

**ACCT-302  
PROJECT I  
SPRING 2008**



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Ulrich Djokovic (**UD**) runs a small company in south-east Delaware. His company, “Burn-IT,” burns songs on CDs and ships the CDs to a number of distributors<sup>1</sup> in the North-East and Mid-Atlantic. He currently does not really have enough information to run his business effectively: distributors keep asking him what has been shipped and where the shipments are, he does not really know how much money distributors owe him and how much he owes carriers, etc. In brief, he desperately needs help. He asks you, **acct302**, to help him. Your first task is to define an entity-relationship (E-R) model starting from your interview with UD below.

**ACCT302** – When you say that you need better information, what exactly do you mean?

**UD** – I would like to have an enterprise system that does two things for me: (1) monitor my CD’s from the time they are burned until they arrive at the distributor, and (2) manage accounts receivable and accounts payable.

**ACCT302** – Ok, let’s start! What do you ship to the different distribution centers? CDs?

**UD** – Good question! Actually, ... no. I put CDs in boxes, put the boxes on pallets, and then ship the pallets to the distribution centers.

**ACCT302** – So, you pack your CDs before you ship them. Let’s talk about these ‘packing events.’ How does it work and what information do you need to know about each of the ‘packing events.’

**UD** – I consider all CDs, boxes, and pallets as items and I record the following information for each item: a unique ID and a description. I further classify each item as being of category CD, box, or pallet. Obviously, most of our items are CDs. Less than 10% of our items are boxes and less than 3% of our items are pallets. I would also like to add other item categories in my database such as ‘container.’ I don’t have any items of category container yet.

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<sup>1</sup> We use the terms ‘distributor’ and ‘distribution center’ interchangeably.

There is also a whole bunch of information that I would like to record regarding the packing events themselves. **First**, a packing event takes one or more items and puts them into another item. For example, a packing event occurred this morning that took 20 CD's (items) and put them into a box (item). Each packing event takes one or more items (at least one). A packing event puts items into exactly one item (logistic unit). Not all items are packed. For example, we don't pack pallets. An item can be packed only once. A CD cannot be used as a logistic unit; i.e., a CD cannot contain other items. Logistic units such as boxes and pallets are packed at once; i.e., they participate in one 'packing event' only. We expect more than 85% of our items being packed. **Second**, we use an ID to uniquely identify each packing event. We also want to know the duration of each packing event and therefore record its start time and its end time. **Third**, we would like to know by whom (employee) a packing event is supervised. While we assign exactly one 'supervising' employee to each packing event, we don't always record that information. I would be happy if we could record a supervising employee for 90% of our packing events. Todd, one of our employees, supervised more than 100 packing events yesterday. Melissa, our accountant (and thus an employee) never gets involved with packing events. We need to record the social-security-number (ssn) and name of all our employees in the database.

**ACCT302** – Can a packing event link any two items? I am not really sure about this?

**UD** – Of course not! For example it would be impossible to take a CD (an item) and put it into another CD (an item). I am happy you are asking me this question. We have some rules regarding how items can be packed. Currently, the following rules apply: (1) a CD can be put into a box, and a box can be put on a pallet. No other combinations are currently allowed! Would it be possible to record such rules into the database and to use them for validation purposes?

**ACCT302** – I think we can do that. Let me rephrase the problem and see if you agree. Your rules determine how the different item categories can be associated. All we have to do is to identify the valid associations between item categories and put them into the database. The table that stores such information could possibly look as follows:



**CAN-BE-PUT-INTO**

<b>ItemCategory (part)</b>	<b>ItemCategory (whole)</b>
CD	Box
Box	Pallet

I would further suggest that we keep things flexible for now and that we assume that an item category can be put into more than one (other) item category and vice versa. For example, down the road, you might want to put boxes on pallets first or you might put them directly in a container. What do you think?

**UD** – Sounds good! Let's go for it.

**ACCT302** – Ok, the CDs are now packed. What do we do with the pallets?

**UD** – Well, we rely on carriers to deliver the pallets (and thus the CDs) to the different distributors. So, we first need to load the pallets on the trucks (loading event). We further want to monitor the actual transportation by the carriers to the distribution centers (transportation events). Remember, distributors want to know where the CDs are at any given time .... !!

**ACCT302** – Let's start with the loading events. How does loading work and what information would you like to know regarding loading events?

