DBMS PORJECT REPORT

PROJECT NAME: PORT MANAGEMENT

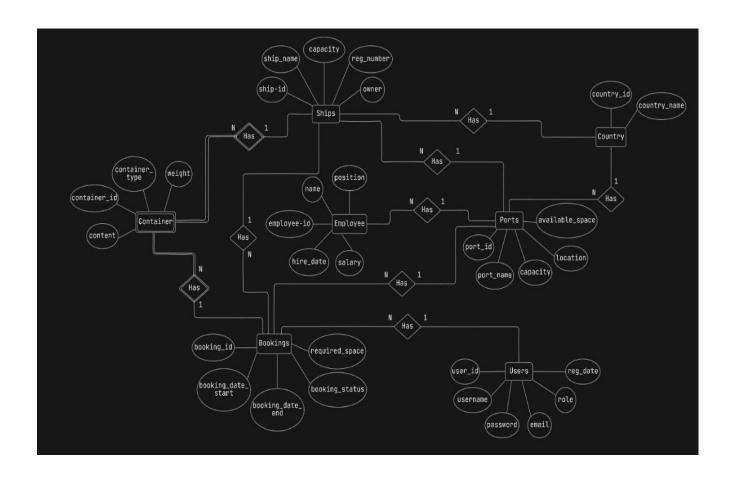
TEAM MEMBER DETAILS:

NAME	SRN
VARUN S	PES1UG22CS679
VIGNESH	PES1UG22CS688

OVERVIEW:

The goal of this system is to optimize the logistics and operations of a port, enabling smooth management of resources (ships, containers, and port spaces), improving efficiency. It provides a central hub for managing port capacity, bookings, and shipping data in a streamlined and secure manner.

ER DIAGRAM:



RELATION SCHEMA:



DDL QUERIES:

TABLE CREATION QUERY:

```
CREATE TABLE Ships (
    ship_id INT PRIMARY KEY AUTO_INCREMENT,
    ship name VARCHAR(100) NOT NULL,
    capacity INT NOT NULL,
    registration_number VARCHAR(50) UNIQUE,
    owner VARCHAR(100),
    country_id INT,
    port id INT,
    FOREIGN KEY (country_id) REFERENCES Country(country_id) ON DELETE SET NULL,
    FOREIGN KEY (port_id) REFERENCES Ports(port_id) ON DELETE SET NULL
);
-- Employee Table
CREATE TABLE Employee (
    employee id INT PRIMARY KEY AUTO INCREMENT,
    first_name VARCHAR(50) NOT NULL,
    last_name VARCHAR(50),
    position VARCHAR(100),
    salary DECIMAL(10, 2),
   hire_date DATE,
    port_id INT,
    FOREIGN KEY (port id) REFERENCES Ports(port id) ON DELETE SET NULL
);
-- Users Table
CREATE TABLE Users (
    user id INT PRIMARY KEY AUTO INCREMENT,
   username VARCHAR(50) NOT NULL,
   password VARCHAR(255) NOT NULL,
    email VARCHAR(100) UNIQUE NOT NULL,
    role ENUM('admin', 'user') DEFAULT 'user',
    registration date TIMESTAMP DEFAULT CURRENT TIMESTAMP
);
CREATE TABLE Bookings (
    booking id INT PRIMARY KEY AUTO INCREMENT,
    user_id INT,
    port id INT,
    ship id INT,
    booking_date_start TIMESTAMP DEFAULT CURRENT_TIMESTAMP,
    booking date end TIMESTAMP DEFAULT CURRENT TIMESTAMP,
    booking_status ENUM('pending', 'confirmed', 'canceled') DEFAULT 'pending',
    required space INT,
```

```
FOREIGN KEY (user_id) REFERENCES Users(user_id) ON DELETE CASCADE,
FOREIGN KEY (port_id) REFERENCES Ports(port_id) ON DELETE CASCADE,
FOREIGN KEY (ship_id) REFERENCES Ships(ship_id) ON DELETE CASCADE
);

-- Container Table

CREATE TABLE Container (
    container_id INT PRIMARY KEY AUTO_INCREMENT,
    container_type VARCHAR(50) NOT NULL,
    weight INT NOT NULL,
    contents VARCHAR(255),
    ship_id INT,
    booking_id INT,
    FOREIGN KEY (ship_id) REFERENCES Ships(ship_id) ON DELETE CASCADE,
    FOREIGN KEY (booking_id) REFERENCES Bookings(booking_id) ON DELETE CASCADE
);
```

