At the end of this session you will be able to …

✧ Create a Context Diagram.

✧ Create a process description.

✧ Define a Data Flow Definition.

Analyst hat:
Where are we in the SDLC?

✧ Specification

  ▪ Identify Problem

  ▪ **Gather requirements**

  ▪ Analyze & Model requirements

  ▪ Select architecture/COTS

✧ Design and implementation

✧ Validation

✧ Evolution

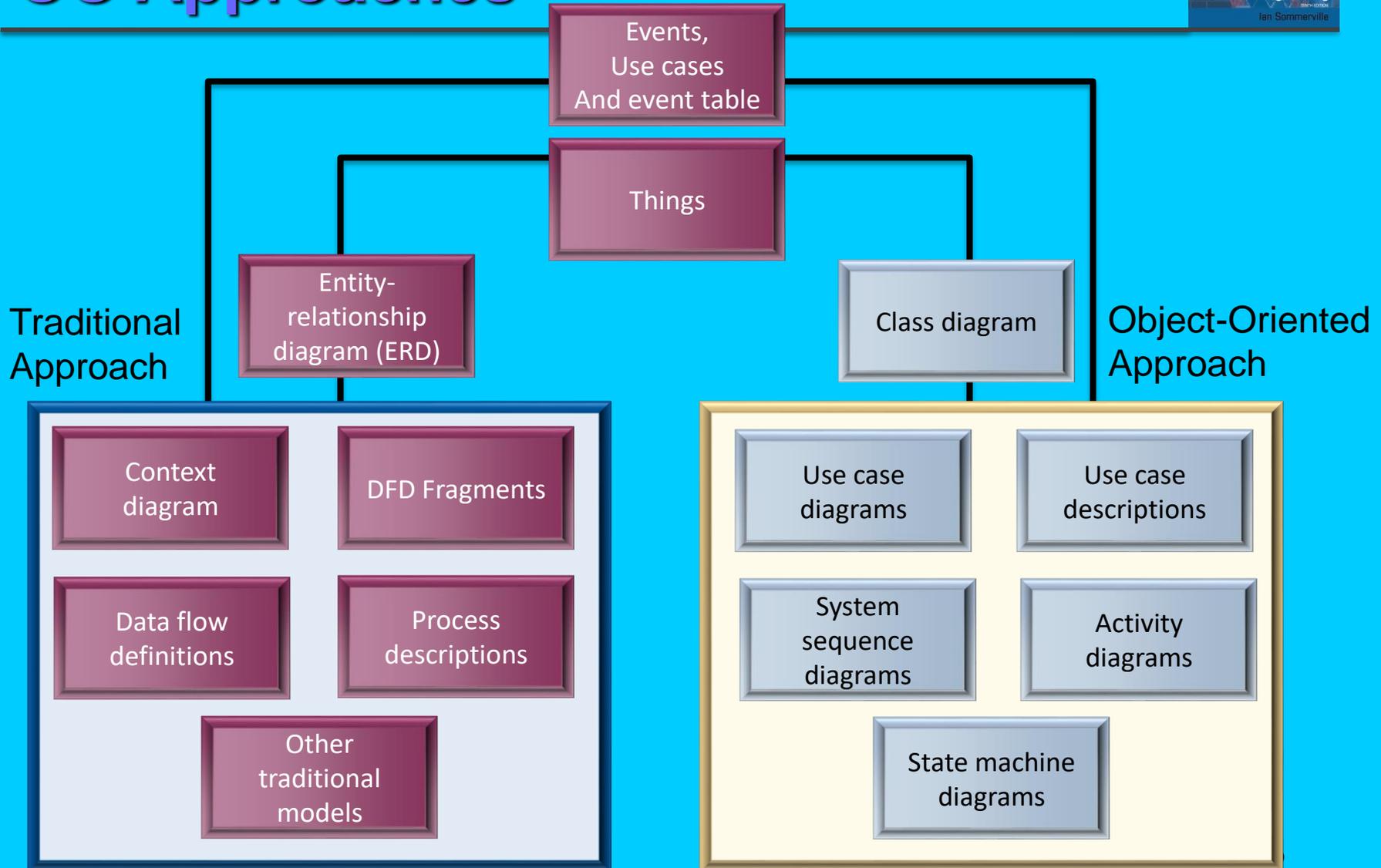# Traditional Approach vs. OO Approach

Traditional Approach

System is a collection of processes
Processes interact with data entities
Processes accept inputs and produce outputs

OO Approach

System is a collection of interacting objects
Objects interact with people and each other
Objects send and respond to messages

Requirements for the Traditional and OO Approaches

Events, Use cases And event table

Things

Entity-relationship diagram (ERD)

Class diagram

Traditional Approach

Object-Oriented Approach

Context diagram

DFD Fragments

Data flow definitions

Process descriptions

Other traditional models

Use case diagrams

Use case descriptions

System sequence diagrams

Activity diagrams

State machine diagrams

The Data Flow Approach


✧ Advantages over narrative:

- Not committed to technical implementation too early;

- Helps analyst understand interrelatedness of systems and sub-systems;

- Communication tool;

- Defines necessary processes and data flows.

Context Diagram

✧ Data Flow Diagram (next class) that summarizes all processing activity for the system or subsystem

✧ Highest level (most abstract) view of system

✧ Shows system boundaries

✧ System scope is represented by a single process, external agents, and all data flows into and out of the system

✧ Data stores are not usually shown in the context diagram since they are considered to be within the system scope

✧ • Context diagram does not show any details of what takes place within the system

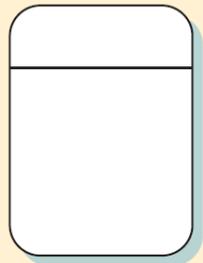# Context Diagrams for a *Course Registration* System
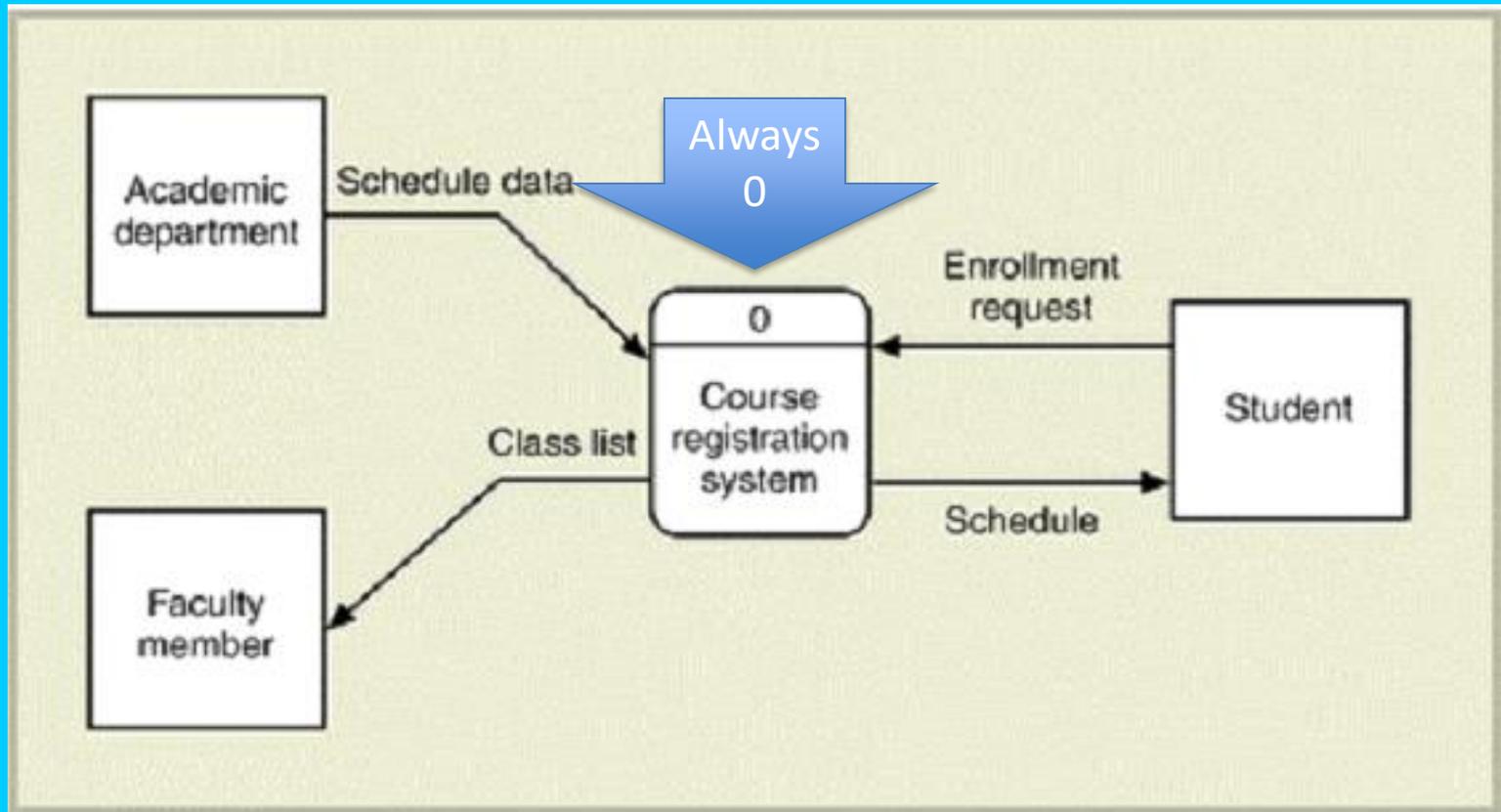
Note: System scope is represented by a single process, external agents, and all data flows into and out of the system

