**Part B Design Normalized Database**

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1. (5 pts / 1 hr) For the relation represented by all of the columns in the CSV file, define all functional dependencies and list them.

Functional Dependencies:

1. flight.number + date → airline, aircraft, dep.airport

The flight details (airline, aircraft type, and departure airport) depend on the combination of flight number and date.

1. iid → date, flight.number, incident.type, severity, delay.mins, num.injuries, reported.by

Each incident ID uniquely identifies all other incident-related attributes.

1. (*5 pts / 1 hr*) Using the functional dependencies and the rules of normalization, decompose the relational from the CSV into several relations that all satisfy 3NF; give the relations reasonable names.
2. No partial dependencies:
   1. For flight table, all non-prime attributes depend on the full composite PK, not just flight\_number or date alone. Example: If flight\_number → airline (partial dependency), it would violate 2NF. But here, airline depends on both flight\_number and date (same flight number can be used by different airlines on different dates).
3. For incident table, since the PK is atomic (iid), partial dependencies cannot exist.
4. No Transitive Dependencies (3NF Compliance)
5. For flight table, all non-prime attributes depend directly on the PK, not on each other. Example: If airline → aircraft (e.g., "Delta only uses Boeing 737"), this would be a transitive dependency (violating 3NF). But in reality, an airline can use multiple aircraft types, so no such dependency exists.
6. All attributes depend only on iid, not on each other. Example: If incident\_type → severity (e.g., " Mechanical only causes minor"), this would be a transitive dependency (violating 3NF). But mechanical incident can cause multiple severity types, so no such dependency exists.
7. (5 pts / 1 hr) For the relations resulting from the normalization, create an ERD in the IE (Crow's Feet) notation. Add all attributes, attribute name, primary and foreign keys, data types, and entity descriptions. You may use any modeling tool of your choosing, e.g., LucidChart or Mermaid. Embed the ERD into your document. Save the document containing your database design as a PDF.