**ProSports – Gear Up**

**Overview**

**ProSports: Gear Up** is an e-commerce platform tailored for **sports equipment, clothing, and accessories**. The platform supports **product attributes** specific to sports gear (e.g., sport type, size, weight, material), **multi-pack discounts** for equipment like tennis balls, and a **recommendation engine** to suggest sport-specific gear based on user preferences.

**Core Functionalities**

1. **Category Management**
   * Organize products into categories such as **Sports Equipment**, **Clothing**, and **Accessories**.
   * Provide subcategories like **Rackets**, **Balls**, and **Shoes**.
2. **Product Type Management**
   * Define reusable **Product Types** with attributes tailored for sports gear (e.g., sport type, size, weight, material).
3. **Product Management**
   * Create and manage products with attributes such as **sport type** (e.g., Tennis, Cricket), **material**, and **size**.
   * Support **multi-pack options** for certain items (e.g., a 3-pack of tennis balls).
4. **Product Variant Management**
   * Handle product variants for items like different sizes or weights.
   * Assign **unique SKUs** to each variant.
5. **Multi-Pack Discounts**
   * Enable configuration of discounts for multi-packs (e.g., a pack of 3 tennis balls at a reduced price).
6. **Recommendation Engine**
   * Suggest sport-specific gear based on user preferences and purchase history.
   * Provide APIs to fetch recommendations for logged-in users.
7. **Advanced Filtering and Search**
   * Allow filtering by **sport type, size, material**, and **price**.
   * Provide sorting by popularity, ratings, or price.

**Entity Relationships**

| **Entity** | **Relationships** |
| --- | --- |
| **Category** | One-to-Many: A category can have multiple subcategories, and products belong to one category. |
| **ProductType** | One-to-Many: A product type defines attributes for multiple products. |
| **Product** | One-to-Many: A product can have multiple variants, and belongs to one category and one product type. |
| **ProductVariant** | Many-to-One: A product variant belongs to one product. |
| **MultiPack** | Many-to-One: Multi-pack deals are associated with specific products. |
| **Recommendation** | Many-to-Many: Recommendations are based on user preferences and linked to multiple products. |

**Entity Descriptions**

**1. Category**

* Represents a hierarchical structure for browsing sports gear.
* **Attributes**:
  + id: Unique identifier.
  + name: Category name (e.g., Sports Equipment, Clothing).
  + parentCategory: Reference to the parent category for hierarchy.
  + description: Description of the category.

**2. ProductType**

* Defines a template for products with reusable attributes.
* **Attributes**:
  + id: Unique identifier.
  + name: Name of the product type (e.g., Racket, Ball, Shoes).
  + attributes: List of attributes (e.g., Sport Type, Size, Material, Weight).

**3. Product**

* Represents a specific product linked to a category and product type.
* **Attributes**:
  + id: Unique identifier.
  + name: Product name (e.g., Wilson Tennis Racket).
  + price: Base price of the product.
  + sportType: Sport type associated with the product (e.g., Tennis, Cricket).
  + description: Product description.
  + categoryId: Reference to the category.
  + productTypeId: Reference to the product type.

**4. ProductVariant**

* Represents specific variations of a product (e.g., different sizes or weights).
* **Attributes**:
  + id: Unique identifier.
  + sku: Unique SKU for the variant.
  + variantAttributes: Attributes specific to the variant (e.g., Size: Medium, Weight: 200g).
  + stock: Stock quantity for the variant.
  + additionalPrice: Price adjustment for this variant.

**5. MultiPack**

* Represents a multi-pack deal for a product.
* **Attributes**:
  + id: Unique identifier.
  + productId: Reference to the product.
  + packSize: Number of items in the pack (e.g., 3).
  + discountedPrice: Price of the multi-pack.

**6. Recommendation**

* Represents product recommendations based on user preferences or purchase history.
* **Attributes**:
  + id: Unique identifier.
  + userId: Reference to the user.
  + productIds: List of recommended product IDs.

**API Requirements**

**1. Category Management**

**1.1 Create Category**

* **Endpoint**: POST /categories
* **Request Body**:

json

Copy code

{

"name": "Sports Equipment",

"parentCategoryId": null,

"description": "Equipment for various sports."

}

* **Response**:

json

Copy code

{

"id": 1,

"name": "Sports Equipment",

"parentCategoryId": null,

"description": "Equipment for various sports."

}

**2. Product Type Management**

**2.1 Create Product Type**

* **Endpoint**: POST /product-types
* **Request Body**:

json

Copy code

{

"name": "Tennis Ball",

"attributes": [

{ "name": "Sport Type", "type": "Enum", "allowedValues": ["Tennis", "Cricket", "Football"] },

{ "name": "Material", "type": "Text" },

{ "name": "Weight", "type": "Number" },

{ "name": "Size", "type": "Enum", "allowedValues": ["Small", "Medium", "Large"] }

]

}

* **Response**:

json

Copy code

{

"id": 1,

"name": "Tennis Ball",

"attributes": [

{ "name": "Sport Type", "type": "Enum", "allowedValues": ["Tennis", "Cricket", "Football"] },

{ "name": "Material", "type": "Text" },

{ "name": "Weight", "type": "Number" },

{ "name": "Size", "type": "Enum", "allowedValues": ["Small", "Medium", "Large"] }

]

}

**3. Product Management**

**3.1 Create Product**

* **Endpoint**: POST /products
* **Request Body**:

json

Copy code

{

"name": "Wilson Tennis Ball",

"categoryId": 1,

"productTypeId": 1,

"price": 10.00,

"sportType": "Tennis",

"description": "High-quality tennis ball by Wilson.",

"variants": [

{

"variantAttributes": { "Size": "Medium", "Material": "Rubber" },

"stock": 50,

"additionalPrice": 0,

"sku": "TENNIS-MEDIUM-RUBBER"

},

{

"variantAttributes": { "Size": "Large", "Material": "Synthetic" },

"stock": 30,

"additionalPrice": 5,

"sku": "TENNIS-LARGE-SYNTHETIC"

}

]

}

* **Response**:

json

Copy code

{

"id": 101,

"name": "Wilson Tennis Ball",

"category": "Sports Equipment",

"price": 10.00,

"sportType": "Tennis",

"description": "High-quality tennis ball by Wilson.",

"variants": [

{

"id": 201,

"variantAttributes": { "Size": "Medium", "Material": "Rubber" },

"stock": 50,

"additionalPrice": 0,

"sku": "TENNIS-MEDIUM-RUBBER"

},

{

"id": 202,

"variantAttributes": { "Size": "Large", "Material": "Synthetic" },

"stock": 30,

"additionalPrice": 5,

"sku": "TENNIS-LARGE-SYNTHETIC"

}

]

}

**4. Multi-Pack Management**

**4.1 Create Multi-Pack**

* **Endpoint**: POST /multi-packs
* **Request Body**:

json

Copy code

{

"productId": 101,

"packSize": 3,

"discountedPrice": 25.00

}

* **Response**:

json

Copy code

{

"id": 301,

"productId": 101,

"packSize": 3,

"discountedPrice": 25.00

}

**5. Recommendation Engine**

**5.1 Get Recommendations**

* **Endpoint**: GET /recommendations
* **Query Parameters**:
  + userId: The ID of the logged-in user.
* **Response**:

json

Copy code

{

"userId": 1,

"recommendations": [

{ "id": 101, "name": "Wilson Tennis Ball", "price": 10.00 },

{ "id": 102, "name": "Nike Tennis Shoes", "price": 100.00 }

]

}