1. **Card Collection Inventory Data Model**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Name** | **Manufacture Name** | **Manufacture Location** | **Item Storage Box Number** | **Storage Box Description** | **Cost** | **Current Market Value** |
| 1 | 2015 Panini Black Gold Nikola Jokic | Panini | 5325 FAA Blvd Suite 100, Irving, TX 75061 | B1 | Modern Basketball | $400 | $900 |
| 2 | 1969 Topps Wes Unseld | Topps | 1 Whitehall Street New York, NY 10004 | B2 | Vintage Basketball | $500 | $500 |
| 3 | 2019 Upper Deck Young Guns Makar Card | Upper Deck | 33 Unknown Street Carlsbad, CA 92008 | H1 | Modern Hockey | $130 | $400 |
| 4 | 1969 Topps Lew Alcindor | Topps | 1 Whitehall Street New York, NY 10004 | B2 | Vintage Basketball | $450 | $455 |

* **Step 1: First Normal Form (1NF)**
  + **Requirement**: Each attribute must contain only atomic (indivisible) values.
  + The data is already “atomic” with no repeating groups present
* **Second Normal Form (2NF)**
  + **Requirement:** The relation must be in 1NF and contain no partial dependencies. All non-prime attributes must be fully dependent on the primary key (composite key or a single key).
  + The table has a composite key of ‘Item\_ID’. However, there are some partial dependencies. These include things like ‘Manufacturer location’ and ‘Manufacturer name’ being dependent only on the manufacturer and not fully on the Item ID
* **Third Normal Form (3NF)**
  + **Requirement:** The relation must be in 2NF and contain no transitive dependencies.
  + There are potential transitive dependencies between ‘Storage Box Number’ and ‘Storage Box Description.’ The description is dependent on the box number, but not on the primary key ‘Item\_ID’
  + The three tables below are in final normalized form.

**Table1: Items**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Item ID** | **Item Name** | **Manufacturer ID** | **Storage Box Number** | **Cost** | **Current Market Value** |
| 1 | 2015 Panini Black Gold Nikola Jokic | 1 | B1 | $400 | $900 |
| 2 | 1969 Topps Wes Unseld | 2 | B2 | $500 | $500 |
| 3 | 2019 Upper Deck Young Guns Makar Card | 3 | H1 | $130 | $400 |
| 4 | 1969 Topps Lew Alcindor | 2 | B2 | $450 | $455 |

**Table2: Manufactures**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| |  | | --- | | **Manufacturer ID** | | |  | | --- | | **Manufacturer Name** | | |  | | --- | | **Manufacturer Location** | |
| 1 | Panini | |  | | --- | |  |  |  | | --- | | 5325 FAA Blvd, Suite 100, Irving, TX 75061 | |
| 2 | Topps | 1 Whitehall Street, New York, NY 10004 |
| 3 | Upper Deck | 33 Unknown Street, Carlsbad, CA 92008 |

**Table3: Storage Boxes**

|  |  |  |
| --- | --- | --- |
| **Storage ID** | **Storage Box Number** | **Storage Box Description** |
| 1 | B1 | Modern Basketball |
| 2 | B2 | Vintage Basketball |
| 3 | H1 | Modern Hockey |

1. **Plant Collection Data Model**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Plant Name** | **Plant Type** | **Plant Location** | **Location Sunlight Time** | **Plant Water Schedule** | **Plant Produces Food** | **Days Alive** | **Plant Water Person** | **Plant Water Person Contact** |
| Carl | Cactus | Kitchen Counter | 4 Hours | None | No | 100 | Bob | 913-875-0987 |
| Chilly | Cayenne Pepper Plant | Front Porch | 6 Hours | Monday | Yes | 10 | Linda | 913-876-0932 |
| Spiderman | Spider Plant | Home Office | 2 Hours | Tuesday, Thursday | No | 35 | Bob | 913-875-0987 |
| Planto the Plant | Tomato Plant | Front Porch | 6 Hours | Monday, Friday | Yes | 15 | Linda | 813-876-0932 |

* **Step 1: First Normal Form (1NF)**
  + **Requirement**: Each attribute must contain only atomic (indivisible) values.
  + The ‘Plant Water Schedule’ column has multiple values for some entries (i.e. Tuesday, Thursday). These values are separated into multiple rows
* **Step 2: Second Normal Form (2NF)**
  + **Requirement:** The relation must be in 1NF and contain no partial dependencies. All non-prime attributes must be fully dependent on the primary key (composite key or a single key).
  + ‘Plant Water Person’ and ‘Plant Water Person Contact’ depend on ‘Plant Water Person’ but not directly on ‘Plant Name,’ which inadvertently leads to a partial dependency. These tables are then split into two being one for plants and another for water schedules
* **Step 3: Third Normal Form (3NF)**
  + **Requirement:** The relation must be in 2NF and contain no transitive dependencies.
  + ‘Plant Water Person Contact’ is dependent on ‘Plant Water Person’ and ‘Location Sunglight Time’ is dependent on ‘Plant Location.’ These are not part of the primary key, so we separate these tables as well.
  + The four tables below are in final normalized form

**Table1: Plants**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Plant ID** | **Plant Name** | **Plant Type** | **Plant Produces Food** | **Days Alive** |
| 1 | Carl | Cactus | No | 100 |
| 2 | Chilly | Cayenne Pepper Plant | Yes | 10 |
| 3 | Spiderman | Spider Plant | No | 35 |
| 4 | Planto the Plant | Tomato Plant | Yes | 15 |

**Table2: Water Schedule**

|  |  |
| --- | --- |
| **Water Schedule ID** | **Water Schedule** |
| 1 | None |
| 2 | Monday |
| 3 | Tuesday |
| 4 | Thursday |
| 5 | Monday |
| 6 | Friday |

**Table3: Water Person**

|  |  |  |
| --- | --- | --- |
| **Water Person ID** | **Plant Water Person** | **Plant Water Person Contact** |
| 1 | Bob | 913-875-0987 |
| 2 | Linda | 913-876-0932 |
| 3 | Bob | 913-875-0987 |

**Table4: Location**

|  |  |  |
| --- | --- | --- |
| **Location ID** | **Plant Location** | **Location Sunlight Time** |
| 1 | Kitchen Counter | 4 Hours |
| 2 | Front Porch | 6 Hours |
| 3 | Home Office | 2 Hours |
| 4 | Front Porch | 6 Hours |