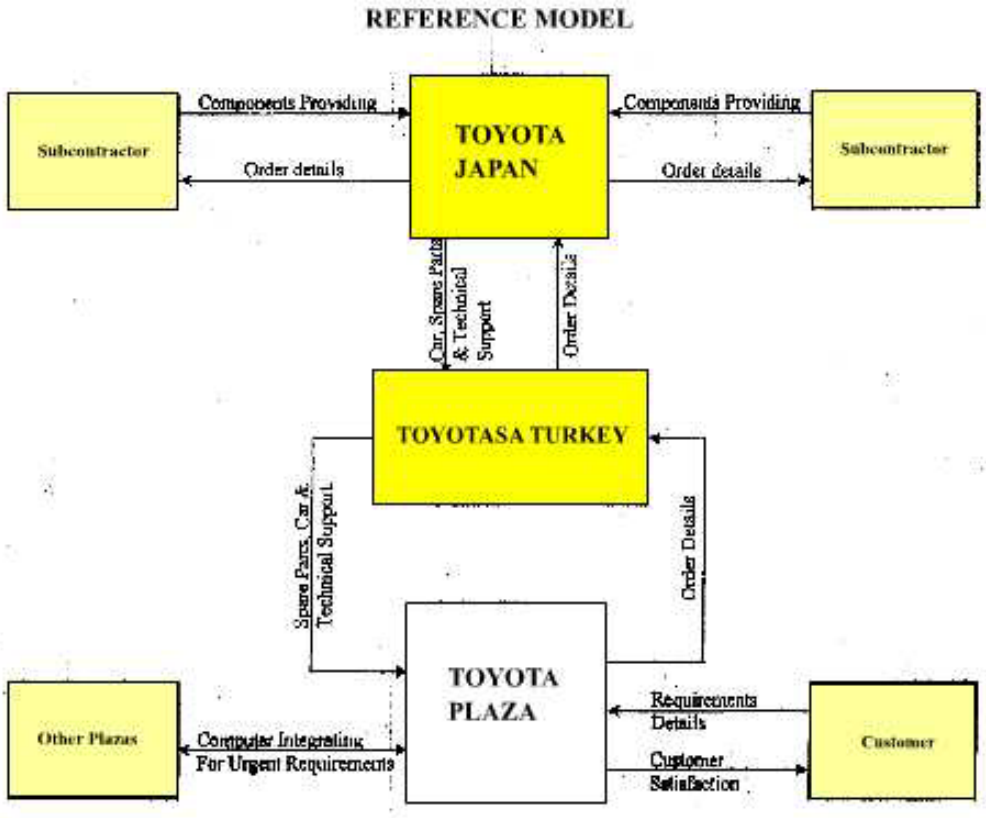

Figure 11.9: Reference Model for Toyota Plaza

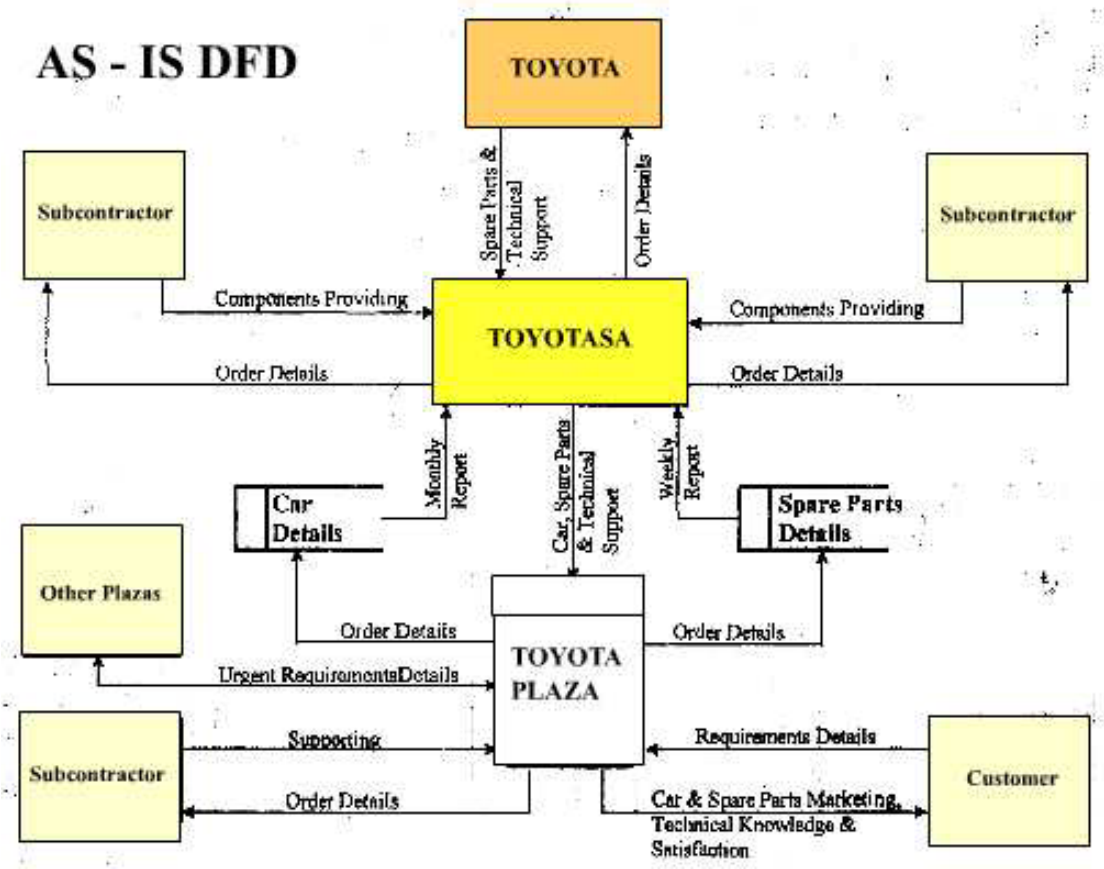

