

**CS 4347 Database Systems
Final Project Deliverable 1**

EcoCraft

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Deliverable 2 starts on page number 31

Description

Project Title: EcoCraft

GitHub Repository Details:

Repository Title: 4347DBPROJ

Owner: Dmahesh123

Repository Link: <https://github.com/dmahesh123/4347DBPROJ>

Team Members: Dharshini Mahesh, Amina Haque, Laurenne Oliver, Waseef Kabir, Momo Qais, Arhum Khan, Mohammad Islam

Delegation of Tasks for Deliverable 1:

Momo, Amina, and Laurenne worked to complete the “Introduction” section of Deliverable 1.

Dharshini, Mohammad, Waseef, and Arhum worked on the “Background and Related Work” section of Deliverable 1.

Amina, Waseef, and Dharshini worked on the “Design & Implementation EER Conceptual Data Model Design” of section 3.

Mohammad, Arhum Khan, and Laurenne Oliver worked on section 3's “Relational Data Model Design.”

Momo worked on the “Create your Database and Populate” and “Database Query Execution” of section 3.

Dharshini worked on the “References” and “Description” sections of Deliverable 1.

Description and Motivation of EcoCraft:

The main motivation behind our project is to reduce waste in a fun and creative way by using a database of creative arts and crafts projects, mainly using recycled materials

In today's world, sustainability is a growing concern and waste management is a critical issue. This project can take small actions, like turning discarded items into art, which in turn can make a significant impact over time, especially for the younger generation. By fostering creativity and encouraging the use of recycled materials, we aim to promote environmental consciousness in an engaging and educational way. We expect that the database design can be used in places such as schools or at home where children can create craft ideas with materials that already exist.

Teachers and parents can integrate these projects and teach students the importance of upcycling

and reusing materials. This can additionally be used in community centers, summer camps, and anywhere where children can unleash their potential. The system can also serve as a useful tool for environmental organizations or workshops focused on sustainability to enable creative ways of reducing waste.

Project timeline for Deliverable 1:

October 18th - Complete the “Final Project Proposal” with all the group members.

Collaborated as a group to define the scope and goals of our project by brainstorming and collectively agreeing on the purpose of our project.

November 20th - Collaborate on dividing tasks and working on the project timeline.

After the proposal, the group met again to divide the tasks to ensure efficient collaboration and time management by working to define the timelines of our project.

November 25th - Complete the “Introduction” section.

Focused on drafting and completing the section by addressing the benefits and use of our project.

November 29th - Work on and complete the “Background and Related Work” section.

Researched existing work to build and differentiate our project idea and then summarized our findings.

October 6th - Use software to complete the “EER Conceptual Data Model Design.”

Created the Enhanced Entity Relation model to serve as a foundation for the database design.

October 13th - Use software to create the relational model for the “Relational Data Model Design” section.

Transitioned to the relational model by using the EER model to ensure all the requirements of the database are met.

October 15th - Use SQL for the “Create your Database and Populate” and “Database Query Execution” sections.

Implement the database using SQL to populate the tables and develop queries for our system.

October 16th - Finalize Deliverable 1 and get ready to submit.

1. Introduction

Our project focuses on creating a database of craft ideas that utilize recycled materials. The motivation behind this project comes from the desire to reduce waste in a fun, engaging, and educational way. EcoCraft will also be a crafty activity caregivers and educational systems can use for kids. The database will store and relate various waste materials and tools needed for crafts. In the future, this design can be used in schools, homes, and other educational environments. Children can explore their creativity while learning about recycling and sustainability. By repurposing items that would usually be discarded, the system helps lower crafting costs, making it an affordable and eco-friendly option for both schools and households. We chose this topic to tackle three main points: waste reduction, educational enrichment, and cost efficiency in crafting. We believe it is an efficient and creative way to reduce waste while also providing kids with developmentally appropriate activities. Not only does it reduce waste but it helps caregivers, teachers, camp counselors, nannies, etc the ability to provide kids with activities with materials they have on hand.

Currently, we are not expecting EcoCraft to contribute anything new to the field of security, but rather prioritizing ensuring that the data input into the system is protected. Our system, however, indirectly supports environmental security by promoting recycling and reducing waste. Our project could be expanded in the future to collect user information & statistics securely while also ensuring that we are using this information to promote support for the environment among other applications that collect this information. This ultimately contributes to the security of natural resources, ensuring a healthier environment for future generations. Our project is unique compared to other similar applications because it does not require you to input any personal information into an account in order to utilize our application. This prevents any risk to users' personal information.

The database was designed to create a platform that links recycled materials to craft ideas, making recycling more accessible and enjoyable for users. We chose to design this particular database to bridge the gap between recycling education and practical application, allowing users to input available recyclable items and instantly receive creative craft suggestions. This approach supports environmental education by making the process of recycling interactive and engaging. The database serves as a resourceful tool for parents, teachers, and students to explore recycling in a hands-on way.

This project fills a gap between environmental education and practical sustainability. Many existing recycling initiatives lack an engaging, hands-on approach, especially for younger audiences. Our database transforms recycling into a creative, fun experience, making it more accessible and enjoyable for anyone of all ages. We not only promote environmental awareness but also encourage users to actively participate in recycling efforts. A real word problem that our design solves is when caregivers want to entertain kids but don't think they have anything on hand to do so. Our design, helps caregivers have the convenience of creating a craft with

materials on hand instead of spending the time and money to go to the store to buy supplies. Another primary issue our project will address is the reduction of waste and environmental sustainability. Finding ways to repurpose materials will help minimize the amount of waste in a fun and creative way. EcoCraft will encourage users to see potential in everyday waste items, promoting recycling and creative reuse.

2. Background and Related Work

There exist websites that relate to our database. These websites show ways to reuse and recycle items which is something that EcoCraft can use to provide arts and crafts projects for users. Listed below are the descriptions and the relations of other websites that are used in the development of EcoCraft for ideas.

Description of the Project/Study	Relation to our project
https://www.instructables.com/ Autodesk Instructables is a website that shares step-by-step craft ideas submitted by users [1].	1. Both focus on crafts and DIY projects. 2. Our DB could integrate similar ideas of how different craft materials can be recycled.
https://ourfamilycode.com/50-recycled-crafts-activities-for-kids/ OurFamilyCode provides recycled crafts and activities for kids with commonly recycled household items [2].	1. It shows how specific items can be recycled into crafts. 2. Both focus on crafts for kids
https://earth911.com/about-earth911-mission-and-history/ Earth 911 is a website that encourages reusing and recycling for families by providing ways to reduce trash at home [3].	1. Its database can inspire our system to include detailed entries for each type of craft material. 2. The database breaks down items into categories which can be useful for crafts
https://www.cutoutandkeep.net/ Cut Out + Keep displays DIY ideas from anyone, and includes the difficulty, cost, and time to make each DIY idea [4].	1. Focuses on DIY ideas 2. Allows for easy addition of new crafts 3. Includes materials and amount of materials if the creator chooses to 4. Can search for ideas by name

Comparisons:

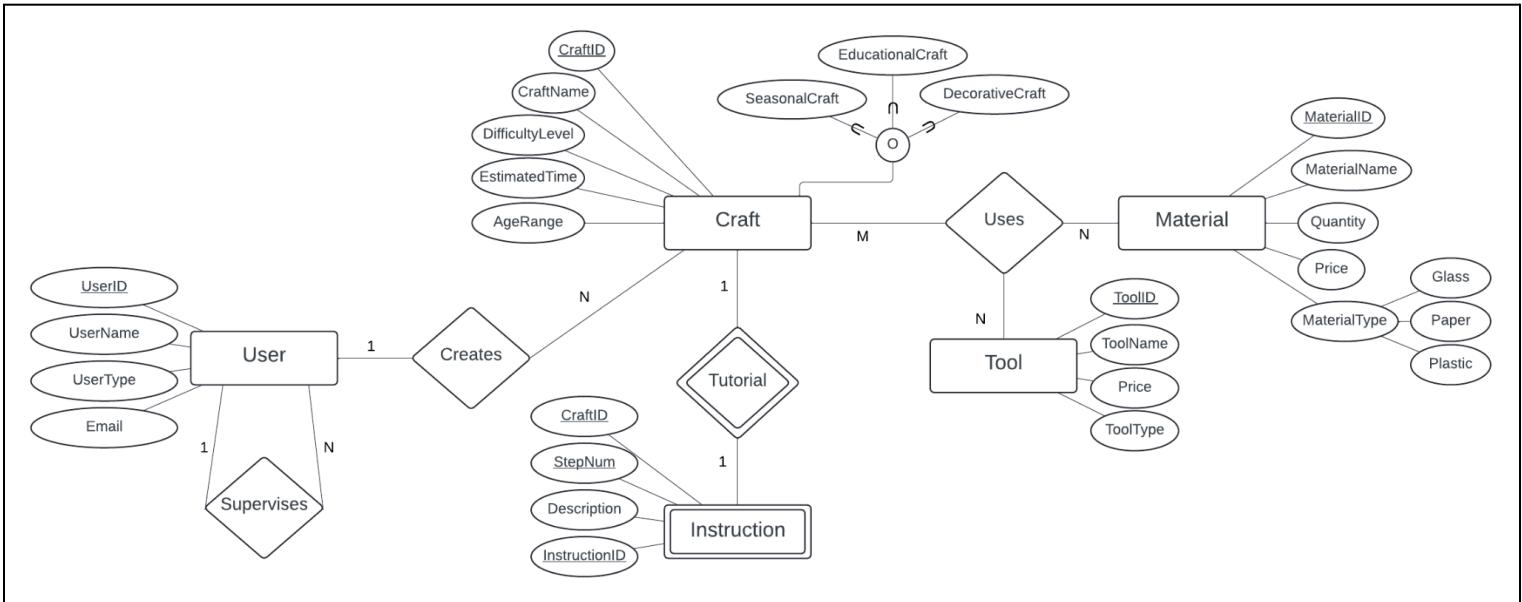
Aspects	EcoCraft (our database)	Instructables	OurFamilyCode	Earth 911	Cut Out + Keep
Purpose	Manage and optimize recycling with crafts for kids	Share DIY guides across various topics	Provide recycled craft activities for kids	Facilitate recycling and disposal information	Share craft tutorials and DIY projects
Material Focus	Household items	Tech and craft-specific items	Recycled household items	Recyclable materials	Fashion, jewelry, and art
Target Audience	Families/ Teachers with kids	DIY enthusiasts	Families with kids	General Public	DIY enthusiasts

How EcoCraft is different from other implementations:

EcoCraft is a database that allows users to input and retrieve craft ideas for children. This is similar to Instructables, OurFamilyCode, and Cut Out + Keep, which provide ideas and crafts but do not allow users to input their materials. Earth911 shows how to recycle but not how recycling can become a craft for kids. Overall, our database allows users to recycle and generate crafts in a personalizable way, making our database unique.

