CPSC 304 Project Cover Page

Milestone #: ___2___

Date: ____2025-03-02____

Group Number: ____77____

Name	Student Number	CS Alias (Userid)	Preferred E-mail Address
Amy Xiong	97765291	m8o7v	amyxiongg@gmail.co m
Matthew Haryanto	24695686	i7q9t	matthewanh10@gmail. com
Sadra Khosravi	90431511	o3v1b	sadrakh@outlook.com

By typing our names and student numbers in the above table, we certify that the work in the attached assignment was performed solely by those whose names and student IDs are included above. (In the case of Project Milestone 0, the main purpose of this page is for you to let us know your e-mail address, and then let us assign you to a TA for your project supervisor.)

In addition, we indicate that we are fully aware of the rules and consequences of plagiarism, as set forth by the Department of Computer Science and the University of British Columbia

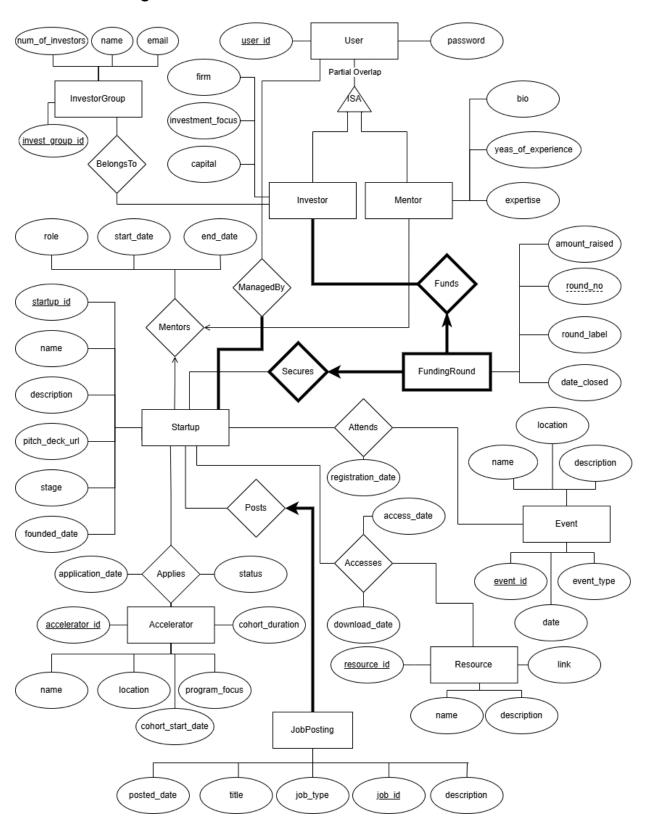
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Summary of Project (2-3 sentences):

Accelera is a platform that connects companies with investors, mentors, accelerators, and other vital resources in order to promote relationships within the startup ecosystem. The program simplifies important procedures including resource sharing, networking events, accelerator applications, mentoring access, and startup funding. The goal is to provide an effective way to handle the many interactions, encouraging growth of startups and collaboration among entrepreneurs.

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Database ER Diagram



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Changes that were made:

- Add ManagedBy relationship, so that a user can manage a Startup instead of the Startup entity being its own entity
- Make FundingRound a weak entity to startup and investor, because the Investor would need to fund the FundingRound so it would be able to exist.
- Change the ISA constraint from total overlap to partial overlap, because a User can exist and manage a Startup without having to become an Investor or a Mentor

User Table

```
User(
    user_id: INT [PK],
    email: VARCHAR(100) [not null, unique],
    password: VARCHAR(100) [not null]
)
```

Candidate Keys (CK):

- user_id
- email

Primary Key (PK):

user_id

Functional Dependencies:

- user_id → email, password
- email → user_id, password

Normalization:

• No need to further decompose, because it is already in BCNF.

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Investor Table (ISA relationship)

```
Investor(
    user_id: INT [PK, FK to User.user_id ON DELETE CASCADE],
    firm: VARCHAR(100),
    investment_focus: VARCHAR(50),
    capital: DECIMAL(15,2)
)
```

Candidate Keys (CK):

user_id

Primary Keys (PK):

user_id

Functional Dependencies:

user_id → firm, investment_focus, capital

Normalization:

- Single attribute primary key.
- All other attributes depend on user_id.
- Therefore, Investor is in BCNF.

