Data Flow Diagrams (DFD)

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Data Flow Diagram (DFD)

- Graphically characterize data processes and flows in a business system.
- Depict:
  - System inputs
  - Processes
  - Outputs

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Advantages of the Data Flow Approach

- Freedom from committing to the technical implementation too early
- Understanding of the interrelatedness of systems and subsystems
- Communicating current system knowledge to users
- Analysis of the proposed system

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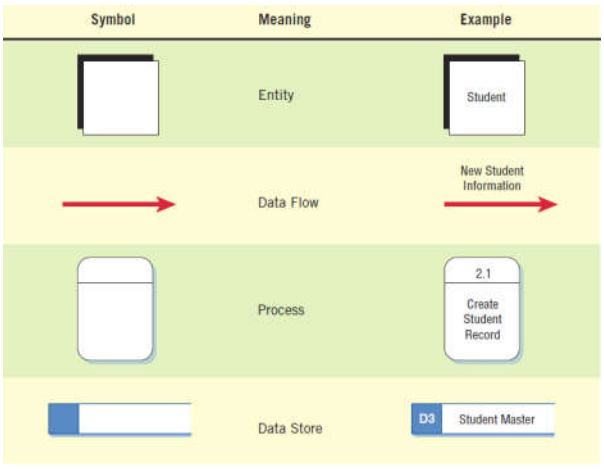
Basic Symbols



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External Entities

- An external entity sends data or receives data from the system.
- A source or destination of data, outside the boundaries of the system
- Should be named with a noun
- The same entity may be used more than once on a given data flow diagram.
- Represent another department, a business, a person, or a machine.
- External entities may be
  - A person, such as CUSTOMER or STUDENT
  - A company or organization, such as BANK or SUPPLIER
  - Another department within the company, such as ORDER FULFILLMENT
  - Another system or subsystem, such as the INVENTORY CONTROL SYSTEM

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Data Flow

- Shows movement of data from one point to another
- Described with a noun
- Arrowhead indicates the flow direction
- Represents data about a person, place, or thing
- Data flows occurring simultaneously can be depicted doing just that using parallel arrows.

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Process

- Denotes a change in or transformation of data
- Represents work being performed in the system
- Naming convention:
  - Assign the name of the whole system when naming a high-level process.
  - To name a major subsystem attach the word subsystem to the name.
  - Use the form verb-adjective-noun for detailed processes.

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Data Store

- A depository for data that allows examination, addition, and retrieval of data
- Named with a noun, describing the data
- Data stores are usually given a unique reference number, such as D1, D2, D3
- Represents a:
  - Database
  - Computerized file
  - Filing cabinet

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Steps in Developing Data Flow Diagrams

- Data flow diagrams can and should be drawn systematically.
- To begin a data flow diagram, collapse the organization's system narrative into a list with four categories of external entity, data flow, process, and data store. This list helps determine the boundaries of the system. Next begin drawing the context diagram.

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Creating the Context Diagram

- The highest level in a data flow diagram
- Contains only one process, representing the entire system
- The process is given the number 0
- All external entities, as well as major data flows are shown

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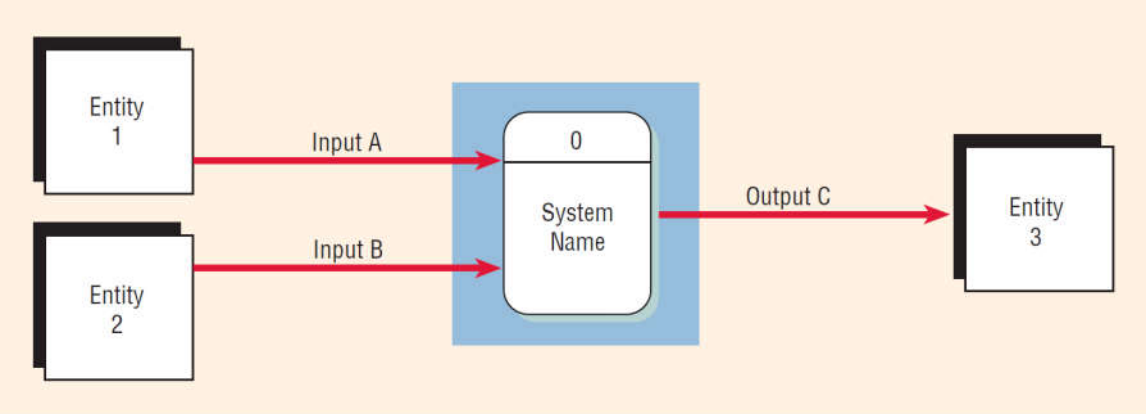
Context Diagram



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Drawing Diagram 0

- The explosion of the context diagram.
- May include up to nine processes.
- Each process is numbered.
- Major data stores and all external entities are included.