3. Design & Implementation (Phase I):

3.1. EER Conceptual Data Model Design:



Entities:

User

- UserID (Primary Key)
- UserType
- UserName
- Email

Craft

- CraftID (Primary Key)
- CraftName
- DifficultyLevel
- EstimatedTime
- AgeRange

Instructions (Weak Entity)

- CraftID (Foreign Key)
- StepNumber
- Description
- InstructionID (PrimaryKey)

Material

- MaterialID (Primary Key)
- MaterialName
- Quantity
- Price
- MaterialType Composite(Plastic, Paper, Glass)

Tool

- ToolID (Primary Key)
- ToolName
- Price
- Tool Type

CraftMaterialRelation (Deleted)

- CraftID (Foreign key to crafts)
- MaterialID (Foreign Key to Materials)
- QuantityRequired

(Primary Key is a composite of CraftID and MaterialID)

CraftToolRelation (Deleted)

- ToolID (Foreign key to Tool)
- CraftID(Foreign Key to Crafts)
- QuantityRequired

(Primary Key is a composite of CraftID and MaterialID)

Relationships:

CraftMaterial

Craft \longleftrightarrow Material: M (many crafts) to N (many materials)

Each craft can require multiple materials, and each material can be used in multiple crafts

CraftTool

Craft \longleftrightarrow Tool: Used M

Each craft requires multiple tools, and each tool can be used across multiple crafts

Creates

User \longleftrightarrow Craft: 1 (1 User) to N (Many crafts)

A user can create multiple crafts, but each craft is created by a single user

Recycles (M b/w Recycling Center and Material)

Materials can be recycled at multiple centers, and each center can recycle multiple materials.

SuperClass/Subclass:

Craft Categories Overlapping:

Superclass: "Craft"

Subclass: "Seasonal Craft," "DecorativeCraft," "EducationalCraft"

Weak Entity

Instructions: Instructions are a weak entity because they depend on the strong entity Craft to exist.

Unary Relationship

User supervises a User.

Ex: (Teacher (User) supervises a Student (User).

Parent (User) supervises a Child (User))

Binary Relationship

Craft Uses a Tool.

User creates a Craft.

Ternary Relationship

Craft uses Material and Tools

3.2. Relational Data Model Design:

User

<u>UserID</u>	UserType	UserName	Email
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Craft

<u>CraftID</u>	CraftName	DifficultyLevel	EstimatedTime	AgeRange
----------------	-----------	-----------------	---------------	----------

Instructions

<u>CraftID</u>	StepNumber	Description	InstructionID
----------------	------------	-------------	---------------

Material

<u>MaterialID</u>	MaterialName	Quantity	Price	MaterialType Composite
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Tool

<u>ToolID</u>	ToolName	Price	Tool Type
---------------	----------	-------	-----------

3.3 Create your Database and Populate:

Database Creation

```
Query Query History
1 ✓ CREATE TABLE Users (
2     UserID INT PRIMARY KEY,
3     UserType VARCHAR(50),
4     UserName VARCHAR(100),
5     Email VARCHAR(100)
6 );
7
8 ✓ CREATE TABLE Craft (
9     CraftID INT PRIMARY KEY,
10    UserID INT,
11    CraftName VARCHAR(100),
12    DifficultyLevel VARCHAR(50),
13    EstimatedTime INT,
14    AgeRange VARCHAR(50),
15    FOREIGN KEY (UserID) REFERENCES Users(UserID)
16 );
17
18 ✓ CREATE TABLE Instructions (
19     InstructionID INT PRIMARY KEY,
20     CraftID INT,
21     StepNumber INT,
22     Description TEXT,
23     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)
24 );
25
26 ✓ CREATE TABLE Material (
27     MaterialID INT PRIMARY KEY,
28     MaterialName VARCHAR(100),
29     Quantity INT,
30     Price DECIMAL(10, 2),
31     MaterialType VARCHAR(50)
32 );
33
34 ✓ CREATE TABLE Tool (
35     ToolID INT PRIMARY KEY,
36     ToolName VARCHAR(100),
37     Price DECIMAL(10, 2),
38     Tooltype VARCHAR(50)
39 );
40
41 ✓ CREATE TABLE CraftMaterialRelation (
42     CraftID INT,
43     MaterialID INT,
44     QuantityRequired INT,
45     PRIMARY KEY (CraftID, MaterialID),
46     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID),
47     FOREIGN KEY (MaterialID) REFERENCES Material(MaterialID)
48 );
49
50 ✓ CREATE TABLE CraftToolRelation (
51     CraftID INT,
52     ToolID INT,
53     QuantityRequired INT,
54     PRIMARY KEY (CraftID, ToolID),
55     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID),
56     FOREIGN KEY (ToolID) REFERENCES Tool(ToolID)
57 );
58
59 ✓ CREATE TABLE Supervises (
60     SupervisorID INT,
61     SupervisedID INT,
62     PRIMARY KEY (SupervisorID, SupervisedID),
63     FOREIGN KEY (SupervisorID) REFERENCES Users(UserID),
64     FOREIGN KEY (SupervisedID) REFERENCES Users(UserID)
65 );
66
67 ✓ CREATE TABLE RecyclingCenter (
68     CenterID INT PRIMARY KEY,
69     CenterName VARCHAR(100),
70
Total rows: 0 of 0   Query complete 00:00:00.129   Ln 12, Col 33
```

```

Query  Query History
60     SupervisorID INT,
61     SupervisedID INT,
62     PRIMARY KEY (SupervisorID, SupervisedID),
63     FOREIGN KEY (SupervisorID) REFERENCES Users(UserID),
64     FOREIGN KEY (SupervisedID) REFERENCES Users(UserID)
65   );
66
67 ✓ CREATE TABLE RecyclingCenter (
68     CenterID INT PRIMARY KEY,
69     CenterName VARCHAR(100),
70     Location VARCHAR(100)
71   );
72
73 ✓ CREATE TABLE Recycles (
74     MaterialID INT,
75     CenterID INT,
76     PRIMARY KEY (MaterialID, CenterID),
77     FOREIGN KEY (MaterialID) REFERENCES Material(MaterialID),
78     FOREIGN KEY (CenterID) REFERENCES RecyclingCenter(CenterID)
79   );
80
81 ✓ CREATE TABLE SeasonalCraft (
82     CraftID INT PRIMARY KEY,
83     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)
84   );
85
86 ✓ CREATE TABLE DecorativeCraft (
87     CraftID INT PRIMARY KEY,
88     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)
89   );
90
91 ✓ CREATE TABLE EducationalCraft (
92     CraftID INT PRIMARY KEY,
93     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)
94   );
95

Total rows: 0 of 0  Query complete 00:00:00.129  Ln 12. Col 33

```

Database Population

```

Query  Query History
1 ✓ INSERT INTO Users (UserID, UserType, UserName, Email)
2 VALUES
3 (1, 'Teacher', 'Alice Johnson', 'alice.johnson@example.com'),
4 (2, 'Student', 'Bob Smith', 'bob.smith@example.com'),
5 (3, 'Parent', 'Carol White', 'carol.white@example.com'),
6 (4, 'Teacher', 'David Green', 'david.green@example.com'),
7 (5, 'Student', 'Eve Brown', 'eve.brown@example.com'),
8 (6, 'Teacher', 'Frank Thomas', 'frank.thomas@example.com'),
9 (7, 'Parent', 'Grace Kelly', 'grace.kelly@example.com'),
10 (8, 'Student', 'Henry Adams', 'henry.adams@example.com'),
11 (9, 'Teacher', 'Ivy Martin', 'ivy.martin@example.com'),
12 (10, 'Student', 'Jake Turner', 'jake.turner@example.com');
13

```

Query **Query History**

```
1 ✓ INSERT INTO Craft (CraftID, UserID, CraftName, DifficultyLevel, EstimatedTime, AgeRange)
2 VALUES
3 (1, 1, 'Paper Airplane', 'Easy', 15, '5-10'),
4 (2, 2, 'Origami Crane', 'Medium', 30, '10-15'),
5 (3, 3, 'Beaded Bracelet', 'Easy', 20, '8-12'),
6 (4, 4, 'Wooden Birdhouse', 'Hard', 90, '12-18'),
7 (5, 5, 'Clay Sculpture', 'Medium', 60, '10-16'),
8 (6, 6, 'Knitted Scarf', 'Hard', 120, '12-18'),
9 (7, 7, 'Paper Mache Mask', 'Medium', 45, '10-15'),
10 (8, 8, 'DIY Picture Frame', 'Easy', 30, '8-12'),
11 (9, 9, 'Christmas Ornament', 'Easy', 20, '5-10'),
12 (10, 10, 'Lego Robot', 'Medium', 60, '10-15');
13
```

Query **Query History**

```
1 ✓ INSERT INTO Instructions (InstructionID, CraftID, StepNumber, Description)
2 VALUES
3 (1, 1, 1, 'Fold the paper in half lengthwise.'),
4 (2, 1, 2, 'Fold the corners into triangles.'),
5 (3, 1, 3, 'Fold the wings down.'),
6 (4, 2, 1, 'Fold the paper into a square.'),
7 (5, 2, 2, 'Fold diagonally to form a triangle.'),
8 (6, 2, 3, 'Bring the edges together to form a crane shape.'),
9 (7, 3, 1, 'Thread the beads onto the string.'),
10 (8, 3, 2, 'Tie a knot at the end of the string.'),
11 (9, 4, 1, 'Cut the wooden pieces according to the measurements.'),
12 (10, 4, 2, 'Assemble the pieces to form the birdhouse.');
13
```

Query **Query History**

```
1 ✓ INSERT INTO Material (MaterialID, MaterialName, Quantity, Price, MaterialType)
2 VALUES
3 (1, 'Paper', 100, 0.10, 'Paper'),
4 (2, 'Beads', 200, 0.05, 'Plastic'),
5 (3, 'Wood', 50, 1.50, 'Wood'),
6 (4, 'Clay', 30, 2.00, 'Plastic'),
7 (5, 'Yarn', 40, 1.20, 'Fabric'),
8 (6, 'Paint', 25, 3.00, 'Glass'),
9 (7, 'Glue', 50, 0.50, 'Plastic'),
10 (8, 'Lego Bricks', 500, 0.15, 'Plastic'),
11 (9, 'Wire', 100, 0.75, 'Metal'),
12 (10, 'Fabric', 60, 1.00, 'Fabric');
```

Query Query History

```
1 ✓ INSERT INTO Tool (ToolID, ToolName, Price, ToolType)
2 VALUES
3 (1, 'Scissors', 2.00, 'Cutting'),
4 (2, 'Paintbrush', 1.50, 'Painting'),
5 (3, 'Needle', 1.00, 'Sewing'),
6 (4, 'Hammer', 5.00, 'Building'),
7 (5, 'Screwdriver', 3.50, 'Building'),
8 (6, 'Hot Glue Gun', 7.00, 'Adhesive'),
9 (7, 'Saw', 8.00, 'Cutting'),
10 (8, 'Pliers', 4.50, 'Bending'),
11 (9, 'Lego Separator', 2.00, 'Building'),
12 (10, 'Measuring Tape', 1.75, 'Measuring');
```

