Database

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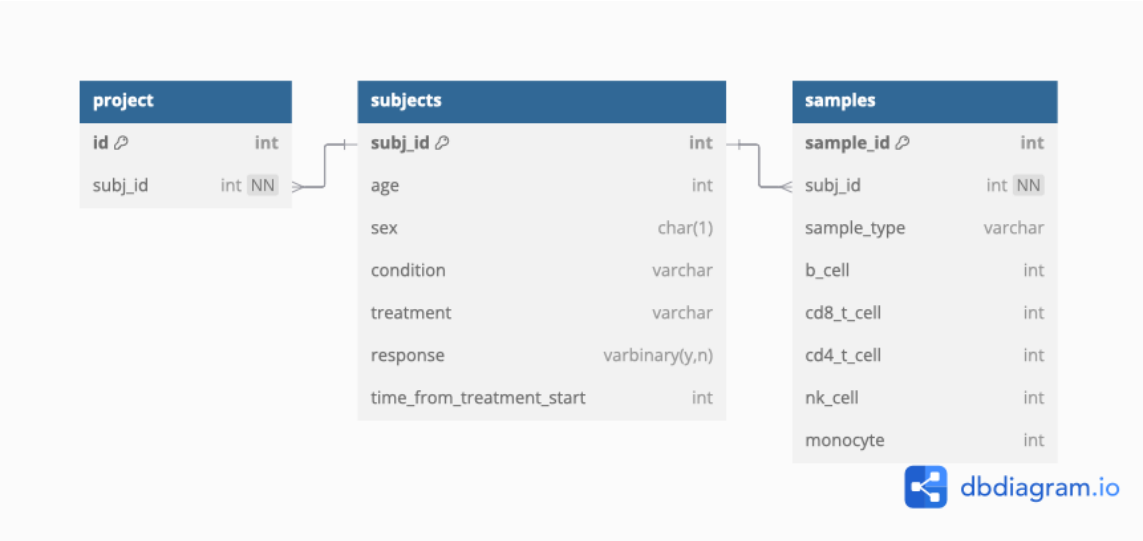
1. **How would you design a database to capture the type of information and data in cell-count.csv?**



2. **What would be some advantages in capturing this information in a database?** Some advantages of capturing this information in a database would be to have a structured way to store and query the data, to ensure data integrity, and to allow for efficient data retrieval and analysis. Not to mention maintaining data security and access control.

3. **Based on the schema you provide in (1), please write a query to summarize the number of subjects available for each condition.**

```
SELECT condition, COUNT(DISTINCT subj_id) AS num_subj
FROM subjects
GROUP BY condition;
```

4. **Please write a query that returns all bladder cancer PBMC samples at baseline (`time_from_treatement_start` is 0) from patients who have treatment `tr1`.**

```
SELECT *
FROM samples as smp
WHERE smp.sample_type = 'PBMC'
LEFT JOIN subjects as sub ON smp.subj_id = sub.subj_id
WHERE sub.treatment = 'tr1'
    AND sub.time_from_treatment_start = 0
    AND sub.condition = 'bladder cancer';
```

5. **Please write queries to provide these following further breakdowns for the samples in (4):** Assuming that table `query as q` is the resultant table from (4).

   (a) **How many samples from each project**

```
SELECT p.id, COUNT(DISTINCT q.sample_id) AS num_samples
FROM query as q
JOIN project as p ON q.subj_id = p.subj_id
GROUP BY p.id;
```

   (b) **How many responders/non-responders**

```
SELECT COUNT(sub.response)
FROM subjects as sub
JOIN query as q ON sub.subj_id = q.subj_id;
GROUP BY sub.response;
```

   (c) **How many males, females**

```
SELECT COUNT(sub.sex)
FROM subjects as sub
JOIN query as q ON sub.subj_id = q.subj_id
GROUP BY sub.sex;
```