Context-Level Data Flow Diagrams

✧ Focus is on the data flowing into and out of the system and the processing of the data
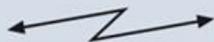
A **process** means that some action or group of actions take place.

An **entity** is a person, group, department, or any system that either receives or originates information or data.
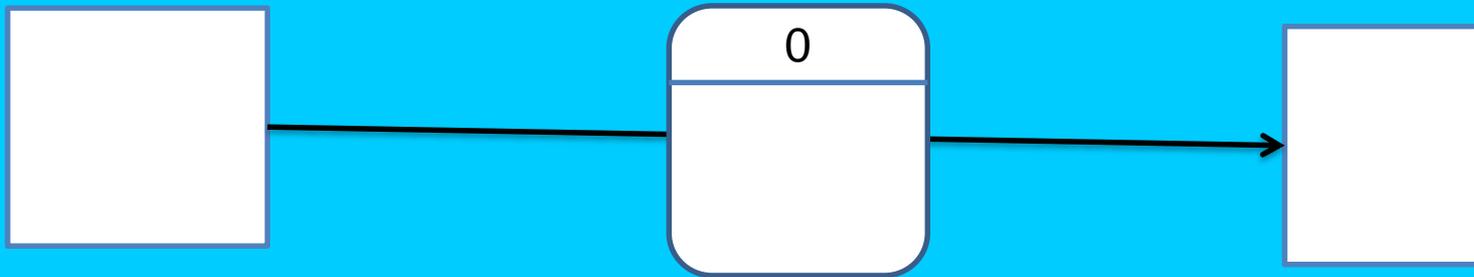
A **data flow** shows that information is being passed from or to a process.
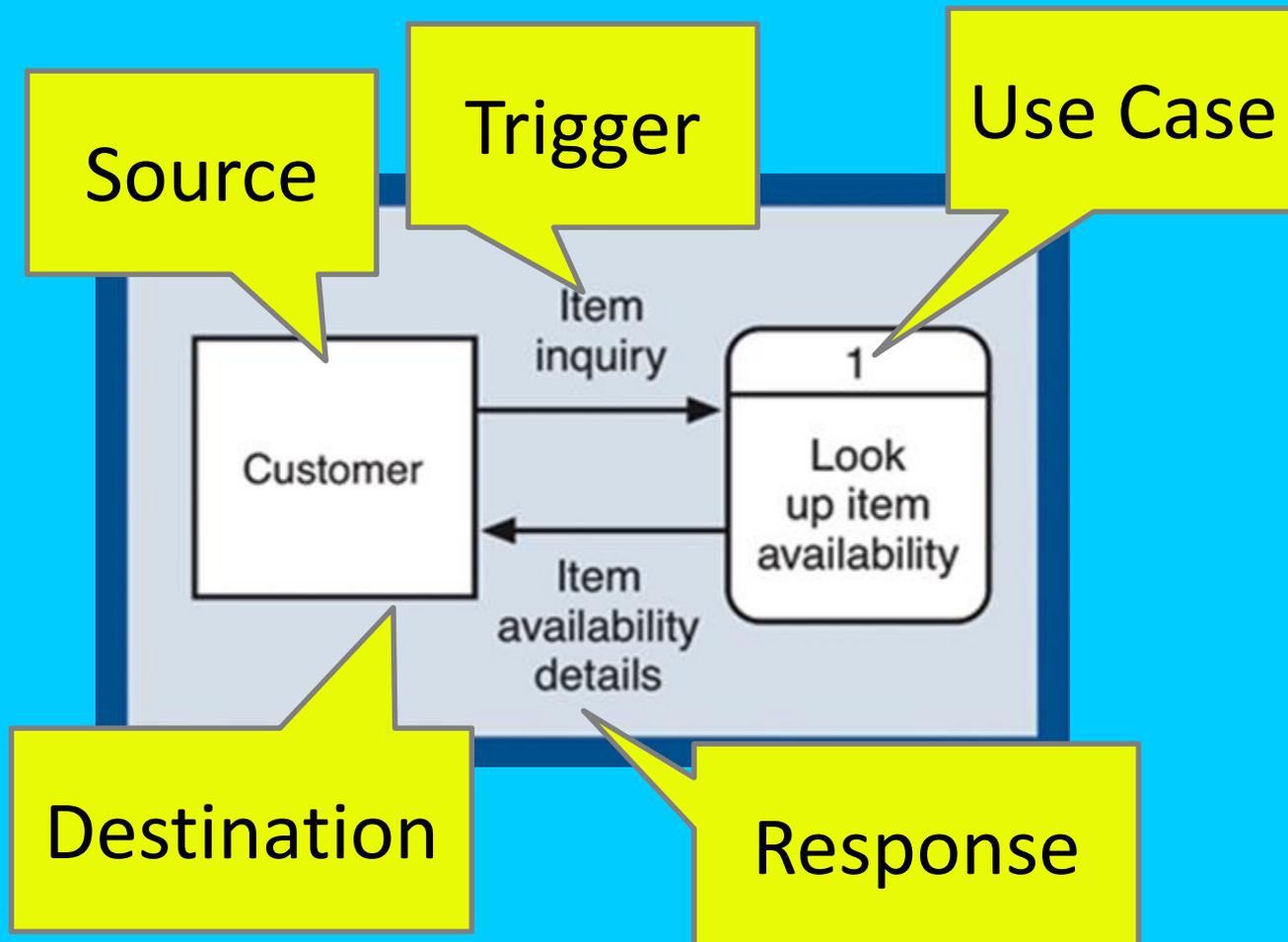
Real-time link — Communication back and forth between an external agent and a process as the process is executing (e.g., credit card verification).

No entity can provide data to anther entity without a process.