Mentor Table (ISA relationship and One-to-one Relationship with Startup)

```
Mentor(
    user_id: INT [PK, FK to User.user_id ON DELETE CASCADE],
    startup_id: INT [FK to Startup.startup_id, unique],
    bio: TEXT,
    years_of_experience: INT [not null],
    role: VARCHAR(100)
    start_date: DATE
    end_date: DATE
    expertise: VARCHAR(100) [not null]
)
```

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Candidate Keys (CK):

user_id

Primary Key (PK):

• user_id

Functional Dependencies:

user_id → bio, years_of_experience, start_date, end_date, expertise, startup_id

Normalization:

- Single attribute primary key.
- All other attributes depend on user_id.
- Therefore, Investor is in BCNF.

Startup Table

```
Startup (
    startup_id: INT [PK],
    name: VARCHAR(100) [not null, unique],
    description: TEXT,
    pitch_deck_url: VARCHAR(100) [unique],
    stage ENUM('Idea', 'Seed', 'Series A', 'Series B', 'Growth',
    'IPO') NOT NULL,
    founded_date: DATE [not null]
)
```

Candidate Keys (CK):

- name
- startup_id

Primary Key (PK):

startup_id

Constraints:

- stage must only allow predefined ENUM values
- founded_date must be a valid date

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Functional Dependencies:

- startup_id → name, description, pitch_deck_url, stage, founded_date
- name → description, pitch_deck_url
- description → founded_date, stage
- pitch_deck_url → stage, founded_date

Steps:

- 1. Decompose on name → description, pitch_deck_url
- 2. Decompose on pitch_deck_url → stage, founded_date

Startup

- Attributes:
 - startup_id (PK)
 - Name

Startup is identified by a unique startup_id; the startup's name is also unique and will be used to relate to further attributes.

StartupAttributes

- Attributes:
 - o name (PK)
 - description
 - pitch_deck_url (Unique)

Since name is a candidate key in the original table, it uniquely determines the description and the pitch deck URL. (Note that we assume each startup's name is unique.)

StartupDetails

- Attributes:
 - pitch_deck_url (PK)
 - stage
 - founded_date

With pitch_deck_url being unique, it can determine the stage and founding date. By using pitch_deck_url as the key for this relation, we isolate this dependency.

With this decomposition we are both in BCNF and 3NF.

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Accelerator Table

```
Accelerator (
    accelerator_id: INT [PK],
    name: VARCHAR(500) [not null],
    location: VARCHAR(500) [not null],
    cohort_start_date: DATE [not null],
    program_focus: TEXT,
    unique (name, location, cohort_start_date)
)
```

Candidate Keys (CK):

- accelerator_id
- name, location, cohort_start_date

Primary Key (PK):

accelerator_id

Constraints:

- cohort_start_date must be a valid date
- name should be unique across accelerators

Functional Dependencies:

- accelerator_id → name, location, cohort_start_date, program_focus
- name, location, cohort_start_date → accelerator_id, program focus

Normalization:

These FDs ensure that every non-key attribute is fully functionally dependent on a candidate key, keeping the Accelerator table in BCNF (and therefore in 3NF).

Applies Table

```
Accelerator (
    accelerator_id: INT [PK, FK to Accelerator.accelerator_id],
    startup_id: INT [PK, FK to Startup.startup_id],
    application date: DATE,
```

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```
status: VARCHAR(10)
)
```

Candidate Keys (CK):

(accelerator_id, startup_id)

Primary Key (PK):

(accelerator_id, startup_id)

Functional Dependencies:

• accelerator_id → name, location, cohort_start_date, program_focus

Normalization:

• No need to further decompose, because it is already in BCNF.

BelongsTo Table (Many-to-many relationship)

```
BelongsTo(
    user_id: INT [PK, FK to Investor.user_id],
    invest_group_id: INT [PK, FK to InvestorGroup.invest_group_id],
)
```

Candidate Keys (CK):

(user_id, invest_group_id)

Primary Key (PK):

(user_id, invest_group_id)

Functional Dependencies:

(user_id, invest_group_id) → (user_id, invest_group_id)

Normalization:

No need to further decompose, because it is already in BCNF.

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ManagedBy Table (Many-to-Many Relationship)

