Unit 10

Working with SQL

(Reflection)

This week's unit focused on using SQL to implement a database design. *Please refer to Unit 10 – Codio Exercises – MySQL* for sample SQL statements used.

SQL versus T-SQL versus PL-SQL

On the surface, it may seem that SQL and T-SQL refer to the same language. However, below are a few key differences I discovered in researching this topic.

- ***Structured Query Language (SQL).***

  1. It originated with relational databases (Codd, 2002) and was referred to as Structured English Query Language (SEQUEL).
  2. SQL became an ANSI standard in 1982 and an ISO standard in 1987 (Grodd, 2002). It is also a U.S. Federal Information Processing (FIPS) standard.
  3. SQL can manipulate and define data within an RDBMS.
  4. SQL is portable across different computer systems and platforms, as seen by the open-source MySQL project.
  5. It is easy to learn because of its proximity to the English language.
  6. Queries written in SQL language are ad-hoc and thus enable *interactive* querying of data.

- ***Transact Structured Query Language (T-SQL).***

  1. An extension (dialect) to ANSI SQL standard, added by Microsoft for their SQL Server product. For example, SQL uses the LIMIT keyword, while T-SQL uses the TOP keyword to limit output.
  2. Adds the use of declared variables, transaction control, exception handling, row processing, procedural execution (the DB engine processes code as a single block)

- ***Procedural Language Structured Query Language (PL-SQL).***
    1. An extension to the ANSI SQL standard, added by Oracle for use in their Oracle database. As a "procedural" extension, it adds several language elements that facilitate conditions and loops within SQL queries.

Relational Model

SQL is strongly related to the relational model with its roots in mathematics, where "relational" refers to mathematical *relations* and not relations between tables. A pivotal point to the relational model is that each relation should represent a single set (Ben-Gan, 2016). Given this definition, it stands to reason that the equivalent database structure of a mathematical relation, is a *table.*

The relational model bases itself on set theory originating from a mathematician, Georg Cantor, who defines set theory as

> *"By a 'set' we mean any collection M into a whole of definite, distinct objects m (which are called the 'elements' of M) of our perception or of our thought" (Dauben, 2020). According to set theory, a "set" is considered a single entity and "distinct" implies every element of a set must be unique.*

Another branch of mathematics holding up the relational model is predicate logic. A "predicate" is a property or expression that either holds or does not hold. I observe the use of predicates in SQL via statements such as

```
... salary > 0
WHERE A = B
WHERE C IN (...)
```

References

Codd, E.F. (2002) A relational model of data for large shared data banks. *Software pioneers:* 263-294. Springer, Berlin, Heidelberg.

Dauben, J.W. (2020) Georg Cantor: His mathematics and philosophy of the infinite. Princeton University Press.

Groff, J.R., Weinberg, P.N. & Oppel, A.J. (2002) *SQL: the complete reference* (Vol. 2). McGraw-Hill/Osborne.

Ben-Gan, I. (2016) *T-SQL Fundamentals*. Microsoft Press.

Bibliography