UNIVERSIDAD GALILEO
Técnico en desarrollo de software
Base de datos III
Sección A

Proyecto I

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Sistema de Gestión de Inventario

Descripción

Este sistema gestiona múltiples almacenes, productos, órdenes de compra y venta, proveedores y usuarios. La base de datos está diseñada para garantizar escalabilidad, seguridad, integridad de datos, eficiencia y flexibilidad.

Entidades

1. Warehouse (bodega)
2. Product (producto)
3. Inventory (inventario)
4. Suppliers (Proveedores)
5. Purchase_oder (Ordenes de compra)
6. Purchase_order_item (Artículos de compra)
7. Sales_order (Ordenes de venta)
8. Sales_order_idem (Articuos de venta)
9. User (Usuarios)

Características

1. Escalabilidad

- Permite la administración de múltiples almacenes y productos.
- Uso de índices en claves primarias y foráneas para optimizar búsquedas.

2. Seguridad

- Autenticación basada en usuarios con roles para restringir accesos.

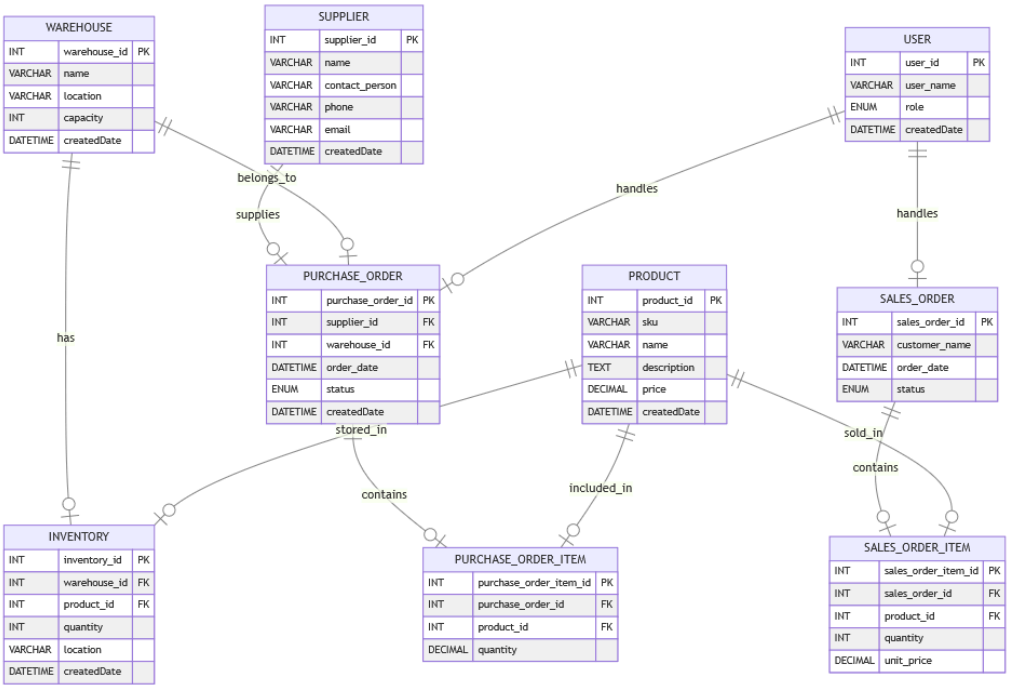
3. Integridad de Datos

- Uso de claves foráneas para garantizar consistencia en relaciones.
- Restricciones de unicidad y valores no nulos donde corresponda.

4. Eficiencia

- Uso de tipos de datos eficientes para almacenamiento y rendimiento.

Diagrama Entidad-Relación



CREACIÓN DE GESTIÓN DE INVENTARIO

```
CREATE DATABASE gestion_inventario;
USE gestion_inventario;

-- Tabla Bodega
CREATE TABLE warehouse (
        warehouse_id INT AUTO_INCREMENT PRIMARY KEY,
        name VARCHAR(100) NOT NULL,
        location VARCHAR(100) NOT NULL,
        capacity INT NOT NULL,
        createdDate DATETIME DEFAULT CURRENT_TIMESTAMP
);

-- Tabla Productos
CREATE TABLE product (
        product_id INT AUTO_INCREMENT PRIMARY KEY,
        sku VARCHAR(50) UNIQUE NOT NULL,
        name VARCHAR(100) NOT NULL,
        description TEXT NOT NULL,
        price DECIMAL(10,2) NOT NULL,
        createdDate DATETIME DEFAULT CURRENT_TIMESTAMP
);

-- Tabla Inventario
CREATE TABLE inventory (
        inventory_id INT AUTO_INCREMENT PRIMARY KEY,
        warehouse_id INT NOT NULL,
        product_id INT NOT NULL,
        quantity INT NOT NULL DEFAULT 0,
        location VARCHAR(100) NOT NULL,
        createdDate DATETIME DEFAULT CURRENT_TIMESTAMP,
        FOREIGN KEY (warehouse_id) REFERENCES warehouse(warehouse_id),
        FOREIGN KEY (product_id) REFERENCES product(product_id)
```

```
);

-- Tabla Proveedores
CREATE TABLE supplier (
        supplier_id INT AUTO_INCREMENT PRIMARY KEY,
        name VARCHAR(150),
        contact_person VARCHAR(150),
        phone VARCHAR(25),
        email VARCHAR(100),
        createdDate DATETIME DEFAULT CURRENT_TIMESTAMP
);

-- Tabla Ordenes de Compra
CREATE TABLE purchase_order (
        purchase_order_id INT AUTO_INCREMENT PRIMARY KEY,
        supplier_id INT NOT NULL,
        warehouse_id INT NOT NULL,
        order_date DATETIME DEFAULT CURRENT_TIMESTAMP,
        status ENUM('Pendiente', 'Recibida', 'Cancelada') DEFAULT 'Pendiente',
        createdDate DATETIME DEFAULT CURRENT_TIMESTAMP,
        FOREIGN KEY (supplier_id) REFERENCES supplier(supplier_id),
        FOREIGN KEY (warehouse_id) REFERENCES warehouse(warehouse_id)
);

-- Tabla artículos de compra
CREATE TABLE purchase_order_item (
        purchase_order_item_id INT AUTO_INCREMENT PRIMARY KEY,
        purchase_order_id INT NOT NULL,
        product_id INT NOT NULL,
        quantity DECIMAL(10,2) NOT NULL,
        FOREIGN KEY (purchase_order_id) REFERENCES
purchase_order(purchase_order_id),
        FOREIGN KEY (product_id) REFERENCES product(product_id)
);

-- Tabla Ordenes de Venta
```

```
CREATE TABLE sales_order (
        sales_order_id INT AUTO_INCREMENT PRIMARY KEY,
        customer_name VARCHAR(200) NOT NULL,
        order_date DATETIME DEFAULT CURRENT_TIMESTAMP,
        status ENUM('Pendiente', 'Enviada', 'Cancelada') DEFAULT 'Pendiente',
        createdDate DATETIME DEFAULT CURRENT_TIMESTAMP
);

-- Tabla de Artículos de la Orden de Venta
CREATE TABLE sales_order_item (
        sales_order_item_id INT AUTO_INCREMENT PRIMARY KEY,
        sales_order_id INT NOT NULL,
        product_id INT NOT NULL,
        quantity INT NOT NULL,
        unit_price DECIMAL(10,2) NOT NULL,
        FOREIGN KEY (sales_order_id) REFERENCES sales_order(sales_order_id),
        FOREIGN KEY (product_id) REFERENCES product(product_id)
);

-- Tabla Usuarios
CREATE TABLE user (
        user_id INT AUTO_INCREMENT PRIMARY KEY,
        user_name VARCHAR(50),
        role VARCHAR(250) NOT NULL,
        createdDate DATETIME DEFAULT CURRENT_TIMESTAMP
);
```

Funciones y procedimientos en MySQL

Función para obtener el valor total de un producto (stock * precio)

```
DELIMITER $$

CREATE FUNCTION calculate_product_value(product_id INT)
RETURNS DECIMAL(10,2)
DETERMINISTIC
BEGIN
    DECLARE total_value DECIMAL(10,2);
    DECLARE price DECIMAL(10,2);
    DECLARE stock INT;

    -- Obtener el precio del producto
    SELECT price INTO price
    FROM product
    WHERE product_id = product_id;

    -- Obtener el stock disponible del producto
    SELECT quantity INTO stock
    FROM inventory
    WHERE product_id = product_id;

    -- Calcular el valor total
    SET total_value = price * stock;

    RETURN total_value;
END $$

DELIMITER ;
```

