

Introduction

An online railway ticket reservation system is a system that allows customers to book and purchase tickets for railway travel online, rather than physically visiting a ticketing office or booking over the phone.

Benefits of an online railway ticket reservation system include:

Convenience: Customers can book tickets from anywhere at any time, without having to visit a physical location or wait in line.

Accuracy: Customers can review and confirm their bookings before completing the purchase, reducing the risk of errors and misunderstandings.

Efficiency: An online reservation system can handle a larger volume of bookings and automatically update availability and scheduling, making it more efficient for the railway company.

Security: Online payment methods are typically secure, protecting personal and financial information.

Cost-effective: An online reservation system can reduce operating costs for the railway company, as it eliminates the need for manual processing and reduces the need for customer service staff.

Data tracking and analysis: An online reservation system can provide valuable data and insights about customer preferences and behavior, which can help the railway company optimize its services and marketing efforts.

Scope

Ticket booking: Customers can book tickets for railway travel online, including selecting the date, time, route, and class of travel.

Payment: Customers can make payments online using a variety of secure payment methods, such as credit cards, debit cards, or online payment platforms.

Scheduling: The system can automatically update availability and scheduling based on bookings made through the system.

Data tracking and analysis: The system may collect data about customer preferences and behavior, which can be used for data analysis and to optimize services and marketing efforts.

Integration with other systems: The system may be integrated with other systems such as a customer relationship management (CRM) system or a reporting and analytics platform.

limitations

The limitations of an online railway ticket reservation system depend on the specific features and capabilities of the system. Some potential limitations of an online railway ticket reservation system include:

Accessibility: The system may not be accessible to users who do not have access to the internet or who are not comfortable using technology.

Payment options: Some customers may not have access to the payment options offered by the system, or may prefer to pay with cash or other methods.

Service availability: The system may not be available at all times, such as during maintenance periods or system failures.

Limited route options: The system may only offer tickets for a limited number of routes or classes of travel.

Booking restrictions: The system may have restrictions on the number of tickets that can be booked at a time or may have other booking limits or policies.

Integration issues: If the system is integrated with other systems, there may be issues with data compatibility or integration processes.

Schema

Graphical user interface

Description automatically generated

ERD

Diagram

Description automatically generated

Table Creations

# Fares

Graphical user interface, text, application, website

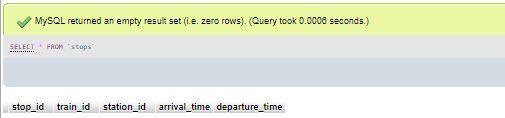
Description automatically generated

# Reservation\_payments

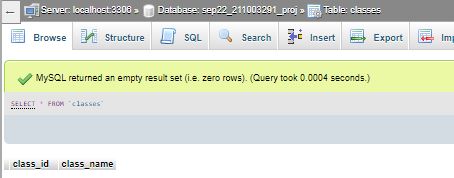
Graphical user interface, text, application

Description automatically generated

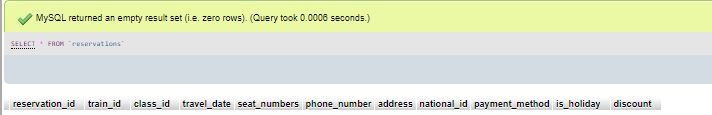
# Stops



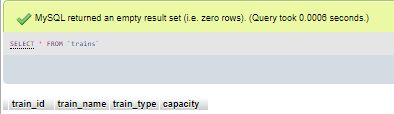
# Classes



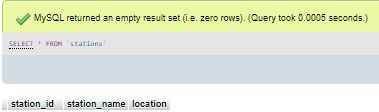
# Reservations



# Trains



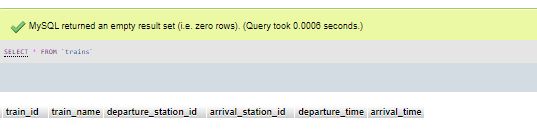
# Stations



# Passengers



# Trains



SQL Queries

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-- Table structure for table `classes`