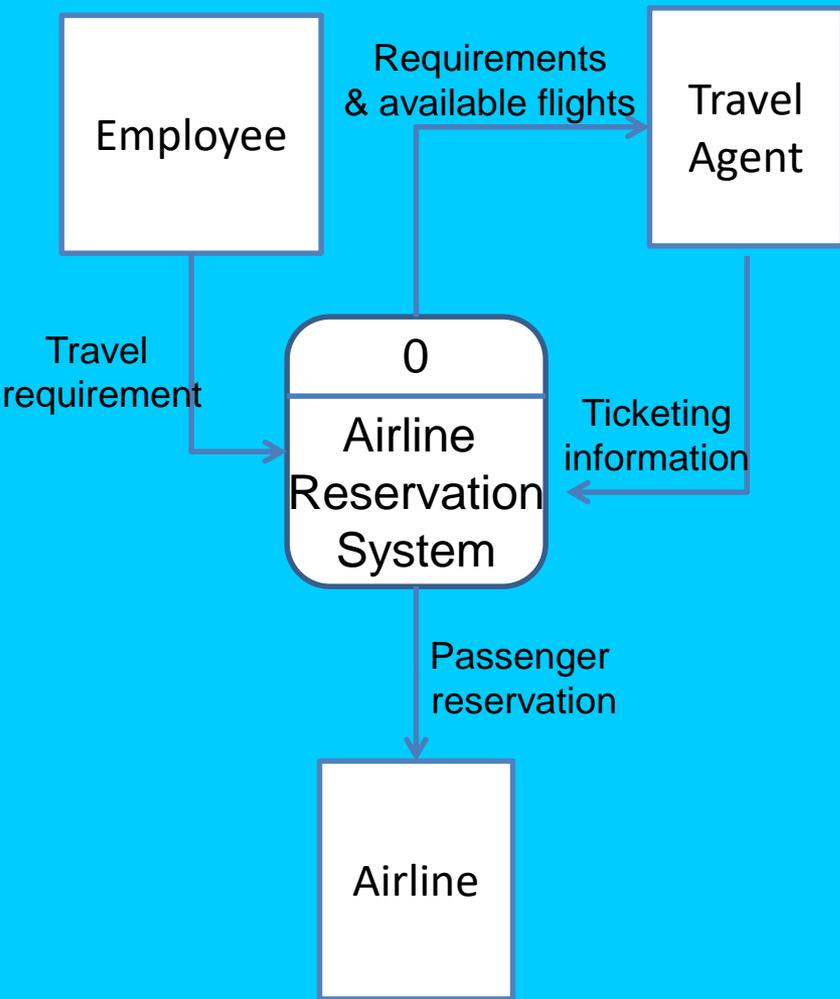# DFD Fragment Showing Use Case *Look Up Item Availability*

Airline Reservation System example

◇ Setting the context:

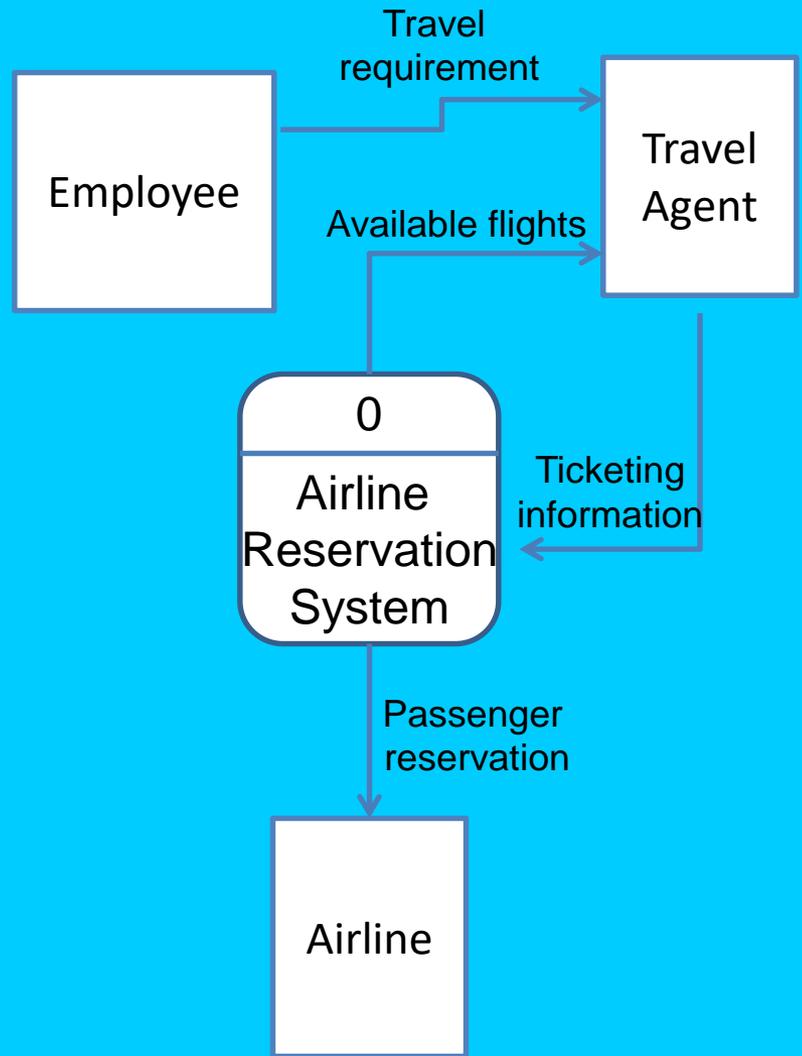- A large organization has an in-house system for making airline reservations for employees.

- An employee that needs to travel for business uses the in-house reservation system to sends her/his air travel requirements to an in-house travel agent.

- The Travel Agent matches flights and requirements and sends ticketing info to the reservation system.

- The system books the reservation with an airline.

A)

Employee

Requirements & available flights

Travel Agent

Travel requirement

0

Airline Reservation System

Ticketing information

Passenger reservation

Airline

B)

