```sql
-- 1. Initialize the database

DROP DATABASE IF EXISTS CareerHub;

CREATE DATABASE CareerHub;

USE CareerHub;


-- 2,3.Create Tables with Primary Keys, Foreign Keys, and Constraints

CREATE TABLE Companies(

CompanyId INT PRIMARY KEY AUTO_INCREMENT,

CompanyName VARCHAR(100),

Location VARCHAR(100),

State VARCHAR(100));


CREATE TABLE Jobs(

JobId INT PRIMARY KEY AUTO_INCREMENT,

CompanyId INT,

JobTitle vARCHAR(100),

JobDescription TEXT,

JobLocation VARCHAR(100),

Salary DECIMAL(10,2),

JobType VARCHAR(50),

PostedDate DATETIME DEFAULT CURRENT_TIMESTAMP,

FOREIGN KEY (CompanyId) REFERENCES Companies(CompanyId));


CREATE TABLE Applicants(

ApplicantId INT PRIMARY KEY AUTO_INCREMENT,

FirstName VARCHAR(50),

LastName VARCHAR(50),

Email VARCHAR(100) UNIQUE,

Phone VARCHAR(20),

Resume TEXT,

ExperienceYears INT);
```

```sql
CREATE TABLE Applications(

ApplicationID INT PRIMARY KEY AUTO_INCREMENT,

JobId INT,

ApplicantId INT,

ApplicationDate DATETIME DEFAULT CURRENT_TIMESTAMP,

CoverLetter TEXT,

FOREIGN KEY (JobId) REFERENCES Jobs(JobId),

FOREIGN KEY (ApplicantId) REFERENCES Applicants(ApplicantId));


INSERT INTO Companies (CompanyName, Location, State)VALUES

('TechCorp', 'San Francisco', 'California'),

('CloudSolutions', 'New York', 'New York'),

('DataVerse', 'Chicago', 'Illinois'),

('CodeCrafters', 'Austin', 'Texas'),

('NextGen Software', 'Seattle', 'Washington'),

('AI Innovations', 'Boston', 'Massachusetts'),

('WebWorks Studio', 'Denver', 'Colorado'),

('FinTech Flow', 'Atlanta', 'Georgia'),

('GreenByte', 'Portland', 'Oregon'),

('CyberNetics', 'Miami', 'Florida');


INSERT INTO Jobs (CompanyID, JobTitle, JobDescription, JobLocation, Salary, JobType, PostedDate)VALUES

(1, 'Frontend Developer', 'Develop UI using React.', 'San Francisco', 90000, 'Full-time', NOW()),

(2, 'Backend Developer', 'Handle APIs and databases.', 'New York', 95000, 'Full-time', NOW()),

(3, 'Data Analyst', 'Analyze company data.', 'Chicago', 85000, 'Contract', NOW()),

(4, 'DevOps Engineer', 'Manage cloud infrastructure.', 'Austin', 98000, 'Full-time', NOW()),

(5, 'Full Stack Developer', 'Frontend & backend dev.', 'Seattle', 105000, 'Full-time', NOW()),

(6, 'ML Engineer', 'Build machine learning models.', 'Boston', 110000, 'Full-time', NOW()),

(7, 'Web Designer', 'Design modern websites.', 'Denver', 70000, 'Part-time', NOW()),
```

```sql
(8, 'Finance Analyst', 'Analyze market trends.', 'Atlanta', 78000, 'Full-time', NOW()),

(9, 'IT Support', 'Support internal systems.', 'Portland', 60000, 'Full-time', NOW()),

(10, 'Cybersecurity Analyst', 'Monitor threats.', 'Miami', 99000, 'Full-time', NOW());


INSERT INTO Applicants (FirstName, LastName, Email, Phone, Resume, ExperienceYears)VALUES

('John', 'Doe', 'john@example.com', '1234567890', 'Resume 1', 2),

('Jane', 'Smith', 'jane@example.com', '2234567890', 'Resume 2', 4),

('Alice', 'Johnson', 'alice@example.com', '3234567890', 'Resume 3', 3),

('Bob', 'Williams', 'bob@example.com', '4234567890', 'Resume 4', 1),

('Charlie', 'Brown', 'charlie@example.com', '5234567890', 'Resume 5', 5),

('David', 'Miller', 'david@example.com', '6234567890', 'Resume 6', 0),

('Eva', 'Davis', 'eva@example.com', '7234567890', 'Resume 7', 6),

('Frank', 'Wilson', 'frank@example.com', '8234567890', 'Resume 8', 3),

('Grace', 'Moore', 'grace@example.com', '9234567890', 'Resume 9', 2),

('Henry', 'Taylor', 'henry@example.com', '1034567890', 'Resume 10', 4);


INSERT INTO Applications (JobID, ApplicantID, ApplicationDate, CoverLetter)VALUES