Query Query History

```
1 ✓ INSERT INTO CraftMaterialRelation (CraftID, MaterialID, QuantityRequired)
2 VALUES
3 (1, 1, 1),
4 (2, 1, 1),
5 (3, 2, 20),
6 (4, 3, 5),
7 (5, 4, 1),
8 (6, 5, 2),
9 (7, 1, 3),
10 (8, 10, 2),
11 (9, 6, 1),
12 (10, 8, 50);
```

Query Query History

```
1 ✓ INSERT INTO CraftToolRelation (CraftID, ToolID, QuantityRequired)
2 VALUES
3 (1, 1, 1),
4 (2, 2, 1),
5 (3, 3, 1),
6 (4, 4, 1),
7 (5, 2, 1),
8 (6, 3, 1),
9 (7, 6, 1),
10 (8, 1, 1),
11 (9, 2, 1),
12 (10, 9, 1);
```

Query Query History

```
1 ✓ INSERT INTO Supervises (SupervisorID, SupervisedID)  
2 VALUES  
3 (1, 2),  
4 (3, 5),  
5 (4, 6),  
6 (1, 8),  
7 (7, 10),  
8 (1, 9),  
9 (6, 8),  
10 (9, 10),  
11 (4, 7),  
12 (3, 4);
```

Query Query History

```
1 ✓ INSERT INTO RecyclingCenter (CenterID, CenterName, Location)  
2 VALUES  
3 (1, 'City Recycling Center', 'Downtown'),  
4 (2, 'Green Earth Recycling', 'Suburbs'),  
5 (3, 'Eco Friendly Recycling', 'Uptown'),  
6 (4, 'Neighborhood Recycling', 'Residential Area'),  
7 (5, 'Community Recycling', 'Park Area'),  
8 (6, 'Reclaim and Recycle', 'Industrial Zone'),  
9 (7, 'Planet Care Recycling', 'City Outskirts'),  
10 (8, 'GreenCycle', 'Main Street'),  
11 (9, 'Future Earth Recycling', 'Town Center'),  
12 (10, 'Clean Earth Recycling', 'Rural Area');
```

Query Query History

```
1 ✓ INSERT INTO Recycles (MaterialID, CenterID)
2   VALUES
3     (1, 1),
4     (2, 2),
5     (3, 3),
6     (4, 4),
7     (5, 5),
8     (6, 6),
9     (7, 7),
10    (8, 8),
11    (9, 9),
12    (10, 10);
```

Query Query History

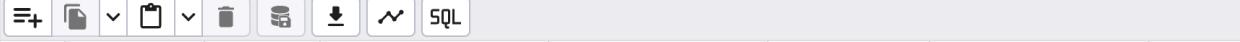
```
1 ✓ INSERT INTO SeasonalCraft (CraftID)
2   VALUES
3     (1), (4), (9);
4
5 ✓ INSERT INTO DecorativeCraft (CraftID)
6   VALUES
7     (3), (6), (8);
8
9 ✓ INSERT INTO EducationalCraft (CraftID)
10  VALUES
11  (2), (5), (10);
12 |
```

Database Tables:

Query Query History

```
1 select * from craft;
```

Data Output Messages Notifications



	craftid [PK] integer	userid integer	craftname character varying (100)	difficultylevel character varying (50)	estimatedtime integer	agerange character varying (50)
1	1	1	Paper Airplane	Easy	15	5-10
2	2	2	Origami Crane	Medium	30	10-15
3	3	3	Beaded Bracelet	Easy	20	8-12
4	4	4	Wooden Birdhouse	Hard	90	12-18
5	5	5	Clay Sculpture	Medium	60	10-16
6	6	6	Knitted Scarf	Hard	120	12-18
7	7	7	Paper Mache Mask	Medium	45	10-15
8	8	8	DIY Picture Frame	Easy	30	8-12
9	9	9	Christmas Ornament	Easy	20	5-10
10	10	10	Lego Robot	Medium	60	10-15

Query Query History

```
1 select * from craftmaterialrelation;
```

Data Output Messages Notifications

The screenshot shows a database interface with a query editor at the top containing a single SQL command to select all columns from the 'craftmaterialrelation' table. Below the query is a toolbar with various icons for file operations like saving and opening, as well as other functions. The main area displays a table with three columns: 'craftid' (PK integer), 'materialid' (PK integer), and 'quantityrequired' (integer). The data consists of 10 rows, each with a unique craftid and materialid combination, and a specific quantity required.

	craftid [PK] integer	materialid [PK] integer	quantityrequired integer
1	1	1	1
2	2	1	1
3	3	2	20
4	4	3	5
5	5	4	1
6	6	5	2
7	7	1	3
8	8	10	2
9	9	6	1
10	10	8	50

Query Query History

```
1 select * from crafttoolrelation;
```

Data Output Messages Notifications

The screenshot shows a database interface with a toolbar at the top and a table below it. The toolbar includes icons for file operations (New, Open, Save, Print, Copy, Paste, Find, Delete, Import, Export, SQL), a chart icon, and a SQL tab.

	craftid [PK] integer	toolid [PK] integer	quantityrequired integer
1	1	1	1
2	2	2	1
3	3	3	1
4	4	4	1
5	5	2	1
6	6	3	1
7	7	6	1
8	8	1	1
9	9	2	1
10	10	9	1

Query Query History

```
1 select * from decorativecraft;
```

Data Output Messages Notifications



	craftid [PK] integer	edit
1	3	
2	6	
3	8	

Query Query History

```
1 select * from educationalcraft;
```

Data Output Messages Notifications



craftid
[PK] integer



1	2
2	5
3	10

Query Query History

```
1 select * from instructions;
```

Data Output Messages Notifications

The screenshot shows a database interface with a toolbar at the top and a table below it. The toolbar includes icons for new table, file operations (open, save, etc.), and SQL. The table has columns: instructionid [PK] integer, craftid integer, stepnumber integer, and description text. The data consists of 10 rows of instructions for a craft, each with a unique instructionid, a specific craftid, a stepnumber, and a detailed description.

	instructionid [PK] integer	craftid integer	stepnumber integer	description text
1		1	1	1 Fold the paper in half lengthwise.
2		2	1	2 Fold the corners into triangles.
3		3	1	3 Fold the wings down.
4		4	2	1 Fold the paper into a square.
5		5	2	2 Fold diagonally to form a triangle.
6		6	2	3 Bring the edges together to form a crane shape.
7		7	3	1 Thread the beads onto the string.
8		8	3	2 Tie a knot at the end of the string.
9		9	4	1 Cut the wooden pieces according to the measurements.
10		10	4	2 Assemble the pieces to form the birdhouse.

Query Query History

```
1 select * from material;
```

Data Output Messages Notifications

The screenshot shows a database interface with a toolbar at the top containing various icons for file operations and SQL navigation. Below the toolbar is a table displaying data from a 'material' table. The table has five columns: materialid, materialname, quantity, price, and materialtype. The data consists of ten rows, each representing a different material with its ID, name, quantity, price, and type.

	materialid [PK] integer	materialname character varying (100)	quantity integer	price numeric (10,2)	materialtype character varying (50)
1	1	Paper	100	0.10	Paper
2	2	Beads	200	0.05	Plastic
3	3	Wood	50	1.50	Wood
4	4	Clay	30	2.00	Plastic
5	5	Yarn	40	1.20	Fabric
6	6	Paint	25	3.00	Glass
7	7	Glue	50	0.50	Plastic
8	8	Lego Bricks	500	0.15	Plastic
9	9	Wire	100	0.75	Metal
10	10	Fabric	60	1.00	Fabric

Query Query History

```
1  select * from recycles;
```

Data Output Messages Notifications

The screenshot shows a database interface with a query editor at the top containing the SQL command `select * from recycles;`. Below the editor is a toolbar with various icons for file operations like new, open, save, and export. The main area displays a table titled "Data Output" with two columns: "materialid" and "centerid". Both columns are annotated with "[PK] integer" and have edit icons. The table contains 10 rows of data, each with a value from 1 to 10 in both columns.

	materialid [PK] integer	centerid [PK] integer
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10

Query Query History

```
1 select * from recyclingcenter;
```

Data Output Messages Notifications

The screenshot shows a database interface with a query editor at the top and a data viewer below. The query editor contains a single line of SQL: 'select * from recyclingcenter;'. The data viewer displays a table titled 'recyclingcenter' with 10 rows of data. The columns are 'centerid' (PK integer), 'centername' (character varying (100)), and 'location' (character varying (100)). The data includes various recycling centers like 'City Recycling Center' and 'Green Earth Recycling' located in different areas such as 'Downtown' and 'Suburbs'.

	centerid [PK] integer	centername character varying (100)	location character varying (100)
1	1	City Recycling Center	Downtown
2	2	Green Earth Recycling	Suburbs
3	3	Eco Friendly Recycling	Uptown
4	4	Neighborhood Recycling	Residential Area
5	5	Community Recycling	Park Area
6	6	Reclaim and Recycle	Industrial Zone
7	7	Planet Care Recycling	City Outskirts
8	8	GreenCycle	Main Street
9	9	Future Earth Recycling	Town Center
10	10	Clean Earth Recycling	Rural Area

Query Query History

```
1 select * from seasonalcraft;
```

Data Output Messages Notifications



craftid	[PK] integer
1	1
2	4
3	9

Query Query History

```
1 select * from supervises;
```

Data Output Messages Notifications



	supervisorid [PK] integer	supervisedid [PK] integer
1	1	2
2	3	5
3	4	6
4	1	8
5	7	10
6	1	9
7	6	8
8	9	10
9	4	7
10	3	4

Query Query History

```
1 select * from tool;
```

Data Output Messages Notifications

The screenshot shows a database interface with a toolbar at the top containing various icons for file operations and SQL navigation. Below the toolbar is a table displaying data from a 'tool' table. The table has five columns: toolid, toolname, price, and tooltype. Each row contains a primary key value (1-10), a tool name, its price, and its type. The table is scrollable, indicated by a vertical scrollbar on the left.

	toolid [PK] integer	toolname character varying (100)	price numeric (10,2)	tooltype character varying (50)
1	1	Scissors	2.00	Cutting
2	2	Paintbrush	1.50	Painting
3	3	Needle	1.00	Sewing
4	4	Hammer	5.00	Building
5	5	Screwdriver	3.50	Building
6	6	Hot Glue Gun	7.00	Adhesive
7	7	Saw	8.00	Cutting
8	8	Pliers	4.50	Bending
9	9	Lego Separator	2.00	Building
10	10	Measuring Tape	1.75	Measuring

