[[to view this document in its own window click here]](https://docs.google.com/document/d/1vFILEHOZbenYolALqlt4fzBZT8an5-AIm85KUVh48pg/edit?usp=sharing)

# **TERM PROJECT PART I: High-Level Design: Entity Relationship Diagramming**

## Overview

Read and review the scenario and supporting documents available at <https://docs.google.com/document/d/1RN3vD9VEWdxaK2aOcadUlhzqwouAj-qp_HWOX13vSco/edit?usp=sharing>. You goal here will be to develop an ERD and supporting documents to meet the requirements specified there.

## Requirements

* Develop a list of entities involved in your design and for each entity all of the attributes associated with it. Maintain a consistent, descriptive naming convention for all entities and attributes.
* Prepare a computer-generated Entity-Relationship Diagram. Be sure to use the diagramming convention covered in this competency.
  + You may use Visio, Lucid Chart, or any other drawing program that you wish to create your diagram
  + Make sure that your diagram is clear, neat and consistent with the modeling conventions used in this class
  + Represent both the cardinality and participation constraints of every relationship.
  + Indicate primary key attributes for all entities.
  + Indicate relationship attributes where appropriate.
  + DO NOT model any attributes other than primary keys and relationship attributes in your diagram

## Assessment

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Emerging | Developing | Proficient | Exemplary |
| ERD Syntax | Diagram is only marginally recognizable or unrecognizable as an ERD | Diagram uses a convention other that used in the class, fails to depict cardinality and/or participation entirely or is otherwise deeply flawed syntactically | Diagram has only minor departures from the required ERD grammar and syntax (e.g., some constraint specifications are omitted) | Diagram adheres completely to the appropriate ERD syntax and grammar |
| ERD Semantics & Consistency with Problem Specification and Scenario Requirements | Errors and/or omissions in the ERD semantics are widespread, profound, and reveal a significant lack of skill with requirements analysis, the use of ER modeling, or both. The resulting diagram is sufficiently flawed that if it were relied on, the resultant database would be unusable | Errors and/or omissions in the semantic representation are sufficient to render the resulting database significantly flawed and the ERD, if relied on, would render a database that would fail to meet requirements in significant ways and to a significant extent | While some minor errors in capturing the project's semantics are present, they are infrequent and minor enough that they do not threaten the utility of a database built from their specification | Errors and/or omissions in the semantic representation are minimal or absent entirely. The ERD represents the specified requirements with high fidelity and is consistent or nearly consistent with basic professional practice |
| ERD Presentation | The diagram presentation is sufficiently poor as to render it on the whole incomprehensible | The diagram presentation is sufficiently flawed that it compromises the diagram's comprehensibility significantly. | The diagram presentation, while not perfect, lacks any flaw that would significantly detract from its comprehensibility | The diagram presentation is neat, clear, and ideal or nearly so. |
| Entity and Attribute List | Attribute list is missing outright or catastrophically incomplete | Attribute list is significantly incomplete or otherwise flawed and/or naming convention is haphazard | Minor flaws or omissions in attribute list and/or minor flaws or inconsistencies in naming convention | Attribute list is exhaustive and accurate; Naming convention is sound and consistently applied. |

## Part II - Low-Level Design: Translating your ERD into a relational schema

* Now map your ERD to a set of relational schema using the **mapped** translation method.
* Indicate a name for each table and in parenthesis all of its corresponding attributes, denoting each primary key by underlying it and each foreign key with an asterisk.
* State any clarifying assumptions you make in creating your ERD. As long as such assumptions are reasonable and don’t contradict what is explicitly stated in the problem, they are fine to make
* Create a data dictionary for the resultant design that details on a table-by-table basis each attribute’s name, its data type (and size if relevant), constraints (if any), a description of what is being stored (including units if relevant and allowable enumerated values if relevant) and default values (if any).
* **Part III - SQL Implementation**

## 

## The Scenario

Your team of database professionals has been retained by the Boyce-Codd Contemporary Art Gallery to design and develop a database to enable them to track information about their operation.