Travel requirement

Employee

Travel Agent

Available flights

0

Airline Reservation System

Ticketing information
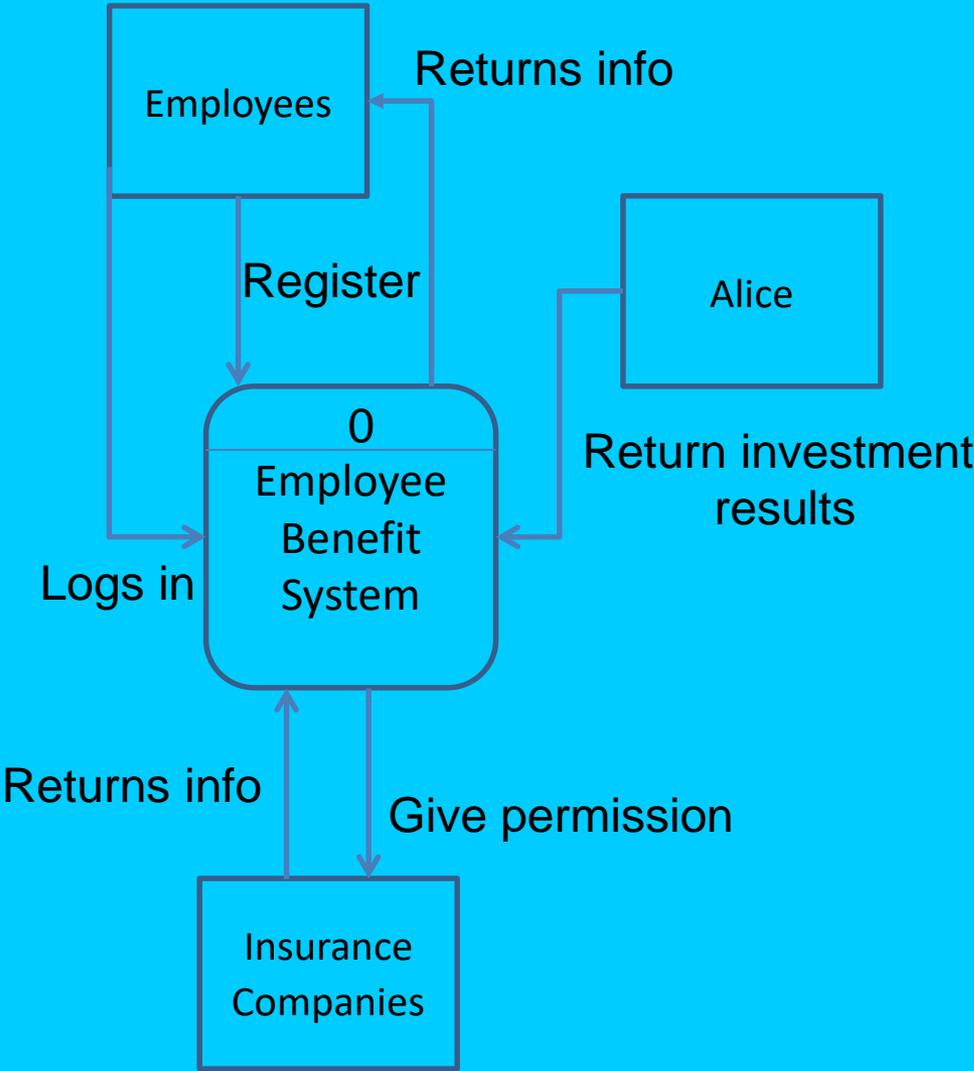
Passenger reservation

Airline
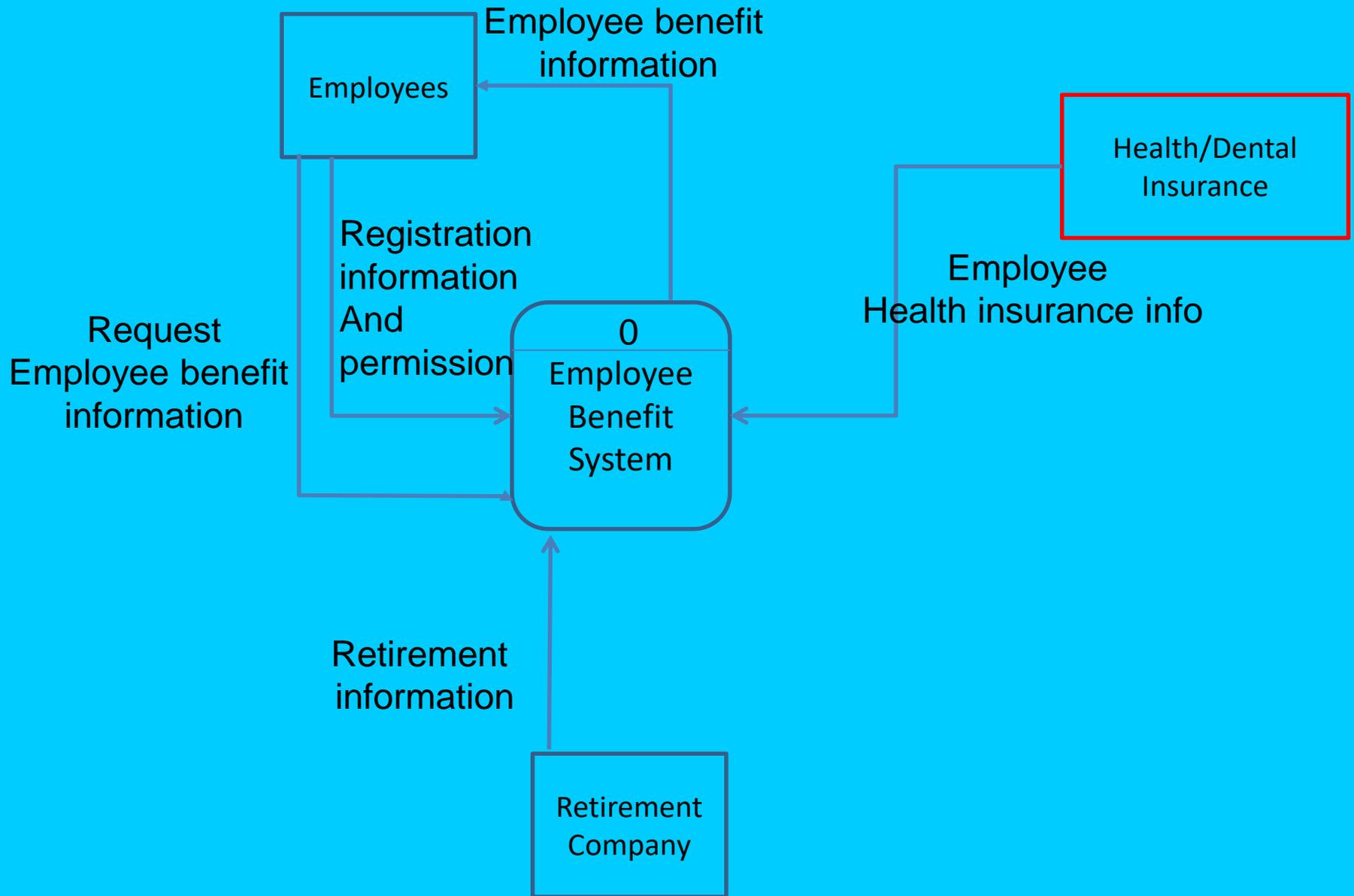
Which one has an error?

Context Diagram Exercise

✧ Alice in the human resources department at the Cho Manufacturing plant is constantly being asked by employees how much is taken out of their pay cheques for insurance, taxes, medical, mandatory retirement, and voluntary retirement. "It takes up to a few hours every day," says Alice.

✧ She would like a Web system that would allow employees to use a secure logon to view the information. Alice wants the system to interface with health and dental insurance companies to obtain the amount remaining in the employee's account for the year. She would also like employees to obtain retirement amounts saved along with investment results. Alice has a high regard for privacy. She wants the system to have employees register and give permission to obtain their financial information from the dental insurance, health insurance, and retirement companies. Create a Context Diagram for the Employee Benefit system.

✧ What is the process?

✧ What are the entities?

✧ What are the data flows?

✧ What questions do you need to ask to complete the diagram?

First Draft

Remove Alice as an entity. Add Health/Dental.