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Drawing Diagram 0 (Cont)

- Start with the data flow from an entity on the input side.
- Work backwards from an output data flow.
- Examine the data flow to or from a data store.
- Analyze a well-defined process.
- Take note of any fuzzy areas.

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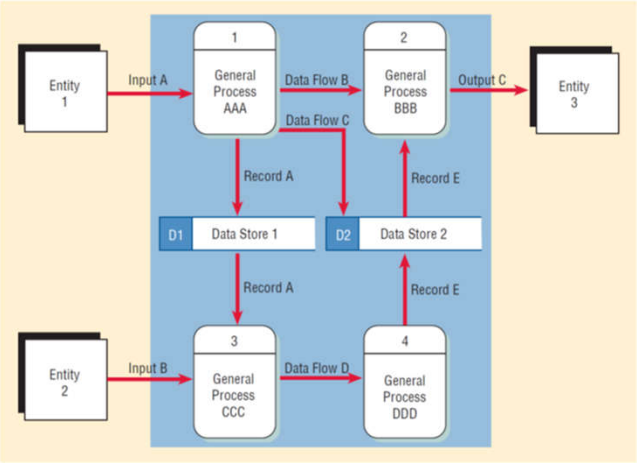
Greater Detail in Diagram 0



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Data Flow Diagram Levels

- Data flow diagrams are built in layers.
- The top level is the context level.
- Each process may explode to a lower level.
- The lower-level diagram number is the same as the parent process number.
- Processes that do not create a child diagram are called primitive.

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Creating Child Diagrams

- Each process on diagram 0 may be exploded to create a child diagram.
- A child diagram cannot produce output or receive input that the parent process does not also produce or receive.
- The child process is given the same number as the parent process.
  - Process 3 would explode to Diagram 3.

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Creating Child Diagrams (Cont)

- Entities are usually not shown on the child diagrams below Diagram 0.
- If the parent process has data flow connecting to a data store, the child diagram may include the data store as well.
- When a process is not exploded, it is called a primitive process.

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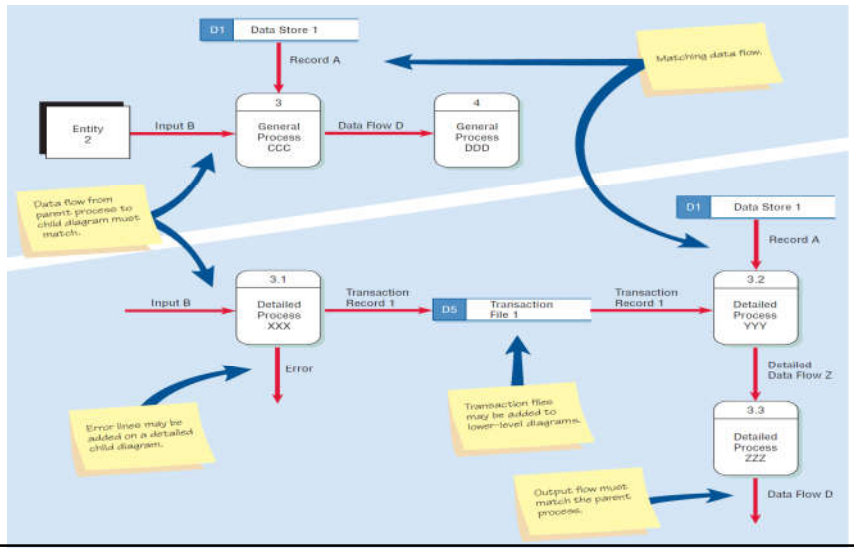
Child Diagram Example



