### **Data Flow Diagram (DFD) for E-Commerce Application**

This E-Commerce system consists of key features like **User Authentication (Login), Product Catalog, Cart Management, and Payment Processing**. Below is the **DFD representation** of how data flows through this system.

## **Level 0 (Context Diagram)**

At the highest level, the system interacts with:

* **External Entity (User)**: The user interacts with the system by logging in, viewing products, adding items to the cart, and making a payment.
* **Process (E-Commerce System)**: Manages authentication, product browsing, cart management, and payment.
* **Data Stores**:
  + **User Database**: Stores user credentials for authentication.
  + **Product Database**: Contains product details.
  + **Cart State**: Holds products added by the user.
  + **Order Database**: Stores completed orders.

### **Context Diagram Representation:**

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| External Entity |

| (User) |

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| E-Commerce System |

| (Processes Data) |

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| | Data Store: User DB |

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| | Data Store: Products |

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| | Data Store: Cart State |

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| Data Store: Orders |

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## **Level 1 DFD (Decomposition of Processes)**

This breaks down the **E-Commerce System** into key processes:

### **Process 1.1: User Authentication (Login)**

* The user enters **username** and **password**.
* The system verifies the credentials with the **User Database**.
* If valid, the user is logged in and redirected to the **Product Catalog**.

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| External Entity |

| (User) |

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| Process 1.1: Login |

| (Authenticate User) |

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| | Data Store: User DB |

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| Redirect to Catalog |

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### **Process 1.2: Product Browsing (Catalog)**

* The system retrieves products from the **Product Database**.
* The user views available products.

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| External Entity (User) |

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| Process 1.2: View |

| Product Catalog |

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| | Data Store: Products |

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| Display Product List |

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### **Process 1.3: Cart Management**

* The user selects a product and clicks **"Add to Cart"**.
* The system updates the **Cart State**.
* The user can remove items from the cart.

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| External Entity (User) |

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| Process 1.3: Add to |

| Cart / Remove Items |

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| | Data Store: Cart State |

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| Updated Cart Display |

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### **Process 1.4: Payment Processing**

* The user enters **card details** (Card Number, Expiry, CVV).
* The system processes the payment and stores the order in the **Order Database**.
* The user is redirected back to the **Catalog**.

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| External Entity (User) |

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| Process 1.4: Payment |

| (Checkout Order) |

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| | Data Store: Orders |

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| Order Confirmation |

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| Redirect to Catalog |

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## **Level 2 DFD (Detailed Breakdown of Cart & Payment)**

If you want a **more detailed** breakdown of how items are processed in the cart and how payment flows, it would look like this:

### **Cart & Checkout**

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| User Adds to Cart |

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| Update Cart State |

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| Proceed to Checkout |

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### **Payment Processing**

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| User Enters Payment |

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| Validate Card Details |

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| Process Payment API |

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| Store Order in DB |

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| Confirmation Message |

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## **Summary of Data Flow**

1. **Login Process**
   * The user logs in using credentials.
   * If authentication is successful, they are redirected to the **Catalog**.
2. **Product Browsing**
   * The user views products retrieved from the **Product Database**.
3. **Cart Management**
   * The user adds or removes products from the cart.
   * The cart updates dynamically in the **Cart State**.
4. **Payment Processing**
   * The user enters payment details.
   * The system processes payment and stores the order in the **Order Database**.
   * The user receives an order confirmation and is redirected to the **Catalog**.