# PROJECT 1

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1. Relational Schema and Normalization (BCNF) (Q3)
   Relational Schema:

**Student** Student(student_id, name, university, major, graduation_year)

**Company** Company(company_id, company_name, industry, hq_location)

**JobPosting** JobPosting(job_id, company_id → Company.company_id, title, location_mode, job_type)

**Application** Application(app_id, student_id → Student.student_id, job_id → JobPosting.job_id, submission_date, current_status, notes)

**InterviewRound** InterviewRound(round_id, app_id → Application.app_id, round_type, scheduled_date, outcome, notes)

**Tag** Tag(tag_id, tag_name)

**ApplicationTag** ApplicationTag( app_id → Application.app_id, tag_id → Tag.tag_id, PRIMARY KEY (app_id, tag_id) )

**Contact** Contact(contact_id, company_id → Company.company_id, contact_name, role, email, phone)

**ApplicationContact** ApplicationContact( app_id → Application.app_id, contact_id → Contact.contact_id, PRIMARY KEY (app_id, contact_id) )

**Offer** Offer(offer_id, app_id UNIQUE → Application.app_id, compensation, deadline, offer_notes)

**JobBoard** JobBoard(board_id, board_name, url)

**StatusHistory** StatusHistory(history_id, app_id → Application.app_id, status, changed_at, notes)

**Functional Dependencies and BCNF Proof :**

**Student** FDs: student_id → name, university, major, graduation_year

Candidate Key: {student_id}

Since the only determinant is a candidate key, Student is in BCNF.

**Company** FDs: company_id → company_name, industry, hq_location

Candidate Key: {company_id}

All determinants are superkeys. Therefore, Company is in BCNF.

**JobPosting** FDs: job_id → company_id, title, location_mode, job_type

Candidate Key: {job_id}

All determinants are superkeys. Therefore, JobPosting is in BCNF.

**Application** FDs: app_id → student_id, job_id, submission_date, current_status, notes

Candidate Key: {app_id}

All determinants are superkeys. Therefore, Application is in BCNF.

**InterviewRound** FDs: round_id → app_id, round_type, scheduled_date, outcome, notes

Candidate Key: {round_id}

All determinants are superkeys. Therefore, InterviewRound is in BCNF.

**Tag** FDs: tag_id → tag_name tag_name → tag_id

Candidate Keys: {tag_id}, {tag_name}

Both tag_id and tag_name are unique and function as candidate keys. All determinants are superkeys. Therefore, Tag is in BCNF.

**ApplicationTag** FDs: (app_id, tag_id) → ∅

Candidate Key: {app_id, tag_id}

There are no non-trivial dependencies other than the composite key. Therefore, ApplicationTag is in BCNF.

**Contact** FDs: contact_id → company_id, contact_name, role, email, phone email → contact_id, company_id, contact_name, role, phone

Candidate Keys: {contact_id}, {email}

Both contact_id and email are unique and function as candidate keys. All determinants are superkeys. Therefore, Contact is in BCNF.

**ApplicationContact** FDs: (app_id, contact_id) → ∅

Candidate Key: {app_id, contact_id}

There are no non-trivial dependencies other than the composite key. Therefore, ApplicationContact is in BCNF.

**Offer** FDs: offer_id → app_id, compensation, deadline, offer_notes app_id → offer_id, compensation, deadline, offer_notes

Candidate Keys: {offer_id}, {app_id}

Because app_id is declared UNIQUE, both offer_id and app_id function as candidate keys. Therefore, all determinants are superkeys. Therefore, Offer is in BCNF.

**JobBoard** FDs: board_id → board_name, url url → board_id, board_name

Candidate Keys: {board_id}, {url}

Both board_id and url are unique and function as candidate keys. All determinants are superkeys. Therefore, JobBoard is in BCNF.


**StatusHistory** FDs: history_id → app_id, status, changed_at, notes

Candidate Key: {history_id}

Multiple status history records can exist per application, so app_id alone is not a superkey. The only determinant is history_id, which is the primary key. All determinants are superkeys. Therefore, StatusHistory is in BCNF.