Query Query History

```
1  select * from users;
```

Data Output Messages Notifications

	userid [PK] integer	usertype character varying (50)	username character varying (100)	email character varying (100)
1	1	Teacher	Alice Johnson	alice.johnson@example.com
2	2	Student	Bob Smith	bob.smith@example.com
3	3	Parent	Carol White	carol.white@example.com
4	4	Teacher	David Green	david.green@example.com
5	5	Student	Eve Brown	eve.brown@example.com
6	6	Teacher	Frank Thomas	frank.thomas@example.com
7	7	Parent	Grace Kelly	grace.kelly@example.com
8	8	Student	Henry Adams	henry.adams@example.com
9	9	Teacher	Ivy Martin	ivy.martin@example.com
10	10	Student	Jake Turner	jake.turner@example.com

3.4 Database Query Execution:

Database Queries

Query Query History

```

1 v SELECT *
2   FROM Craft
3 WHERE EstimatedTime > 60;
4

```

Data Output Messages Notifications

	craftid [PK] integer	userid integer	craftname character varying (100)	difficultylevel character varying (50)	estimatedtime integer	agerange character varying (50)
1	4	4	Wooden Birdhouse	Hard	90	12-18
2	6	6	Knitted Scarf	Hard	120	12-18

Query Query History

```

1 Select * from material;
2
3 --INSERT INTO Material (MaterialID, MaterialName, Quantity, Price, MaterialType) VALUES (11, 'Cardboard', 50, 0.75, 'Paper');
4

```

Data Output Messages Notifications

	materialid [PK] integer	materialname character varying (100)	quantity integer	price numeric (10,2)	materialtype character varying (50)
1	1	Paper	100	0.10	Paper
2	2	Beads	200	0.05	Plastic
3	3	Wood	50	1.50	Wood
4	4	Clay	30	2.00	Plastic
5	5	Yarn	40	1.20	Fabric
6	6	Paint	25	3.00	Glass
7	7	Glue	50	0.50	Plastic
8	8	Lego Bricks	500	0.15	Plastic
9	9	Wire	100	0.75	Metal
10	10	Fabric	60	1.00	Fabric
11	11	Cardboard	50	0.75	Paper

Query Query History

```

1 select * from tool;
2
3 --DELETE FROM Tool WHERE ToolID = 5;
4

```

Data Output Messages Notifications

SQL

	toolid [PK] integer	toolname character varying (100)	price numeric (10,2)	tooltype character varying (50)
1	1	Scissors	2.00	Cutting
2	2	Paintbrush	1.50	Painting
3	3	Needle	1.00	Sewing
4	4	Hammer	5.00	Building
5	6	Hot Glue Gun	7.00	Adhesive
6	7	Saw	8.00	Cutting
7	8	Pliers	4.50	Bending
8	9	Lego Separator	2.00	Building
9	10	Measuring Tape	1.75	Measuring

Query Query History

```

1 select * from craft;
2
3 --UPDATE Craft SET DifficultyLevel = 'Very Hard' WHERE CraftID = 3;
4

```

Data Output Messages Notifications

SQL

	craftid [PK] integer	userid integer	craftname character varying (100)	difficultylevel character varying (50)	estimatedtime integer	agerange character varying (50)
1	1	1	Paper Airplane	Easy	15	5-10
2	2	2	Origami Crane	Medium	30	10-15
3	4	4	Wooden Birdhouse	Hard	90	12-18
4	5	5	Clay Sculpture	Medium	60	10-16
5	6	6	Knitted Scarf	Hard	120	12-18
6	7	7	Paper Mache Mask	Medium	45	10-15
7	8	8	DIY Picture Frame	Easy	30	8-12
8	9	9	Christmas Ornament	Easy	20	5-10
9	10	10	Lego Robot	Medium	60	10-15
10	3	3	Beaded Bracelet	Very Hard	20	8-12

**CS 4347 Database Systems
Final Project Deliverable 2**

EcoCraft

Dharshini Mahesh, Amina Haque,
Laurenne Oliver, Waseef Kabir,
Momo Qais, Arhum Khan, Mohammad Islam

The description for deliverable 2 is the same as the description for deliverable 1.

Project Title: EcoCraft

GitHub Repository Details:

Repository Title: 4347DBPROJ

Owner: Dmahesh123

Repository Link: <https://github.com/dmahesh123/4347DBPROJ>

Team Members: Dharshini Mahesh, Amina Haque, Laurenne Oliver, Waseef Kabir, Momo Qais, Arhum Khan, Mohammad Islam

Delegation of Tasks for Deliverable 2:

Dharshini worked on the submission and GitHub commits.

Waseef and Mohammad worked on the normalization of EER Conceptual Data Model and drawing the dependency diagrams for the initial and normalized 3NF relations.

Amina worked on the relational data model design using the normalized EER diagram.

Momo worked on creating the CREATE VIEW on the database.

Dharshini worked on normalizing and populating the database in the SQL platform and worked on the database query execution on the normalized database to query, insert, delete, and update.

Dharshini, Waseef, Arhum, and Laurenne worked on the user interface together, creating a Python GUI for querying, inserting, deleting, updating, and quitting the application.

Amina and Momo worked on the final report and future work for this project and the presentation slides.

Amina and Laurenne worked on the conclusion and references for this report.

Project timeline for Deliverable 2:

October 25th - Start drafting tasks for group members and finish assigning tasks to pairs.

October 28th - Completed normalization of EER conceptual model and normalized diagrams to

create dependency relations.

October 30th - Completed the relational data model design using the normalized EER diagram.

November 1st - Created the normalized database and populated it.

November 4th - Completed the database query execution on the normalized database. Query, insert, delete, and update using the normalized database.

November 10th - Finished the GUI for our application in Python.

November 11th - Finished the conclusion, future work, and references section.

November 12th - Completed the report and presentation slides.

November 15th - Submit deliverable 2.

Description and Motivation of EcoCraft:

The main motivation behind our project is to reduce waste in a fun and creative way by using a database of creative arts and crafts projects, mainly using recycled materials. In today's world, sustainability is a growing concern and waste management is a critical issue. This project can take small actions, like turning discarded items into art, which in turn can make a significant impact over time, especially for the younger generation. By fostering creativity and encouraging the use of recycled materials, we aim to promote environmental consciousness in an engaging and educational way. We expect that the database design can be used in places such as schools or at home where children can create craft ideas with materials that already exist. Teachers and parents can integrate these projects and teach students the importance of upcycling and reusing materials. This can additionally be used in community centers, summer camps, and anywhere where children can unleash their potential. The system can also serve as a useful tool for environmental organizations or workshops focused on sustainability to enable creative ways of reducing waste.

1. Introduction (Same as deliverable 1)

Our project focuses on creating a database of craft ideas that utilize recycled materials. The motivation behind this project comes from the desire to reduce waste in a fun, engaging, and educational way. EcoCraft will also be a crafty activity caregivers and educational systems can use for kids. The database will store and relate various waste materials and tools needed for crafts. In the future, this design can be used in schools, homes, and other educational

environments. Children can explore their creativity while learning about recycling and sustainability. By repurposing items that would usually be discarded, the system helps lower crafting costs, making it an affordable and eco-friendly option for both schools and households. We chose this topic to tackle three main points: waste reduction, educational enrichment, and cost efficiency in crafting. We believe it is an efficient and creative way to reduce waste while also providing kids with developmentally appropriate activities. Not only does it reduce waste but it helps caregivers, teachers, camp counselors, nannies, etc the ability to provide kids with activities with materials they have on hand.

Currently, we are not expecting EcoCraft to contribute anything new to the field of security, but rather prioritizing ensuring that the data input into the system is protected. Our system, however, indirectly supports environmental security by promoting recycling and reducing waste. Our project could be expanded in the future to collect user information & statistics securely while also ensuring that we are using this information to promote support for the environment among other applications that collect this information. This ultimately contributes to the security of natural resources, ensuring a healthier environment for future generations. Our project is unique compared to other similar applications because it does not require you to input any personal information into an account in order to utilize our application. This prevents any risk to users' personal information.

The database was designed to create a platform that links recycled materials to craft ideas, making recycling more accessible and enjoyable for users. We chose to design this particular database to bridge the gap between recycling education and practical application, allowing users to input available recyclable items and instantly receive creative craft suggestions. This approach supports environmental education by making the process of recycling interactive and engaging. The database serves as a resourceful tool for parents, teachers, and students to explore recycling in a hands-on way.

This project fills a gap between environmental education and practical sustainability. Many existing recycling initiatives lack an engaging, hands-on approach, especially for younger audiences. Our database transforms recycling into a creative, fun experience, making it more accessible and enjoyable for anyone of all ages. We not only promote environmental awareness but also encourage users to actively participate in recycling efforts. A real word problem that our design solves is when caregivers want to entertain kids but don't think they have anything on hand to do so. Our design helps caregivers have the convenience of creating a craft with materials on hand instead of spending the time and money to go to the store to buy supplies. Another primary issue our project will address is the reduction of waste and environmental sustainability. Finding ways to repurpose materials will help minimize the amount of waste in a fun and creative way. EcoCraft will encourage users to see potential in everyday waste items, promoting recycling and creative reuse.

2. Background and Related Work (Same as Deliverable 1)

There exist websites that relate to our database. These websites show ways to reuse and recycle items which is something that EcoCraft can use to provide arts and crafts projects for users. Listed below are the descriptions and the relations of other websites that are used in the development of EcoCraft for ideas.