Ejemplo:

```
SELECT calculate_product_value(1);
```

Procedimiento para eliminar un producto del inventario

```
DELIMITER $$

CREATE PROCEDURE delete_product_from_inventory(
        IN p_product_id INT,
        IN p_warehouse_id INT
)
BEGIN
        DELETE FROM inventory
        WHERE product_id = p_product_id
        AND warehouse_id = p_warehouse_id;
END $$

DELIMITER ;
```

Procedimiento para agregar o actualizar el inventario

```
DELIMITER $$
CREATE PROCEDURE add_or_update_inventory(
        IN p_warehouse_id INT,
        IN p_product_id INT,
        IN p_quantity INT,
        OUT p_result VARCHAR(255)
)
BEGIN
        DECLARE v_existing_id INT;

        -- Verifico si ya existe el producto en el almacén
        SELECT inventory_id INTO v_existing_id
        FROM inventory
        WHERE product_id = p_product_id AND warehouse_id =
p_warehouse_id;

        IF v_existing_id IS NOT NULL THEN
        -- Si ya existe, actualizo la cantidad
           UPDATE inventory
        SET quantity = quantity + p_quantity
        WHERE inventory_id = v_existing_id;
        SET p_result = 'Inventory updated successfully';
```

```
        ELSE
    -- Si no existe, inserto un nuevo registro
    INSERT INTO inventory (product_id, warehouse_id, quantity)
        VALUES (p_product_id, p_warehouse_id, p_quantity);
        SET p_result = 'Item added successfully';
        END IF;
END $$

DELIMITER ;
```

Procedimiento para procesar una venta

```
DELIMITER $$

CREATE PROCEDURE process_sale(
        IN p_user_id INT,
        IN p_product_id INT,
        IN p_warehouse_id INT,
        IN p_quantity INT,
        IN p_unitary_price DECIMAL(10,2),
        OUT p_result VARCHAR(255)
)
BEGIN
        DECLARE v_available_stock INT;
        DECLARE v_total DECIMAL(10,2);

        -- Verificar stock disponible
        SELECT quantity INTO v_available_stock
        FROM inventory
        WHERE product_id = p_product_id AND warehouse_id =
p_warehouse_id;

        IF v_available_stock IS NULL THEN
        SET p_result = 'Producto no encontrado en inventario.';
        ELSEIF v_available_stock < p_quantity THEN
        SET p_result = 'Stock insuficiente.';
        ELSE
    -- Registrar la venta en sales
        INSERT INTO sales (user_id, date, total)
        VALUES (p_user_id, NOW(), 0);
```

```
        SET @sale_id = LAST_INSERT_ID();

        -- Calcular el total de la venta
        SET v_total = p_quantity * p_unitary_price;

        -- Insertar en sales_detail
        INSERT INTO sales_detail (sale_id, product_id, quantity, unitary_price,
warehouse_id)
        VALUES (@sale_id, p_product_id, p_quantity, p_unitary_price,
p_warehouse_id);

        -- Descontar del inventario
        UPDATE inventory
        SET quantity = quantity - p_quantity
        WHERE product_id = p_product_id AND warehouse_id =
p_warehouse_id;

        -- Actualizar total en sales
        UPDATE sales
        SET total = v_total
        WHERE sale_id = @sale_id;

        SET p_result = 'Venta procesada correctamente.';
        END IF;
END $$

DELIMITER ;
```

Procedimiento para obtener inventario

```
DELIMITER $$

DROP PROCEDURE IF EXISTS get_inventory_report; $$

CREATE PROCEDURE get_inventory_report()
BEGIN
        SELECT
        p.product_id,
        p.sku,
        p.name,
        COALESCE(SUM(i.quantity), 0) AS stock,
           p.price,
        (COALESCE(SUM(i.quantity), 0) * p.price) AS total_value
        FROM product p
        LEFT JOIN inventory i ON p.product_id = i.product_id
        GROUP BY p.product_id, p.sku, p.name, p.price;
END $$

DELIMITER ;
```

Procedimiento para procesar una compra

```
DELIMITER $$

DROP PROCEDURE IF EXISTS process_purchase; $$

CREATE PROCEDURE process_purchase(
        IN p_supplier_id INT,
        IN p_warehouse_id INT,
        IN p_product_id INT,
        IN p_quantity INT,
        IN p_unitary_price DECIMAL(10,2),
        IN p_order_date DATETIME,
        OUT p_result VARCHAR(255)
)
BEGIN
        DECLARE v_purchase_order_id INT;
        DECLARE v_existing_inventory INT;
```

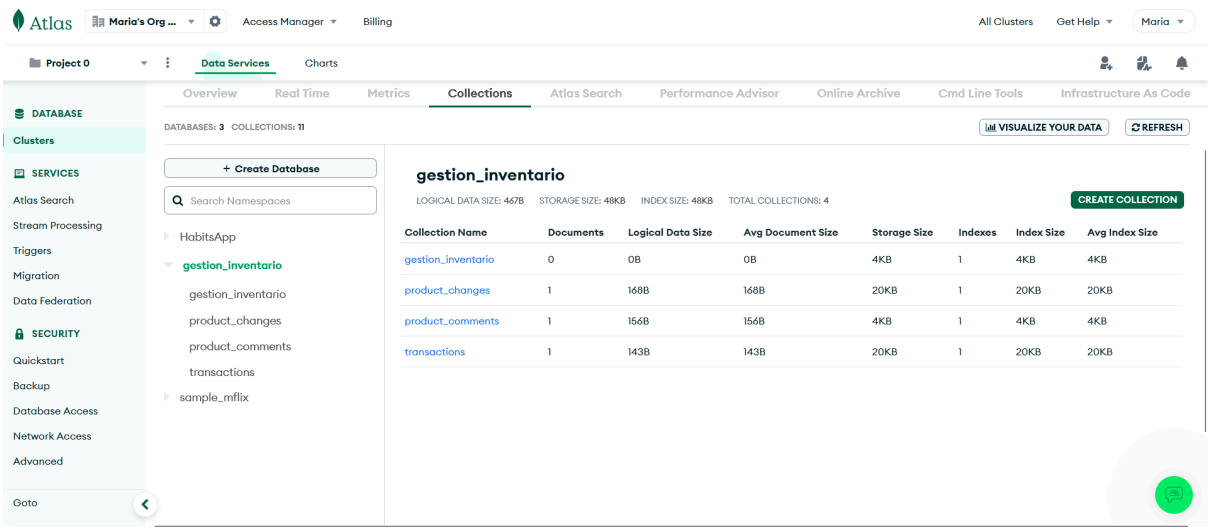
```
        -- Crear la orden de compra
        INSERT INTO purchase_order (supplier_id, warehouse_id, order_date,
total)
        VALUES (p_supplier_id, p_warehouse_id, p_order_date, 0);

        SET v_purchase_order_id = LAST_INSERT_ID(); -- Obtener el ID de la
orden de compra creada

        -- Insertar el detalle de compra
        INSERT INTO purchase_order_item (purchase_order_id, product_id,
quantity, unitary_price)
        VALUES (v_purchase_order_id, p_product_id, p_quantity,
p_unitary_price);

        -- Verificar si el producto ya existe en el inventario del almacén
        SELECT inventory_id INTO v_existing_inventory
        FROM inventory
        WHERE product_id = p_product_id AND warehouse_id =
p_warehouse_id;

        IF v_existing_inventory IS NOT NULL THEN
        -- Si ya existe, actualizar la cantidad sumándola
        UPDATE inventory
        SET quantity = quantity + p_quantity
        WHERE inventory_id = v_existing_inventory;
        ELSE
        -- Si no existe, agregarlo al inventario
        INSERT INTO inventory (product_id, warehouse_id, quantity)
        VALUES (p_product_id, p_warehouse_id, p_quantity);
        END IF;

        -- Actualizar el total en purchase_order
        UPDATE purchase_order
        SET total = (p_quantity * p_unitary_price)
        WHERE purchase_order_id = v_purchase_order_id;

        SET p_result = 'Compra procesada correctamente.';
END $$

DELIMITER ;
```