```
ManagedBy(
    user_id: INT [PK, FK to User.user_id ON DELETE RESTRICT],
    startup_id: INT [PK, FK to Startup.startup_id ON DELETE CASCADE],
    role: VARCHAR(50) [NOT NULL],
    start_date: DATE [NOT NULL],
    CONSTRAINT valid_role CHECK (role IN ('Founder', 'Co-Founder',
    'CEO', 'CTO', 'Employee', 'Advisor'))
)
```

Candidate Keys (CK):

(user_id, startup_id)

Primary Key (PK):

• (user_id, startup_id) - Composite key

Functional Dependencies:

- (user_id, startup_id) → role, start_date
- (startup_id, role) → user_id (Non-PK/CK FD: certain roles like 'CEO' can only be held by one user per startup)

Normalization:

No need to further decompose, because it is already in BCNF.

Additional Constraints:

- Every startup_id in Startup must appear at least once in the ManagedBy table (enforcing total participation)
- This will need to be implemented through either:
 - Database triggers
 - Application-level logic
 - CHECK constraints with subqueries (if supported by the DBMS)

FundingRound Table (Weak Entity)

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```
SecuresFundingRound(
    round_no: INT,
    amount_raised: INT,
    round_label: VARCHAR(100),
    date_closed: DATE,
    user_id: INT [FK to Investor.user_id],
    startup_id: INT [FK to Startup.startup_id],
    PK(round_no, user_id, startup_id))
```

Candidate Keys (CK):

(startup_id, user_id, round_no)

Primary Key (PK):

(startup_id, user_id, round_no)

Functional Dependencies:

funding_round_id → startup_id, round_type, amount, funding_date

Normalization:

• No need to further decompose, because it is already in BCNF.

JobPostingPosts Table (Many-to-One Relationship)

```
JobPostingPosts(
    job_id: INT [PK],
    title: VARCHAR(10),
    description: TEXT,
    posted_date: DATE,
    job_type: VARCHAR(10),
    startup_id: INT [FK to Startup.startup_id, unique]
)
```

Candidate Keys (CK):

(job_id)

Primary Key (PK):

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• (job_id)

Functional Dependencies:

(job_id) → (startup_id, title, description, posted_date)

Normalization:

No need to further decompose, because it is already in BCNF.

Accesses Table (Many-to-Many Relationship)

```
Accesses(
    access_date: INT,
    download_date: VARCHAR(10),
    resource_id: INT [PK, FK to Resource.resouce_id],
    startup_id: INT [PK, FK to Startup.startup_id],
)
```

Candidate Keys (CK):

(resource_id, startup_id)

Primary Key (PK):

(resource_id, startup_id)

Functional Dependencies:

(resource_id, startup_id) → (access_date, download_date)

Normalization:

No need to further decompose, because it is already in BCNF.

Resource Table

```
Resource(
    resource id: INT [PK],
```

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```
name: VARCHAR(500),
description: VARCHAR(500),
link: VARCHAR(100)
```

Candidate Keys (CK):

• (resource_id)

Primary Key (PK):

• (resource_id)

Functional Dependencies:

(resource_id) → (name, description, link)

Normalization:

• No need to further decompose, because it is already in BCNF.

Attends Table (Many-to-Many Relationship)

```
Attends(
    event_id: INT [PK, FK to Event.event_id],
    startup_id: INT [PK, FK to Startup.startup_id],
    registration_date: DATE,
)
```

Candidate Keys (CK):

(event_id, startup_id)

Primary Key (PK):

(event_id, startup_id)

Functional Dependencies:

(event_id, startup_id) → (registration_date)

No need to further decompose, because it is already in BCNF.

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Event Table

```
Event(
    event_id: INT [PK],
    name: VARCHAR(100),
    location: VARCHAR(100),
    description: VARCHAR(500),
    event_type: VARCHAR(30)
)
```

Candidate Keys (CK):

(event_id)

Primary Key (PK):

(event_id)

Functional Dependencies:

(event_id) → (name, location, description, event_type)

No need to further decompose, because it is already in BCNF.

SQL DDL

```
CREATE TABLE Accelerator(
     accelerator_id INT PRIMARY KEY, name VARCHAR(500) NOT NULL,
     name
                      VARCHAR (500) NOT NULL,
     location
     cohort_start_date DATE NOT NULL,
     program_focus TEXT,
     UNIQUE(name, location, cohort start date)
)
CREATE TABLE Applies (
     accelerator_id
                      INT,
     startup id
                        INT
     application_date DATE,
     status
                        VARCHAR (10)
```