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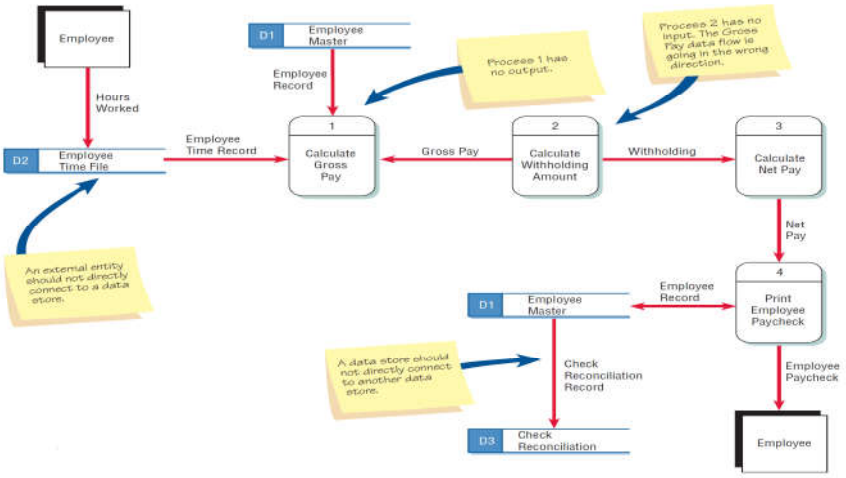
Typical Errors that Can Occur in a Data Flow Diagram



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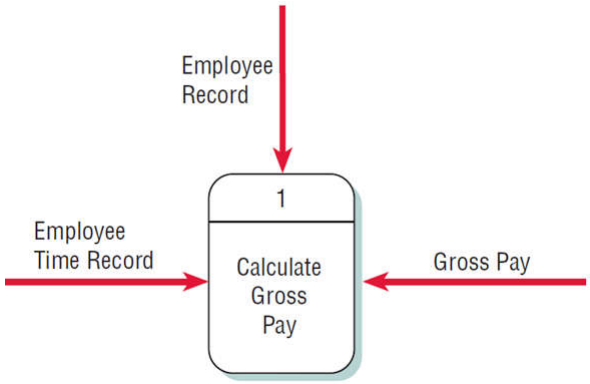
Checking the Diagrams for Errors



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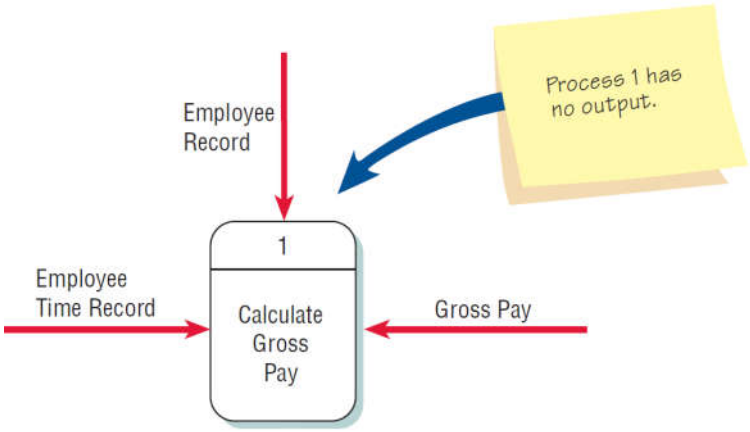

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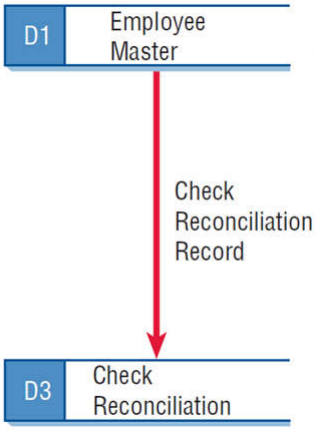