DML QUERIES:

1.DATA RETERIVAL QUERIES

```
SELECT * FROM Users WHERE username = ? OR email = ?

SELECT Ports.*, Country.country_name FROM Ports LEFT JOIN Country ON Ports.country_id = Country.country_id

SELECT port_id, required_space FROM Bookings WHERE booking_id = ?

SELECT * FROM Country;

SELECT * FROM Country WHERE country_name = ?;

SELECT * FROM Ships WHERE registration_number = ?;

SELECT available_space FROM Ports WHERE port_id = ?;

SELECT * FROM Bookings WHERE user_id = ? ORDER BY booking_date_start DESC;

SELECT ship_id, ship_name FROM Ships;

SELECT required_space, port_id FROM Bookings WHERE booking_id = ?;
```

```
SELECT * FROM Users WHERE email = ?;

SELECT * FROM Users WHERE user_id = ?;

SELECT * FROM Employee WHERE first_name = ? AND last_name = ?;

SELECT available_space FROM Ports WHERE port_id = ?;
```

2.DATA RETERIVAL WITH JOIN

```
SELECT Bookings.*, Users.username, Ports.port_name, Ships.ship_name FROM Bookings

LEFT JOIN Users ON Bookings.user_id = Users.user_id

LEFT JOIN Ports ON Bookings.port_id = Ports.port_id

LEFT JOIN Ships ON Bookings.ship_id = Ships.ship_id;
```

Description:

- Retrieves all columns from the Bookings table.
- Adds the username from the Users table, port_name from the Ports table, and ship_name from the Ships table.
- Uses LEFT JOIN to ensure all bookings are included, even if they don't have matching user, port, or ship information.

```
SELECT Employee.*, Ports.port_name
FROM Employee
LEFT JOIN Ports ON Employee.port_id = Ports.port_id;
```

Description:

- Retrieves all columns from the Employee table.
- Adds the port name from the Ports table.
- Uses **LEFT JOIN** to include all employees,

```
SELECT Ships.*, Country.country_name, Ports.port_name
FROM Ships
LEFT JOIN Country ON Ships.country_id = Country.country_id
LEFT JOIN Ports ON Ships.port_id = Ports.port_id;
```

Description:

- Retrieves all columns from the Ships table.
- Adds the country_name from the Country table and port_name from the Ports table.
- Uses LEFT JOIN to ensure all ships are included even if they have no matching country or port.

```
SELECT Container.*, Ships.ship_name, Bookings.booking_status
FROM Container

LEFT JOIN Ships ON Container.ship_id = Ships.ship_id

LEFT JOIN Bookings ON Container.booking_id = Bookings.booking_id;
```

- Retrieves all columns from the Container table.
- Adds the ship_name from the Ships table, showing which ship is associated with each container.
- Adds the booking_status from the Bookings table to show the status of the booking for each container.
- Uses LEFT JOIN to ensure all containers are included

```
SELECT Bookings.booking_id, Bookings.booking_status, Bookings.booking_date_start,
   Bookings.booking_date_end, Bookings.required_space, Ports.port_name,
   Ports.location, Ports.capacity, Ships.ship_name, Ships.ship_id
FROM Bookings JOIN Ports ON Bookings.port_id = Ports.port_id
LEFT JOIN Ships ON Bookings.ship_id = Ships.ship_id
WHERE Bookings.user_id = ? ORDER BY Bookings.booking_date_start DESC;
```

Description:

- Retrieves booking details (ID, status, start/end dates, and required space) from the Bookings table.
- Retrieves associated port details (name, location, capacity) from the Ports table using an inner JOIN.
- Retrieves associated ship details (name, ID) from the Ships table using a LEFT JOIN (to ensure all bookings are shown, even if no ship is assigned).
- Filters the bookings to only those for a specific user, identified by user_id (specified by a parameter ?).
- Orders the results by the booking's start date in descending order (DESC), showing the most recent bookings first.

```
Country.country_name FROM Ports LEFT JOIN Country ON Ports.country_id = Country.country_id WHERE Ports.available_space > 0;
```

- Retrieves information from the Ports table including the port ID, name, capacity, and available space.
- Retrieves the associated country name from the Country table using a LEFT JOIN on the country_id.
- Filters the results to only include ports where the available_space is greater than zero, ensuring that only ports with available capacity are returned.

```
SELECT Container.*
FROM Container

JOIN Bookings ON Container.booking_id = Bookings.booking_id
WHERE Bookings.user_id = ?;
```

Description:

- Retrieves all columns from the Container table.
- Joins the Bookings table to filter containers by the user_id of the bookings.
- The query returns containers associated with a particular user.

```
SELECT Ships.*, Bookings.booking_date_start, Bookings.booking_date_end
FROM Ships
JOIN Bookings ON Ships.ship_id = Bookings.ship_id
WHERE Bookings.user_id = ?
  AND Bookings.booking_status = 'pending'
  AND Bookings.booking_date_start > NOW()
ORDER BY Bookings.booking_date_start ASC;
```

Description:

- Retrieves details of ships from the Ships table.
- Filters bookings by user_id, with a status of 'pending' and a start date in the future (> NOW()).
- Orders the results by the start date of the bookings in ascending order.

```
SELECT Container.*, Bookings.booking_status
FROM Container
JOIN Bookings ON Container.booking_id = Bookings.booking_id
```

- Retrieves all columns from the Container table along with the booking_status from the Bookings table.
- Filters the containers based on the user_id of the associated bookings, returning the booking status along with container details.

3. SELECT QUERIES WITH SUBQUERIES

```
SELECT
  Ports.port_id,
  Ports.port_name,
  Ports.capacity,
  Ports.available space,
  calculate port utilization(Ports.port id) AS capacityUtilization,
  (SELECT COUNT(*)
  FROM Bookings
  WHERE Bookings.port_id = Ports.port_id
   AND (booking_status = 'confirmed' OR booking_status = 'pending')) AS
activeBookings,
  (SELECT SUM(Container.weight)
   FROM Container
  INNER JOIN Bookings ON Container.booking_id = Bookings.booking_id
  WHERE Bookings.port_id = Ports.port_id) AS totalCargoLoad
FROM Ports;
```

Description:

- Ports Information: It fetches the port_id, port_name, capacity, and available_space from the Ports table.
- Capacity Utilization: It calculates the port's capacity utilization using the calculate_port_utilization() function.
- Active Bookings: It counts the number of active bookings (both 'confirmed' and 'pending') for each port by querying the Bookings table.
- Total Cargo Load: It calculates the total cargo load by summing the weight of containers associated with active bookings for each port.

4.SET OPERATIONS:

```
(SELECT
  'New Booking' AS activity,
  Bookings.booking_date_start AS timestamp,
 Ports.port name,
  Bookings.booking_id AS reference_id
 FROM Bookings
 JOIN Ports ON Bookings.port id = Ports.port id
 ORDER BY Bookings.booking_date_start DESC)
UNION ALL
(SELECT
  'User Registration' AS activity,
 Users.registration date AS timestamp,
 'System' AS port_name,
 Users.user id AS reference id
 FROM Users
 ORDER BY Users.registration_date DESC)
ORDER BY timestamp DESC;
```

- 1. First Query (Bookings):
 - Retrieves booking information: booking date start, port name, and booking id.
 - Labels this activity as "New Booking".
 - Joins the Ports table to get the corresponding port name for each booking.
 - Orders by the booking_date_start in descending order.