Description of the Project/Study	Relation to our project
https://www.instructables.com/ Autodesk Instructables is a website that shares step-by-step craft ideas submitted by users [1].	1. Both focus on crafts and DIY projects. 2. Our DB could integrate similar ideas of how different craft materials can be recycled.
https://ourfamilycode.com/50-recycled-crafts-a-ctivities-for-kids/ OurFamilyCode provides recycled crafts and activities for kids with commonly recycled household items [2].	1. It shows how specific items can be recycled into crafts. 2. Both focus on crafts for kids
https://earth911.com/about-earth911-mission-and-history/ Earth 911 is a website that encourages reusing and recycling for families by providing ways to reduce trash at home [3].	1. Its database can inspire our system to include detailed entries for each type of craft material. 2. The database breaks down items into categories which can be useful for crafts
https://www.cutoutandkeep.net/ Cut Out + Keep displays DIY ideas from anyone, and includes the difficulty, cost, and time to make each DIY idea [4].	5.Focuses on DIY ideas 6.Allows for easy addition of new crafts 7.Includes materials and amount of materials if the creator chooses to 8.Can search for ideas by name

Comparisons:

Aspects	EcoCraft (our database)	Instructables	OurFamilyCode	Earth 911	Cut Out + Keep
Purpose	Manage and	Share DIY	Provide	Facilitate	Share craft

	optimize recycling with crafts for kids	guides across various topics	recycled craft activities for kids	recycling and disposal information	tutorials and DIY projects
Material Focus	Household items	Tech and craft-specific items	Recycled household items	Recyclable materials	Fashion, jewelry, and art
Target Audience	Families/ Teachers with kids	DIY enthusiasts	Families with kids	General Public	DIY enthusiasts

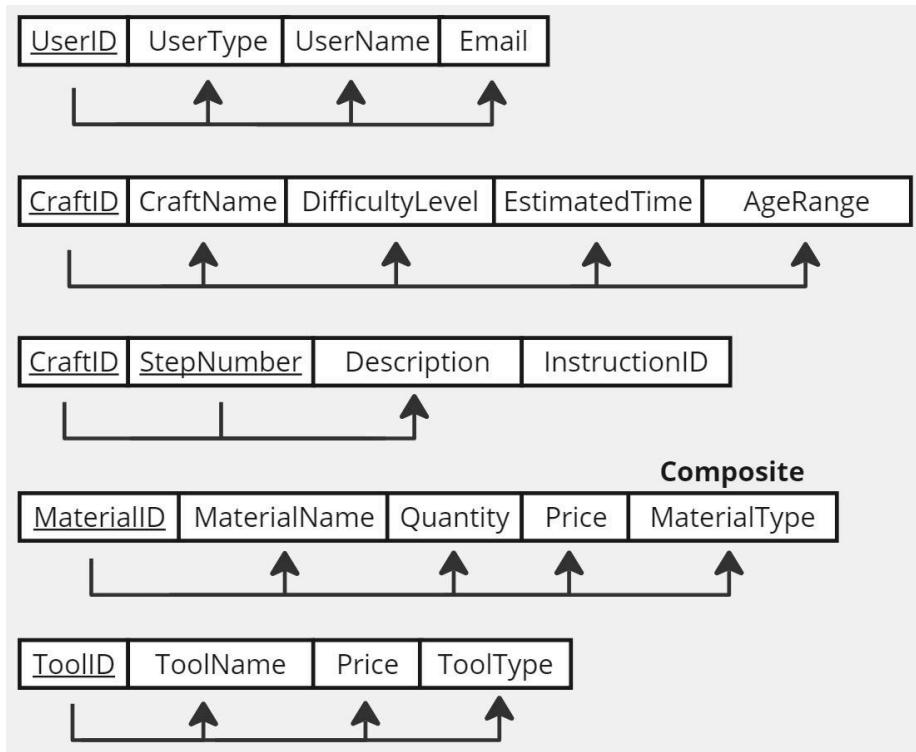
How EcoCraft is different from other implementations:

EcoCraft is a database that allows users to input and retrieve craft ideas for children. This is similar to Instructables, OurFamilyCode, and Cut Out + Keep, which provide ideas and crafts but do not allow users to input their materials. Earth911 shows how to recycle but not how recycling can become a craft for kids. Overall, our database allows users to recycle and generate crafts in a personalizable way, making our database unique.

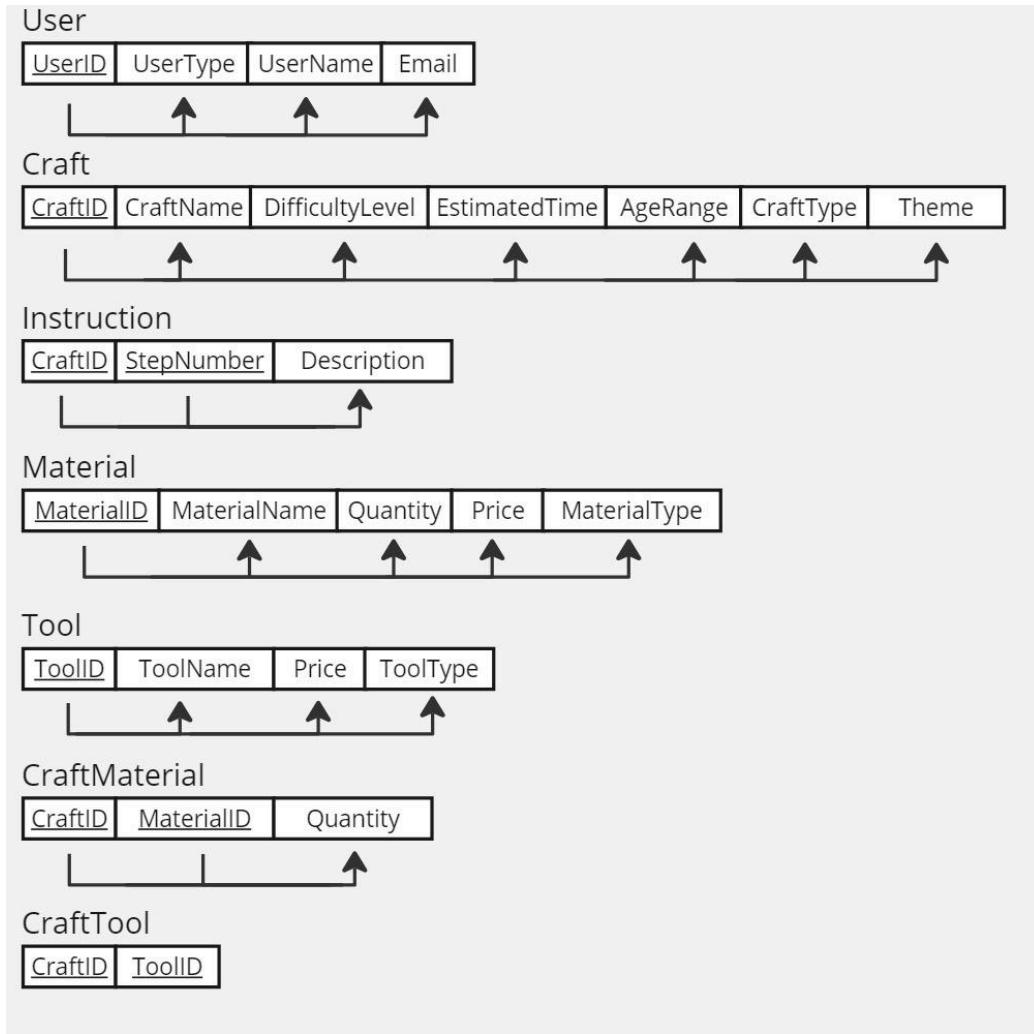
3. Design and Implementation (Phase II):

3.1. EER Conceptual Data Model Design:

Original Table that is not in 3NF:



Below is the 3NF tables:



User, **Craft**, and **Tool** are already in 3NF since all the non-prime attributes depended on only the primary key

- In **Craft** the DifficultyLevel, EstimatedTime, and AgeRange attributes may be dependent on each other but they are independent enough that it would make sense for them not to be functionally dependent on one another
- In **Craft** the CraftType and Theme attributes were added to represent the subclasses in the ER diagram that were not showcased in the old relational model
- **Instruction** was not in 3NF nor 2NF since it had InstructionID which was not determined nor did determine any other attribute so InstructionID was removed
- **Material** was not in 3NF nor 1NF since MaterialType was a composite attribute so it was turned into a regular attribute as the component attributes were not useful
- **CraftMaterial** and **CraftTool** were added to represent relationships that were not represented in the old relational model. These relations are already in 3NF

3.2. Relational Data Model Design:

Schema Diagram

User

<u>UserID</u>	UserType	UserName	Email
---------------	----------	----------	-------

Craft

<u>CraftID</u>	CraftName	DifficultyLevel	EstimatedTime	AgeRange	CraftType	Theme
----------------	-----------	-----------------	---------------	----------	-----------	-------

Instruction

<u>CraftID</u>	<u>StepNumber</u>	Description
----------------	-------------------	-------------

Material

<u>MaterialID</u>	MaterialName	Quantity	Price	MaterialType
-------------------	--------------	----------	-------	--------------

Tool

<u>ToolID</u>	ToolName	Price	ToolType
---------------	----------	-------	----------

CraftMaterial

<u>CraftID</u>	<u>MaterialID</u>	Quantity
----------------	-------------------	----------

CraftTool

<u>CraftID</u>	<u>ToolID</u>
----------------	---------------

Specified Primary Keys, Foreign Keys and referential integrity constraints:

User

- **Primary Key:** UserID
- **Attributes:** UserType, UserName, Email

Craft

- **Primary Key:** CraftID
- **Attributes:** CraftName, DifficultyLevel, EstimatedTime, AgeRange, CraftType, Theme

Instruction

- **Composite Primary Key:** CraftID, StepNumber
- **Attributes:** Description
- **Foreign Key:** CraftID references Craft(CraftID)

Material

- **Primary Key:** MaterialID
- **Attributes:** MaterialName, Quantity, Price, MaterialType

Tool

- **Primary Key:** ToolID
- **Attributes:** ToolName, Price, ToolType

CraftMaterial

- **Composite Primary Key:** CraftID, MaterialID
- **Attributes:** Quantity
- **Foreign Keys:**
 - CraftID references Craft(CraftID)
 - MaterialID references Material(MaterialID)

CraftTool

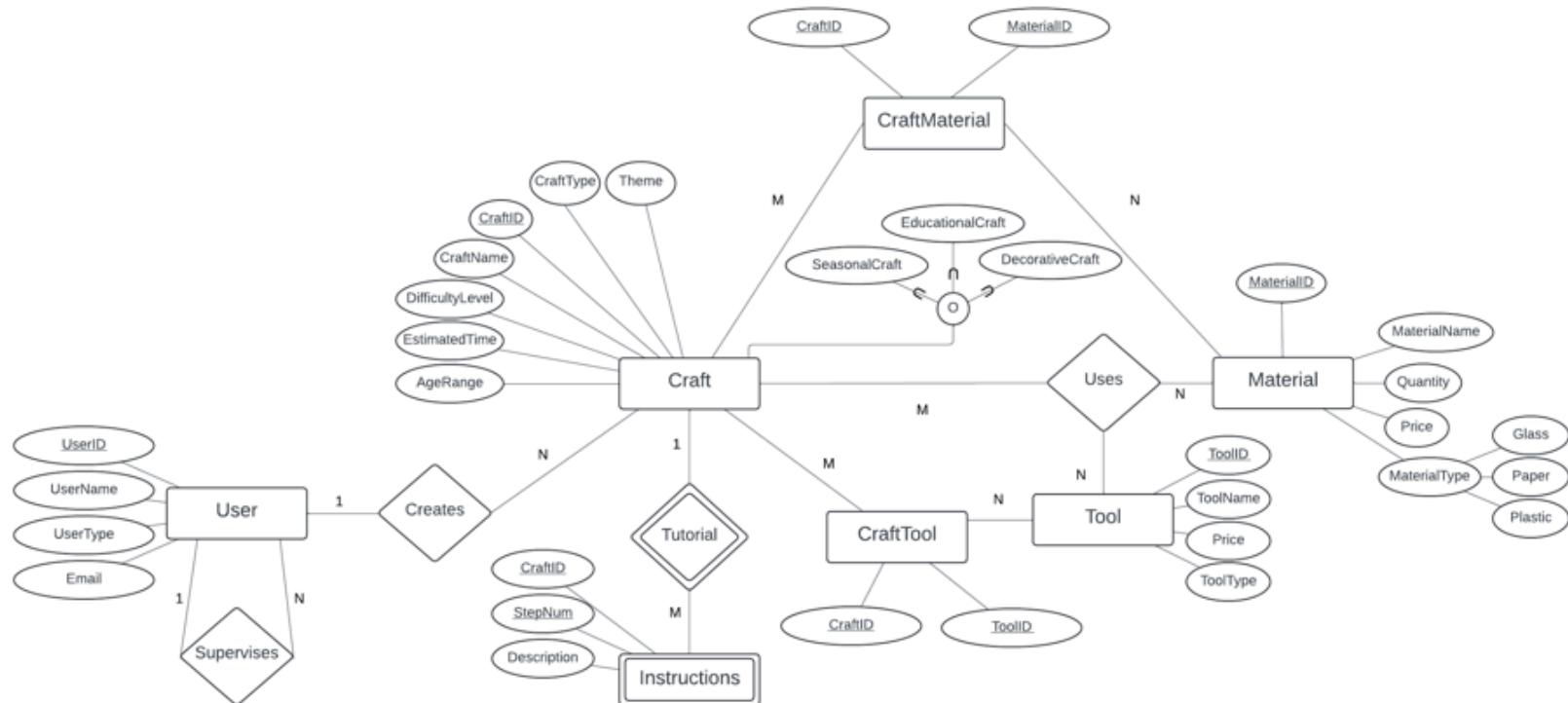
- **Composite Primary Key:** (CraftID, ToolID)
- **Foreign Keys:**
 - CraftID references Craft(CraftID)
 - ToolID references Tool(ToolID)

