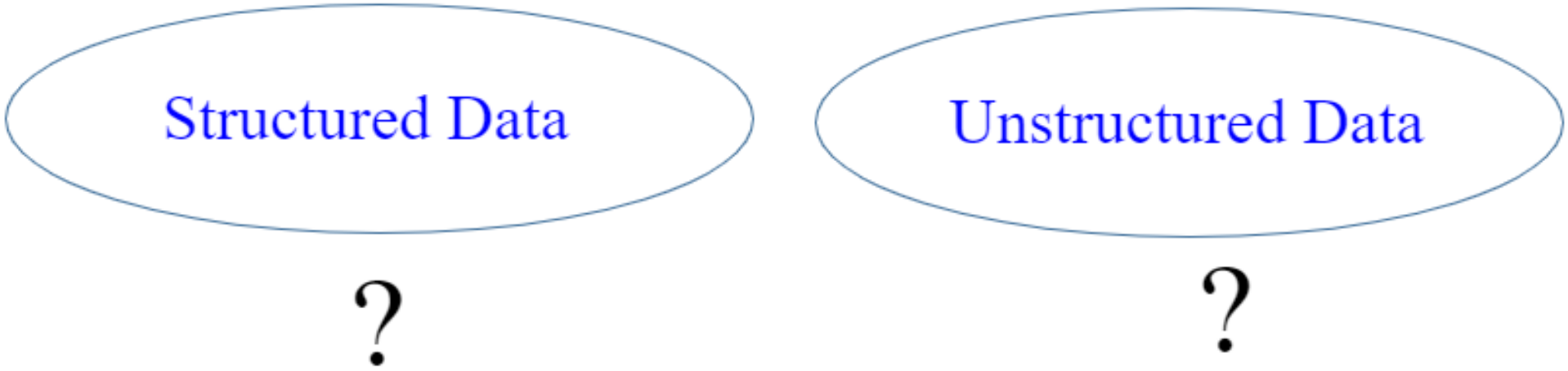
Big Data: Structured and Unstructured Data

Thuan L Nguyen, PhD

Slide 2: Big Data: Structured and Unstructured Data

Structured and Unstructured Data (Source: Christine Taylor)

Slide 3: Big Data: Structured and Unstructured Data



Slide 4: Big Data: Structured and Unstructured Data

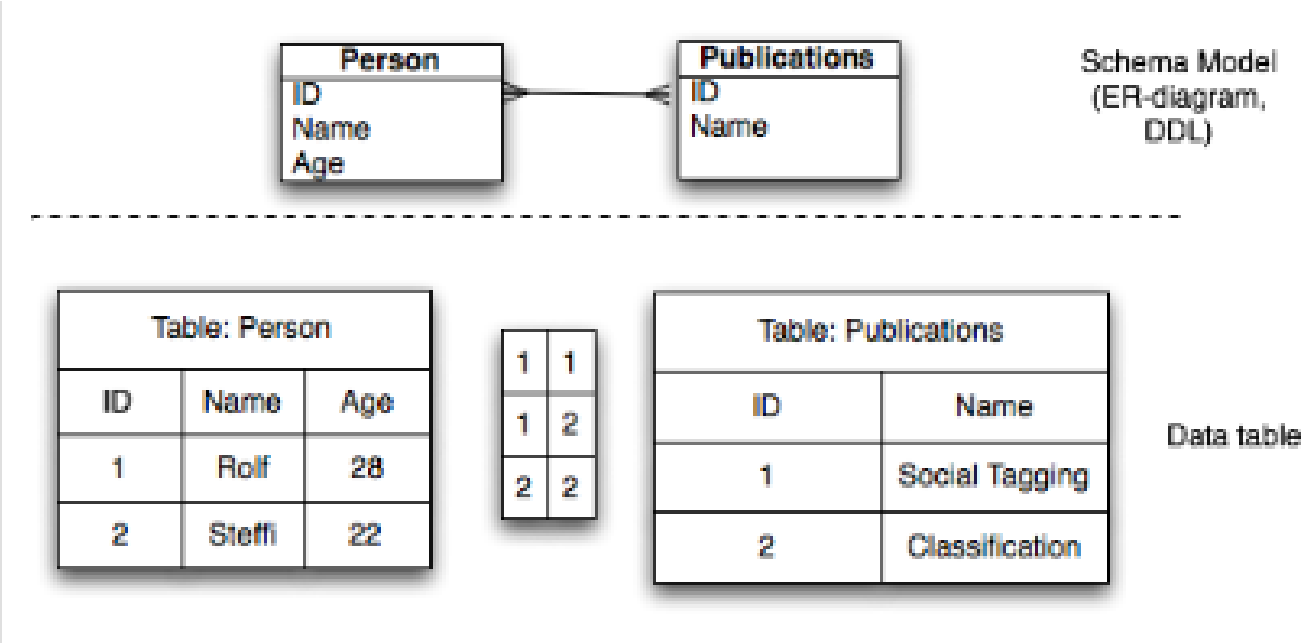


Fig. 1: Sample Table in a Relational Database System

Source: Sint et al.