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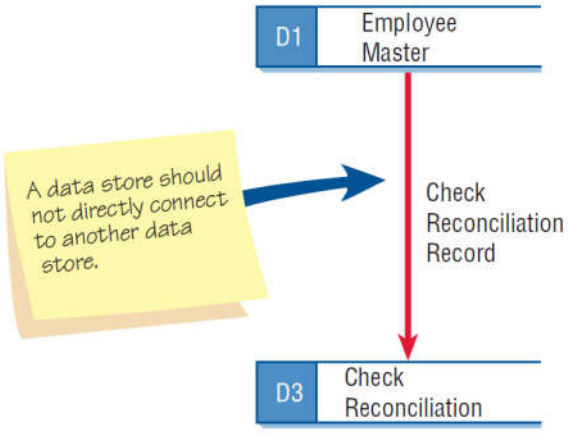

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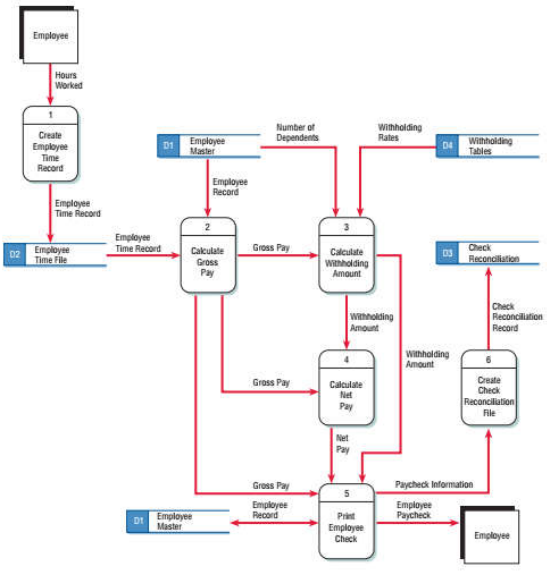

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Case Study

- Burger restaurant Inventory System data come from suppliers provide invoices , food-ordering system inventory report returns payments and orders , provide inventory counts and stock on hand also provides inventory counts
- Create the context diagram

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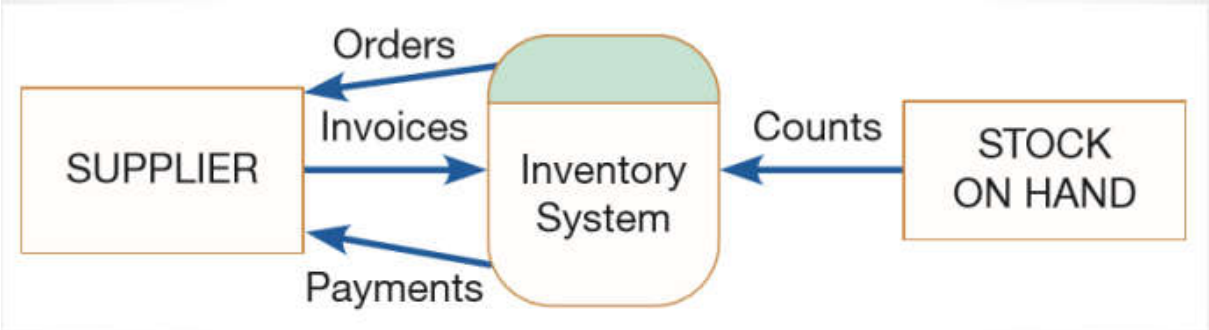
Context Diagram



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- When receives invoices from suppliers, he records their receipt on an invoice log sheet, and files the actual invoices in his accordion file. Using the invoices, records the amount of stock delivered on stock logs these are paper forms posted near the point of storage for each inventory item.
- Minimum order quantities appear on the log form stock level at which orders must be placed in order to avoid running out of an item. Stock log also has spaces for entering a) starting amount entered on the sheet when logs stock deliveries b) amount delivered, and c) amount used for each item entered on sheet after has compared amounts of stock used according to a physical count and according to the numbers on the inventory report generated by the food-ordering system.