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CREATE TABLE `classes` (

  `class\_id` int NOT NULL PRIMARY KEY AUTO\_INCREMENT,

  `class\_name` varchar(255) NOT NULL,)

PRIMARY KEY (`class\_id`);

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-- Dumping data for table `classes`

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INSERT INTO `classes` (`class\_id`, `class\_name`, `air\_conditioning`) VALUES

(1, 'First Class'),

(2, 'Second Class'),

(3, 'Third Class');

ALTER TABLE classes

ADD air\_conditioning BOOLEAN NOT NULL DEFAULT FALSE;

UPDATE classes

SET air\_conditioning = TRUE

WHERE class\_name IN ('First Class', 'Second Class');

UPDATE classes

SET air\_conditioning = FALSE

WHERE class\_name = 'Third Class';

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-- Table structure for table `fares`

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CREATE TABLE `fares` (

  `fare\_id` int NOT NULL PRIMARY KEY AUTO\_INCREMENT,

  `train\_id` int NOT NULL,

  `class\_id` int NOT NULL,

  `original\_price` int NOT NULL),

FOREIGN KEY (`train\_id`) REFERENCES `trains` (`train\_id`),

FOREIGN KEY (`class\_id`) REFERENCES `classes` (`class\_id`);

--

-- Dumping data for table `fares`

--

INSERT INTO `fares` (`fare\_id`, `train\_id`, `class\_id`, `original\_price`) VALUES

(1, 1, 1, 850),

(2, 2, 1, 200),

(3, 3, 1, 750),

(4, 4, 1, 200),

(5, 5, 1, 200),

(6, 6, 1, 300),

(7, 7, 1, 150),

(8, 8, 1, 380),

(9, 9, 1, 270),

(10, 10, 1, 300),

(11, 11, 1, 300),

(12, 1, 2, 630),

(13, 2, 2, 150),

(14, 3, 2, 590),

(15, 4, 2, 150),

(16, 5, 2, 250),

(17, 6, 2, 140),

(18, 7, 2, 75),

(19, 8, 2, 200),

(20, 9, 2, 190),

(21, 10, 2, 170),

(22, 11, 2, 170),

(23, 1, 3, 525),

(24, 2, 3, 75),

(25, 3, 3, 400),

(26, 4, 3, 75),

(27, 5, 3, 170),

(28, 6, 3, 90),

(29, 7, 3, 50),

(30, 8, 3, 150),

(31, 9, 3, 120),

(32, 10, 3, 60),

(33, 11, 3, 60);

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-- Table structure for table `passengers`

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CREATE TABLE `passengers` (

  `fname` varchar(255) NOT NULL,

  `minit` char(1) DEFAULT NULL,

  `lname` varchar(255) NOT NULL,

  `street\_name` varchar(255),

  `house\_number` int NOT NULL,

  `national\_id` char(14) NOT NULL,

  `Gender` char(1) NOT NULL,

  `phone\_number` char(14) NOT NULL)

PRIMARY KEY (`national\_id`);

--

-- Dumping data for table `passengers`

--

INSERT INTO `passengers` (`fname`, `minit`, `lname`, `street\_name`, `house\_number`, `national\_id`, `Gender`, `phone\_number`) VALUES

('Fatma', 'I', 'Ibrahim', 'El-Tagammu Street', 321, '30403300202042', 'F', '00201221110009'),

('Mohammed', 'A', 'Salem', 'El-Khalifa Street', 789, '30403300202051', 'M', '00201111222333'),

('Ahmed', 'M', 'Ali', 'Elm Street, Cairo', 24, '30403300202057', 'M', '00201156266232'),

('Sara', 'M', 'Mohammed', 'El Ekbal Street, Giza', 456, '30403300202058', 'F', '00201111166231'),

('Samir', 'S', 'Mustafa', 'Shaarawy Street, Alexandria', 902, '30403300202059', 'M', '00201111166230'),

