**Introducing the Callaghan Brothers’ Circus**

The Callaghan Brothers’ Circus is a small traveling circus that performs throughout the Pacific Northwest from Memorial Day through Labor Day. Callaghan Brothers’ is not a tent circus—it doesn’t own or transport its own tents—but gives shows in structures provided by the locations at which it performs. The Multnomah County Fair in Oregon, for example, provides tents for the circus. Callaghan Brothers’ has, however, performed in venues as diverse as airplane hangers and school gyms.

Callaghan Brothers’ Circus presents a 90-minute show in a single ring. The permanent acts include a family of acrobats, a high-wire act, jugglers, animal acts (horses and big cats), as well as clown that perform throughout the show. Although all the performers are professionals, they cannot make enough to support themselves throughout an entire year during the short, three-month season; therefore, most performers have winter jobs to supplement their circus earnings.

A midway made up of amusement rides and games of chance is also available before, during, and after the show. Some venues, such as county and state fairs, have their own midway attractions; Callaghan Brothers’ cannot run their midway during those engagements.

The circus transports its props, costumes, and animals in trucks that it own outright. The majority of the performers and midway staff own motorhomes, although a few prefer to stay in motels. At one point, the owners of the circus decided to hire personnel to load, unload, and drive the trucks. The performers and midway staff, however, agreed to handle those jobs themselves so that they could receive higher salaries.

Matthew and Gregory Callaghan had managed their circus for nearly 40 years when both brothers died in the same week in early May. Their heirs—nephews Ed, Sam, and Harry—were initially amused by the idea of inheriting a circus. The three bothers had spent occasional summers with the circus as teenagers but once they reached college age had little contact with their uncles or the circus.

Summers with the circus had been hard work, although it was the kind of work that seemed more like fun than labor. The nephews had traveled with the circus, occasionally driving the trucks. At each stop, they helped to settle the animals in their quarters and to unload sets and props. They also sold tickets for both the midway and the main show.

Because they enjoyed their summers so much, the Callaghans thought that running the circus would be an ideal job. When they learned of their inheritance, Ed and Harry took 90 days of unpaid leave from their respective jobs. Sam, a high-school teacher, decided to devote his summer break to the circus; he planned to wait until the end of the summer before deciding whether to continue teaching. The brothers were looking forward to a summer like those they had had as teenagers.

Running the circus, however, was very different from working at the circus during the summer. Within three weeks, the Callaghans realized that managing the circus was a complex and difficult a job as any of them had ever had; among other things, it required a great deal of data management.

For example, the brothers had to keep track of the circus’s bookings. Although the season started on Memorial Day, the season was not fully book at that time. Requests for bookings continued to come in during the first few weeks of the season. Because Matthew and Gregory had kept most of the booking data in their heads (many bookings were the same from one year to another), assembling a calendar presented a real challenge. Fortunately, the ringmaster, who had been with the show for more than 25 years, knew the standard bookings by heart. He also knew where to find the slips of paper on which the uncles had scribbled new bookings. Although the system of memorizing bookings or writing them on small pieces of paper had worked for the uncles, it wouldn’t work for their heirs.

The first thing Sam, Ed, and Harry did was to hire an accountant. Their uncles had kept their books and the circus’s finances were disorganized. The accountant was able to relieve the brothers of the nastiest of their problems: managing the money. The accountant even took care of the payroll.

Harry had a good grasp of database management and felt that he could handle the rest of the record keeping. He was knowledgeable enough to recognize that while it would be easy to use a computer to keep track of bookings once they were made, getting the computer to decide whether a booking would fit into the circus’s schedule was beyond his capabilities. (He knew from experience at his regular job that scheduling algorithms are very complex because so many factors to into deciding when a new activity can be scheduled.) As a result, Harry planned to design the bookings portion of the database to report which bookings had already been made; the brothers would decide whether it was possible to schedule a new booking.

In addition to storing booking data, the Callaghans also wanted to be able to evaluate each venue. Although the younger Callaghans realized that the circus didn’t accept booking just because of their profitability, they wanted to be able to at least have some information about how a given venue contributed to the circus’s overall performance. Therefore, Harry decided to include data about the number of people that attended each main show and the revenues from the midway attractions. These data, combined with data from the accountant, would enable the brothers to evaluate the profitability of the venues.

