


Comp 3700 Homework #1  
Maximum points: 100  
(Individual Assignment)

**Assignment Goals:**

1. Familiarize with UML tools. (E.g. draw.io)
2. Understand Class / State / Interaction Modeling concepts.
3. Convert written descriptions into UML model and vice versa.

**Instructions:**

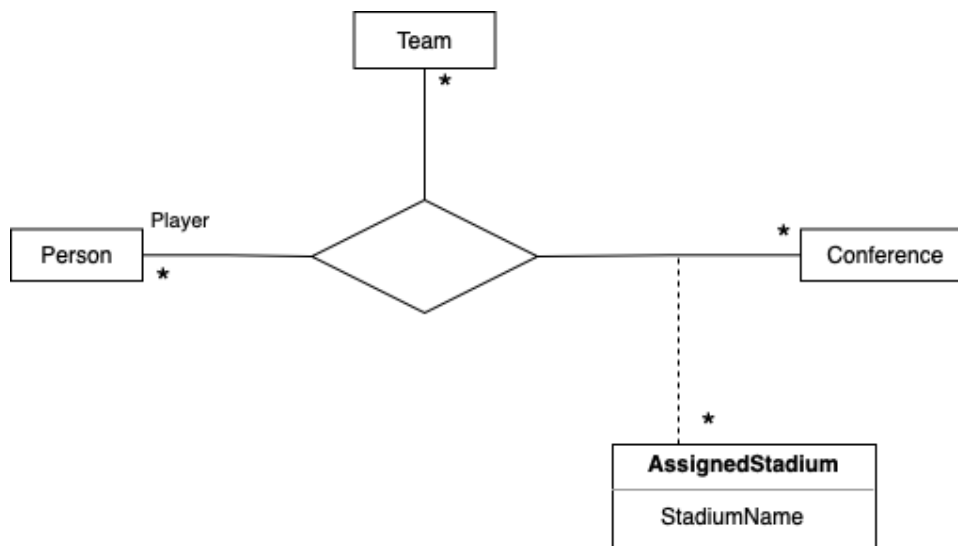
- \* Work on the homework on your own and don't share your answers with any students.
- \* Use any UML tool of your choice. **No handwritten (even with tablets) or scanned drawings, or those taken by camera! are allowed.** Make sure the drawings are readable; for example, use proper picture/font sizes. Use the export function to convert to images.
- \* **Submit a single pdf file (.pdf)** to Canvas before the due date. This should be the only file you should submit to Canvas.
- \*  **No homework will be accepted after the due date**, so make sure to start as early as you can.

### Question #1 (4\* 2.5 = 10 Points):

Draw a Class Model corresponding to each of the descriptions below. You don't need to include attributes and methods. However, you must include all the required details such as relationships, associations, multiplicity, end names, etc.:

1. An employee is either a full-time employee, a part-time employee, or an intern employee (Student employee).
2. A University consists of Colleges, which in turn consist of Departments.
3. A Seminar is given by at least two speakers and managed by a coordinator.
4. A driver may own cars that can be driven by authorized drivers.

### Question #2 (6+7+3+4=20 Points):



Referring to the model above, provide the following:

- A. Briefly describe the system modeled by the previous class diagram.
- B. Modify the previous diagram to promote the N-ary association into a class.
- C. Why would we want to promote the N-ary association into a class?
- D. Did this promotion make a difference in the meaning of the model? Briefly justify your answer.

### Question #3 (15 Points):

Draw a **Class Model** corresponding to the description below:

A customer may place any number of orders. Each order is received on a specific date, may be prepaid when order is received. Each order is identified by a number, and the price/value of order. Each order may include any number of items. For each item, the number / quantity ordered as well as its price is provided. A given product may comprise one or more items. Each customer is identified by name and address, and based on those values, we should be able to retrieve the CreditRating of customer. Customer may be a personal customer, who is allowed to pay by CreditCard by providing the CreditCardNumber. Customer may be a corporate customer, who will be assigned a SalesRep, an employee of company. For each corporate customer, their contact details are saved in company database along with their CreditRating and CreditLimit allowed.

### Question #4 (15 Points):

Draw a **State Diagram** for the states that a cell phone status can be in, using the description provided below.

A customer goes to a cell phone store to purchase a cell phone. The salesman creates a cell phone application for the customer, including the cell phone identifier and the customer application information. The cell phone status is set to pending credit check and the phone remains inactive until the salesman has established the credit rating of the potential customer. If their credit rating is satisfactory, the salesman submits an activation request to the switching department, and the status of the cell phone is set to pending activation. If the credit rating is unsatisfactory, the cell phone purchase is cancelled, and the status is adjusted accordingly. The switching department then activates the cell phone that is pending activation by adding it to the list of valid cell phones on the cell phone system, assigning it a status of active. Now, the cell phone is active. When the customer makes their first phone call following activation, the cell phone status is set to in service and the start date of service is established. If the customer tries to use the cell phone, and the cell phone is not active or in service, the call is refused. The customer can cancel their cell phone account at any time and the cell phone status is set to cancelled.

### Question #5 (10Points):

Draw an **activity diagram** for processing an order, which involves several tasks as follows.

Once an order is received, the customer is sent an invoice, as well as associates work on the refill order. Once the order is ready, if a rush order is requested, the order is sent by overnight delivery, otherwise, it is sent by regular delivery. Customer receives invoice and eventually makes a payment. So, once the payment is received, processing for order is considered complete, and order will be closed.

**Question #6 (10+10+10 = 30 Points) (Three parts #a-c):**

Consider the following required functionality of a print-on-demand service:

The print-on-demand service provides customers the possibility to print posters, flyers, or books on demand. The customer should be able to select a type of product (poster, flyer, or book), a desired quantity, and a paper type. In case a book has to be printed, additionally the customer can choose between hard cover and soft cover. Finally, the customer needs to provide a PDF file containing the desired content.

In order for the customer to be able to place an order, he or she must have an account. The customer can create an account by choosing a username/password combination. Furthermore, his or her address and credit card number can be linked to the account, which is required information when placing an order. Once a customer has provided the information for an order, the system checks if all required information is there, either given in the order (type of product, quantity, etc.), or in the account (address and payment information). If any information is lacking, the system will inform the customer that it needs to be added before the order can be placed. Once all information is in place, the order is placed, and the credit card information is sent to the bank for approval. If the bank approves the card, the order is finalized.

A printing agent is in charge of actually performing the printing. He or she inspects the provided PDF files of finalized orders. If a file does not meet the quality requirements, the customer will be informed about this, and the order is temporarily put on hold until the customer has provided a new PDF file.

Finally, the administrator monitors if at all times, sufficient paper and ink stock is present. Whenever the amount of paper or ink is running low, an order must be placed at the appropriate supplier (either the paper or ink supplier).

**#6a (10 points):** Create a Use Case Diagram for the print-on-demand service. Identify all use cases, actors, and link them, as appropriate. Identify any relationships among use cases.

**#6b (10 points):** Give a detailed description of a scenario of the use case for “place an order”. Use the following card as a template.

**Use case:** Place an Order

**Pre:** User has account

**Trigger:**

**Guarantee:**

**Main:**

**Alternatives:**

**#6c (10 points):** Based on the scenario description of use case for “place an order”, create a Sequence Diagram. **Complete the diagram bellow.**