Employees

Employee benefit information

Health/Dental Insurance

Registration information And permission

Request Employee benefit information

Employee Health insurance info

0
Employee Benefit System

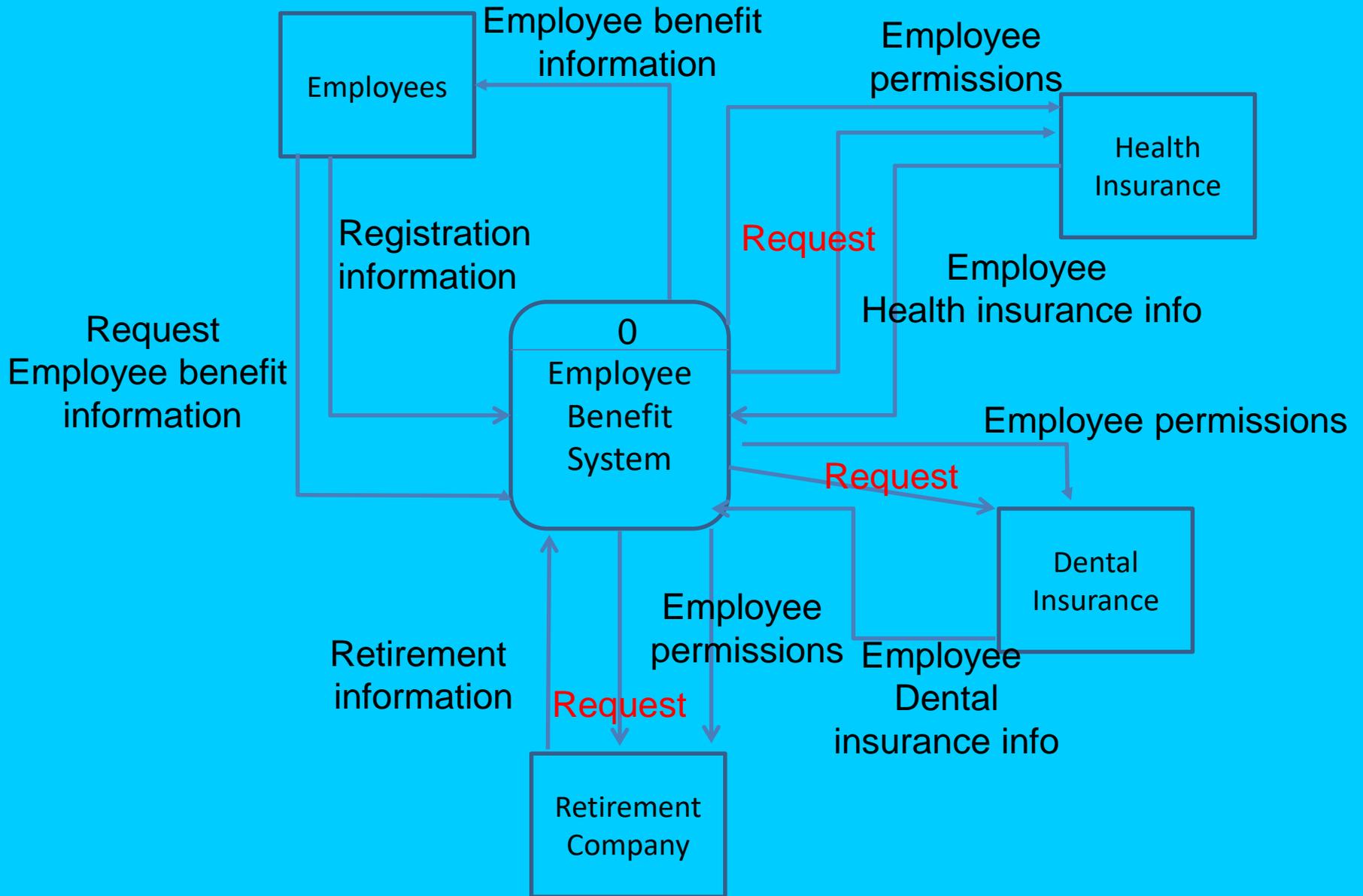Retirement information

Retirement Company