('Hayah', 'E', 'Hassan', 'Safya Zaghloul Street, Alexandria', 3412, '30403300202060', 'F', '00201123665265'),

('Fares', 'F', 'Ali', 'El-Nahda Street', 987, '30403300202064', 'M', '00201443221001'),

('Tariq', 'B', 'Mansour', 'Cassara Street, Suez', 5678, '30403300202065', 'M', '00201111166224'),

('Lena', 'F', 'Kamal', 'Saad Zaghloul Street, Alexandria', 12, '30403300202066', 'F', '00201111166223'),

('Yasmin', 'T', 'Ahmed', 'El-Zamalek Street', 654, '30403300202073', 'F', '00201332211001'),

('Omar', 'R', 'Sami', 'El-Mohandessin Street', 246, '30403300202095', 'M', '00201554321000');

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-- Table structure for table `reservations`

--

CREATE TABLE `reservations` (

  `reservation\_id` int NOT NULL PRIMARY KEY AUTO\_INCREMENT,

  `travel\_date` date NOT NULL,

  `seat\_numbers` varchar(255) NOT NULL,

  `phone\_number` varchar(14) CHECK (phone\_number REGEXP '002[0-9]{14}'),

  `address` varchar(255) NOT NULL,

  `national\_id` char(14) NOT NULL,

  `payment\_method` varchar(255) NOT NULL,

  `is\_holiday` tinyint(1) NOT NULL DEFAULT '0',

  `discount` decimal(10,2) NOT NULL DEFAULT '0.00',

  `train\_id` int,

  `class\_id` int,

  FOREIGN KEY (`train\_id`) REFERENCES `trains` (`train\_id`),

  FOREIGN KEY (`class\_id`) REFERENCES `classes` (`class\_id`),

  FOREIGN KEY (`national\_id`) REFERENCES `passengers` (`national\_id`)

--

-- Dumping data for table `reservations`

--

INSERT INTO `reservations` (`reservation\_id`, `travel\_date`, `seat\_numbers`, `phone\_number`, `address`, `national\_id`, `payment\_method`, `is\_holiday`, `discount`, `train\_id`, `class\_id`) VALUES

(1, '2023-01-01', '1A, 1B', '00201111166223', '678 ElHoreya Street', '30403300202057', 'Credit Card', 0, '10.00', 1, 1),

(3, '2023-03-01', '3A, 3B', '00201111166225', '456 El Ekbal Street', '30403300202058', 'Cash', 1, '20.00', 2, 3),

(4, '2023-04-01', '4A, 4B', '0020112366526', '789 Shaarawy Street', '30403300202059', 'Credit Card', 0, '25.00', 3, 1),

(5, '2023-08-01', '8A, 8B', '00201111166230', '123 Safya Zaghloul Street', '30403300202060', 'Credit Card', 0, '10.00', 1, 1),

(6, '2023-09-01', '9A, 9B', '00201111166231', '456 Qasr Elnil Street', '30403300202065', 'Debit Card', 0, '15.00', 2, 2),

(7, '2023-10-01', '10A, 10B', '00201156266232', '789 Saad Zaghloul Street', '30403300202066', 'Cash', 1, '20.00', 3, 3),

(8, '2022-12-31', '4A, 5A', '00201554321000', 'El-Mohandessin Street 246', '30403300202095', 'credit card', 0, '0.00', 1, 1),

(9, '2022-12-31', '6A, 7A', '00201554321000', 'El-Mohandessin Street 246', '30403300202095', 'credit card', 0, '0.00', 1, 1),

(10, '2023-07-01', '6B,7B', '00201111166230', 'Shaarawy Street, Alexandria 902', '30403300202059', 'credit card', 0, '0.00', 1, 1),

(41, '2023-02-01', '2A, 2B', '00201111166225', '857 Talaat Harb Street, Cairo', '30403300202066', 'Credit Card', 0, '0.00', 1, 2),