(1, 1, NOW(), 'Cover letter from John'),

(2, 2, NOW(), 'Cover letter from Jane'),

(3, 3, NOW(), 'Cover letter from Alice'),

(4, 4, NOW(), 'Cover letter from Bob'),

(5, 5, NOW(), 'Cover letter from Charlie'),

(6, 6, NOW(), 'Cover letter from David'),

(7, 7, NOW(), 'Cover letter from Eva'),

(8, 8, NOW(), 'Cover letter from Frank'),

(9, 9, NOW(), 'Cover letter from Grace'),

(10, 10, NOW(), 'Cover letter from Henry');


-- 4.Error Handling for Existing Tables


USE CareerHub;
```

```sql
DROP TABLE IF EXISTS Applications;

DROP TABLE IF EXISTS Applicants;

DROP TABLE IF EXISTS Jobs;

DROP TABLE IF EXISTS Companies;

CREATE TABLE IF NOT EXISTS Companies (

    CompanyID INT PRIMARY KEY AUTO_INCREMENT,

    CompanyName VARCHAR(100),

    Location VARCHAR(100),

    State VARCHAR(100));

CREATE TABLE IF NOT EXISTS Jobs (

    JobID INT PRIMARY KEY AUTO_INCREMENT,

    CompanyID INT,

    JobTitle VARCHAR(100),

    JobDescription TEXT,

    JobLocation VARCHAR(100),

    Salary DECIMAL(10, 2),

    JobType VARCHAR(50),

    PostedDate DATETIME DEFAULT CURRENT_TIMESTAMP,

    FOREIGN KEY (CompanyID) REFERENCES Companies(CompanyID));

CREATE TABLE IF NOT EXISTS Applicants (

    ApplicantID INT PRIMARY KEY AUTO_INCREMENT,

    FirstName VARCHAR(50),

    LastName VARCHAR(50),

    Email VARCHAR(100) UNIQUE,

    Phone VARCHAR(20),

    Resume TEXT,

    ExperienceYears INT);

CREATE TABLE IF NOT EXISTS Applications (

    ApplicationID INT PRIMARY KEY AUTO_INCREMENT,

    JobID INT,

    ApplicantID INT,
```

```sql
    ApplicationDate DATETIME DEFAULT CURRENT_TIMESTAMP,

    CoverLetter TEXT,

    FOREIGN KEY (JobID) REFERENCES Jobs(JobID),

    FOREIGN KEY (ApplicantID) REFERENCES Applicants(ApplicantID));


INSERT INTO Companies (CompanyName, Location, State)VALUES

('TechCorp', 'San Francisco', 'California'),

('CloudSolutions', 'New York', 'New York'),

('DataVerse', 'Chicago', 'Illinois'),

('CodeCrafters', 'Austin', 'Texas'),

('NextGen Software', 'Seattle', 'Washington'),

('AI Innovations', 'Boston', 'Massachusetts'),

('WebWorks Studio', 'Denver', 'Colorado'),

('FinTech Flow', 'Atlanta', 'Georgia'),

('GreenByte', 'Portland', 'Oregon'),

('CyberNetics', 'Miami', 'Florida');

INSERT INTO Jobs (CompanyID, JobTitle, JobDescription, JobLocation, Salary, JobType, PostedDate)VALUES

(1, 'Frontend Developer', 'Develop UI using React.', 'San Francisco', 90000, 'Full-time', NOW()),

(2, 'Backend Developer', 'Handle APIs and databases.', 'New York', 95000, 'Full-time', NOW()),

(3, 'Data Analyst', 'Analyze company data.', 'Chicago', 85000, 'Contract', NOW()),

(4, 'DevOps Engineer', 'Manage cloud infrastructure.', 'Austin', 98000, 'Full-time', NOW()),

(5, 'Full Stack Developer', 'Frontend & backend dev.', 'Seattle', 105000, 'Full-time', NOW()),

(6, 'ML Engineer', 'Build machine learning models.', 'Boston', 110000, 'Full-time', NOW()),

(7, 'Web Designer', 'Design modern websites.', 'Denver', 70000, 'Part-time', NOW()),

(8, 'Finance Analyst', 'Analyze market trends.', 'Atlanta', 78000, 'Full-time', NOW()),

(9, 'IT Support', 'Support internal systems.', 'Portland', 60000, 'Full-time', NOW()),

(10, 'Cybersecurity Analyst', 'Monitor threats.', 'Miami', 99000, 'Full-time', NOW());

INSERT INTO Applicants (FirstName, LastName, Email, Phone, Resume, ExperienceYears)VALUES

('John', 'Doe', 'john@example.com', '1234567890', 'Resume 1', 2),

('Jane', 'Smith', 'jane@example.com', '2234567890', 'Resume 2', 4),
```