Trigger para actualizar el valor total en la tabla `sales_order_item` después de realizar una venta:

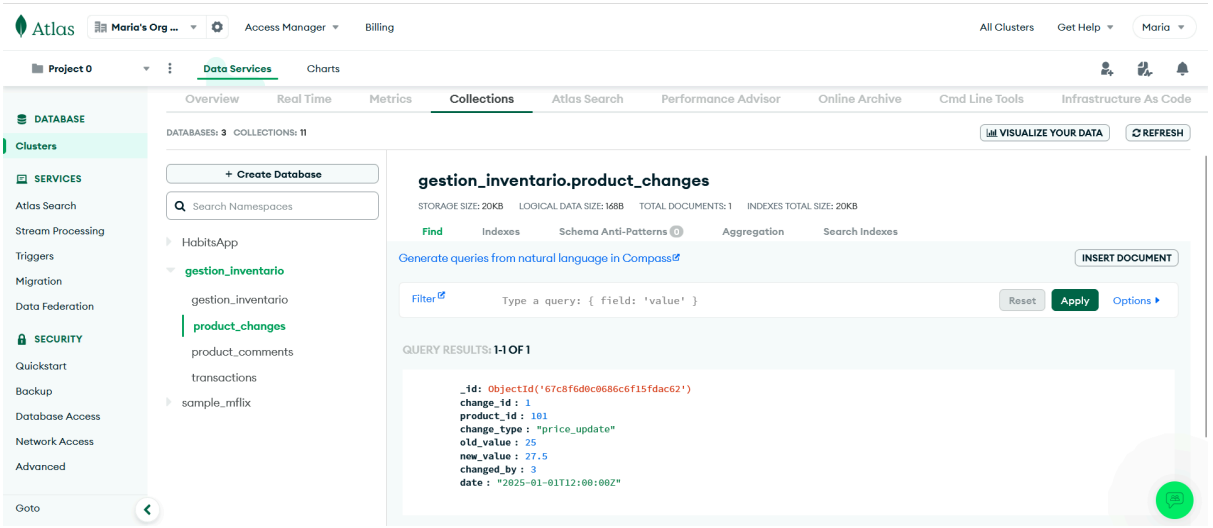
```
DELIMITER $$

CREATE TRIGGER after_sales_order_item_insert
AFTER INSERT ON sales_order_item
FOR EACH ROW
BEGIN
	DECLARE total_value DECIMAL(10,2);

	-- Calcular el valor total (precio unitario * cantidad)
	SET total_value = NEW.unit_price * NEW.quantity;

	-- Actualizar el valor total en la orden de venta
	UPDATE sales_order
	SET total_value = total_value + total_value
	WHERE sales_order_id = NEW.sales_order_id;
END $$

DELIMITER ;
```

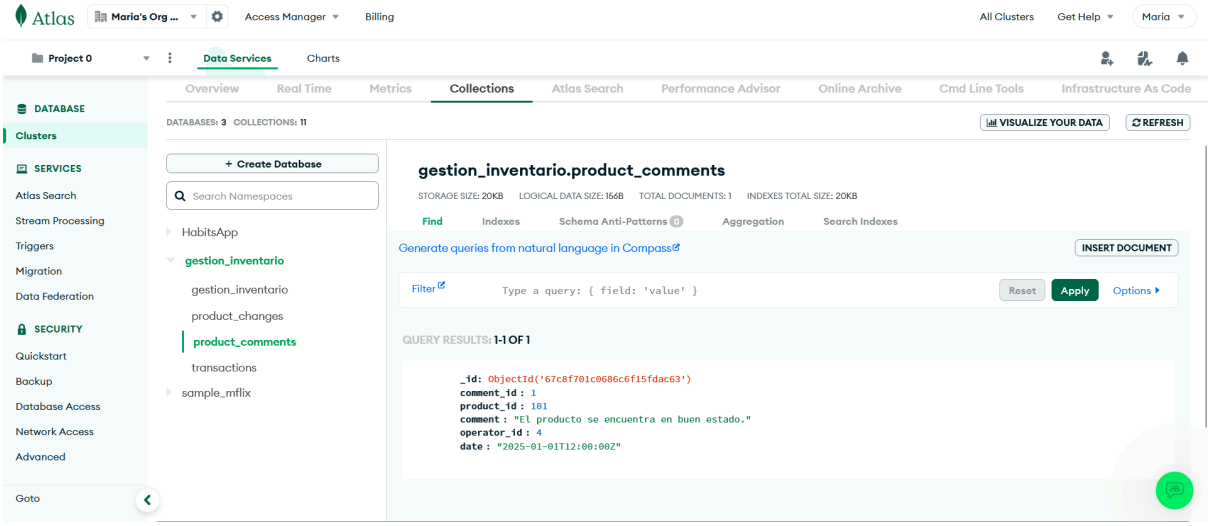
Configuración de bases de datos en MongoDB

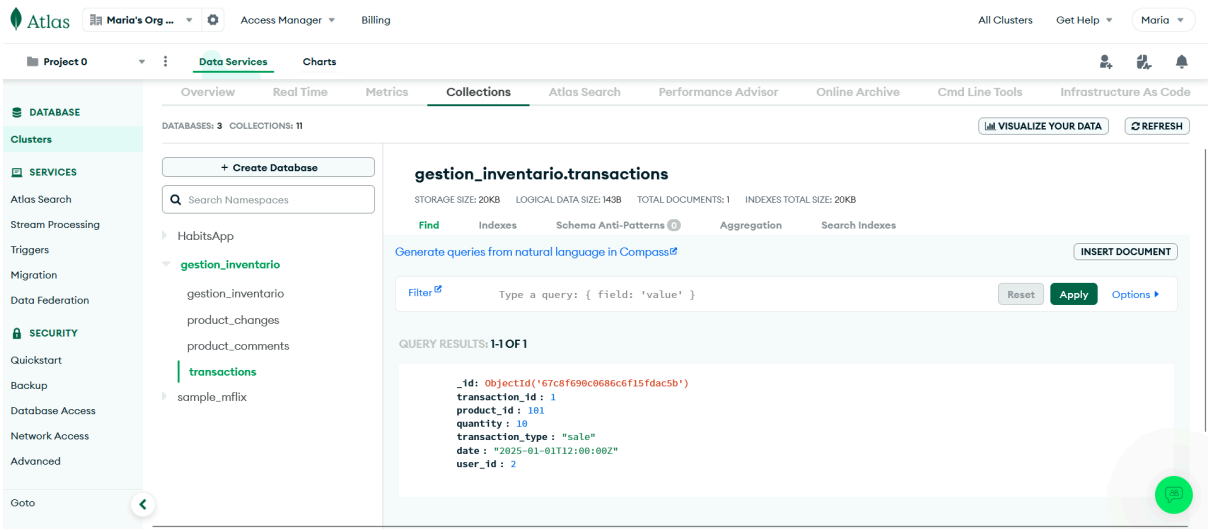
Creación de colecciones
product_changes
product_comments
transactions