2.Second Query (User Registration):

- Retrieves user registration information: registration date and user id.
- Labels this activity as "User Registration".
- Sets 'System' as the port name (since it's not related to a port).
- Orders by the registration_date in descending order.

3.UNION ALL:

- Combines the two queries into one result set without removing duplicates.
- Sorts the combined results by the timestamp (either booking_date_start or registration_date) in descending order.

5.INSERT QUERIES:

```
INSERT INTO Ports (port_name, capacity, available_space, location, country_id)
VALUES (?, ?, ?, ?, ?)

INSERT INTO Country (country_name) VALUES (?);

INSERT INTO Employee (first_name, last_name, position, salary, hire_date, port_id)
VALUES (?, ?, ?, ?, ?, ?);

INSERT INTO Ships (ship_name, capacity, registration_number, owner, country_id, port_id) VALUES (?, ?, ?, ?, ?);

INSERT INTO Users (username, email, password, role) VALUES (?, ?, ?, ?);
```

6. UPDATE QUERIES:

```
UPDATE Users SET role = ? WHERE user_id = ?

UPDATE Ports SET port_name = ?, capacity = ?, available_space = ?, location = ?
WHERE port_id = ?

UPDATE Bookings SET booking_status = ? WHERE booking_id = ?

UPDATE Ports SET available_space = available_space + ? WHERE port_id = ?

UPDATE Country SET country_name = ? WHERE country_id = ?;

UPDATE Employee SET first_name = ?, last_name = ?, position = ?, salary = ?, hire_date = ?, port_id = ? WHERE employee_id = ?

UPDATE Ships SET ship_name = ?, capacity = ?, registration_number = ?, owner = ?, country_id = ?, port_id = ? WHERE ship_id = ?;

UPDATE Container SET container_type = ?, weight = ?, contents = ?, ship_id = ?, booking_id = ? WHERE container_id = ?;

UPDATE Users SET username = ?, email = ? WHERE user_id = ?;
```

7.DELETE QUERIES:

DELETE FROM Users WHERE user id = ?

```
DELETE FROM Ports WHERE port_id = ?

DELETE FROM Bookings WHERE booking_id = ?

DELETE FROM Country WHERE country_id = ?;

DELETE FROM Employee WHERE employee_id = ?;

DELETE FROM Ships WHERE ship_id = ?;

DELETE FROM Container WHERE container_id = ?;
```

8. PROCEDURE

```
-- Procedure for adding booking
DELIMITER //
CREATE PROCEDURE add_booking(
 IN p_user_id INT,
 IN p_port_id INT,
 IN p_ship_id INT,
 IN p_start_date TIMESTAMP,
 IN p_end_date TIMESTAMP,
 IN p_required_space INT
BEGIN
 DECLARE available INT;
 DECLARE new_booking_id INT;
 SELECT available_space INTO available FROM Ports WHERE port_id = p_port_id;
 IF available >= p_required_space THEN
   INSERT INTO Bookings (user_id, port_id, ship_id, booking_date_start,
booking_date_end, booking_status, required_space)
    VALUES (p_user_id, p_port_id, p_ship_id, p_start_date, p_end_date, 'pending',
p required space);
    SET new_booking_id = LAST_INSERT_ID();
   UPDATE Ports
   SET available_space = available_space - p_required_space
    WHERE port id = p port id;
```

```
SELECT 'Booking created successfully' AS message, new_booking_id AS
booking_id;
ELSE
    SIGNAL SQLSTATE '45000'
    SET MESSAGE_TEXT = 'Insufficient space available at the selected port for
this booking.';
END IF;
END //
DELIMITER;
```

The procedure is responsible for adding a booking to the system, ensuring that the required space is available at the selected port, and adjusting the port's available space accordingly. If there isn't enough space, it raises an error.