```
PRIMARY KEY(accelerator id, startup id)
    FOREIGN KEY(accelerator id)
             REFERENCES Accelerator (accelerator id)
    FOREIGN KEY (startup id)
              REFERENCES Startup(startup id)
)
CREATE TABLE User (
    user_id INT PRIMARY KEY,
    email VARCHAR(100) NOT NULL UNIQUE, password VARCHAR(100) NOT NULL
CREATE TABLE Investor (
    user_id
firm
                   INT,
                   VARCHAR (100),
    capital
                   DECIMAL(15, 2),
    PRIMARY KEY (user id),
    FOREIGN KEY (user id)
             REFERENCES User (user id)
              ON DELETE CASCADE
CREATE TABLE Mentor (
    TEXT,
    years of experience INT NOT NULL,
                     VARCHAR(100),
    start date
                     DATE,
    end date
                      DATE,
                     VARCHAR (100) NOT NULL,
    expertise
    FOREIGN KEY (user id)
              REFERENCES User(user id)
             ON DELETE CASCADE,
    FOREIGN KEY(startup id)
              REFERENCES Startup(startup id)
)
CREATE TABLE Startup (
    VARCHAR (100)
    FOREIGN KEY(name)
              REFERENCES StartupAttributes(name)
)
```

```
CREATE TABLE StartupAttributes(
                  VARCHAR (100) PRIMARY KEY,
     description TEXT,
     pitch deck url VARCHAR(100) UNIQUE
     FOREIGN KEY (pitch deck url)
               REFERENCES StartupDetails(pitch deck url)
)
CREATE TABLE StartupDetails(
     pitch deck url VARCHAR (100) PRIMARY KEY,
                   VARCHAR(100),
     stage
     founded date DATE
)
CREATE TABLE BelongsTo(
    user id INT,
     invest group id INT,
     PRIMARY KEY (user id, invest group id),
     FOREIGN KEY(user id)
               REFERENCES Investor(user id)
     FOREIGN KEY(invest group id)
               REFERENCES InvestorGroup(invest group id)
)
CREATE TABLE ManagedBy (
     user id INT NOT NULL,
     startup id INT NOT NULL,
               VARCHAR (50) NOT NULL
     role
                    CHECK (role IN ('Founder', 'Co-Founder', 'CEO',
                    'CTO', 'Employee', 'Advisor')),
     start date DATE NOT NULL,
     PRIMARY KEY (user id, startup id),
     FOREIGN KEY (user id)
              REFERENCES User (user id),
     FOREIGN KEY (startup id)
              REFERENCES Startup(startup id)
)
CREATE TABLE FundingRound(
    round_no INT,
     amount raised INT,
     round label VARCHAR(100),
     date_closed DATE,
```

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```
user id
     startup id INT,
     PRIMARY KEY(round_no, user_id, startup_id),
     FOREIGN KEY(user id)
                 REFERENCES Investor(user id)
                 ON DELETE CASCADE
                 ON UPDATE CASCADE,
     FOREIGN KEY (startup id)
                 REFERENCES Startup(startup id)
                 ON DELETE CASCADE
                 ON UPDATE CASCADE
)
CREATE TABLE JobPostingPosts (
     job id INT PRIMARY KEY,
     title VARCHAR(10),
     description TEXT,
     posted date DATE,
     job_type VARCHAR(10), startup_id INT UNIQUE,
     FOREIGN KEY(startup id)
                REFERENCES Startup(startup id)
)
CREATE TABLE Accesses (
     access date INT,
     download date VARCHAR(10),
     resource id INT,
     startup id INT,
     PRIMARY KEY (resource_id, startup_id),
     FOREIGN KEY(startup id)
                REFERENCES Startup (startup id),
     FOREIGN KEY (resource id)
                REFERENCES Resource (resource id)
)
CREATE TABLE Resource (
     resource_id INT PRIMARY KEY,
name VARCHAR(500),
description TEXT,
link VARCHAR(100)
)
CREATE TABLE Attends (
```