Referential Integrity Constraints

- **User** table is independent and does not reference any other table.
- **Craft** table is a reference for other tables:
 - CraftID in **Instruction** references Craft(CraftID).
 - CraftID in **CraftMaterial** references Craft(CraftID).
 - CraftID in **CraftTool** references Craft(CraftID).
- **Material** table:
 - MaterialID in **CraftMaterial** references Material(MaterialID).
- **Tool** table:
 - ToolID in **CraftTool** references Tool(ToolID).

EER Diagram

User, Craft, Material, and Tool tables are in 3NF because each non-prime attribute is dependent on the primary key and there are no transitive dependencies. CraftMaterial and CraftTool were added as junction tables to represent many-to-many relationships, for normalization and to reduce the redundancy. Instruction table was normalized by removing InstructionID, using a composite key (CraftID, StepNumber).



3.3 Create your Database and Populate:

The normalized database now conforms to the 3NF specifications that were stated in 3.1. There are no more partial dependencies and attributes now depend on the whole primary key.

Create Statements

```
CREATE TABLE Users (
    UserID INT PRIMARY KEY,
    UserType VARCHAR(50),
    UserName VARCHAR(100),
    Email VARCHAR(100)
);

CREATE TABLE Craft (
    CraftID INT PRIMARY KEY,
    UserID INT,
    CraftName VARCHAR(100),
    DifficultyLevel VARCHAR(50),
    EstimatedTime INT,
    AgeRange VARCHAR(50),
    CraftType VARCHAR(50),
    Theme VARCHAR(50),
    FOREIGN KEY (UserID) REFERENCES Users(UserID)
);

CREATE TABLE Instructions (
    CraftID INT,
    StepNumber INT,
    Description TEXT,
    PRIMARY KEY (CraftID, StepNumber),
    FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)
);

CREATE TABLE Material (
    MaterialID INT PRIMARY KEY,
    MaterialName VARCHAR(100),
    Quantity INT,
    Price DECIMAL(10, 2),
    MaterialType VARCHAR(50)
);

CREATE TABLE Tool (
    ToolID INT PRIMARY KEY,
    ToolName VARCHAR(100),
    Price DECIMAL(10, 2),
    ToolType VARCHAR(50)
);
```

```
CREATE TABLE CraftMaterialRelation (
    CraftID INT,
    MaterialID INT,
    Quantity INT,
    PRIMARY KEY (CraftID, MaterialID),
    FOREIGN KEY (CraftID) REFERENCES Craft(CraftID),
    FOREIGN KEY (MaterialID) REFERENCES Material(MaterialID)
);

CREATE TABLE CraftToolRelation (
    CraftID INT,
    ToolID INT,
    QuantityRequired INT,
    PRIMARY KEY (CraftID, ToolID),
    FOREIGN KEY (CraftID) REFERENCES Craft(CraftID),
    FOREIGN KEY (ToolID) REFERENCES Tool(ToolID)
);

CREATE TABLE Supervises (
    SupervisorID INT,
    SupervisedID INT,
    PRIMARY KEY (SupervisorID, SupervisedID),
    FOREIGN KEY (SupervisorID) REFERENCES Users(UserID),
    FOREIGN KEY (SupervisedID) REFERENCES Users(UserID)
);

CREATE TABLE RecyclingCenter (
    CenterID INT PRIMARY KEY,
    CenterName VARCHAR(100),
    Location VARCHAR(100)
);

CREATE TABLE Recycles (
    MaterialID INT,
    CenterID INT,
    PRIMARY KEY (MaterialID, CenterID),
    FOREIGN KEY (MaterialID) REFERENCES Material(MaterialID),
    FOREIGN KEY (CenterID) REFERENCES RecyclingCenter(CenterID)
);
```

```
|  
| CREATE TABLE SeasonalCraft (  
|     CraftID INT PRIMARY KEY,  
|     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)  
| );  
  
| CREATE TABLE DecorativeCraft (  
|     CraftID INT PRIMARY KEY,  
|     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)  
| );  
  
| CREATE TABLE EducationalCraft (  
|     CraftID INT PRIMARY KEY,  
|     FOREIGN KEY (CraftID) REFERENCES Craft(CraftID)  
| );
```

Population Statements

```

    □ INSERT INTO Users (UserID, UserType, UserName, Email)
    VALUES
        (1, 'Teacher', 'Alice Johnson', 'alice.johnson@example.com'),
        (2, 'Student', 'Bob Smith', 'bob.smith@example.com'),
        (3, 'Parent', 'Carol White', 'carol.white@example.com'),
        (4, 'Teacher', 'David Green', 'david.green@example.com'),
        (5, 'Student', 'Eve Brown', 'eve.brown@example.com'),
        (6, 'Teacher', 'Frank Thomas', 'frank.thomas@example.com'),
        (7, 'Parent', 'Grace Kelly', 'grace.kelly@example.com'),
        (8, 'Student', 'Henry Adams', 'henry.adams@example.com'),
        (9, 'Teacher', 'Ivy Martin', 'ivy.martin@example.com'),
        (10, 'Student', 'Jake Turner', 'jake.turner@example.com');

    □ INSERT INTO Craft (CraftID, UserID, CraftName, DifficultyLevel, EstimatedTime, AgeRange)
    VALUES
        (1, 1, 'Paper Airplane', 'Easy', 15, '5-10'),
        (2, 2, 'Origami Crane', 'Medium', 30, '10-15'),
        (3, 3, 'Beaded Bracelet', 'Easy', 20, '8-12'),
        (4, 4, 'Wooden Birdhouse', 'Hard', 90, '12-18'),
        (5, 5, 'Clay Sculpture', 'Medium', 60, '10-16'),
        (6, 6, 'Knitted Scarf', 'Hard', 120, '12-18'),
        (7, 7, 'Paper Mache Mask', 'Medium', 45, '10-15'),
        (8, 8, 'DIY Picture Frame', 'Easy', 30, '8-12'),
        (9, 9, 'Christmas Ornament', 'Easy', 20, '5-10'),
        (10, 10, 'Lego Robot', 'Medium', 60, '10-15');

    □ INSERT INTO Instructions (CraftID, StepNumber, Description)
    VALUES
        (1, 1, 'Fold the paper in half lengthwise.'),
        (1, 2, 'Fold the corners into triangles.'),
        (1, 3, 'Fold the wings down.'),
        (2, 1, 'Fold the paper into a square.'),
        (2, 2, 'Fold diagonally to form a triangle.'),
        (2, 3, 'Bring the edges together to form a crane shape.'),
        (3, 1, 'Thread the beads onto the string.'),
        (3, 2, 'Tie a knot at the end of the string.'),
        (4, 1, 'Cut the wooden pieces according to the measurements.'),
        (4, 2, 'Assemble the pieces to form the birdhouse.');

```

```

]INSERT INTO Material (MaterialID, MaterialName, Quantity, Price, MaterialType)
VALUES
(1, 'Paper', 100, 0.10, 'Paper'),
(2, 'Beads', 200, 0.05, 'Plastic'),
(3, 'Wood', 50, 1.50, 'Wood'),
(4, 'Clay', 30, 2.00, 'Plastic'),
(5, 'Yarn', 40, 1.20, 'Fabric'),
(6, 'Paint', 25, 3.00, 'Glass'),
(7, 'Glue', 50, 0.50, 'Plastic'),
(8, 'Lego Bricks', 500, 0.15, 'Plastic'),
(9, 'Wire', 100, 0.75, 'Metal'),
(10, 'Fabric', 60, 1.00, 'Fabric');

]INSERT INTO Tool (ToolID, ToolName, Price, ToolType)
VALUES
(1, 'Scissors', 2.00, 'Cutting'),
(2, 'Paintbrush', 1.50, 'Painting'),
(3, 'Needle', 1.00, 'Sewing'),
(4, 'Hammer', 5.00, 'Building'),
(5, 'Screwdriver', 3.50, 'Building'),
(6, 'Hot Glue Gun', 7.00, 'Adhesive'),
(7, 'Saw', 8.00, 'Cutting'),
(8, 'Pliers', 4.50, 'Bending'),
(9, 'Lego Separator', 2.00, 'Building'),
(10, 'Measuring Tape', 1.75, 'Measuring');

]INSERT INTO CraftMaterialRelation (CraftID, MaterialID, Quantity)
VALUES
(1, 1, 1),
(2, 1, 1),
(3, 2, 20),
(4, 3, 5),
(5, 4, 1),
(6, 5, 2),
(7, 1, 3),
(8, 10, 2),
(9, 6, 1),
(10, 8, 50);