Split up health and Dental
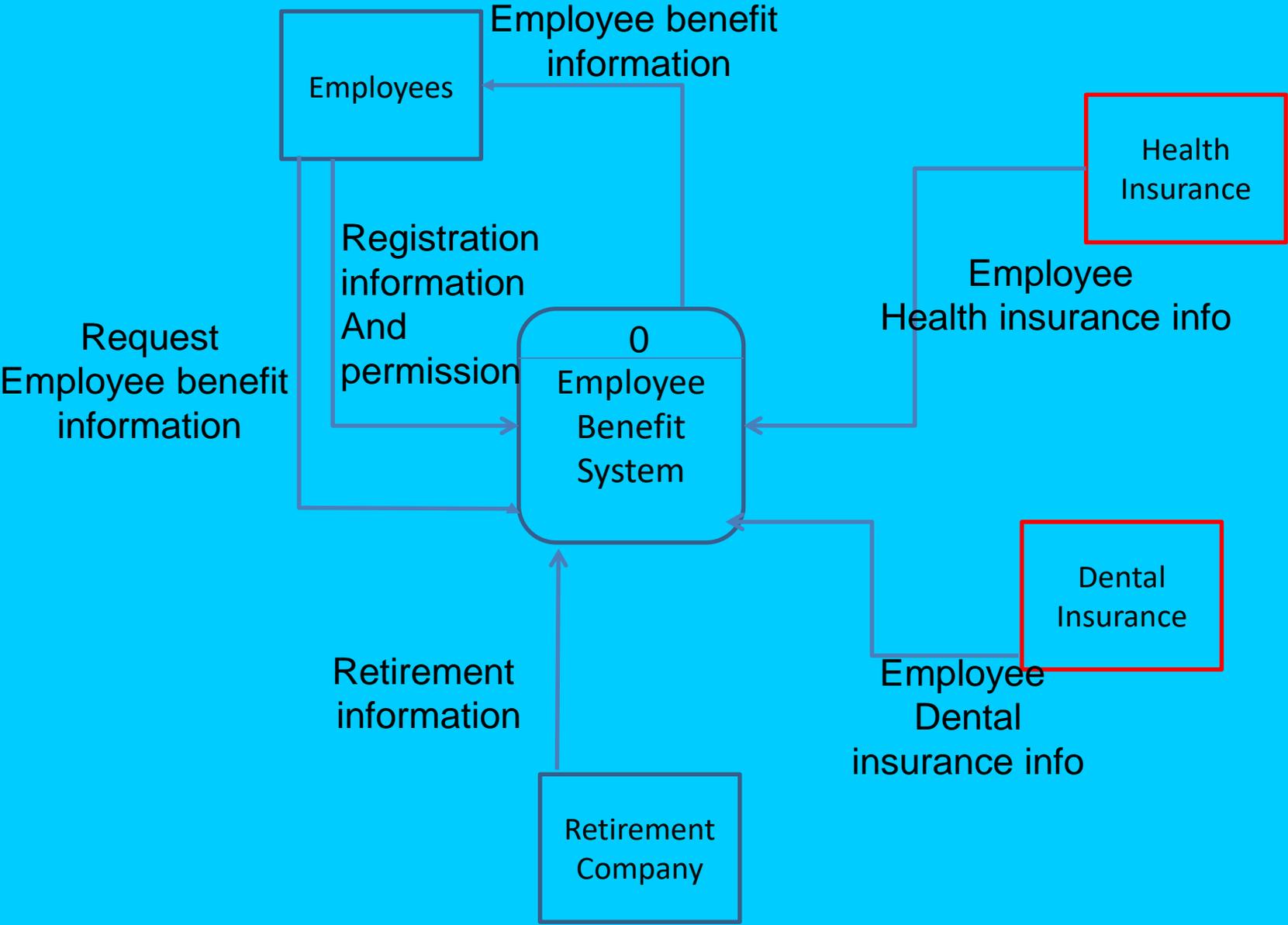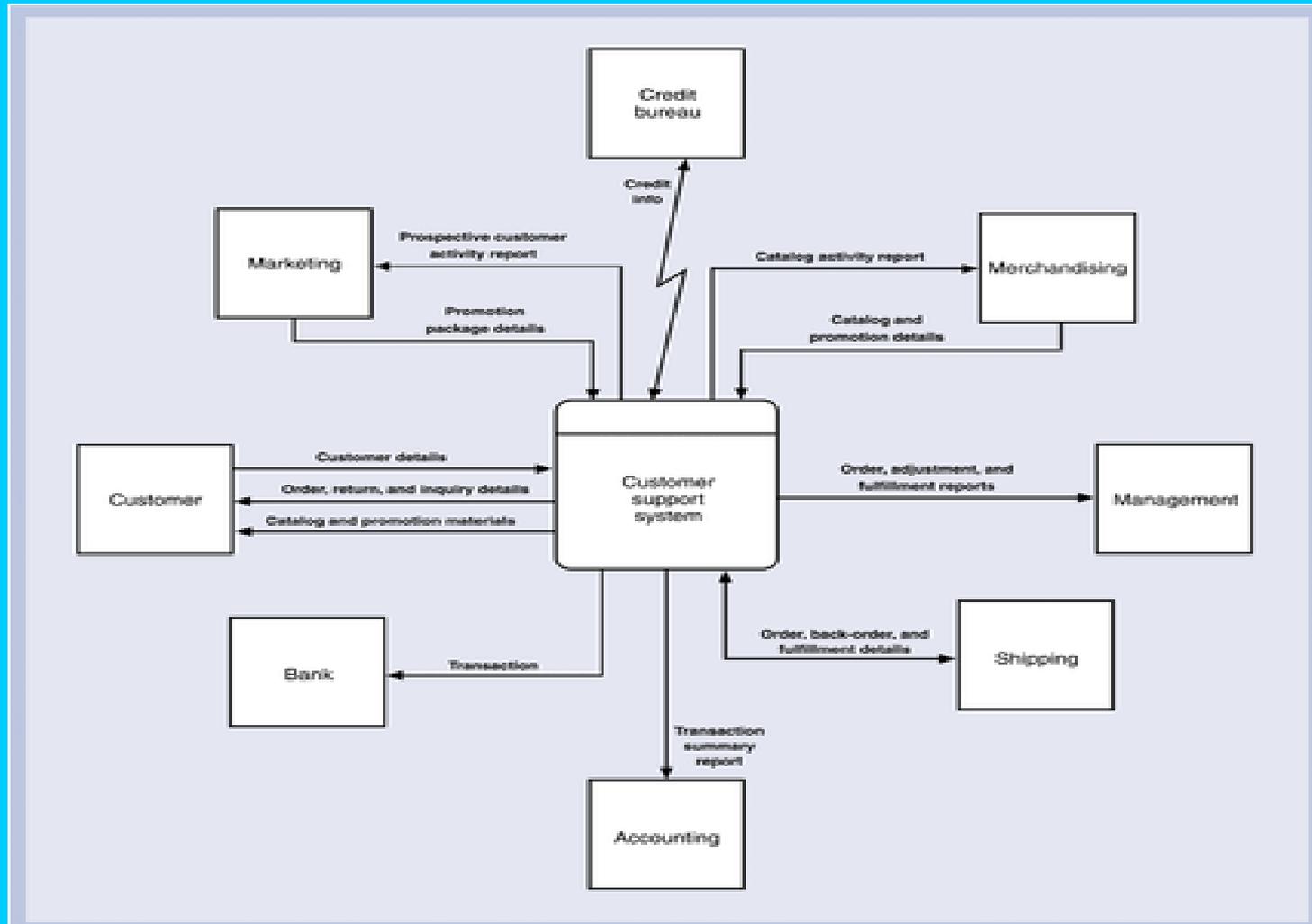
Add Permissions
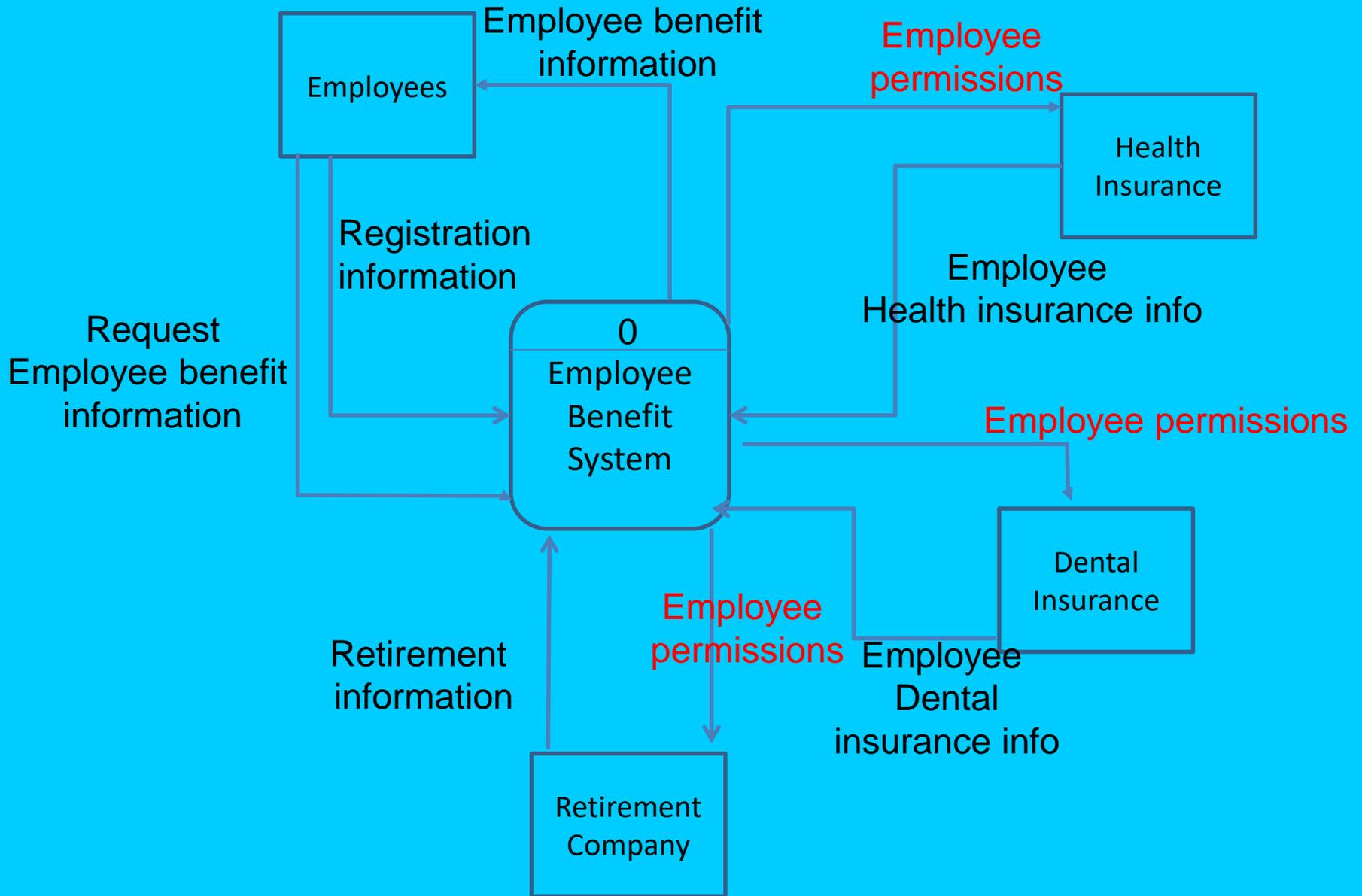
Add Requests

Rocky Mountains Outfitters (RMO): Case Study

- ✧ RMO is a sports clothing manufacturer and distributor.