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```
event id
                     INT,
    startup id
                     INT,
    registration date DATE,
    PRIMARY KEY (event id, startup id),
    FOREIGN KEY (event id)
              REFERENCES Event (event id),
    FOREIGN KEY(startup id)
              REFERENCES Startup(startup id)
)
CREATE TABLE Event (
    event id
                INT PRIMARY KEY,
                 VARCHAR (100),
    name
                VARCHAR(100),
    location
    )
```

Populating Tables

```
INTO Accelerator (accelerator id, name, location, cohort start date,
program focus)
VALUES
     (1, 'LaunchPad', 'Toronto', '2024-04-01', 'AI & Robotics'),
     (2, 'Capital Boost', 'Ottawa', '2024-05-15', 'Blockchain'),
     (3, 'Startup Works', 'Vancouver', '2024-06-10', 'E-commerce &
     Retail'),
     (4, 'Green Future', 'Seattle', '2024-07-20', 'Sustainable
     (5, 'Health Forward', 'Richmond', '2024-08-05', 'Health &
     Wellness');
(before BCNF decomposition)
INSERT INTO Startup (startup id, name, description, pitch deck url,
stage, founded date)
VALUES
     (1, 'MealMate', 'Meal planning app with grocery integration',
     'mealmate pitch.pdf', 'Seed', '2023-02-14'),
     (2, 'SmartWatts', 'Home energy usage tracker and optimizer',
     'smartwatts pitch.pdf', 'Series A', '2021-08-30'),
```

```
(3, 'WellBand', 'Smartwatch that tracks senior health metrics',
     'wellband pitch.pdf', 'Series B', '2020-06-25'),
     (4, 'PlayCloud', 'Cloud gaming platform for indie developers',
     'playcloud pitch.pdf', 'Growth', '2019-12-10'),
     (5, 'QuickDrop', 'Drone delivery service for online orders',
     'quickdrop pitch.pdf', 'IPO', '2018-04-05');
(after BCNF decomposition)
INSERT INTO Startup (startup id, name)
VALUES
(1, 'MealMate'),
(2, 'SmartWatts'),
(3, 'WellBand'),
(4, 'PlayCloud'),
(5, 'QuickDrop');
INSERT
INTO StartupAttributes (name, description, pitch deck url)
     ('MealMate', 'Meal planning app with grocery integration',
     'mealmate pitch.pdf'),
     ('SmartWatts', 'Home energy usage tracker and optimizer',
     'smartwatts pitch.pdf'),
     ('WellBand', 'Smartwatch that tracks senior health metrics',
     'wellband pitch.pdf'),
     ('PlayCloud', 'Cloud gaming platform for indie developers',
     'playcloud pitch.pdf'),
     ('QuickDrop', 'Drone delivery service for online orders',
     'quickdrop pitch.pdf');
INSERT
INTO StartupDetails (pitch deck url, stage, founded date)
('mealmate pitch.pdf', 'Seed', '2023-02-14'),
('smartwatts pitch.pdf', 'Series A', '2021-08-30'),
('wellband pitch.pdf', 'Series B', '2020-06-25'),
('playcloud pitch.pdf', 'Growth', '2019-12-10'),
('quickdrop_pitch.pdf', 'IPO', '2018-04-05');
```

```
INTO Applies (accelerator id, startup id, application date, status)
VALUES
    (3, 1, '2024-02-01', 'Pending'),
    (1, 2, '2024-01-10', 'Rejected'),
    (2, 3, '2024-01-22', 'Accepted'),
    (5, 4, '2024-02-15', 'Accepted'),
    (4, 5, '2024-03-02', 'Pending');
INSERT
INTO User (user id, email, password)
VALUES
    (1, 'lisa@gmail.com', 'strongP@ssw0rd'),
    (2, 'mark@gmail.com', 'random123'),
    (3, 'nina@gmail.com', 'health4all!'),
    (4, 'jake@gmail.com', 'gamingMaster42'),
    (5, 'sophia@gmail.com', 'drones2025');
INSERT
INTO Investor (user id, firm, invesment focus, capital)
VALUES
    (1, 'SkyBridge Capital', 'AI & Robotics', 8000000.00),
    (2, 'Blue Ocean Ventures', 'Green Energy', 3200000.50),
    (3, 'Quantum Capital', 'FinTech', 12000000.75),
    (4, 'Summit Growth Fund', 'E-commerce & Retail', 5500000.00),
    (5, 'Pioneer VC', 'SaaS & Cloud Computing', 20000000.00);
INSERT
INTO Mentor (user id, startup id, bio, years of experience, role,
start date, end date, expertise)
VALUES
     (1, 1, 'Former AI researcher at Google, now mentoring startups
     in deep learning applications.', 15, 'Technical Advisor',
     '2023-05-01', NULL, 'Machine Learning'),
     (2, 2, 'Ex-CTO of a green tech startup, specializing in
     sustainability and energy optimization.', 10, 'Industry
     Mentor', '2022-08-15', NULL, 'Sustainable Technology'),
     (3, 3, 'Angel investor turned mentor, guiding fintech startups
     on scaling and compliance.', 12, 'Investor Mentor',
     '2023-01-10', NULL, 'FinTech'),
```