```

```
INSERT INTO CraftToolRelation (CraftID, ToolID, QuantityRequired)
VALUES
(1, 1, 1),
(2, 2, 1),
(3, 3, 1),
(4, 4, 1),
(5, 2, 1),
(6, 3, 1),
(7, 6, 1),
(8, 1, 1),
(9, 2, 1),
(10, 9, 1);

INSERT INTO Supervises (SupervisorID, SupervisedID)
VALUES
(1, 2),
(3, 5),
(4, 6),
(1, 8),
(7, 10),
(1, 9),
(6, 8),
(9, 10),
(4, 7),
(3, 4);

INSERT INTO RecyclingCenter (CenterID, CenterName, Location)
VALUES
(1, 'City Recycling Center', 'Downtown'),
(2, 'Green Earth Recycling', 'Suburbs'),
(3, 'Eco Friendly Recycling', 'Uptown'),
(4, 'Neighborhood Recycling', 'Residential Area'),
(5, 'Community Recycling', 'Park Area'),
(6, 'Reclaim and Recycle', 'Industrial Zone'),
(7, 'Planet Care Recycling', 'City Outskirts'),
(8, 'GreenCycle', 'Main Street'),
(9, 'Future Earth Recycling', 'Town Center'),
(10, 'Clean Earth Recycling', 'Rural Area');
```

```

INSERT INTO Recycles (MaterialID, CenterID)
VALUES
(1, 1),
(2, 2),
(3, 3),
(4, 4),
(5, 5),
(6, 6),
(7, 7),
(8, 8),
(9, 9),
(10, 10);

INSERT INTO SeasonalCraft (CraftID)
VALUES
(1), (4), (9);

INSERT INTO DecorativeCraft (CraftID)
VALUES
(3), (6), (8);

INSERT INTO EducationalCraft (CraftID)
VALUES
(2), (5), (10);

```

Resulting Table Statements

Select * from Craft;

	CraftID	UserID	CraftName	DifficultyLevel	EstimatedTime	AgeRange	CraftType	Theme
1	1	1	Paper Airplane	Easy	15	5-10	NULL	NULL
2	2	2	Origami Crane	Medium	30	10-15	NULL	NULL
3	3	3	Beaded Bracelet	Easy	20	8-12	NULL	NULL
4	4	4	Wooden Birdhouse	Hard	90	12-18	NULL	NULL
5	6	6	Knitted Scarf	Hard	120	12-18	NULL	NULL
6	7	7	Paper Mache Mask	Medium	45	10-15	NULL	NULL
7	8	8	DIY Picture Frame	Easy	30	8-12	NULL	NULL
8	9	9	Christmas Ornament	Easy	20	5-10	NULL	NULL
9	10	10	Lego Robot	Medium	60	10-15	NULL	NULL
10	11	5	Bottle Rocket	Easy	15	5-10	NULL	NULL

);
Select * from Users;

99 %

Results Messages

	UserID	UserType	UserName	Email
1	1	Teacher	Alice Johnson	alice.johnson@example.com
2	2	Student	Bob Smith	bob.smith@example.com
3	3	Parent	Carol White	carol.white@example.com
4	4	Teacher	David Green	david.green@example.com
5	5	Student	Eve Brown	eve.brown@example.com
6	6	Teacher	Frank Thomas	frank.thomas@example.com
7	7	Parent	Grace Kelly	grace.kelly@example.com
8	8	Student	Henry Adams	henry.adams@example.com
9	9	Teacher	Ivy Martin	ivy.martin@example.com
10	10	Student	Jake Turner	jake.turner@example.com

Select * from Instructions;

99 %

Results Messages

	CraftID	StepNumber	Description
1	1	1	Fold the paper in half lengthwise.
2	1	2	Fold the corners into triangles.
3	1	3	Fold the wings down.
4	2	1	Fold the paper into a square.
5	2	2	Fold diagonally to form a triangle.
6	2	3	Bring the edges together to form a crane shape.
7	3	1	Thread the beads onto the string.
8	3	2	Tie a knot at the end of the string.
9	4	1	Cut the wooden pieces according to the measureme...
10	4	2	Assemble the pieces to form the birdhouse.

```
Select * from Material;
```

99 %

Results Messages

	MaterialID	MaterialName	Quantity	Price	MaterialType
1	1	Paper	100	0.10	Paper
2	2	Beads	200	0.05	Plastic
3	3	Wood	50	1.50	Wood
4	4	Clay	30	2.00	Plastic
5	5	Yarn	40	1.20	Fabric
6	6	Paint	25	3.00	Glass
7	7	Glue	50	0.50	Plastic
8	8	Lego Bricks	500	0.15	Plastic
9	9	Wire	100	0.75	Metal
10	10	Fabric	60	1.00	Fabric

```
);
```

```
Select * from Tool;
```

99 %

Results Messages

	ToolID	ToolName	Price	ToolType
1	1	Scissors	2.00	Cutting
2	2	Paintbrush	1.50	Painting
3	3	Needle	1.00	Sewing
4	4	Hammer	5.00	Building
5	5	Screwdriver	3.50	Building
6	6	Hot Glue Gun	7.00	Adhesive
7	7	Saw	8.00	Cutting
8	8	Pliers	4.50	Bending
9	9	Lego Separator	2.00	Building
10	10	Measuring Tape	1.75	Measuring

Select * from CraftMaterialRelation;

99 %

Results Messages

	CraftID	MaterialID	Quantity
1	1	1	1
2	2	1	1
3	3	2	20
4	4	3	5
5	6	5	2
6	7	1	3
7	8	10	2
8	9	6	1
9	10	8	50

Select * from CraftToolRelation;

99 %

Results Messages

	CraftID	ToolID	QuantityRequired
1	1	1	1
2	2	2	1
3	3	3	1
4	4	4	1
5	6	3	1
6	7	6	1
7	8	1	1
8	9	2	1
9	10	9	1

Select * from Supervises;

99 %

Results Messages

	SupervisorID	SupervisedID
1	1	2
2	1	8
3	1	9
4	3	4
5	3	5
6	4	6
7	4	7
8	6	8
9	7	10
10	9	10

Select * from RecyclingCenter;

99 %

Results Messages

	CenterID	CenterName	Location
1	1	City Recycling Center	Downtown
2	2	Green Earth Recycling	Suburbs
3	3	Eco Friendly Recycling	Uptown
4	4	Neighborhood Recycling	Residential Area
5	5	Community Recycling	Park Area
6	6	Reclaim and Recycle	Industrial Zone
7	7	Planet Care Recycling	City Outskirts
8	8	GreenCycle	Main Street
9	9	Future Earth Recycling	Town Center
10	10	Clean Earth Recycling	Rural Area

Select * from Recycles;

99 %

Results Messages

	MaterialID	CenterID
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	8
9	9	9
10	10	10

Select * from SeasonalCraft;

99 %

Results Messages

	CraftID
1	1
2	4
3	9

Select * from DecorativeCraft;

99 %

Results Messages

	CraftID
1	3
2	6
3	8

Select * from EducationalCraft;

99 %

Results Messages

	CraftID
1	2
2	10

3.4 Database Query Execution:

Query 1: List the crafts where the difficulty is easy.

```
SELECT CraftID, CraftName, DifficultyLevel, AgeRange
FROM Craft
WHERE DifficultyLevel = 'Easy';
```

99 %

	CraftID	CraftName	DifficultyLevel	AgeRange
1	1	Paper Airplane	Easy	5-10
2	3	Beaded Bracelet	Easy	8-12
3	8	DIY Picture Frame	Easy	8-12
4	9	Christmas Ornament	Easy	5-10

Query 2: List the materials for a craft with ID 1.

```
SELECT Material.MaterialName, CraftMaterialRelation.Quantity
FROM Material
JOIN CraftMaterialRelation
    ON Material.MaterialID = CraftMaterialRelation.MaterialID
WHERE CraftMaterialRelation.CraftID = 1;
```

99 %

	MaterialName	Quantity
1	Paper	3

Insert: Insert into Tool 2 objects “Wrench” and “Pen”

```

Insert into Tool
Values
(11, 'Wrench', 2.00, 'Building'),
(12, 'Pen', 1.50, 'Drawing');

Select * from Tool;

```

99 % ▾

Results Messages

	ToolID	ToolName	Price	ToolType
1	1	Scissors	2.00	Cutting
2	2	Paintbrush	1.50	Painting
3	3	Needle	1.00	Sewing
4	4	Hammer	5.00	Building
5	5	Screwdriver	3.50	Building
6	6	Hot Glue Gun	7.00	Adhesive
7	7	Saw	8.00	Cutting
8	8	Pliers	4.50	Bending
9	9	Lego Separator	2.00	Building
10	10	Measuring Tape	1.75	Measuring
11	11	Wrench	2.00	Building
12	12	Pen	1.50	Drawing

Delete: Delete from SeasonalCraft where CraftID is 1.

```

DELETE FROM SeasonalCraft
WHERE CraftID = 1;
Select * from SeasonalCraft;

```

99 % ▾

Results Messages

	CraftID
1	4
2	9

Update: Update CraftMaterialRelation to have a quantity of 3 materials where CraftID and MaterialID are 1.

```
UPDATE CraftMaterialRelation
SET Quantity = 3
WHERE CraftID = 1 AND MaterialID = 1;

Select * from CraftMaterialRelation;
```

99 %

	CraftID	MaterialID	Quantity
1	1	1	3
2	2	1	3
3	3	2	3
4	4	3	3
5	6	5	3
6	7	1	3
7	8	10	3
8	9	6	3
9	10	8	3

3.5 Create View

The purpose of this view is to provide a look at each craft along with the creator's information. This can be useful for viewing craft details along with creator details in a user interface or report.

Query Query History

```

1 ✓ CREATE VIEW CraftDetailsView AS
2   SELECT
3     c.CraftID,
4     c.CraftName,
5     c.DifficultyLevel,
6     c.EstimatedTime,
7     c.AgeRange,
8     u.UserName AS CreatorName,
9     u.UserType AS CreatorType
10    FROM
11      Craft c
12    JOIN
13      Users u ON c.UserID = u.UserID;
14
15  SELECT * FROM CraftDetailsView;

```

Data Output Messages Notifications

	craftid integer	craftname character varying (100)	difficultylevel character varying (50)	estimatedtime integer	agerange character varying (50)	creatormame character varying (100)	creatortype character varying (50)
1	1	Paper Airplane	Easy	15	5-10	Alice Johnson	Teacher
2	2	Origami Crane	Medium	30	10-15	Bob Smith	Student
3	4	Wooden Birdhouse	Hard	90	12-18	David Green	Teacher
4	5	Clay Sculpture	Medium	60	10-16	Eve Brown	Student
5	6	Knitted Scarf	Hard	120	12-18	Frank Thomas	Teacher
6	7	Paper Mache Mask	Medium	45	10-15	Grace Kelly	Parent
7	8	DIY Picture Frame	Easy	30	8-12	Henry Adams	Student
8	9	Christmas Ornament	Easy	20	5-10	Ivy Martin	Teacher
9	10	Lego Robot	Medium	60	10-15	Jake Turner	Student
10	3	Beaded Bracelet	Very Hard	20	8-12	Carol White	Parent

4. Front End User Interface:

Main Menu GUI:

The screenshot shows a Windows-style application window titled "Craft Ideas Database Operations". The window contains four main sections: "Add New Craft", "Delete Craft", "Update Craft", and "Query Crafts".