- ✧ It is about to begin customer support system (CSS) project

Context Diagrams for RMO CSS

RMO Subsystems and Use Cases/Activities from Event Table

Order-entry subsystem

- Look up item availability
- Create new order
- Update order
- Produce order summary reports
- Produce transaction summary reports

Order fulfillment subsystem

- Look up order status
- Record order fulfillment
- Record back order
- Create order return
- Produce fulfillment summary report

Customer maintenance subsystem

- Provide catalog information
- Produce prospective customer activity reports
- Update customer account
- Distribute promotional package
- Create customer charge adjustment
- Produce customer adjustment reports

Catalog maintenance subsystem

- Update catalog
- Create special product promotion
- Create new catalog
- Produce catalog activity reports

Context Diagram for RMO Order-Entry Subsystem
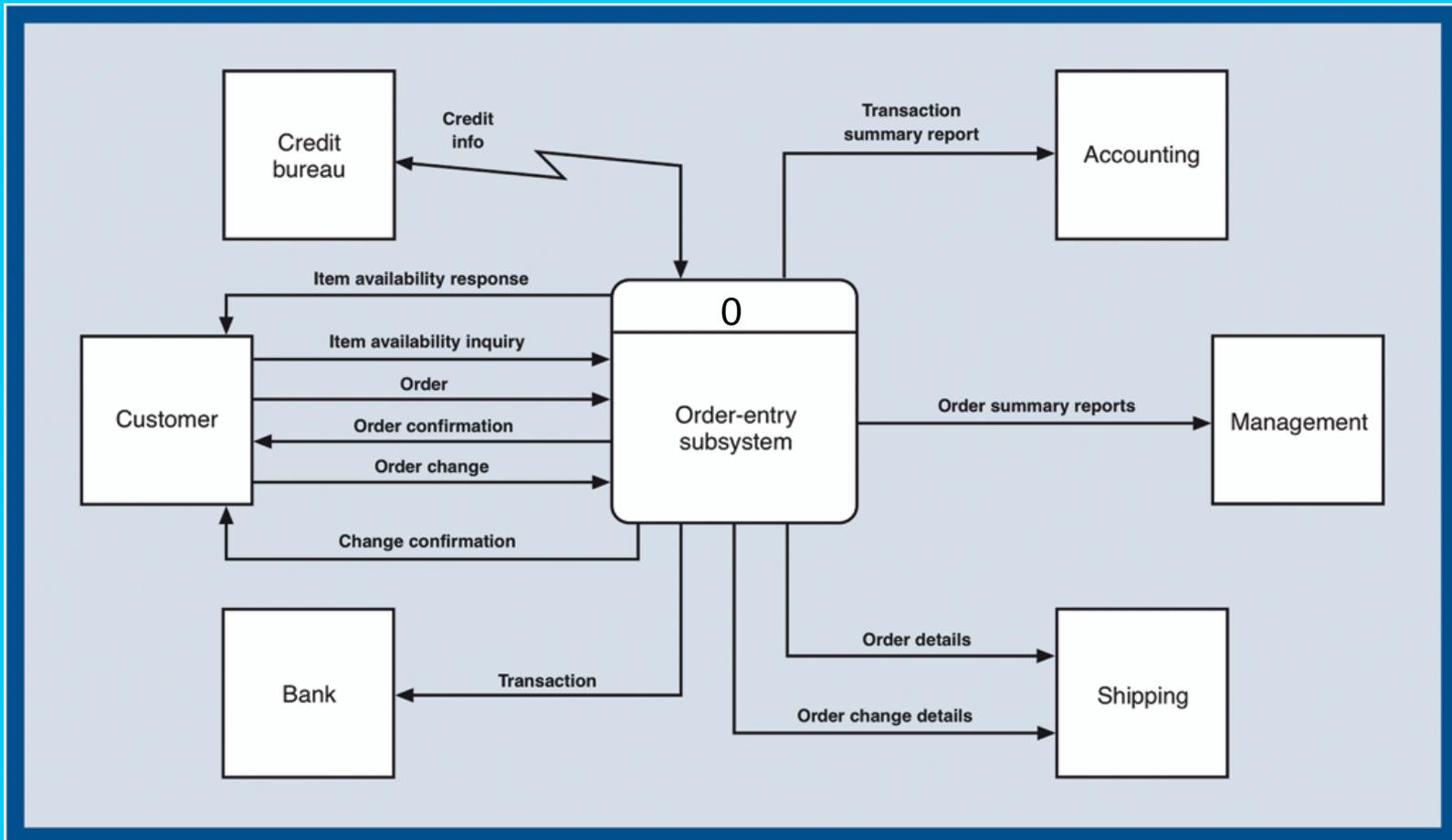
Process Descriptions

Process Descriptions

- Each process on a DFD must be formally defined
- There are several options for process definition including decomposition.
  - In a process of decomposition, a higher-level process is formally defined by a DFD that contains lover-level processes, which, in turn, may be further decomposed into even lower-level DFDs.

Layers of DFD Abstraction for *Course Registration* System

30
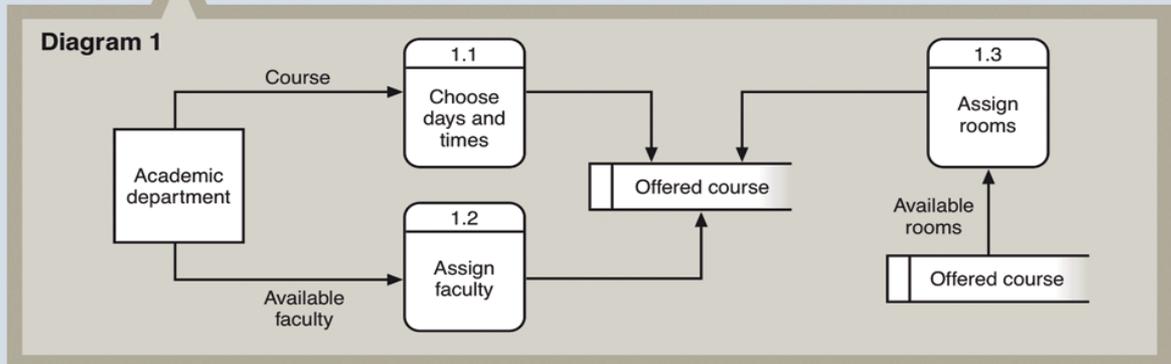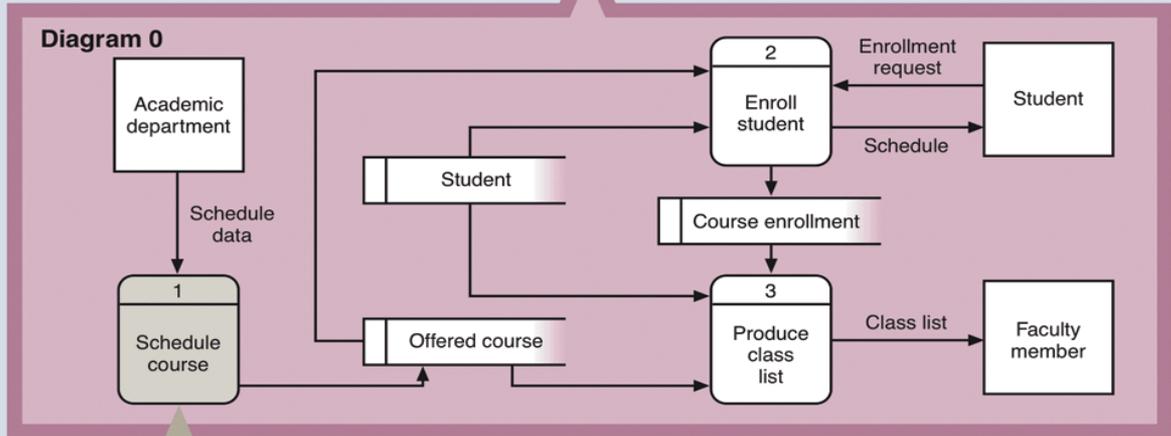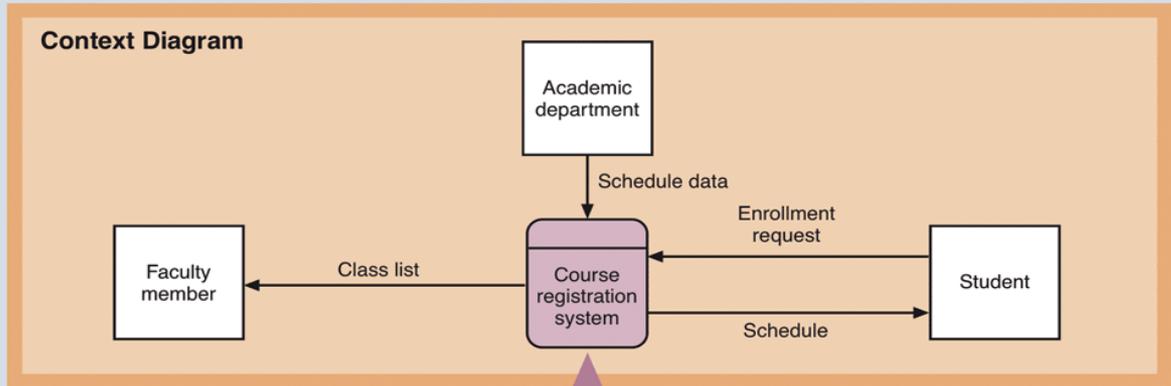
Process Descriptions

