# Summary and Highlights

In this lesson, you have learned:

* The process of identifying data begins by determining the information that needs to be collected, which in turn is determined by the goal you seek to achieve.
* Having identified the data, your next step is to identify the sources from which you will extract the required data and define a plan for data collection. Decisions regarding the timeframe over which you need your data set, and how much data would suffice for arriving at a credible analysis also weigh in at this stage.
* Data Sources can be internal or external to the organization, and they can be primary, secondary, or third-party, depending on whether you are obtaining the data directly from the original source, retrieving it from externally available data sources, or purchasing it from data aggregators.
* Some of the data sources from which you could be gathering data include databases, the web, social media, interactive platforms, sensor devices, data exchanges, surveys and observation studies.
* Data that has been identified and gathered from the various data sources is combined using a variety of tools and methods to provide a single interface using which data can be queried and manipulated.
* The data you identify, the source of that data, and the practices you employ for gathering the data have implications for quality, security, and privacy, which need to be considered at this stage.

# Summary and Highlights

In this lesson, you have learned the following information:

Once the data you identified is gathered and imported, your next step is to make it analysis-ready. This is where the process of Data Wrangling, or Data Munging, comes in. Data Wrangling is an iterative process that involves data exploration, transformation, and validation.

Transformation of raw data includes the tasks you undertake to:

* Structurally manipulate and combine the data using Joins and Unions.
* Normalize data, that is, clean the database of unused and redundant data.
* Denormalize data, that is, combine data from multiple tables into a single table so that it can be queried faster.
* Clean data, which involves profiling data to uncover quality issues, visualizing data to spot outliers, and fixing issues such as missing values, duplicate data, irrelevant data, inconsistent formats, syntax errors, and outliers.
* Enrich data, which involves considering additional data points that could add value to the existing data set and lead to a more meaningful analysis.

A variety of software and tools are available for the Data Wrangling process. Some of the popularly used ones include Excel Power Query, Spreadsheets, OpenRefine, Google DataPrep, Watson Studio Refinery, Trifacta Wrangler, Python, and R, each with their own set of characteristics, strengths, limitations, and applications.