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- Burger restaurant has standing daily delivery orders for some perishable items that are used every day determines which orders need to be placed by comparing, minimum order quantities and the amount of stock on hand uses the invoices, determines which bills need to be paid, and carefully records each payment

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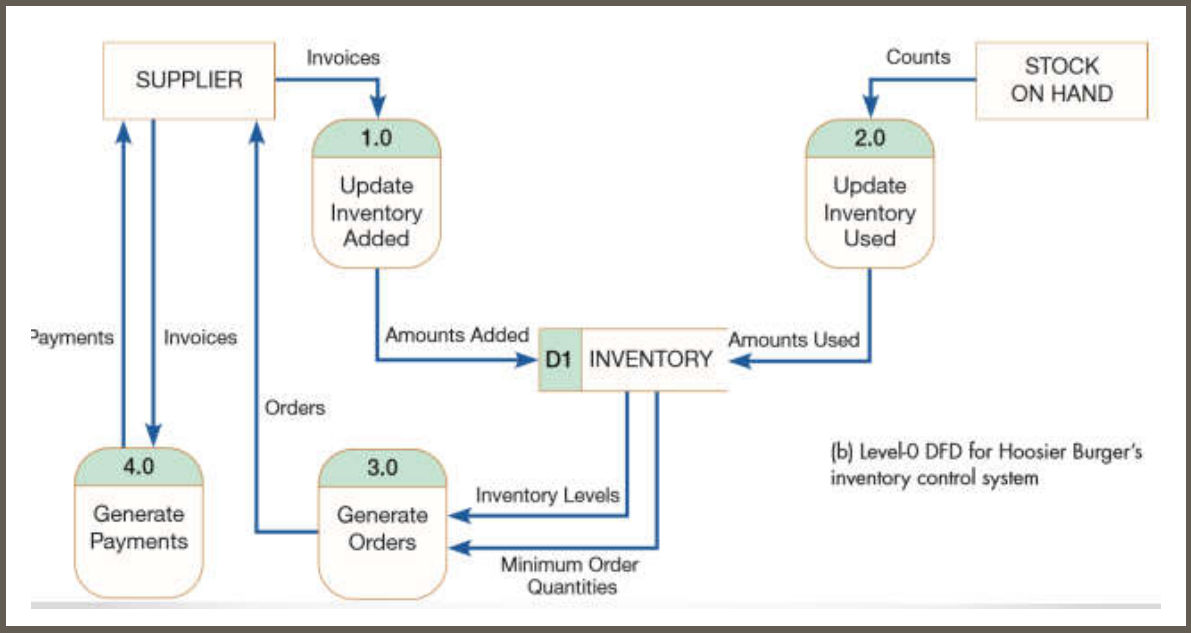

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Restaurant would like to add 3 additional functions:

1. data on new shipments should be entered into an automated system, thus:
   - no more paper stock log sheets
   - shipment data will stay as current as possible
2. System should determine automatically whether a new order should be placed.
3. Restaurant Management would like to be able to know, at any time, the approximate inventory level for each good in stock
   - for some items , can visually inspect the amount in stock and determine approximately how much is left and how much more is needed before closing time
   - for other items, however, may need a rough estimate of what is in stock more quickly than he can estimate via a visual inspection

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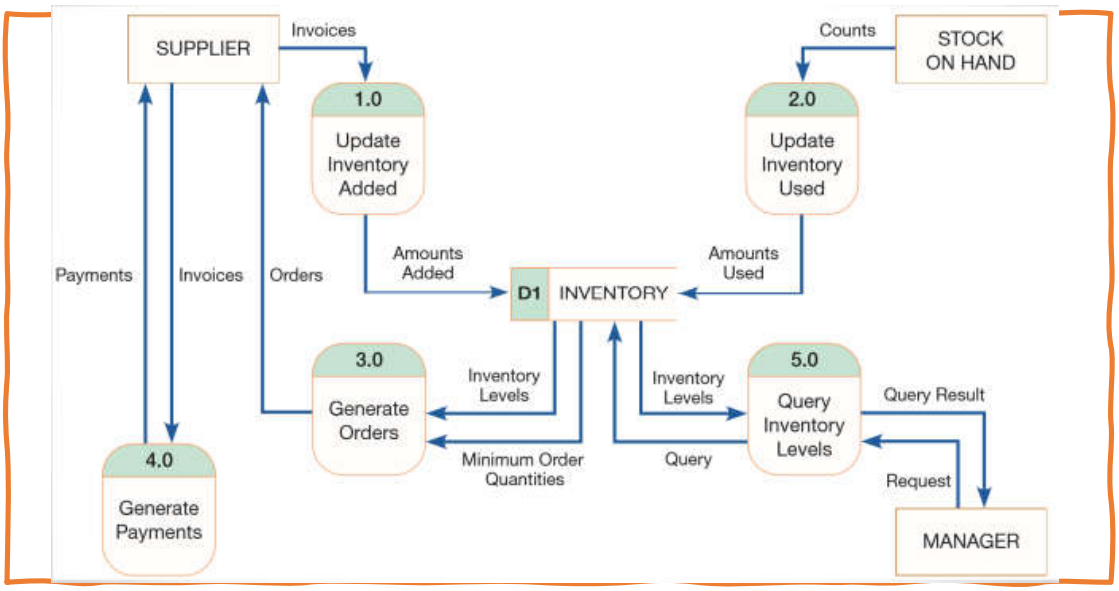