('Alice', 'Johnson', 'alice@example.com', '3234567890', 'Resume 3', 3),

('Bob', 'Williams', 'bob@example.com', '4234567890', 'Resume 4', 1),

('Charlie', 'Brown', 'charlie@example.com', '5234567890', 'Resume 5', 5),

('David', 'Miller', 'david@example.com', '6234567890', 'Resume 6', 0),

('Eva', 'Davis', 'eva@example.com', '7234567890', 'Resume 7', 6),

('Frank', 'Wilson', 'frank@example.com', '8234567890', 'Resume 8', 3),

('Grace', 'Moore', 'grace@example.com', '9234567890', 'Resume 9', 2),

('Henry', 'Taylor', 'henry@example.com', '1034567890', 'Resume 10', 4);

INSERT INTO Applications (JobID, ApplicantID, ApplicationDate, CoverLetter)VALUES

(1, 1, NOW(), 'Cover letter from John'),

(2, 2, NOW(), 'Cover letter from Jane'),

(3, 3, NOW(), 'Cover letter from Alice'),

(4, 4, NOW(), 'Cover letter from Bob'),

(5, 5, NOW(), 'Cover letter from Charlie'),

(6, 6, NOW(), 'Cover letter from David'),

(7, 7, NOW(), 'Cover letter from Eva'),

(8, 8, NOW(), 'Cover letter from Frank'),

(9, 9, NOW(), 'Cover letter from Grace'),

(10, 10, NOW(), 'Cover letter from Henry');

-- 5.Count Applications per Job (Include Jobs with 0 Applications)

SELECT jo.JobTitle,Count(app.ApplicationId) AS ApplicationCount

FROM Jobs jo

LEFT JOIN Applications app ON jo.JobId=app.JobId

GROUP BY jo.JobId,jo.JobTitle;

	JobTitle	ApplicationCount
▶	Frontend Developer	1
	Backend Developer	1
	Data Analyst	1
	DevOps Engineer	1
	Full Stack Developer	1
	ML Engineer	1
	Web Designer	1
	Finance Analyst	1
	IT Support	1
	Cybersecurity Analyst	1

-- 6.Job Listings within a Salary Range (With Parameters)

SELECT j.JobTitle,c.CompanyName,j.JobLocation,j.Salary

FROM Jobs j

INNER JOIN Companies c ON j.CompanyId=c.CompanyId

WHERE j.Salary BETWEEN 70000 AND 100000

ORDER BY j.Salary;

	JobTitle	CompanyName	JobLocation	Salary
▶	IT Support	GreenByte	Portland	60000.00
	Web Designer	WebWorks Studio	Denver	70000.00
	Finance Analyst	FinTech Flow	Atlanta	78000.00
	Data Analyst	DataVerse	Chicago	85000.00
	Frontend Developer	TechCorp	San Francisco	90000.00
	Backend Developer	CloudSolutions	New York	95000.00
	DevOps Engineer	CodeCrafters	Austin	98000.00
	Cybersecurity Analyst	CyberNetics	Miami	99000.00

-- 7.Job Application History for a Specific Applicant

SELECT j.JobTitle,c.CompanyName,app.ApplicationDate

FROM Applications app

INNER JOIN Jobs j ON app.JobID = j.JobID

INNER JOIN Companies c ON j.CompanyID = c.CompanyID
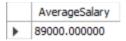
WHERE app.ApplicantID = 5;