Slide 5: Big Data: Structured and Unstructured Data

Structured Data:

- Is highly organized information found in a relational database
  - Is formatted in fixed fields, following a predefined schema
  - Is easily detectable via search operations or algorithms.
  - Is relatively simple to enter, store, query, and analyze
  - Is strictly defined in terms of field name and type (e.g. alpha, numeric, date, currency)
    - Is often restricted by character numbers or specific terminology.
- Language (SQL) is used to perform queries on structured data within relational databases.
- Structured data leaves out immense amounts of material that do not fit simply into a firm's organization of information.

Slide 6: Big Data: Structured and Unstructured Data

Unstructured Data:

- Is essentially everything else – that is not structured data
- Unstructured data:
  - Textual or non-textual
  - Human or machine-generated.

Slide 7: Big Data: Structured and Unstructured Data

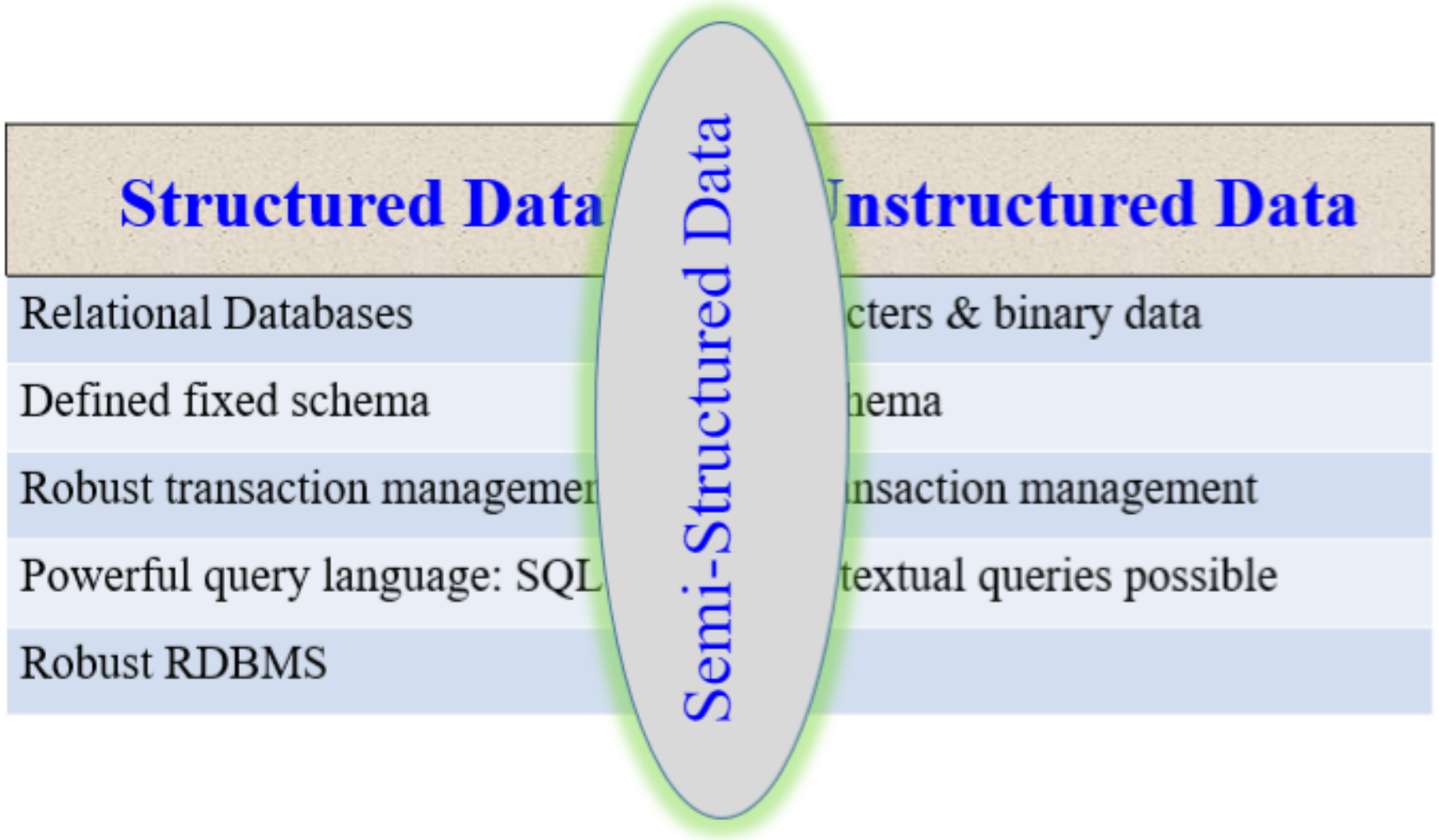
Sources of Big Data (Source: ADEC Group)