Ejemplo de Documentos

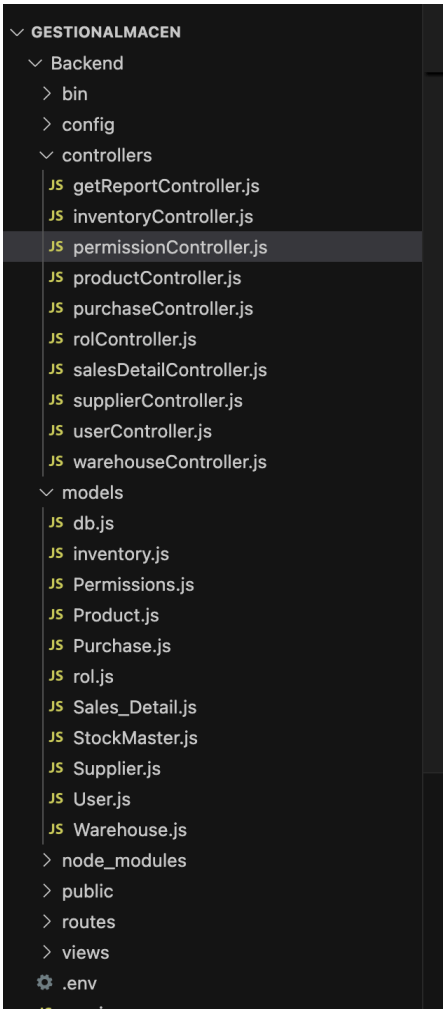




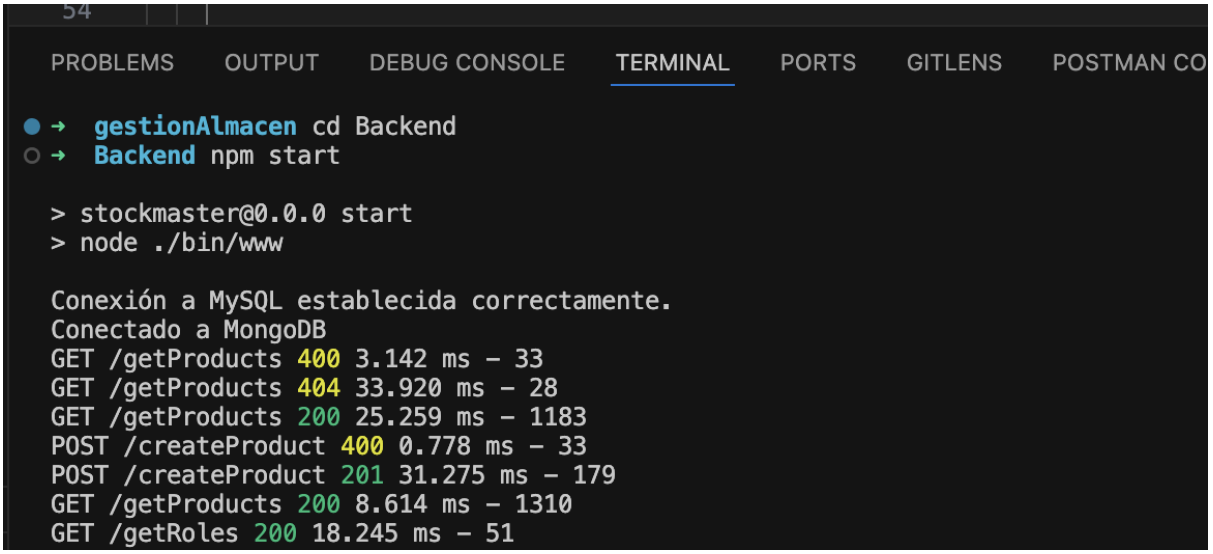


Backend

El Backend se realizó con Node.js y Express, utilizando Modelos y Controladores, para la creación de los endpoints.



Pruebas de conexión:



Pruebas de endpoints
Las pruebas se realizaron con Postman, incluyendo perfiles de seguridad y permisos en cada petición.

```
//NOTE - Endpoints de productos
router.post("/createProduct", checkPermission("GESTIONAR_PRODUCTOS"), createProduct);
router.get("/getProducts", checkPermission("GESTIONAR_PRODUCTOS"), getProducts);
router.delete("/deleteProduct/:product_id", checkPermission("GESTIONAR_PRODUCTOS"), deleteProducts);

//NOTE - Endpoints de almacen
router.post("/createWarehouse", checkPermission("GESTIONAR_ALMACENES"), createWarehouse);
router.get("/getWarehouse", checkPermission("GESTIONAR_ALMACENES"), getWarehouse);
router.delete("/deleteWarehouse/:warehouse_id", checkPermission("GESTIONAR_ALMACENES"), deleteWarehouse);

//NOTE - Endpoints de inventario
router.post("/addInventoryItem", checkPermission("GESTIONAR_INVENTARIO"), addInventoryItem);
router.get("/getInventory", checkPermission("GESTIONAR_INVENTARIO"), getinventory);
router.delete("/deleteInventoryItem/:product_id/:warehouse_id", checkPermission("GESTIONAR_INVENTARIO"), deleteInventoryIter
```

```
const checkPermission = (requiredAction) => {
  return async (req, res, next) => {
    try {
      const { user_id } = req.body;

      if (!user_id) {
        return res.status(400).json({ message: "User ID is required" });
      }

      const [user] = await sequelize.query(
        "SELECT rol_id FROM user WHERE user_id = ?",
        { replacements: [user_id], type: sequelize.QueryTypes.SELECT }
      );

      if (!user) {
        return res.status(404).json({ message: "User not found" });
      }

      const [permission] = await sequelize.query(
        "SELECT accion FROM permissions WHERE rol_id = ? AND accion = ?",
        { replacements: [user.rol_id, requiredAction], type: sequelize.QueryTypes.SELECT }
      );

      if (!permission) {
        return res.status(403).json({ message: "No tienes permisos para esta acción" });
      }

      next();
    } catch (error) {
      console.error("Error en la validación de permisos:", error);
      return res.status(500).json({ message: "Error en el servidor" });
    }
  };
};
```

Permisos, Roles y Usuarios

Se crearon 4 tipos de Roles:

```
"name": "UA" //Administrador
"name": "UO" //Operador de inventarios
"name": "UV" //Ventas
"name": "UAD" //Auditor
```

A ada uno de los Roles se les asignan distintos permisos:

```
"rol_id": 1,
"accion": [
  "GESTIONAR_USUARIOS",
```

```
  "GESTIONAR_PRODUCTOS",
  "GESTIONAR_VENTAS",
  "GESTIONAR_ALMACENES",
  "GESTIONAR_INVENTARIO",
  "VER_REPORTES"
]
```

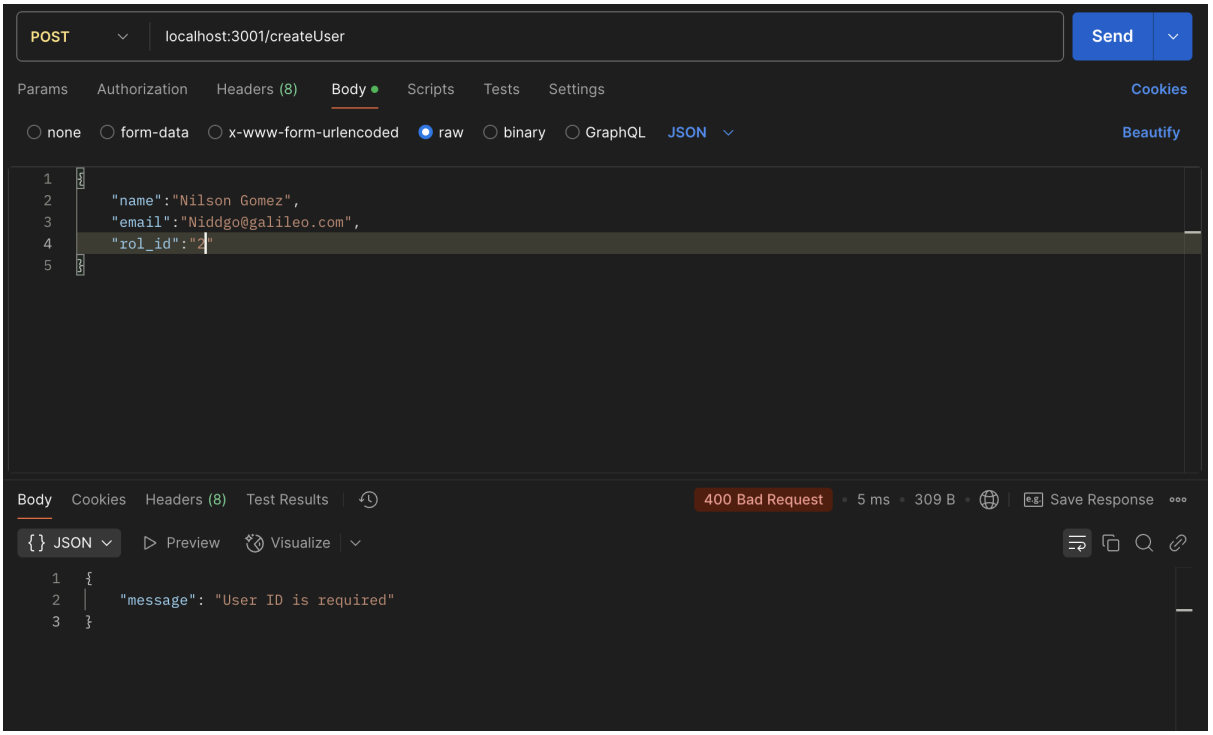
```
"rol_id": 2,
 "accion": [
  "GESTIONAR_PRODUCTOS",
  "GESTIONAR_ALMACENES",
  "GESTIONAR_INVENTARIO"
 ]
```

```
"rol_id": 3,
 "accion": [
  "GESTIONAR_VENTAS"
 ]
```

```
"rol_id": 4,
 "accion": [
  "VER_REPORTES"
 ]
```