The Callaghans also wanted to keep track of their performers. Although over three-quarters of the acts appear with the circus year after year, the remainder change frequently. In fact, even if two or three shows are given on the same day, each show typically does not include exactly the same acts.

Matthew and Gregory had been in the circus business so long that they knew most of the performers personally and never made notes about which acts were currently performing, which acts actually appear in a given show, or which acts were available to fill vacancies in the program. Unfortunately, Harry, Ed, and Sam had no such experience. They planned to rely on Harry’s database system to keep track of which acts appear in which shows, which acts are currently traveling with the circus, and which acts are available to fill vacancies.

The simple entities in Harry’s database are:

* **Venue**: a place where a show can be held.
* **Booking**: an appointment to perform one or more shows at a specific venue.
* **Show**: a 90-minute performance on one day at one time. (A show is made up of many acts.)
* **Act**: a group of people that perform during one or more shows.
* **Performer**: a person in an act. (A performer can be in only one act.)
* **Attraction**: a booth or ride in the midway.

The attributes that describe these entities are:

* **venue\_numb**: a unique, arbitrary identifier for each venue
* **venue\_name**: the place where the circus has, will, or might perform (the name of a venue).
* **venue\_city**: the city where a venue can be found.
* **venue\_state**: the state where a venue can be found.
* **venue\_contact\_person\_first**: the first name of the person to contact to make a booking at a venue.
* **venue\_contact\_person\_last**: the last name of the person to contact to make a booking at a venue.
* **venue\_contact\_phone**: the telephone number to call to make a booking at a venue.
* **main\_show**: a description of the facility in which a main show can be hold at a given venue. Includes square footage of the facility as well as the number of seats.
* **allows\_midway**: a Boolean indicating whether a venue allows a midway
* **midway**: a description of the facilities for setting up the midway at a given venue. Includes square footage the venue will make available.
* **storage**: a description of facilities for the storage of props and costumes at a venue.
* **parking**: a description of facilities for parking at unloading trucks at a venue.
* **camping**: a description of facilities available for motorhomes either at or near a venue.
* **animals**: a description of facilities for housing animals at a venue.
* **people**: a description of housing for people that is provided at or near a venue.
* **booking\_numb** an arbitrary, unique number assigned to each booking.
* **start\_date**: the date when a booking begins or began.
* **end\_date**: the date when a booking ends or ended.
* **fee**: if a positive value, the amount paid by the venue to the circus; if negative, the amount paid by the circus to the venue.
* **show\_numb**: an arbitrary, unique number assigned to each show.
* **show\_date**: a date on which the circus is performing. (A booking is for a range of dates;
* **show\_date** refers to one date within a booking.)
* **show\_time**: the time at which a show starts.
* **full**: the number of paid admissions to a show at full price.
* **reduced**: the number of paid admissions to a show at reduced price (students and senior citizens).
* **attraction\_name**: the name of an attraction (a booth or ride) on the midway.
* **attraction\_description**: description of a midway attraction.
* **amount\_collected**: the amount of money taken in by a midway attraction on a given day. (*Major hint*: Income is collected once a day from each attraction. You need to keep track of *daily* income collections.)
* **collection\_date**: A date on which income was collected from a midway attraction.
* **act\_numb**: An arbitrary number identifying an act that is performing with the circus or that might perform with the circus.
* **act\_name**: the name of an act that is performing with the circus or might perform with the circus.
* **act\_description**: a description of an act.
* **status**: the current status of the act (for example, “currently performing” or “available to perform”).
* **act\_contact\_person\_first**: the first name of the individual to be contacted about booking the act.
* **act\_contact\_person\_last**: the last name of the individual to be contacted about booking the act.
* **act\_contact\_phone**: the phone number where the contact person can be reached.
* **performer\_number:** a unique identifier for a person who performs in an act.
* **performer\_first\_name**: the first name of a person who performs in an act.
* **performer\_last\_name**: the last name of a person who performs in an act.
* **date\_started**: the date an act first performed with the circus.
* **performer\_winter\_phone**: a person’s winter phone.

Hints for creating a good ER diagram:

* There is a many-to-many relationship between a show and an act. You will need to introduce a composite entity to handle that relationship.
* Midway attractions are unrelated to shows. They are related either to the booking or the venue, depending on how you view the “rules” of the environment. Don’t forget that you will be collecting income from many midway atractions on many days. The value for income is therefore multivalued. You will need to introduce another entity to handle it.