9. FUNCTIONS

```
- Function to calculate port utilization
DELIMITER //
CREATE FUNCTION calculate port utilization(pid INT)
RETURNS DECIMAL(5,2)
DETERMINISTIC
BEGIN
 DECLARE total capacity INT;
 DECLARE space available INT;
 DECLARE utilization DECIMAL(5,2);
  SELECT capacity, available_space INTO total_capacity, space_available
  FROM Ports
 WHERE port_id = pid;
 IF total capacity > 0 THEN
    SET utilization = ((total_capacity - space_available) / total_capacity) *
100;
  ELSE
   SET utilization = 0;
  END IF;
 RETURN utilization;
```

```
END //
DELIMITER;
```

This function calculates the percentage of a port's capacity that is currently being used by comparing the total capacity to the available space. It returns this value as a percentage of utilization. If the port has no capacity, it returns a utilization of 0%.

10. TRIGGERS

```
-- Trigger for preventing deletion of country if associated with any port or ship
DELIMITER //
CREATE TRIGGER prevent_country_deletion
BEFORE DELETE ON Country
FOR EACH ROW
BEGIN
 DECLARE port_count INT;
 DECLARE ship_count INT;
 SELECT COUNT(*) INTO port_count FROM Ports WHERE country_id = OLD.country_id;
 SELECT COUNT(*) INTO ship_count FROM Ships WHERE country_id = OLD.country_id;
 IF port_count > 0 OR ship_count > 0 THEN
   SIGNAL SQLSTATE '45000'
    SET MESSAGE_TEXT = 'Cannot delete country with associated ports or ships.';
  END IF;
END //
DELIMITER;
```

Description:

This trigger ensures that a country cannot be deleted if there are any associated ports or ships. If such associations exist, the trigger raises an error message, preventing the deletion and maintaining data integrity.

```
-- Trigger for prevention of deletion of ports if associated with any ship
DELIMITER //
CREATE TRIGGER prevent_port_deletion
```

```
BEFORE DELETE ON Ports
FOR EACH ROW
BEGIN
   DECLARE ship_count INT;

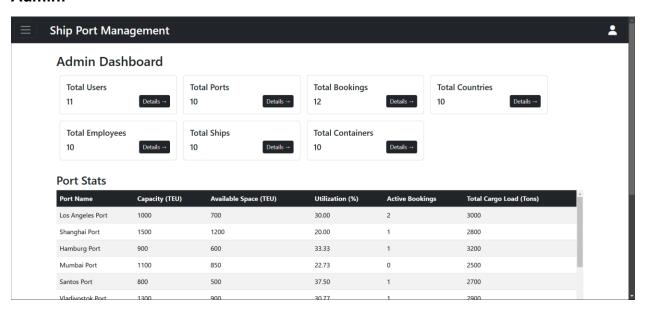
SELECT COUNT(*) INTO ship_count FROM Ships WHERE port_id = OLD.port_id;

IF ship_count > 0 THEN
   SIGNAL SQLSTATE '45000'
   SET MESSAGE_TEXT = 'Cannot delete port with associated ships.';
   END IF;
END //
DELIMITER;
```

This trigger prevents the deletion of a port if there are ships associated with it. If such ships exist, the trigger raises an error with a custom message, ensuring that ports with active ship associations cannot be deleted.

FRONTEND:

Admin:



Port Stats

Port Name	Capacity (TEU)	Available Space (TEU)	Utilization (%)	Active Bookings	Total Cargo Load (Tons)
Santos Port	800	500	37.50	1	2700
Vladivostok Port	1300	900	30.77	1	2900
Tokyo Port	1400	1100	21.43	1	2600
Vancouver Port	1000	700	30.00	1	2750
Sydney Port	950	650	31.58	1	3050
London Port	1050	800	23.81	0	2550

Activity Logs

Activity	Port Name	Reference ID	Timestamp
New Booking	Los Angeles Port	14	11/13/2024, 9:18:00 AM
New Booking	Los Angeles Port	15	11/13/2024, 12:00:00 AM
User Registration	System	11	11/12/2024, 11:29:31 PM
User Registration	System	10	11/12/2024, 11:29:00 PM
User Registration	System	9	11/12/2024, 11:28:38 PM
User Registration	System	8	11/12/2024, 11:28:22 PM

Ship Port Management

.