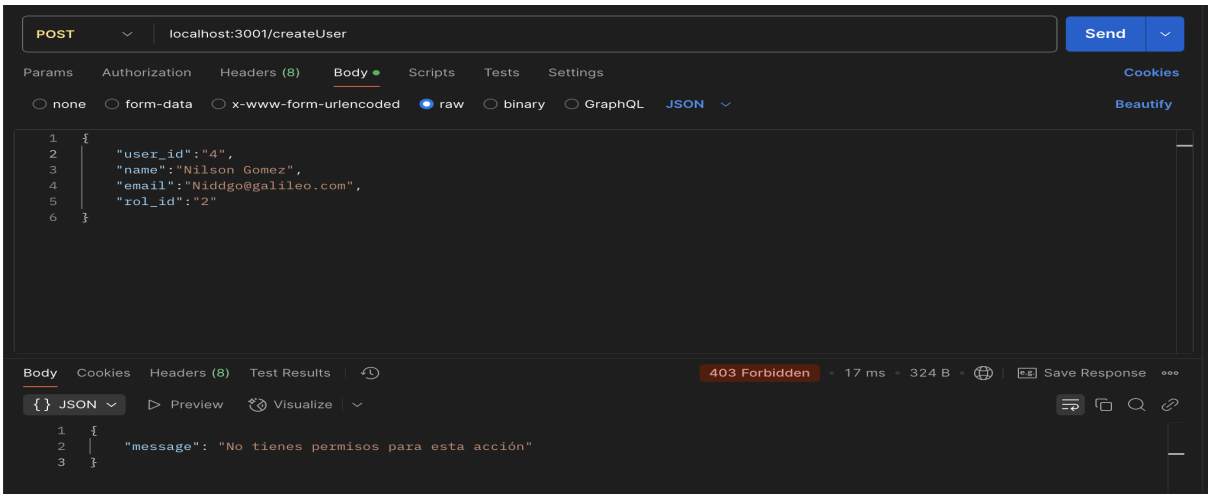
Limitando de esta manera los distintos permisos que puede realizar cada uno de los usuarios, por ejemplo, si un usuario tiene Rol 4, este no podra gestionar usuarios,, productos, ventas, etc.

Ejemplo:



En este caso, se intenta crear un usuario con Rol 2 (UV), sin embargo no se está proporcionando el user_id de quien está creando la solicitud, por lo que procedemos a incluirlo en la solicitud.
Se utiliza el user_id:4, que tiene la siguiente info:

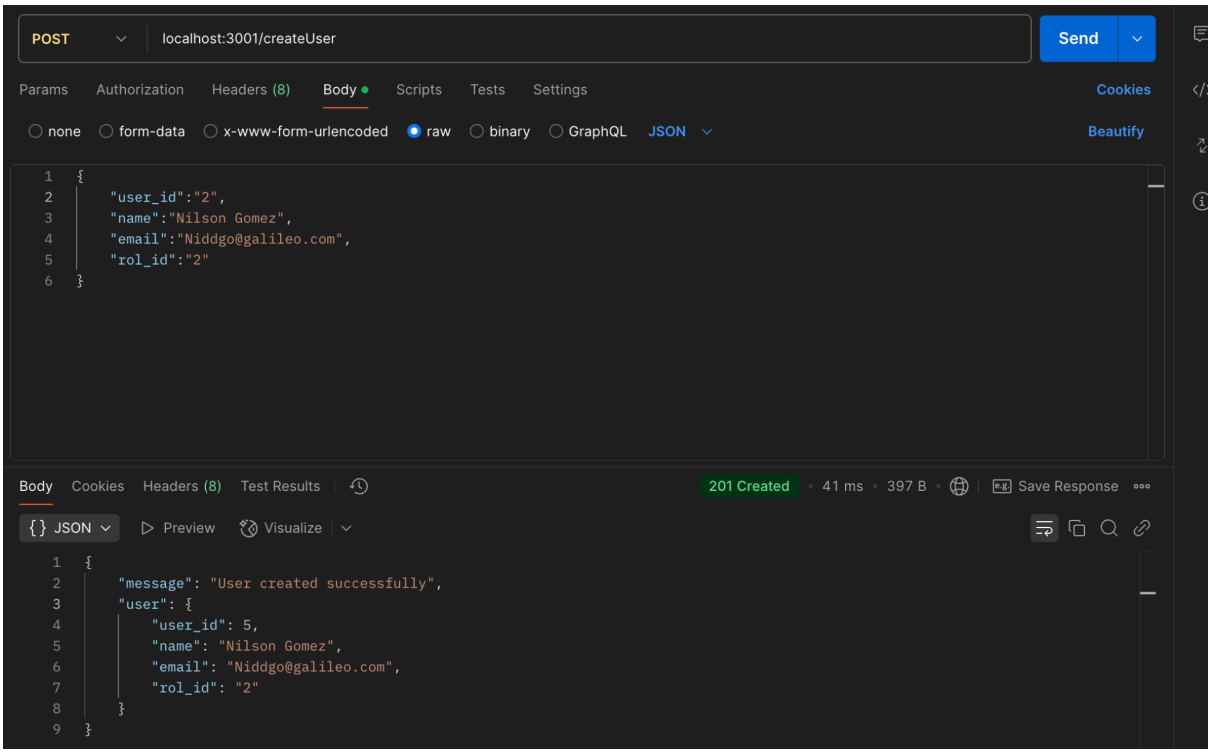

```
    {
        "user_id": 4,
        "name": "Nery Reyes",
        "email": "Guares@galileo.com",
        "rol_id": 2
    }
]
```

al ser un usuario con rol_id 4 (UAD/Usuario administrador), no tiene permisos suficientes, por lo que procedemos a hacer la solicitud con el siguiente usuario, con rol:1 (UA):

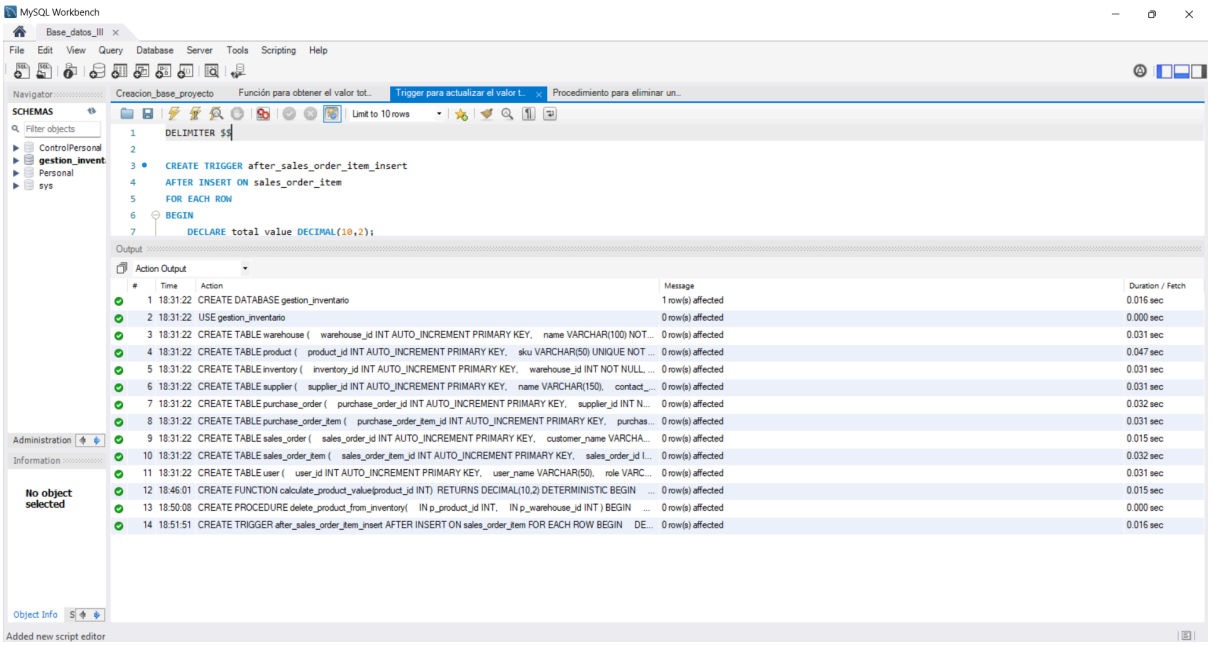

```
    {
```

```
    "user_id": 2,
    "name": "Byron Ramírez",
    "email": "bramirez@galileo.com",
    "rol_id": 1
},
```