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Business Process Reengineering (BPR) – "IBM Credit Corporation

- IBM Credit Corporation
  - o provides financing for customers making large purchases of IBM computer equipment
  - o analyzes deals proposed by salespeople and writes the final contracts governing those deals
  - o it typically took six business days to process each financing deal

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Steps in processing each financing deal:

1. salesperson calls in with a proposed deal
    - o clerk logs it and writes details on a piece of paper
2. second person:
    - o enters data into a computer system and
    - o checks client's creditworthiness
    - o writes details on a piece of paper and carries paper (along with original documentation) to a loan officer
3. loan officer:
    - o modifies standard IBM loan agreement for the customer
    - o involves separate computer system from one used in step

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Steps in processing each financing deal:

4.details of modified loan agreement:
    - o sent on to the next station in the process
    - o different clerk determines interest rate for loan
    - o again, this involves its own information system
5. quote letter is created at the next stop:
    - o using resulting interest rate and
    - o all of the paper generated up to this point
    - o quote letter is sent via overnight mail back to the salesperson

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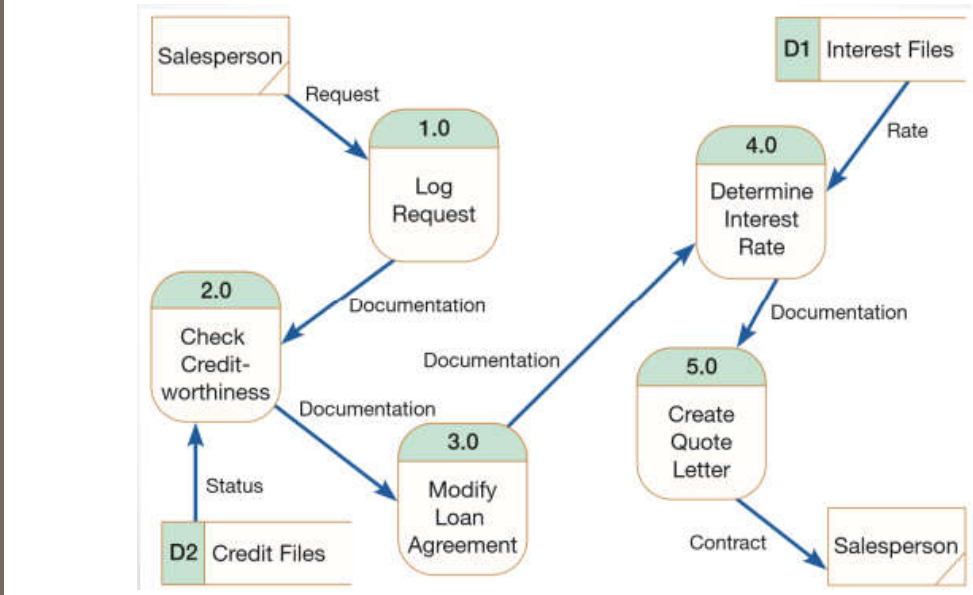

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Case Study 3

- Pine Valley Furniture (PVF) made a project to sell furniture products over the Internet
  - o develop a level-0 DFD for those requirements

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- Pine Valley Furniture (PVF) made a project to sell furniture products over the Internet
  - o develop a level-0 DFD for those requirements

Determine existing PVF systems with which webstore can exchange information:

1. Customer Tracking System (for managing customer information)
   - info. is passed from webstore system to this system when customer opens an account
2. Purchasing Fulfillment System (for tracking orders)
   - info. is stored in this system when an order is placed, and
   - retrieves status info. on a prior order (at customer request)