Manage Users

Search by ID, Username, or Email

O All O User O Admin

Add New User

ID	Username	Email	Role	Actions
1	Admin	admin@test.com	admin	Edit Delete
2	User 1	user1@test.com	user	Edit Delete
3	User 2	user2@test.com	user	Edit Delete
4	User 3	user3@test.com	user	Edit Delete
5	User 4	user4@test.com	user	Edit Delete
6	User 5	user5@test.com	user	Edit Delete
7	User 6	userr6@test.com	user	Edit Delete
0	Hear 7	usar7@tast.com	ucor	cm ott

Ship Port Management

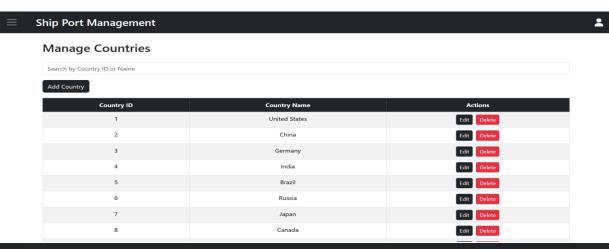
9

Manage Bookings

Search by Booking ID, User ID, Name, Port ID, Port Name, Ship ID, Ship Name

O All Pending Confirmed Canceled

Booking ID	User	Port	Ship	From Booking Date	To Booking Date	Required Space	Status	Actions
1	2 - User 1	1 - Los Angeles Port	1 - Ocean Queen	5/10/2023	5/15/2023	200	confirmed	Edit Delete
2	3 - User 2	2 - Shanghai Port	2 - Pacific Pearl	6/12/2023	6/17/2023	150	confirmed	Edit Delete
3	4 - User 3	3 - Hamburg Port	3 - Atlantic Giant	7/14/2023	7/19/2023	180	pending	Edit Delete
4	5 - User 4	4 - Mumbai Port	4 - Indian Voyager	8/10/2023	8/15/2023	220	canceled	Edit Delete
5	6 - User 5	5 - Santos Port	5 - Brazilian Falcon	9/8/2023	9/13/2023	210	confirmed	Edit Delete
6	7 - User 6	6 - Vladivostok Port	6 - Arctic Voyager	10/18/2023	10/23/2023	190	pending	Edit Delete
7	8 - User 7	7 - Tokyo Port	7 - Asian Star	11/22/2023	11/27/2023	230	confirmed	Edit Delete
8	9 - User 8	8 - Vancouver Port	8 - Maple Breeze	12/1/2023	12/6/2023	170	pending	Edit Delete



Ship Port Management

•

Manage Employees

Search by ID, Name, Position, or Port Name

Add Employee

Employee ID	First Name	Last Name	Position	Salary	Hire Date	Port Name	Actions
1	John	Doe	Manager	₹55000.00	2/15/2021	Los Angeles Port	Edit Delete
2	Jane	Smith	Engineer	₹48000.00	6/12/2020	Shanghai Port	Edit Delete
3	Emily	Johnson	Technician	₹45000.00	8/23/2019	Hamburg Port	Edit Delete
4	Michael	Williams	Supervisor	₹50000.00	11/5/2021	Mumbai Port	Edit Delete
5	Sarah	Brown	Manager	₹54000.00	1/19/2022	Santos Port	Edit Delete
6	David	Jones	Dock Worker	₹40000.00	12/28/2018	Vladivostok Port	Edit Delete
7	Laura	Garcia	Engineer	₹46000.00	9/13/2020	Tokyo Port	Edit Delete
8	Daniel	Martinez	Technician	₹43000.00	7/4/2019	Vancouver Port	Edit Delete