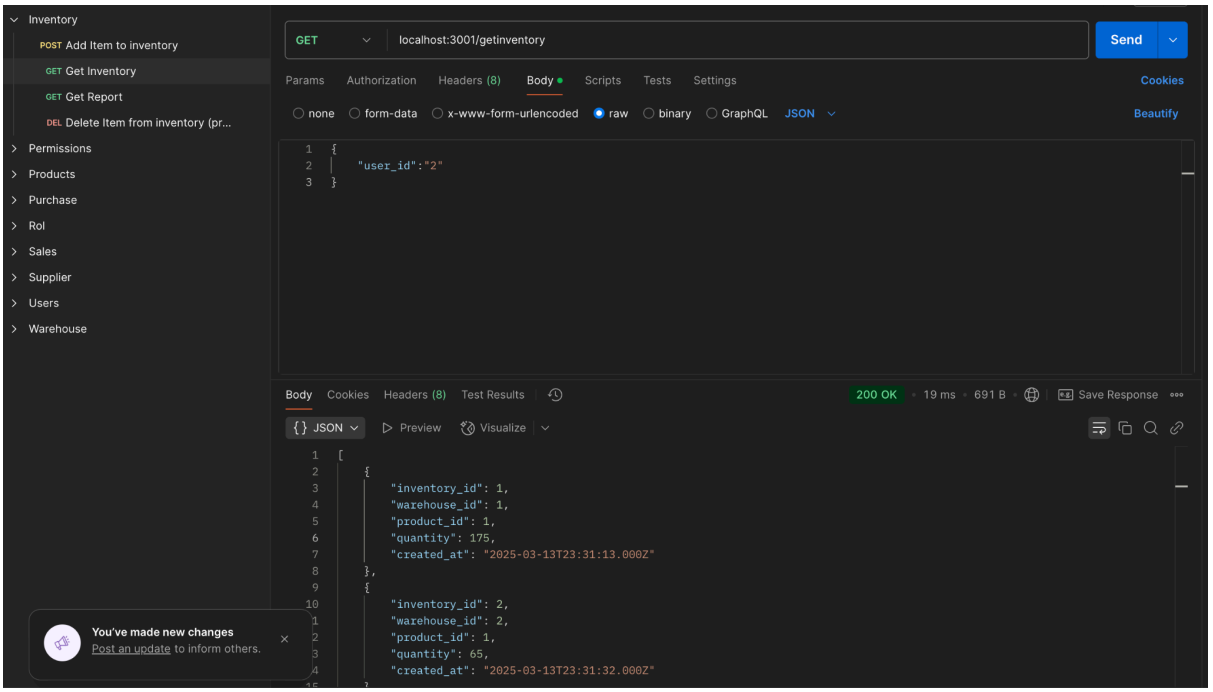



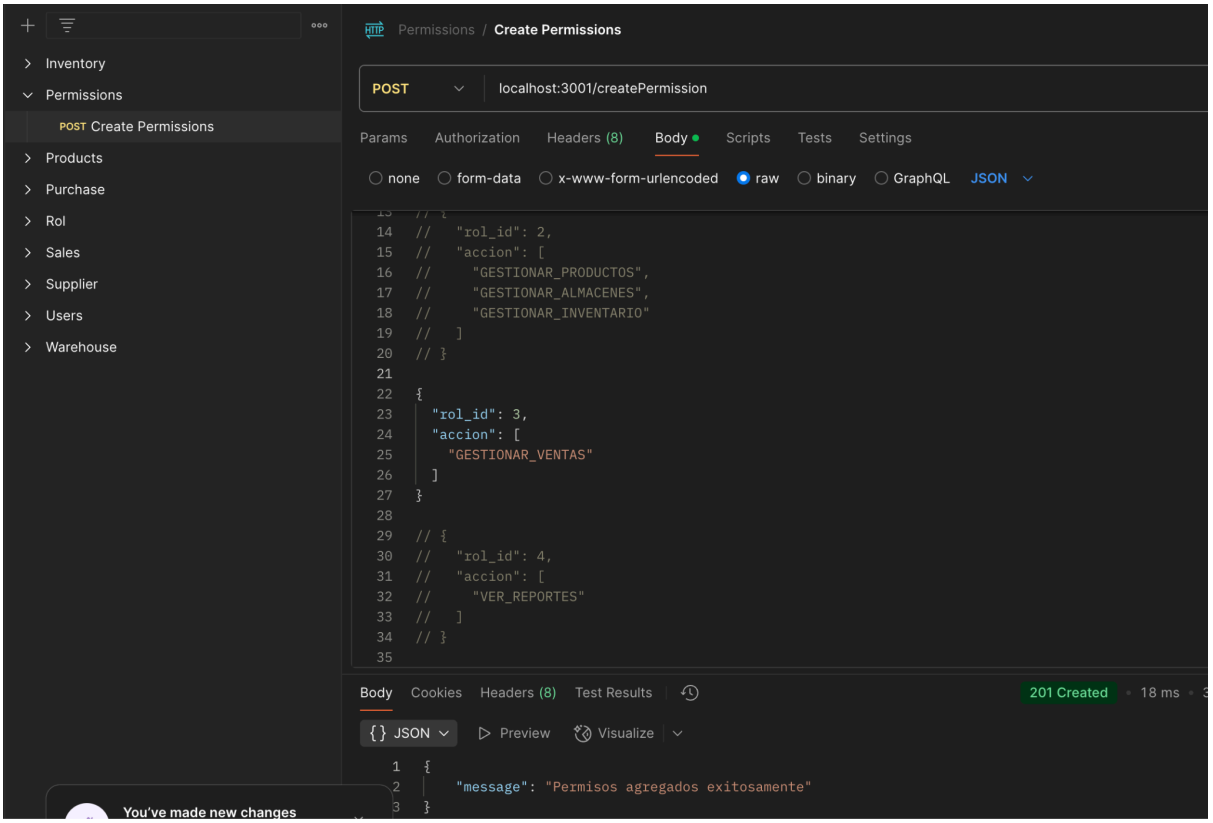
Acá vemos el funcionamiento puntual, de los permisos y roles.