**UD** – Actually, we use very complex models to assign pallets to carriers in order to make sure that we get them to the different distribution centers as efficient and cost-effective as possible. However, for the database, we would like it to provide us information regarding the logistics of the loading events. In essence, a loading event puts a number of pallets (at least one) on a truck. A pallet can be loaded only once. Only pallets are loaded; so, we expect to record a loading event for less than 10% of our items. For all loading events, we want to know the carrier and the truck being used. There is exactly one carrier per loading event<sup>2</sup> and there is exactly one truck per loading event. Most trucks participate in hundreds of loading events. All trucks have a unique identification number. We ask all carriers to provide us with a list of all their truck IDs (and that information needs to be recorded into the database). There is exactly one carrier per truck. All carriers we work with have a large fleet of trucks; at least 25 trucks. Only carriers for which we know at least one truck are recorded in our database. A new carrier needs to submit this information (truck IDs) to us at least one week before we schedule a first loading event with that carrier. Obviously, we want to use that information for validation purposes. Pallets can only be loaded on authorized trucks! We also want to record the distribution centers for each of the loading events. Things get somewhat more complicated here. It is sometimes more cost-efficient to put pallets for more than one distribution center in the same truck. So, more than one distribution center can be associated with the same loading event. However, we also have to know which pallet goes to which distributor and this information needs to be recorded in the database. There is only one distributor per pallet. Many pallets are of course assigned to the same distributor. Finally, we would like to record all distribution centers in the North-East and Mid-Atlantic, even when they don't do business with us. We have 15 loading events scheduled this week for our biggest distributor; Rock-And-More (located in New Jersey).

**ACCT302** – You also want information regarding the actual transportations.

**UD** – We sure do. The transportation event occurs once the pallets are loaded. There is exactly one transportation event per loading event. There is exactly one loading event per transportation event. We also would like to record the following information for each of the transportation events: a unique ID, when the truck left (start time), and when the truck reached its (final) destination (end time).

**ACCT302** – It looks like we are pretty much done with the logistics model. You also told me that you would like to have better information regarding A/R (accounts receivable) and A/P (accounts payable). Let's start with collecting money from distributors (A/R).

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<sup>2</sup> You need to record this information even when it is derivable from other relationships.

**UD** – Well, we consider transfer of ownership at the time we put goods on a truck. So, loading events are kind of sale events. Since there are often multiple distributors per loading event, we record the total (\$) amount per loading event per distributor. We actually use a ‘balance forward’ system here. After goods are being loaded (sold), the distributor’s A/R amount is increased. A distributor’s A/R amount is decreased when we receive a payment. Information to be recorded regarding cash receipts (payments) includes the following: when we received the payment (date), the account we used to deposit the money we received, and which distributor we received the money from. We have received five payments from Rock-And-More this month. We record exactly one distributor for each cash receipt. We record exactly one account for each cash receipt. We put all payments from distributors into the same account. We created a new account yesterday but did not deposit any money in it yet.

**ACCT302** – Could you explain to me what you mean by a ‘balance forward’ system?

**UD** – Sure, ‘balance forward systems’ keep track of the balance customers (distributors) owe us. However, we don’t apply payments to invoices. Systems that apply payments to invoices are called ‘open-invoice systems.’

**ACCT302** – Tell me more about your payments to carriers (A/P).

**UD** – Well here we would like to have an open-invoice system. We pay carriers for the transportation services they provide us. We pay each of the carriers at the end of the month for all transportation services they have provided during that month. We send them a (one) check at the end of the month. More than 95% of the transportation events have been paid. Not all cash disbursements (payments) are for transportation services. We further record which account we use for each of the cash disbursements. There is exactly one account for each cash disbursement. We currently use one account for all our payments (cash disbursements). We also record to whom (carrier) we pay. There is exactly one carrier for each cash disbursement. Obviously, we need to record many payments for most of our carriers.

## **ASSIGNMENT**

1. Prepare an **Entity-Relationship** diagram.
2. Prepare a **Relational Database Design**.

Note: This project does NOT have an Access component; i.e. you don’t have to implement the relational database structure in Access!

## LIST OF ATTRIBUTES

PackingEvent-start-time  
Employee-ssn  
Distributor-code  
Transportation-start-time  
Carrier-name  
Distributor-a/r (accounts receivable)  
Transportation-id  
Item-id  
LoadingEvent-id  
LoadingEvent -start-time  
LoadingEvent-Distributor-amount  
CashReceipt-date  
ItemCategory-code  
Cash-balance  
Cash-accountnumber  
PackingEvent-id

Item-description  
LoadingEvent -end-time  
Truck-id  
Carrier-code  
CashReceipt-number  
Cash-description  
CashReceipt-amount  
ItemCategory-description  
CashDisbursement-number  
PackingEvent-end-time  
Distributor-name  
CashDisbursement-amount  
CashDisbursement-date  
Transportation-end-time  
Truck-capacity  
Employee-name