### Background and System Requirements

*Note: In real life, the information that follows would be generated from meetings and interviews with the users of the present system and the proponents of the proposed system to determine the nature of the work that the system supports as well as the stakeholders’ data needs and preferences. In this exercise, you will assume that these meetings have already taken place and that the information that follows has been developed from them:*

### General Description

BCCAG accepts original artworks by living contemporary artists to be sold on a commission basis. It currently offers work from about 100 artists, and sells approximately 1000 pieces each year. The average selling price is several thousand dollars. There are about 5000 customers who have purchased pieces from the gallery. The sales staff consists of the gallery owner, Ray Boyce, and 4 sales associates. Their activities are supported by an office staff of 2 people.

### Standard Operations at BCCAG

When an artist wishes to sell works, he or she contacts the gallery. Ray Boyce, the owner, visits the artist's studio and selects the works to be sold through the gallery. If the artist is well known to the gallery, this visit may be eliminated, and the works may be accepted automatically. An artist may submit one or several pieces for sale at a time. The artist, working with Ray, identifies an asking price for each work. The sales staff try to sell the work at that price, or as close to that price as possible. Customers may negotiate with salespeople, so that the actual selling price may be below the asking price. If it is below the asking price, the final selling price must be approved by the artist. The commission charged by the gallery is 10% of the selling price. The gallery splits the commission with the salesperson who makes the sale. Any salesperson can sell any work in the gallery. However, customers work with a single salesperson when they buy each piece, so that the salesperson's portion of the commission for a single piece goes to only one salesperson.

The gallery promotes the works by holding showings featuring various pieces. The showings are advertised in newspapers and other media, and potential customers are sent personal invitations. A showing is actually a reception that provides an opportunity for the public to see the pieces and to meet the artist or artists whose works are featured. A “one-person show” features works by a single artist, while a themed show features works by multiple artists centered on a single theme, such as “Mediterranean Seascapes”. Works of art that have been featured at a showing remain on display until they are sold or returned to the artists. A piece may be purchased at the showing or at any time afterward. Occasionally, a work may be purchased from the gallery prior to the show and included in the exhibit, marked as "Sold", to provide the public with a better view of the artist's work. Not all works are promoted through showings. Some are simply displayed in the gallery. If a work has been at the gallery for six months without being sold, Ray contacts the artist and returns the work, unless both agree to continue displaying the work for an additional period of time.

At present, all data relating to artists, unsold works, shows, sales, and customers is kept in paper files. A description card is made up for each work currently on exhibit, and placed on the wall or floor stand next to the piece. A copy of the card is also placed in a file. The card lists the artist’s name, title of the work, year created, type, medium, style, size, and asking price. Each work is an original, one-of-a-kind, piece produced by a single artist. No two artists have the same name. The title of the work must be unique to the artist, but may not be totally unique to the gallery. For example, many artists may have works such as "Composition Number 2", but no artist has two works with that title. No prints or reproductions are sold at the gallery. An artist can produce several works in the same year. The type refers to the type of work, which may be painting, sculpture, collage, and so forth. The medium refers to the materials used in the work, such as oil, watercolor, acrylic, marble, mixed, etc. A piece using more than one medium is categorized as mixed. The style means the style of the work, which may be contemporary, impressionist, folk, etc. The size is expressed in units appropriate for the work; for example, for a painting, the size would be the number of inches in width and height, while a sculpture would have three dimensions.

When a purchase is made, a receipt is made out for the buyer, a payment check and stub are made out for the artist, the commission is allocated between the gallery and the salesperson, and all paper files are updated individually.

### Information Needs

In addition to the data about artists, artworks, shows, sales, and customers currently kept in paper files, there are other information needs. For income tax purposes, the gallery is required to report the amount of sales for each artist each year, a task that is very time-consuming at present. Ray realizes that a database could provide more information than is available now from the paper files. He also wants to capture data not currently stored. He would like to keep track of customers who have made purchases and information about the amount of their purchases last year and so far this year. He would like to be able to send mailings to potential customers, and to record their preferences. In addition, he foresees that the gallery may begin to accept works owned by collectors as well as works directly from artists. The database design should include the possibility that the owner is not the artist.

The paper forms that are currently used to collect and input information follow:

**1. Artist Information Form**. When Ray interviews an artist, he collects contact information and data about the artist’s usual works in the form shown below. To allow for the possibility that in future Ray’s associates may do the interviews, the interviewer’s name is listed.