Figure 11.10: The AS-IS Model of DFD

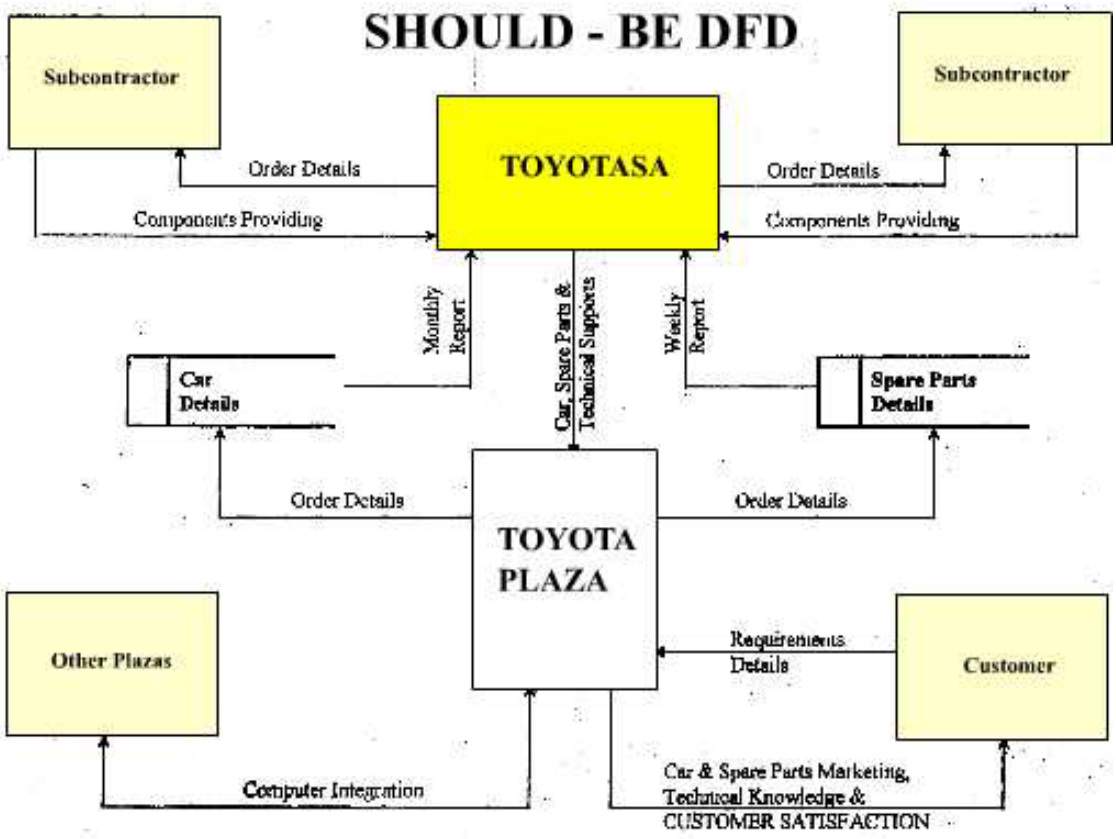

Figure 11.11: The SHOULD–BE Model of DFD