	JobTitle	CompanyName	ApplicationDate
▶	Full Stack Developer	NextGen Software	2025-04-15 12:30:19

-- 8.Average Salary Offered by All Companies (Excluding Salary 0)

SELECT AVG(Salary) AS AverageSalary

FROM Jobs

WHERE Salary > 0;

	AverageSalary
▶	89000.000000

-- 9.Company with the Most Job Listings (Handle Ties)

SELECT c.CompanyName,COUNT(j.JobID) AS JobCount

FROM Companies c

LEFT JOIN Jobs j ON c.CompanyID = j.CompanyID

GROUP BY c.CompanyID, c.CompanyName

HAVING COUNT(j.JobID) = (SELECT MAX(JobCount) FROM (SELECT COUNT(JobID) AS JobCount FROM Jobs GROUP BY CompanyID) AS JobCounts);

	CompanyName	JobCount
▶	TechCorp	1
	CloudSolutions	1
	DataVerse	1
	CodeCrafters	1
	NextGen Software	1
	AI Innovations	1
	WebWorks Studio	1
	FinTech Flow	1
	GreenByte	1
	CyberNetics	1

-- 10.Applicants Who Have Applied for Jobs in Companies Located in 'CityX' with 3+ Years of Experience

UPDATE Companies SET Location = 'CityX' WHERE CompanyID = 3;

SELECT a.FirstName, a.LastName

FROM Applicants a

INNER JOIN Applications app ON a.ApplicantID = app.ApplicantID

INNER JOIN Jobs j ON app.JobID = j.JobID

INNER JOIN Companies c ON j.CompanyID = c.CompanyID

WHERE c.Location = 'CityX' AND a.ExperienceYears >= 3;

	FirstName	LastName
▶	Alice	Johnson

-- 11.Distinct Job Titles with Salaries Between $60,000 and $80,000

SELECT DISTINCT JobTitle

FROM Jobs

WHERE Salary BETWEEN 60000 AND 80000;

	JobTitle
▶	Web Designer
	Finance Analyst
	IT Support

-- 12.Jobs with No Applications

DELETE FROM Applications WHERE JobID = 5;

SELECT j.JobTitle,c.CompanyName

FROM Jobs j

LEFT JOIN Applications a ON j.JobID = a.JobID

INNER JOIN Companies c ON j.CompanyID = c.CompanyID

WHERE a.ApplicationID IS NULL;

	JobTitle	CompanyName
▶	Full Stack Developer	NextGen Software

-- 13.Job Applicants and Their Applied Jobs

SELECT a.FirstName,a.LastName,j.JobTitle,c.CompanyName

FROM Applicants a

LEFT JOIN Applications app ON a.ApplicantID = app.ApplicantID

LEFT JOIN Jobs j ON app.JobID = j.JobID

LEFT JOIN Companies c ON j.CompanyID = c.CompanyID;

	FirstName	LastName	JobTitle	CompanyName
▶	John	Doe	Frontend Developer	TechCorp
	Jane	Smith	Backend Developer	CloudSolutions
	Alice	Johnson	Data Analyst	DataVerse
	Bob	Williams	DevOps Engineer	CodeCrafters
	Charlie	Brown	NULL	NULL
	David	Miller	ML Engineer	AI Innovations
	Eva	Davis	Web Designer	WebWorks Studio
	Frank	Wilson	Finance Analyst	FinTech Flow
	Grace	Moore	IT Support	GreenByte
	Henry	Taylor	Cybersecurity Analyst	CyberNetics

-- 14.Companies and the Count of Jobs They Have Posted (Including Those with No Jobs)

SELECT c.CompanyName,COUNT(j.JobID) AS JobCount

FROM Companies c

LEFT JOIN Jobs j ON c.CompanyID = j.CompanyID

GROUP BY c.CompanyID, c.CompanyName;

	CompanyName	JobCount
▶	TechCorp	1
	CloudSolutions	1
	DataVerse	1
	CodeCrafters	1
	NextGen Software	1
	AI Innovations	1
	WebWorks Studio	1
	FinTech Flow	1
	GreenByte	1
	CyberNetics	1

-- 15.Applicants and Companies/Positions They Have Applied For (Including Those Who Have Not Applied)

SELECT a.FirstName,a.LastName,c.CompanyName,j.JobTitle

FROM Applicants a

LEFT JOIN Applications app ON a.ApplicantID = app.ApplicantID

LEFT JOIN Jobs j ON app.JobID = j.JobID

LEFT JOIN Companies c ON j.CompanyID = c.CompanyID;