(42, '2023-05-01', '5A, 5B', '00201111166226', '928 El Gomhoria Street, Alexandria', '30403300202065', 'Debit Card', 0, '0.00', 2, 2),

(43, '2023-06-01', '6A, 6B', '00201111166227', '1234 Qasr El Nil Street, Cairo', '30403300202060', 'Cash', 0, '0.00', 3, 2),

(44, '2023-07-01', '7A, 7B', '00201111166228', '567 Saad Zaghloul Street, Alexandria', '30403300202059', 'Credit Card', 1, '10.00', 4, 3),

(45, '2023-08-01', '8A, 8B', '00201111166229', '246 El Mohandessin Street, Cairo', '30403300202058', 'Debit Card', 0, '5.00', 5, 3),

(46, '2023-09-01', '9A, 9B', '00201111122229', '789 El Horreya Street, Alexandria', '30403300202057', 'Cash', 0, '0.00', 6, 3),

(47, '2023-10-01', '10A, 10B', '00201111166223', '321 Safya Zaghloul Street, Alexandria', '30403300202066', 'Credit Card', 1, '20.00', 7, 1),

(48, '2023-11-01', '11A, 11B', '00201111166224', '654 El Ekbal Street, Alexandria', '30403300202065', 'Debit Card', 0, '15.00', 8, 1),

(49, '2023-12-01', '12A, 12B', '00201111166230', '987 Shaarawy Street, Alexandria', '30403300202060', 'Cash', 0, '0.00', 9, 1),

(50, '2023-01-01', '1A, 1B', '00201111166231', '246 El Mohandessin Street, Cairo', '30403300202059', 'Credit Card', 0, '0.00', 10, 1);

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-- Table structure for table `reservation\_payments`

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CREATE TABLE `reservation\_payments` (

  `payment\_id` int NOT NULL PRIMARY KEY AUTO\_INCREMENT,

  `reservation\_id` int NOT NULL,

  `payment\_amount` decimal(10,2) NOT NULL,

  FOREIGN KEY (`reservation\_id`) REFERENCES `reservations` (`reservation\_id`));

--

-- Dumping data for table `reservation\_payments`

--

INSERT INTO reservation\_payments (reservation\_id, payment\_amount)

SELECT r.reservation\_id, f.original\_price - (f.original\_price \* r.discount / 100) - (f.original\_price\* 0.1 \* r.is\_holiday) --10% off default if holiday

FROM reservations r

JOIN fares f ON r.train\_id = f.train\_id AND r.class\_id = f.class\_id;

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-- Table structure for table `stations`

--

CREATE TABLE `stations` (

  `station\_id` int NOT NULL PRIMARY KEY AUTO\_INCREMENT,

  `station\_name` varchar(255) NOT NULL,

  `location` varchar(255) NOT NULL

)

--

-- Dumping data for table `stations`

--

INSERT INTO `stations` (`station\_id`, `station\_name`, `location`) VALUES

(1, 'Cairo Central', 'Cairo'),

(2, 'Aswan Railway Station', 'Aswan'),

(3, 'Luxor Railway Station', 'Luxor'),

(4, 'Abu Simbel', 'Aswan'),

(5, 'Victoria Railway Station', 'Alexandria'),

(6, 'Sidi Gaber Railway Station', 'Alexandria'),

(7, 'Port Said Railway Station', 'Port Said'),

(8, 'Sohag Railway Station', 'Sohag'),

(9, 'Suez Railway Station', 'Suez'),

(10, 'Tanta Railway Station', 'Tanta');

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-- Table structure for table `stops`

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CREATE TABLE `stops` (

  `stop\_id` int NOT NULL PRIMARY KEY AUTO\_INCREMENT,

  `train\_id` int NOT NULL,

  `station\_id` int NOT NULL,

  `arrival\_time` time NOT NULL,

  `departure\_time` time NOT NULL

FOREIGN KEY (`train\_id`) REFERENCES `trains` (`train\_id`),

FOREIGN KEY (`station\_id`) REFERENCES `stations` (`station\_id`)

