1 Possibly Useful Information

- **Canonical SQL Statement:**

```
SELECT <attributes>
FROM <tables>
WHERE <conditions>
GROUP BY <attributes>
HAVING <conditions>
```

- **Functional Dependency (FD):** For a relation R, and sets of attributes X and Y, the functional dependency $X \to Y$ holds if for any $t_1, t_2 \in R$, $t_1[X] = t_2[X] \implies t_1[Y] = t_2[Y]$.
- **Armstrong's Axioms:** Let the A_is, B_js, and C_ks be attributes:
  1. *Split/Combine:* If $A_1, ..., A_n \to B_j$ for $j = 1, ..., m$, then this is equivalent to $A_1, ..., A_n \to B_1, ..., B_m$ and vice-versa
  2. *Reduction/Trivial:* $A_1, ..., A_n \to A_i$ for any $i = 1, ..., n$
  3. *Transitive Closure:* If $A_1, ..., A_n \to B_1, ..., B_m$ and $B_1, ..., B_m \to C_1, ..., C_p$ then $A_1, ..., A_n \to C_1, ..., C_p$
- **Closure:** Given a set of attributes X and a set of FDs F, the closure X^+ is the set of all attributes y such that $X \to y$.
- **Superkey:** Given a relation R, a superkey is a set of attributes X such that X^+ is equal to the full set of attributes of R.
- **Key:** A key is a minimal superkey, i.e. a superkey where no subset of it is also a superkey.
- **Boyce-Codd Normal Form (BCNF):** A relation R is in BCNF if for all sets of attributes X, either $X^+ = X$ (X is trivial) or $X^+ =$ the set of all attributes (X is a superkey).
- **Conflicts:** Two actions conflict if they are part of different TXNs, involve the same variable, and at least one of them is a write.
- **Serializable:** A schedule is serializable if it is equivalent to some serial ordering.
- **Multi-Value Dependency (MVD):** Given a relation R with a set of attributes A, two sets of attributes $X, Y \subseteq A$, we say that the MVD $X \twoheadrightarrow Y$ holds if for any tuples $t_1, t_2 \in R$ such that $t_1[X] = t_2[X]$, there is a tuple t_3 such that:
  - $t_3[X] = t_1[X]$
  - $t_3[Y] = t_1[Y]$
  - $t_3[A \setminus Y] = t_2[A \setminus Y]$
- **ER Diagrams:**
  - Entities are contained in rectangles
  - Attributes are contained in circles
  - Relationships are contained in diamonds
  - Primary Key Attributes are underlined
  - Relationships with at most one instance of an entity connect with arrows
  - Relationships with at least one instance of an entity connect with bold lines