	FirstName	LastName	CompanyName	JobTitle
▶	John	Doe	TechCorp	Frontend Developer
	Jane	Smith	CloudSolutions	Backend Developer
	Alice	Johnson	DataVerse	Data Analyst
	Bob	Williams	CodeCrafters	DevOps Engineer
	Charlie	Brown	NULL	NULL
	David	Miller	AI Innovations	ML Engineer
	Eva	Davis	WebWorks Studio	Web Designer
	Frank	Wilson	FinTech Flow	Finance Analyst
	Grace	Moore	GreenByte	IT Support
	Henry	Taylor	CyberNetics	Cybersecurity Analyst

-- 16.Companies with Jobs Offering Salary Higher Than the Average Salary

SELECT c.CompanyName

FROM Companies c

INNER JOIN Jobs j ON c.CompanyID = j.CompanyID

WHERE j.Salary > (SELECT AVG(Salary) FROM Jobs WHERE Salary > 0);

	CompanyName
▶	TechCorp
	CloudSolutions
	CodeCrafters
	NextGen Software
	AI Innovations
	CyberNetics

-- 17.Applicants with Their Names and Concatenated

SELECT a.FirstName,a.LastName,CONCAT(c.Location, ', ', c.State) AS CityState

FROM Applicants a

INNER JOIN Applications app ON a.ApplicantID = app.ApplicantID

INNER JOIN Jobs j ON app.JobID = j.JobID

INNER JOIN Companies c ON j.CompanyID = c.CompanyID;

FirstName	LastName	CityState
John	Doe	San Francisco, California
Jane	Smith	Chennai, New York
Alice	Johnson	CityX, Illinois
Bob	Williams	Austin, Texas
David	Miller	Boston, Massachusetts
Eva	Davis	Denver, Colorado
Frank	Wilson	Atlanta, Georgia
Grace	Moore	Portland, Oregon
Henry	Taylor	Miami, Florida

-- 18.Jobs with Titles Containing 'Developer' or 'Engineer'

SELECT j.JobTitle,c.CompanyName

FROM Jobs j

INNER JOIN Companies c ON j.CompanyID = c.CompanyID

WHERE j.JobTitle LIKE '%Developer%' OR j.JobTitle LIKE '%Engineer%';

JobTitle	CompanyName
Frontend Developer	TechCorp
Backend Developer	CloudSolutions
DevOps Engineer	CodeCrafters
Full Stack Developer	NextGen Software
ML Engineer	AI Innovations

-- 19.Applicants and Jobs They Have Applied For (Including Those Who Have Not Applied and Jobs Without Applicants)

SELECT a.FirstName,a.LastName,j.JobTitle,c.CompanyName

FROM Applicants a

LEFT JOIN Applications app ON a.ApplicantID = app.ApplicantID

LEFT JOIN Jobs j ON app.JobID = j.JobID

LEFT JOIN Companies c ON j.CompanyID = c.CompanyID;

FirstName	LastName	JobTitle	CompanyName
John	Doe	Frontend Developer	TechCorp
Jane	Smith	Backend Developer	CloudSolutions
Alice	Johnson	Data Analyst	DataVerse
Bob	Williams	DevOps Engineer	CodeCrafters
Charlie	Brown	NULL	NULL
David	Miller	ML Engineer	AI Innovations
Eva	Davis	Web Designer	WebWorks Studio
Frank	Wilson	Finance Analyst	FinTech Flow
Grace	Moore	IT Support	GreenByte
Henry	Taylor	Cybersecurity Analyst	CyberNetics

-- 20.Applicants and Companies Where Company is in Specific City and Applicant Has More Than 2 Years of Experience

UPDATE Companies SET Location = 'Chennai' WHERE CompanyID = 2;

SELECT a.FirstName,a.LastName,c.CompanyName

FROM Applicants a

INNER JOIN Applications app ON a.ApplicantID = app.ApplicantID

INNER JOIN Jobs j ON app.JobID = j.JobID

INNER JOIN Companies c ON j.CompanyID = c.CompanyID

WHERE c.Location = 'Chennai' AND a.ExperienceYears > 2;

	FirstName	LastName	CompanyName
▶	Jane	Smith	CloudSolutions