- Add New Craft:** A form with fields for User (dropdown), Craft Name (text input), Difficulty Level (dropdown), Craft Type (dropdown), Theme (text input), Estimated Time (minutes) (text input), and Age Range (e.g., 5-10) (text input). A green "Add Craft" button is at the bottom.
- Delete Craft:** A form with a field for Craft Name to Delete (text input) and a red "Delete Craft" button.
- Update Craft:** A form with fields for Craft Name to Update (text input), New Difficulty Level (dropdown), New Theme (text input), New Estimated Time (minutes) (text input), and New Age Range (e.g., 5-10) (text input). An orange "Update Craft" button is at the bottom.
- Query Crafts:** Three blue buttons labeled "Show Easy Crafts", "Show Medium Crafts", and "Show Hard Crafts". Below them is a grey "Quit Application" button.

Original Craft Tuples:

Select * from Craft;

	CraftID	UserID	CraftName	DifficultyLevel	EstimatedTime	AgeRange	CraftType	Theme
1	1	1	Paper Airplane	Medium	15	12-19	NULL	Decorative
2	2	2	Origami Crane	Medium	30	10-15	NULL	NULL
3	3	3	Beaded Bracelet	Easy	20	8-12	NULL	NULL
4	4	4	Wooden Birdhouse	Hard	90	12-18	NULL	NULL
5	6	6	Knitted Scarf	Hard	120	12-18	NULL	NULL
6	7	7	Paper Mache Mask	Medium	45	10-15	NULL	NULL
7	8	8	DIY Picture Frame	Easy	30	8-12	NULL	NULL
8	9	9	Christmas Ornament	Easy	20	5-10	NULL	NULL
9	10	10	Lego Robot	Medium	60	10-15	NULL	NULL
10	11	5	Bottle Rocket	Easy	15	5-10	NULL	NULL

1. Query to retrieve all easy, medium and hard crafts.

Easy Difficulty Crafts Query:

Craft Name	Time (min)	Age Range
Beaded Bracelet	20	8-12
Bottle Rocket	15	5-10
Christmas Ornament	20	5-10
DIY Picture Frame	30	8-12

Medium Difficulty Crafts Query:

The application interface shows the 'Medium Difficulty Crafts' window. The window title is 'Medium Difficulty Crafts'. It contains a table with three columns: 'Craft Name', 'Time (min)', and 'Age Range'. The data in the table is as follows:

Craft Name	Time (min)	Age Range
Lego Robot	60	10-15
Origami Crane	30	10-15
Paper Airplane	15	12-19
Paper Mache Mask	45	10-15

Hard Difficulty Crafts Query:

The application interface shows the 'Hard Difficulty Crafts' window. The window title is 'Hard Difficulty Crafts'. It contains a table with three columns: 'Craft Name', 'Time (min)', and 'Age Range'. The data in the table is as follows:

Craft Name	Time (min)	Age Range
Knitted Scarf	120	12-18
Wooden Birdhouse	90	12-18

2. Insert a new craft into the database

Craft Ideas Database Operations

Add New Craft

User:	1 - 1 - Alice Johnson
Craft Name:	Scrapbook
Difficulty Level:	Medium
Craft Type:	Decorative
Theme:	Study
Estimated Time (minutes):	50
Age Range (e.g., 5-10):	15-20

Add Craft

Success

Craft idea 'Scrapbook' inserted successfully with ID 12!

OK

```
Select * from Craft;
```

	CraftID	UserID	CraftName	DifficultyLevel	EstimatedTime	AgeRange	CraftType	Theme
1	1	1	Paper Airplane	Medium	15	12-19	NULL	Decorative
2	2	2	Origami Crane	Medium	30	10-15	NULL	NULL
3	3	3	Beaded Bracelet	Easy	20	8-12	NULL	NULL
4	4	4	Wooden Birdhouse	Hard	90	12-18	NULL	NULL
5	6	6	Knitted Scarf	Hard	120	12-18	NULL	NULL
6	7	7	Paper Mache Mask	Medium	45	10-15	NULL	NULL
7	8	8	DIY Picture Frame	Easy	30	8-12	NULL	NULL
8	9	9	Christmas Ornament	Easy	20	5-10	NULL	NULL
9	10	10	Lego Robot	Medium	60	10-15	NULL	NULL
10	11	5	Bottle Rocket	Easy	15	5-10	NULL	NULL
11	12	1	Scrapbook	Medium	50	15-20	Decorative	Study

3. Delete a craft by name in the database

The screenshot shows a web-based application interface. At the top left is a green button labeled "Add Craft". Below it is a modal dialog titled "Delete Craft" with a sub-header "Craft Name to Delete: Scrapbook". A red "Delete Craft" button is at the bottom of this dialog. To the right of the main window is a success message box with an orange header "Success" and a blue info icon. The message reads "Craft idea 'Scrapbook' and all related records deleted successfully!" with an "OK" button. Below the main window is a SQL query editor containing the command "Select * from Craft;". At the bottom is a database results grid titled "Results" showing 10 rows of craft data.

	CraftID	UserID	CraftName	DifficultyLevel	EstimatedTime	AgeRange	CraftType	Theme
1	1	1	Paper Airplane	Medium	15	12-19	NULL	Decorative
2	2	2	Origami Crane	Medium	30	10-15	NULL	NULL
3	3	3	Beaded Bracelet	Easy	20	8-12	NULL	NULL
4	4	4	Wooden Birdhouse	Hard	90	12-18	NULL	NULL
5	6	6	Knitted Scarf	Hard	120	12-18	NULL	NULL
6	7	7	Paper Mache Mask	Medium	45	10-15	NULL	NULL
7	8	8	DIY Picture Frame	Easy	30	8-12	NULL	NULL
8	9	9	Christmas Ornament	Easy	20	5-10	NULL	NULL
9	10	10	Lego Robot	Medium	60	10-15	NULL	NULL
10	11	5	Bottle Rocket	Easy	15	5-10	NULL	NULL

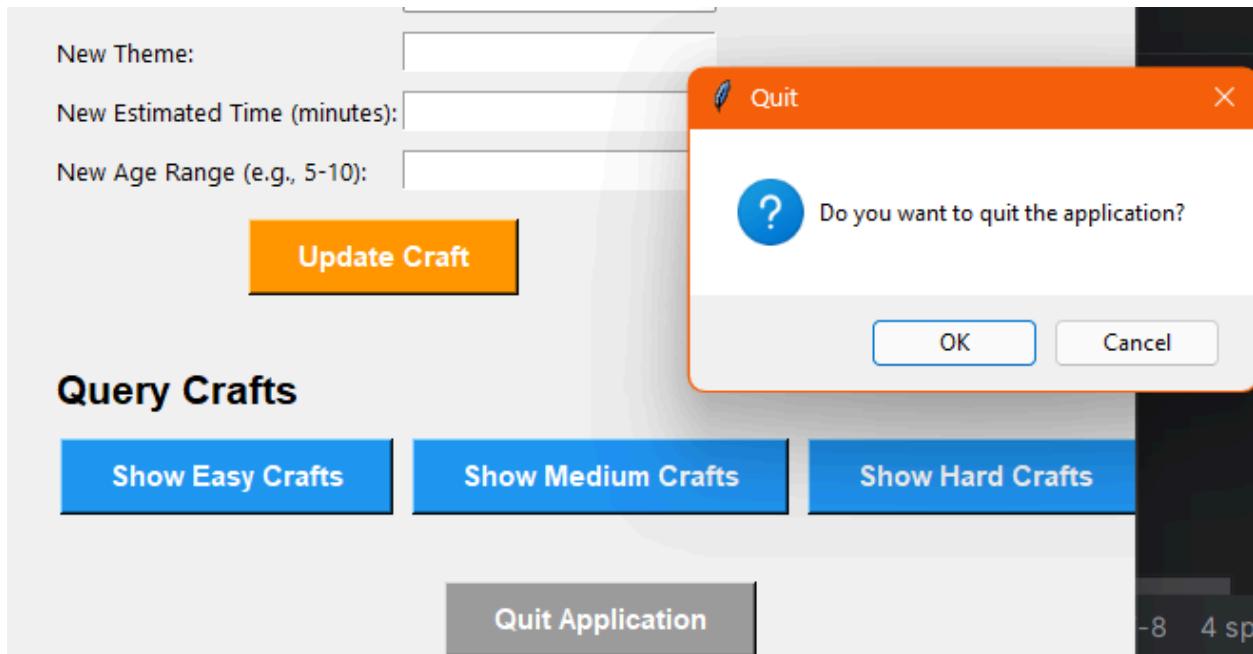
4. Update a craft in the database for the attributes in craft

The screenshot shows a web-based application interface. On the left is an "Update Craft" form with fields for "Craft Name to Update" (Origami Crane), "New Difficulty Level" (Hard), "New Theme" (Paper Crafts), "New Estimated Time (minutes)" (20), and "New Age Range (e.g., 5-10)" (10-20). An orange "Update Craft" button is at the bottom. To the right is a success message box with an orange header "Success" and a blue info icon. The message reads "Craft 'Origami Crane' updated successfully!" with an "OK" button.

Select * from Craft;

	CraftID	UserID	CraftName	DifficultyLevel	EstimatedTime	AgeRange	CraftType	Theme
1	1	1	Paper Airplane	Medium	15	12-19	NULL	Decorative
2	2	2	Origami Crane	Hard	20	10-20	NULL	Paper Crafts
3	3	3	Beaded Bracelet	Easy	20	8-12	NULL	NULL
4	4	4	Wooden Birdhouse	Hard	90	12-18	NULL	NULL
5	6	6	Knitted Scarf	Hard	120	12-18	NULL	NULL
6	7	7	Paper Mache Mask	Medium	45	10-15	NULL	NULL
7	8	8	DIY Picture Frame	Easy	30	8-12	NULL	NULL
8	9	9	Christmas Ornament	Easy	20	5-10	NULL	NULL
9	10	10	Lego Robot	Medium	60	10-15	NULL	NULL
10	11	5	Bottle Rocket	Easy	15	5-10	NULL	NULL

5. End the connection to close the program



5. Conclusion & Future Work

In this report, we talked about the development and implementation of the EcoCraft database system, which aims to promote sustainability and waste reduction through creative craft ideas using recycled materials. Our team has successfully designed a relational database and

interface that allows users to input and retrieve craft ideas, and manage materials and tools. Throughout the project, we have adhered to our original goals of improving sustainable education, waste reduction, and cost efficiency in crafting.

In the future, we have several ideas for expansion to improve our project further. Our first idea would be developing user authentication to provide a personalized experience allowing users to track which crafts they have completed while maintaining security. Another feature we want to implement would be a message board or forum, allowing users to share their craft creations and ideas with others on the platform. Lastly, we want to look for ways to push EcoCraft's impact further such as advertising it in schools to teach recycling and creativity to the new generation. These future directions not only improve the functionality of EcoCraft but also contribute to its mission of reducing waste and encouraging sustainable practices.

6. References

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