Ship Port Management

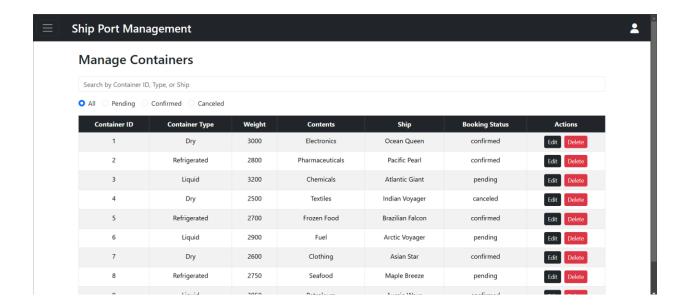
2

Manage Ships

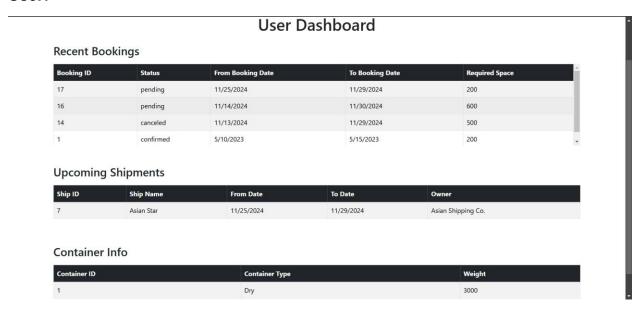
Search by Ship ID, Name, Registration Number, Country, or Port

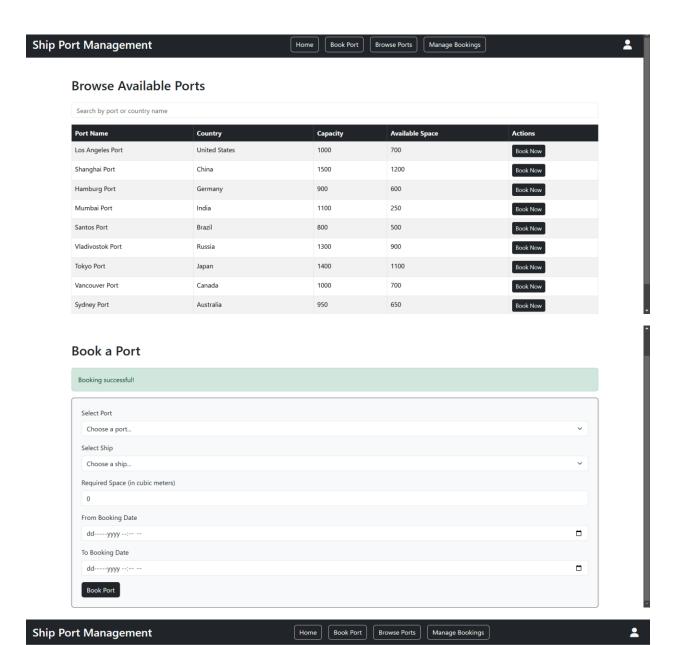
Add New Ship

Ship ID	Ship Name	Capacity	Registration Number	Owner	Country	Port	Actions
1	Ocean Queen	500	REG001	Oceanic Inc.	United States	1 - Los Angeles Port	Edit Delete
2	Pacific Pearl	400	REG002	Seafarer Ltd.	China	2 - Shanghai Port	Edit Delete
3	Atlantic Giant	600	REG003	Atlantic Corp.	Germany	3 - Hamburg Port	Edit Delete
4	Indian Voyager	550	REG004	Indian Ocean Ltd.	India	4 - Mumbai Port	Edit Delete
5	Brazilian Falcon	480	REG005	Falcon Transport	Brazil	5 - Santos Port	Edit Delete
6	Arctic Voyager	500	REG006	Arctic Ships	Russia	6 - Vladivostok Port	Edit Delete
7	Asian Star	530	REG007	Asian Shipping Co.	Japan	7 - Tokyo Port	Edit Delete
8	Maple Breeze	450	REG008	Maple Logistics	Canada	8 - Vancouver Port	Edit Delete



User:





Manage Your Bookings