```
(4, 4, 'Former VP of Marketing at a Fortune 500, helping
     startups with growth strategies.', 18, 'Marketing Consultant',
     '2021-11-20', '2024-02-28', 'Growth & Marketing'),
     (5, 5, 'Blockchain developer with extensive experience in
     decentralized finance.', 8, 'Blockchain Advisor', '2022-03-05',
     NULL, 'Blockchain & Crypto');
INSERT
INTO BelongsTo (user id, invest group id)
VALUES
    (1, 201),
    (3, 202),
    (4, 203),
    (2, 201),
    (5, 204);
INSERT
INTO ManagedBy (user id, startup id, role, start date)
VALUES
    (1, 1, 'Founder', '2023-02-14'),
    (2, 2, 'CEO', '2021-09-01'),
    (3, 3, 'Co-Founder', '2020-07-01'),
    (4, 4, 'CTO', '2019-12-15'),
    (5, 5, 'CEO', '2018-05-01');
INSERT
INTO FundingRound (round no, amount raised, round label, date closed,
user id, startup id)
VALUES
    (1, 150000, 'Pre-Seed', '2023-03-22', 1, 1),
    (2, 3000000, 'Series A', '2022-09-05', 2, 2),
    (3, 12000000, 'Series B', '2021-11-20', 3, 3),
    (4, 28000000, 'Growth', '2020-08-30', 4, 4),
    (5, 75000000, 'IPO', '2019-06-15', 5, 5);
INSERT
INTO JobPostingPosts (job id, title, description, posted date,
job type, startup id)
VALUES
```

```
(1, 'ML Engineer', 'Build AI models for meal planning',
     '2024-03-01', 'Full-Time', 1),
     (2, 'Frontend Dev', 'Develop web dashboard for energy
     monitoring', '2024-02-15', 'Part-Time', 2),
     (3, 'UX Designer', 'Improve accessibility for wearable
     devices', '2024-02-25', 'Full-Time', 3),
     (4, 'Game Dev', 'Work on multiplayer cloud games',
     '2024-03-05', 'Contract', 4),
     (5, 'Logistics Lead', 'Optimize drone delivery routes',
     '2024-03-10', 'Full-Time', 5);
INSERT
INTO Accesses (access date, download date, resource id, startup id)
VALUES
    (2024-02-05, '2024-02-05', 101, 1),
    (2024-02-08, '2024-02-08', 102, 2),
    (2024-02-10, '2024-02-10', 103, 3),
    (2024-02-12, '2024-02-12', 104, 4),
    (2024-02-15, '2024-02-15', 105, 5);
INSERT
INTO Resource (resource id, name, description, link)
     (101, 'Lean Startup Ebook', 'Guide to running a lean startup',
     'lean startup.pdf'),
     (102, 'Blockchain Whitepaper', 'Introduction to decentralized
     apps', 'blockchain whitepaper.pdf'),
     (103, 'Investor Deck Template', 'Template for pitching to VCs',
     'investor deck.pptx'),
     (104, 'SEO Playbook', 'Strategies for online growth',
     'seo guide.pdf'),
     (105, 'Legal Handbook', 'Common legal pitfalls for startups',
     'startup legal.pdf');
INSERT
INTO Attends (event id, startup id, registration date)
VALUES
    (101, 1, '2024-04-01'),
    (102, 2, '2024-04-02'),
    (103, 3, '2024-04-05'),
    (104, 4, '2024-04-10'),
```

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Al Declaration

No AI tools were used in this assignment.