Date of Interview \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name of Interviewer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Artist Last Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Artist First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Street \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

City\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ State \_\_ Zip \_\_\_\_\_

Telephone: Area Code \_\_\_ Number \_\_\_\_\_\_\_\_

Social Security Number \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
(Required for Tax Purposes)

Usual Type \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Usual Medium \_\_\_\_\_\_\_\_\_\_\_

Usual Style \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**2. Collector Information Form**. When the gallery begins to offer works owned by people other than the artist, these collectors will also be interviewed. They may own one or many artworks, and their collections may or may not have works that are predominately by a single artist or of a single type, style, or medium. The form shown below will be filled out by the interviewer.

Date of Interview \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name of Interviewer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Collector Last Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Street \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

City\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ State \_\_ Zip \_\_\_\_\_

Telephone: Area Code \_\_\_ Number \_\_\_\_\_\_\_\_

Social Security Number \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If the collection is predominantly by one artist, or has a distinguishing type, medium, or style, fill in this section.

Artist Last Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Artist First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Collection Type \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Collection Medium \_\_\_\_\_\_\_\_\_\_\_

Collection Style \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**3. Artwork Information Form**. For each artwork to be considered, the interviewer fills in the basic information needed for the description card, as shown below. If the piece is chosen to be offered for sale by the gallery, the date listed and the asking price are filled in.

Artist Last Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Artist First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Title \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Year Completed \_\_\_\_\_\_\_\_

Type \_\_\_\_\_\_\_\_\_\_

Medium \_\_\_\_\_\_\_\_\_\_

Style \_\_\_\_\_\_\_\_\_\_\_

Size \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

If owned by someone other than the artist, please complete this section with the owner information:

Owner Last Name \_\_\_\_\_\_\_\_\_\_\_\_ Owner First Name \_\_\_\_\_\_\_\_\_\_

Street \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

City \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ State \_\_ Zip\_\_\_\_\_

Telephone: Area code \_\_\_ Number \_\_\_\_\_\_\_\_\_

Owner Social Security Number \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  
 (Required for Tax Purposes)

If the piece is chosen to be offered by the gallery, please complete this section.

Date Listed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Asking Price \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**4. Sale Invoice** When a work is sold, the sales associate fills out the form shown below. Currently, a copy is given to the buyer, and the original is placed in the files. The unique invoice number is pre-printed on the form. When the database is created, the invoice will be produced by the system.

Invoice Number 99999

Title of Artwork \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Artist: Last Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Owner: Last Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_ First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Street \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

City \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ State \_\_ Zip\_\_\_\_\_

Telephone: Area code \_\_\_ Number \_\_\_\_\_\_\_\_\_

Buyer: Last Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Street \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

City\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ State \_\_ Zip \_\_\_\_\_

Telephone: Area Code \_\_\_ Number \_\_\_\_\_\_\_\_

Price \_\_\_\_\_\_\_\_\_\_\_\_\_\_Tax \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Total Paid \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Salesperson Signature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date \_\_\_\_\_\_\_\_\_\_\_\_

**5. Mailing List Form** The form shown here is left in various locations for potential customers to sign up for a mailing list.

Date \_\_\_\_\_\_\_\_\_\_\_\_

Last Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ First Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Street \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

City\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ State \_\_ Zip \_\_\_\_\_

Telephone: Area Code \_\_\_ Number \_\_\_\_\_\_\_\_

Please indicate preferences (if any) below:

Preferred Artist \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Preferred Style (e.g. contemporary, impressionist, folk) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Preferred Type (e.g. painting, sculpture, collage) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Preferred Medium (e.g oil, watercolor,, mixed media, sculpture) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Standard reports that the new system will need to generate include the following:

1. **Active Artists Summary Report:** Lists summary data about all active artists, including the total amount of each one’s sales for last year and this year.
2. **Individual Artist Sales Report**: For a period starting with whatever date is selected (e.g. January first of the current year) and ending with another selected date (e.g. today's date), this report lists all the works of a given artist that the gallery has received from the listing date specified to the date of the report. The status of the work can be sold, returned, or for sale. If the work was sold, the date sold and selling price are listed. If the work was returned, the return date is listed. If the work is for sale as of the date of the report, the asking price is listed. The total amount of sales of the artist’s works during the period is displayed. The total value of asking prices of the artist’s works currently for sale is also given. By choosing dates that cover the entire year, the total sales data on this report can also be used for the end-of-year tax reporting required by the government.
3. **Collectors Summary Report.**  The BCCAG plans to begin selling works owned by collectors, in addition to works owned by the artist who created them. When works owned by people other than the artist are made available, they will need to output information about each collector as well as their total sales both last year and year-to-date this year.
4. **Individual Collector Sales Report**. This report is similar to the one for individual artists but will used when the gallery begins to sell works owned by collectors. It gives information about works the collector has offered for sale through the gallery. It lists all works sold, works returned, and works for sale for that collector for the period specified. The total sales for each collector is sent to the government for tax reporting purposes at the end of the year.
5. **Works for Sale Report:** Lists data about each work that is currently offered for sale in the gallery. The date of the showing to promote the work, if any, is given. The history of all asking prices is given.
6. **Sales This Week**: Lists data about all sales of works during the current week. It is divided by salesperson, showing each of the works that salesperson has sold this week, and his or her total sales. At the end, it gives the grand total of all sales for the week.
7. **Buyer Sales Report:** Shows buyers in alphabetical order by last name. Works purchased this year are listed for each buyer ordered by date of purchase.
8. **Preferred Customer Report:** Tracks potential customers by keeping information about all those who attend showings, or whose names are gathered from the potential customer information form. For each present and potential customer,identifying data and information about the customer's preferences, such as the name of a preferred artist, type, medium, and style for each customer will be stored. This information will be used for targeted invitation lists for showings of works that match customer preferences.
9. **Salesperson Performance Report**: Generated for a period starting with whatever date is selected (e.g. January first of the current year) and ending with another selected date (e.g. today's date). Provides an individual listing of each of the works sold by that person during the period, as well as his or her total sales for the period. Typically, it would be run once a month, to evaluate each salesperson’s performance.
10. **Aged Artworks Report:** Generated at the end of each month. Lists the works of art that have been for sale in the gallery for six months or more. BCCAG uses it to contact the artist or collector to determine whether the works should be returned, discounted, or remain for sale for an additional period of time.
11. **Payment Stub:** When a work is sold, a check is sent to its owner for 90% of the selling price. This stub accompanies these checks and includes the date, owner information, information about the work sold, the sales price, and the amount of the check remitted to the owner
12. **Art Show Details:** Provides a historical record of each art show For each show, this report provides information about the dates, featured artist or theme, and works shown.

## Routine Transactions that the system needs to support

1. **Finding an artwork to suit a customer**The user enters any or all of the following: the artist name, the type, the medium, the style preferred. The screen displays a list of the title, artist, type, medium, style, and price of all the unsold works that fit the categories specified.
2. **Finding the history of a particular artwork**The user enters the name of the artist and the title of the work, and the screen displays all the information about the work itself, including the year completed, type, medium, style, size, asking price, date listed, dates it appeared in shows, date returned (if any), and if sold, the sales information.

## Initial list of Requirements, Assumptions, and Statements of Scope for the BCCAG Project

1. Artist names are unique, but customer names and collector names are not.
2. For privacy reasons, only people who may receive payments from the gallery are asked to provide their social security numbers, because these payments have to be reported for income tax purposes. Therefore, the gallery keeps social security numbers for salespersons, collectors, and artists, but not for buyers or potential customers
3. An artist may have many works for sale in the gallery.
4. Each work is an original, one-of-a-kind piece. No prints or reproductions are sold.
5. Two works of art may have the same title, but the combination of title and artist name is unique.
6. A work of art can be owned either by the artist who created it or by another person, referred to here as a collector.
7. Even if the work of art is owned by a collector, it is important to keep information about the artist who created it, since that is a factor in determining its value.
8. A work of art is sold by the gallery only once. The gallery does not resell its own works.
9. A work of art may appear in more than one show. Some works do not appear in any show.
10. Payment for all sales is made immediately and in full at the time of purchase. Payment may be by credit, cash, or check. The owner is paid the balance and the salesperson is paid the commission at the end of the week.
11. The database does not include payroll information, except for the commission to be paid to salespeople for sales of artwork.
12. There are lists of valid values for type, style, and medium of artworks. Each has a value “other” for works that do not fit existing values.
13. Information about works not selected to be listed by the gallery is discarded.
14. Lists of artists, collectors, buyers, and potential customers are evaluated periodically to determine whether they should be dropped.