- Eventually a point will be reached when a process becomes so simple that it can adequately be described by another process description method, i.e. without next lower-level DFD.
- These description methods include:
  - Decision trees
  - Structured English
  - Decision tables
- These models describe the process as an algorithm.

Decision Tree for Calculating Shipping Charges

YTD purchases >$250	Number of items purchased (N)	Delivery day	Delivery charge ($)
Yes	<= 3	Next	25
		2nd	10
		7th	N x 1.50
	>= 4	Next	N x 6.00
		2nd	N x 2.50
		7th	Free
No	<= 3	Next	35
		2nd	15
		7th	10
	>= 4	Next	N x 7.50
		2nd	N x 3.50
		7th	N x 2.50
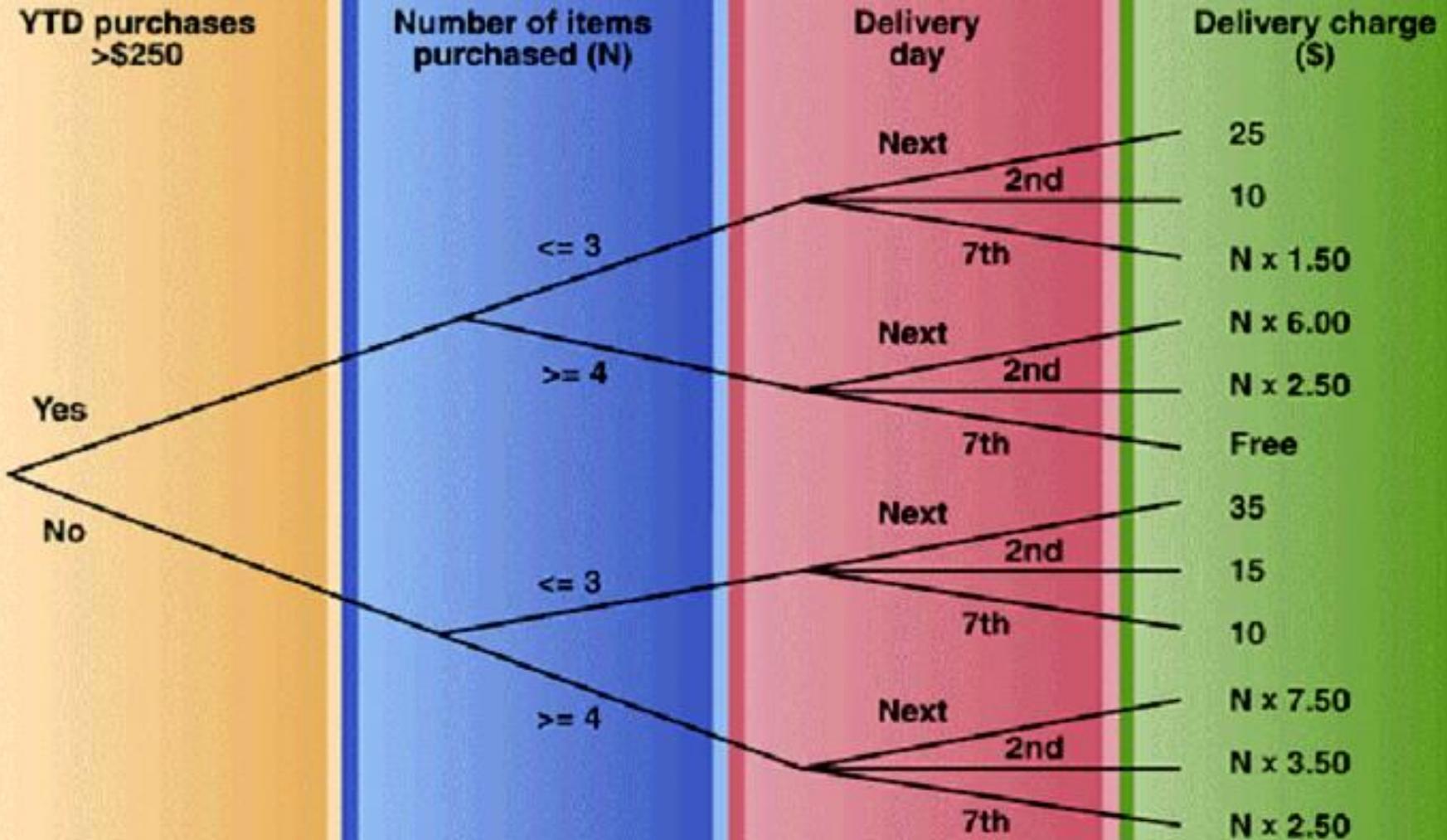
A structured English process description for calculating *shipping charges*

```
If YTD purchases > $250 then
    If number of items ordered < 4 then
        If delivery date is next day then
            delivery charge is $25
        Endif
        If delivery date is second day then
            delivery charge is $10
        Endif
        If delivery date is seventh day then
            delivery charge is $1.50 per item
        Endif
    Else
        If delivery date is next day then
            delivery charge is $6 per item
        Endif
        If delivery date is second day then
            delivery charge is $2.50 per item
        Endif
        If delivery date is seventh day then
            delivery charge is zero (free)
        Endif
    Endif
Else
    If number of items ordered < 4 then
        If delivery date is next day then
            delivery charge is $35
        Endif
        If delivery date is second day then
            delivery charge is $15
        Endif
        If delivery date is seventh day then
            delivery charge is $10
        Endif
    Else
        If delivery date is next day then
            delivery charge is $7.50 per item
        Endif
        If delivery date is second day then
            delivery charge is $3.50 per item
        Endif
        If delivery date is seventh day then
            delivery charge is $2.50 per item
        Endif
    Endif
Endif
```

Decision Table for Calculating Shipping Charges

YTD purchases > $250	YES						NO					
Number of Items (N)	N≤3			N≥4			N≤3			N≥4		
Delivery Day	Next	2nd	7th	Next	2nd	7th	Next	2nd	7th	Next	2nd	7th
Shipping Charge ($)	25	10	N*1.50	N*6.00	N*2.50	Free	35	15	10	N*7.50	N*3.50	N*2.50

A Decision Table with Multiple Action Rows

New customer	Yes		No	
Item back order ≥ 25 days	Yes	No	Yes	No
Include detailed return Instructions	✓	✓		
Expedite delivery	✓		✓	