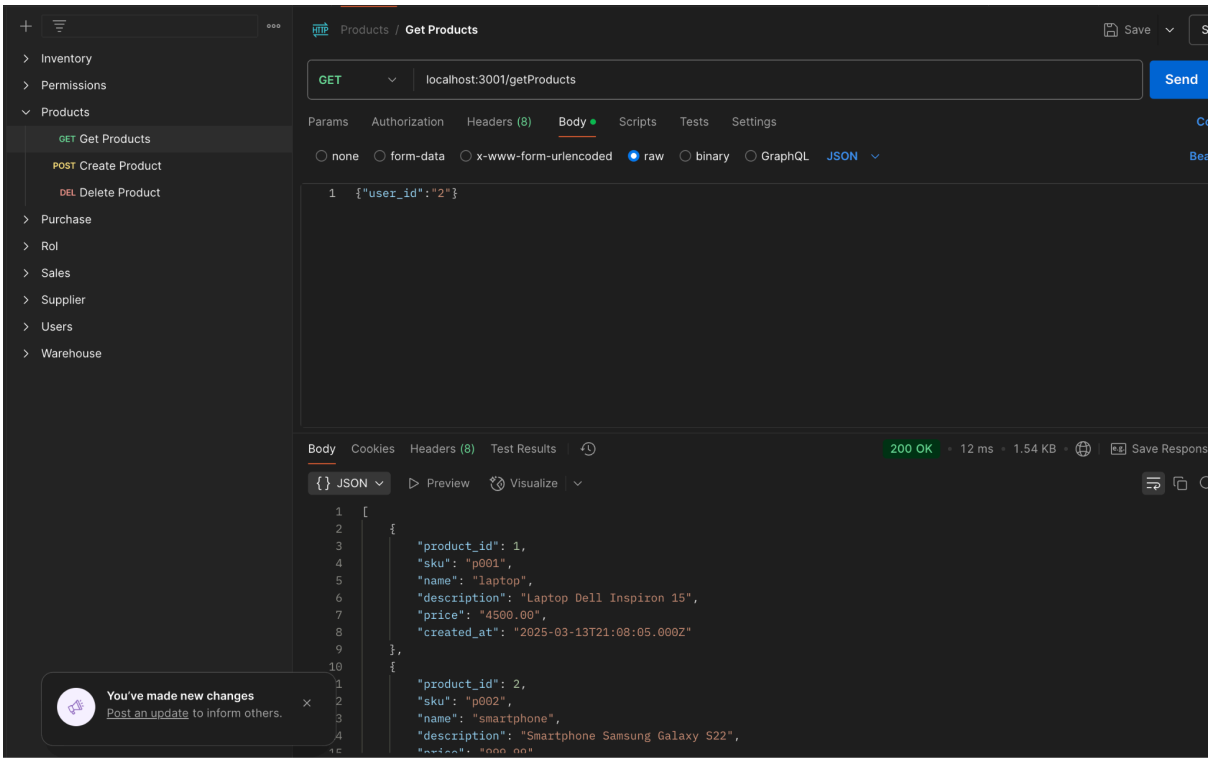
Apéndice

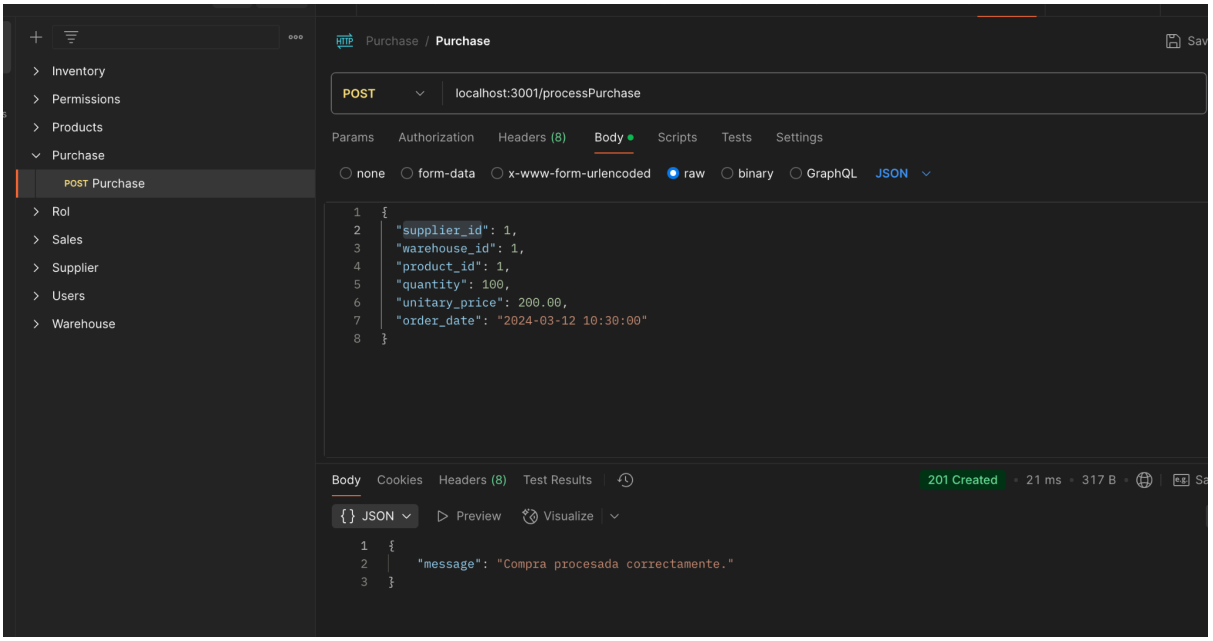


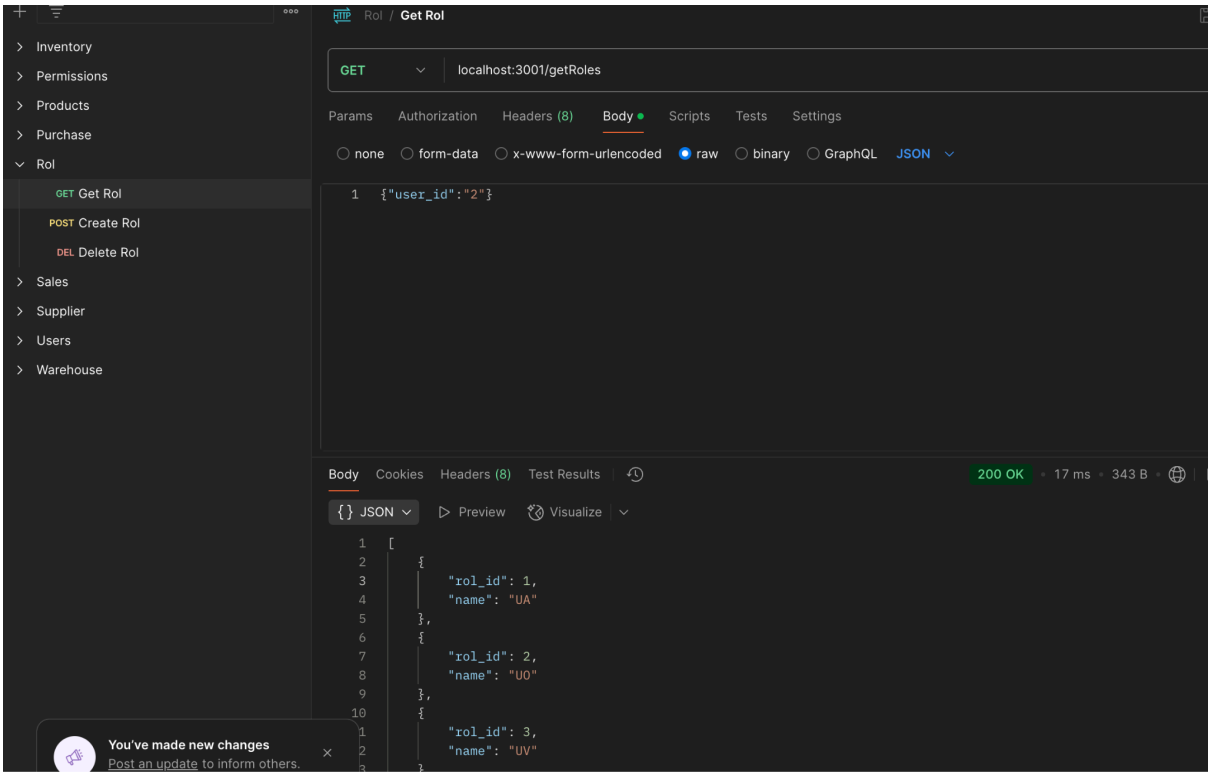
Ejemplos con postman:

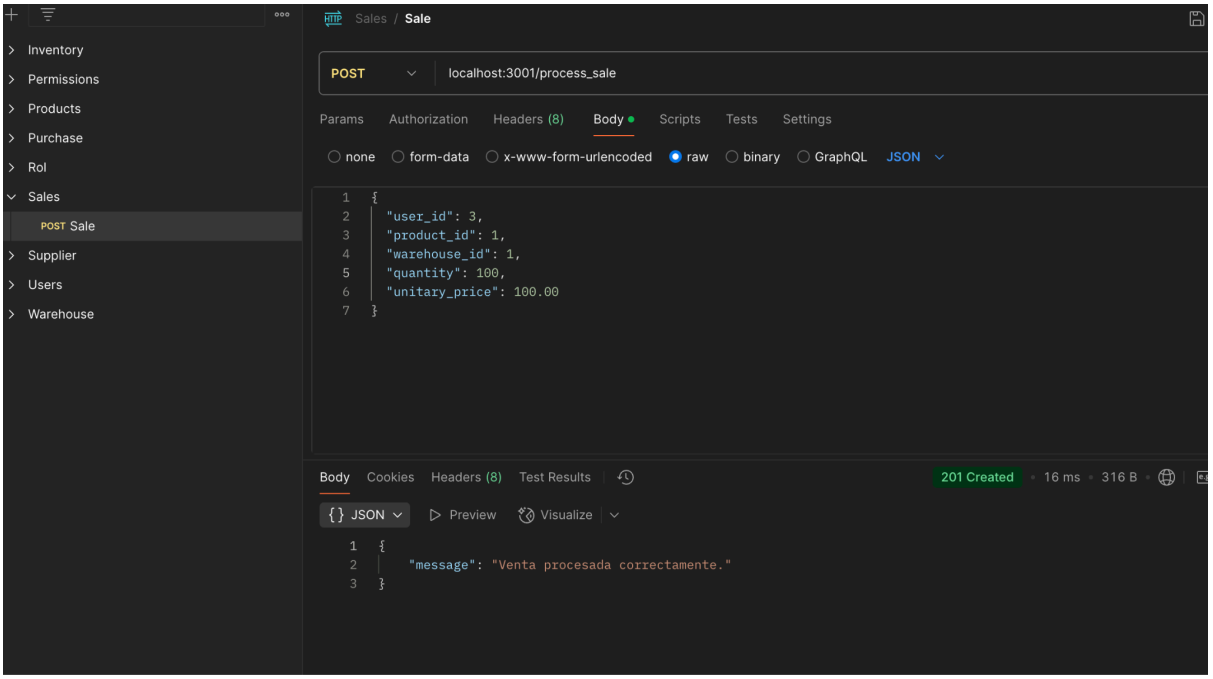


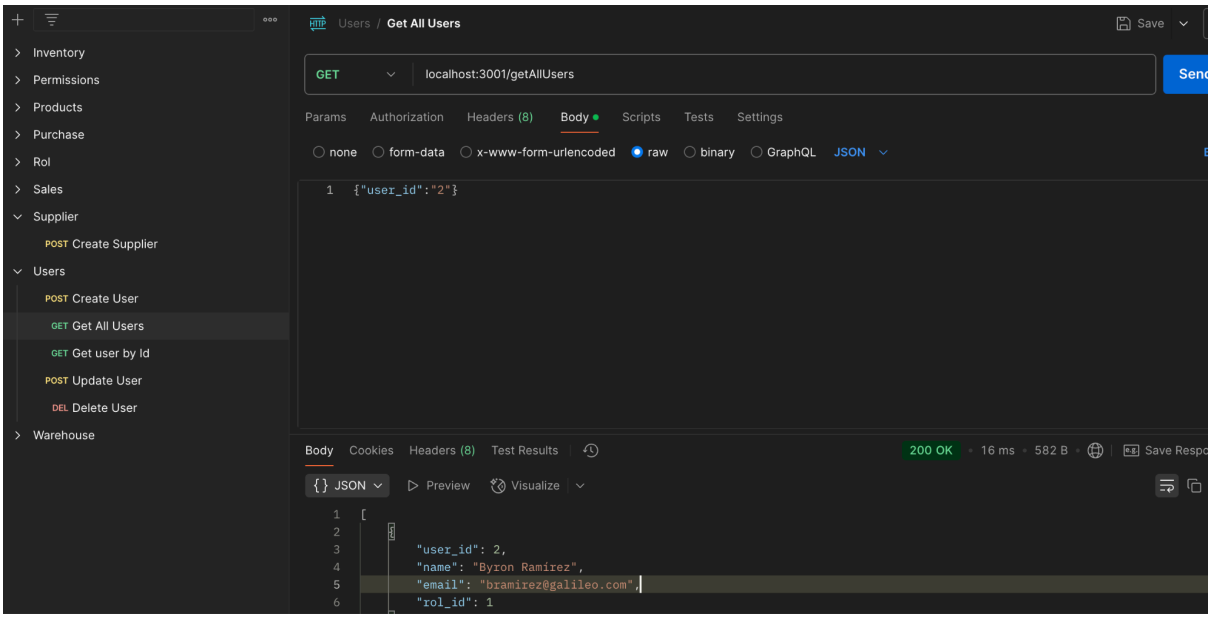

Inventory
Permissions
POST Create Permissions
Products
Purchase
Rol
Sales
Supplier
Users
Warehouse
Permissions / Create Permissions
POST
localhost:3001/createPermission
Params
Authorization
Headers (8)
Body
Scripts
Tests
Settings
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
// {
// "rol_id": 2,
// "accion": [
// "GESTIONAR_PRODUCTOS",
// "GESTIONAR_ALMACENES",
// "GESTIONAR_INVENTARIO"
//]
// }
{
"rol_id": 3,
"accion": [
"GESTIONAR_VENTAS"
]
}
// {
// "rol_id": 4,
// "accion": [
// "VER_REPORTES"
//]
// }
Body
Cookies
Headers (8)
Test Results
201 Created
18 ms
{ } JSON
Preview
Visualize
{
"message": "Permisos agregados exitosamente"
}
You've made new changes


Inventory
Permissions
Products
GET Get Products
POST Create Product
DEL Delete Product
Purchase
Rol
Sales
Supplier
Users
Warehouse
Products / Get Products
Save
GET
localhost:3001/getProducts
Send
Params
Authorization
Headers (8)
Body
Scripts
Tests
Settings
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
{"user_id":"2"}
Body
Cookies
Headers (8)
Test Results
200 OK
12 ms
1.54 KB
Save Respons
{ } JSON
Preview
Visualize
[
{
"product_id": 1,
"sku": "p001",
"name": "laptop",
"description": "Laptop Dell Inspiron 15",
"price": "4500.00",
"created_at": "2025-03-13T21:08:05.000Z"
},
{
"product_id": 2,
"sku": "p002",
"name": "smartphone",
"description": "Smartphone Samsung Galaxy S22",
You've made new changes
Post an update to inform others.


Inventory
Permissions
Products
Purchase
POST Purchase
Rol
Sales
Supplier
Users
Warehouse
Purchase / Purchase
POST
localhost:3001/processPurchase
Params
Authorization
Headers (8)
Body
Scripts
Tests
Settings
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
{
"supplier_id": 1,
"warehouse_id": 1,
"product_id": 1,
"quantity": 100,
"unitary_price": 200.00,
"order_date": "2024-03-12 10:30:00"
}
Body
Cookies
Headers (8)
Test Results
201 Created
21 ms
317 B
JSON
Preview
Visualize
{
"message": "Compra procesada correctamente."
}


Inventory
Permissions
Products
Purchase
Rol
GET Get Rol
POST Create Rol
DEL Delete Rol
Sales
Supplier
Users
Warehouse
Rol / Get Rol
GET
localhost:3001/getRoles
Params
Authorization
Headers (8)
Body
Scripts
Tests
Settings
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
{"user_id":"2"}
Body
Cookies
Headers (8)
Test Results
200 OK
17 ms
343 B
JSON
Preview
Visualize
[
{
"rol_id": 1,
"name": "UA"
},
{
"rol_id": 2,
"name": "UO"
},
{
"rol_id": 3,
"name": "UV"
You've made new changes
Post an update to inform others.


Inventory
Permissions
Products
Purchase
Rol
Sales
POST Sale
Supplier
Users
Warehouse
Sales / Sale
POST
localhost:3001/process_sale
Params
Authorization
Headers (8)
Body
Scripts
Tests
Settings
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
{
"user_id": 3,
"product_id": 1,
"warehouse_id": 1,
"quantity": 100,
"unitary_price": 100.00
}
Body
Cookies
Headers (8)
Test Results
201 Created
16 ms
316 B
JSON
Preview
Visualize
{
"message": "Venta procesada correctamente."
}


Inventory
Permissions
Products
Purchase
Rol
Sales
Supplier
POST Create Supplier
Users
POST Create User
GET Get All Users
GET Get user by Id
POST Update User
DEL Delete User
Warehouse
Users / Get All Users
Save
GET
localhost:3001/getAllUsers
Send
Params
Authorization
Headers (8)
Body
Scripts
Tests
Settings
none
form-data
x-www-form-urlencoded
raw
binary
GraphQL
JSON
{"user_id":"2"}
Body
Cookies
Headers (8)
Test Results
200 OK
16 ms
582 B
Save Respo
JSON
Preview
Visualize
[
{
"user_id": 2,
"name": "Byron Ramirez",
"email": "bramirez@galileo.com",
"rol_id": 1