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Case Study 3

Determine additional data sources (i.e. data stores):

1. access to inventory database
   - to produce an online product catalog

2. webstore shopping cart
   - a temporary database
   - used to store the items a customer wants to purchase
   - shopping cart data can be deleted once transaction is completed

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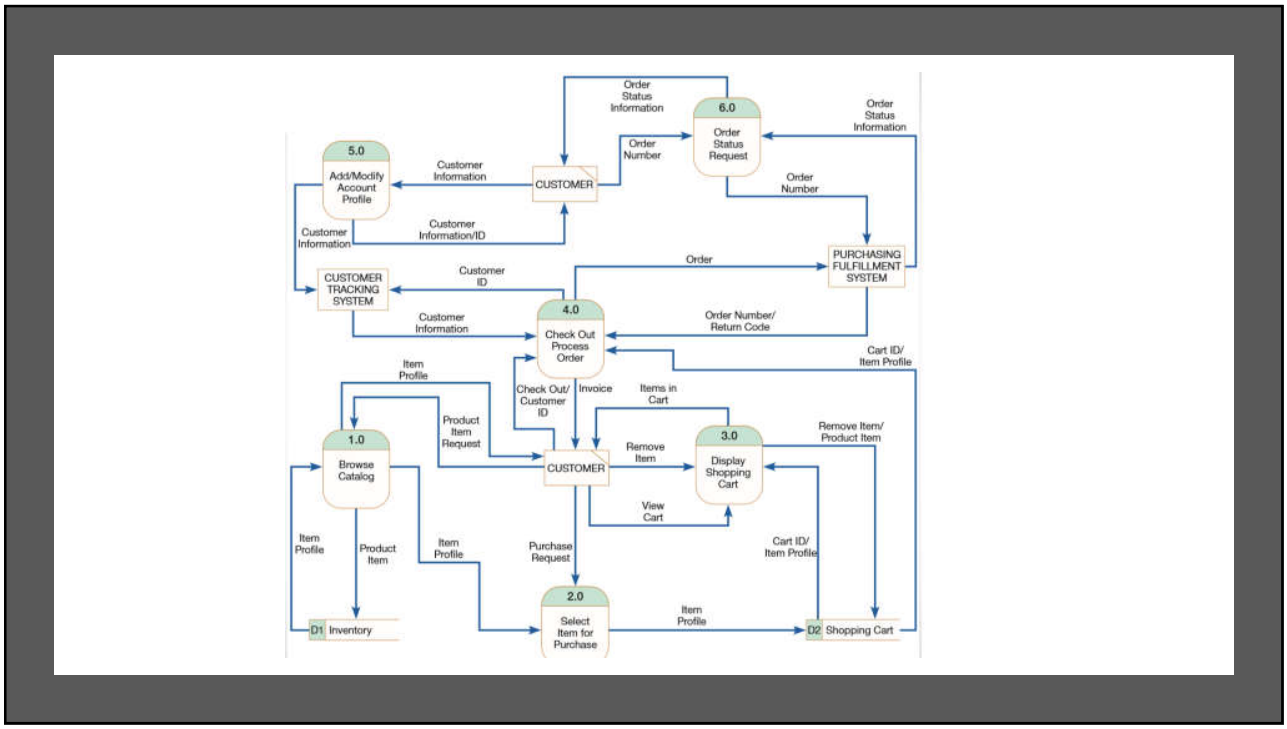
Order Status Information
6.0
Order Status Request
Order Status Information
5.0
Add/Modify Account Profile
Customer Information
CUSTOMER
Order Number
Order Number
Customer Information
Customer Information/ID
PURCHASING FULFILLMENT SYSTEM
Order
CUSTOMER TRACKING SYSTEM
Customer ID
4.0
Check Out Process Order
Customer Information
Order Number/ Return Code
Cart ID/ Item Profile
Item Profile
Check Out/ Customer ID
Invoice
Items in Cart
1.0
Browse Catalog
Product Item Request
CUSTOMER
Remove Item
3.0
Display Shopping Cart
Remove Item/ Product Item
View Cart
Item Profile
Product Item
Item Profile
Purchase Request
Cart ID/ Item Profile
2.0
Select Item for Purchase
Item Profile
D1 Inventory
D2 Shopping Cart

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