)

--

-- Dumping data for table `stops`

--

INSERT INTO `stops` (`stop\_id`, `train\_id`, `station\_id`, `arrival\_time`, `departure\_time`) VALUES

(1, 1, 1, '07:00:00', '07:30:00'),

(2, 1, 2, '10:00:00', '10:15:00'),

(4, 2, 1, '10:00:00', '11:00:00'),

(5, 2, 2, '12:00:00', '13:00:00'),

(6, 2, 3, '14:00:00', '15:00:00'),

(7, 3, 1, '10:00:00', '11:00:00'),

(8, 3, 2, '12:00:00', '13:00:00'),

(9, 3, 3, '14:00:00', '15:00:00');

--

-- Table structure for table `trains`

--

CREATE TABLE `trains` (

  `train\_id` int NOT NULL PRIMARY KEY AUTO\_INCREMENT,

  `train\_name` varchar(255) NOT NULL,

  `departure\_station\_id` int NOT NULL,

  `arrival\_station\_id` int NOT NULL,

  `departure\_time` time NOT NULL,

  `arrival\_time` time NOT NULL

FOREIGN KEY (`departure\_station\_id`) REFERENCES `stations` (`station\_id`)

  FOREIGN KEY (`arrival\_station\_id`) REFERENCES `stations` (`station\_id`)

)

--

-- Dumping data for table `trains`

--

INSERT INTO `trains` (`train\_id`, `train\_name`, `departure\_station\_id`, `arrival\_station\_id`, `departure\_time`, `arrival\_time`) VALUES

(1, 'Abu Simbel Express', 6, 4, '06:00:00', '09:00:00'),

(2, 'Aswan Express', 3, 2, '09:00:00', '11:00:00'),

(3, 'Luxor Express', 1, 3, '12:00:00', '15:00:00'),

(4, 'Alexandria local', 5, 6, '06:00:00', '06:30:00'),

(5, 'Alexandria local', 6, 5, '15:00:00', '15:15:00'),

(6, 'Alexandria Express', 1, 6, '15:00:00', '17:30:00'),

(7, 'Port Said Express', 1, 7, '06:00:00', '09:00:00'),

(8, 'Sohag Express', 1, 8, '09:00:00', '14:00:00'),

(9, 'Suez Express', 1, 9, '12:00:00', '14:00:00'),

(10, 'Tanta Express', 1, 10, '15:00:00', '17:30:00'),

(11, 'Tanta Express', 6, 10, '05:00:00', '07:30:00');

Extra queries

--Inserting data into reservations of all combinations of every passenger

INSERT INTO reservations (travel\_date, seat\_numbers, phone\_number, address, national\_id, payment\_method, is\_holiday, discount, train\_id, class\_id)

SELECT '2022-12-31', '4A, 5A', p.phone\_number, CONCAT(p.street\_name, ' ', p.house\_number), p.national\_id, 'credit card', 0, 0, 1, 1

FROM passengers p

WHERE p.phone\_number in ('00201554321000'or'00201332211001'or

'00201111166223'or'00201111166224'or

'00201443221001'or'00201123665265'or

'00201111166230'or'00201111166231'or

'00201156266232'or'00201111222333'or

'00201221110009');

------------------------- or Where p.phone\_number in ('00201554321000');

Table after insertions

Graphical user interface, text, application

Description automatically generatedGraphical user interface, text, application

Description automatically generatedTable

Description automatically generated

Table

Description automatically generatedGraphical user interface

Description automatically generated with medium confidenceBackground pattern

Description automatically generatedTable

Description automatically generated

Table

Description automatically generated

Conclusion

Overall, the use of an SQL database in an online railway ticket reservation system helps to streamline the ticket booking process, improving the customer experience and increasing the efficiency of the system. It also allows for easy tracking and management of ticket sales and customer data.

In conclusion, an SQL-based online railway ticket reservation system is a valuable tool for both customers and railway companies, offering a fast and reliable way to book tickets and track ticket sales.