Slide 8: Big Data: Structured and Unstructured Data

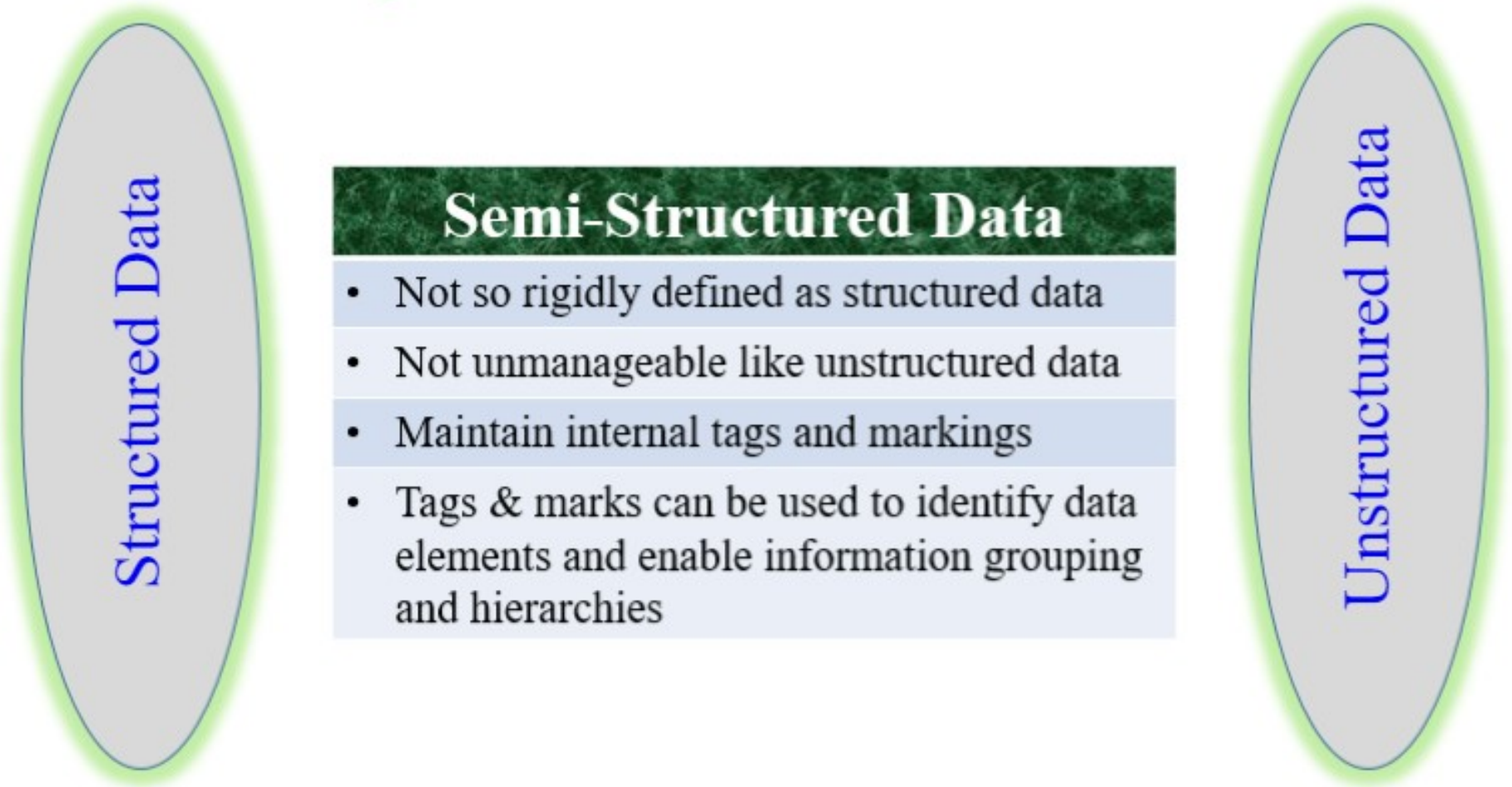
Unstructured Data:

- Can be human-generated:
  - Text files: Word processing, spreadsheets, presentations, email, logs.
  - Email contents
  - Social Media: Data from Facebook, Twitter, LinkedIn.
  - Website: YouTube, Instagram, photo sharing sites.
  - Mobile data: Text messages, locations.
  - Communications: Chat, IM, phone recordings, collaboration software.
  - Media: MP3, digital photos, audio and video files.
  - Business applications: MS Office documents, productivity applications.
- Can be machine-generated:
  - Satellite imagery: Weather data, land forms, military movements.
  - Scientific data: Oil and gas exploration, space exploration, seismic imagery, atmospheric data.
  - Digital surveillance: Surveillance photos and video.
  - Sensor data: Traffic, weather, oceanographic sensors.

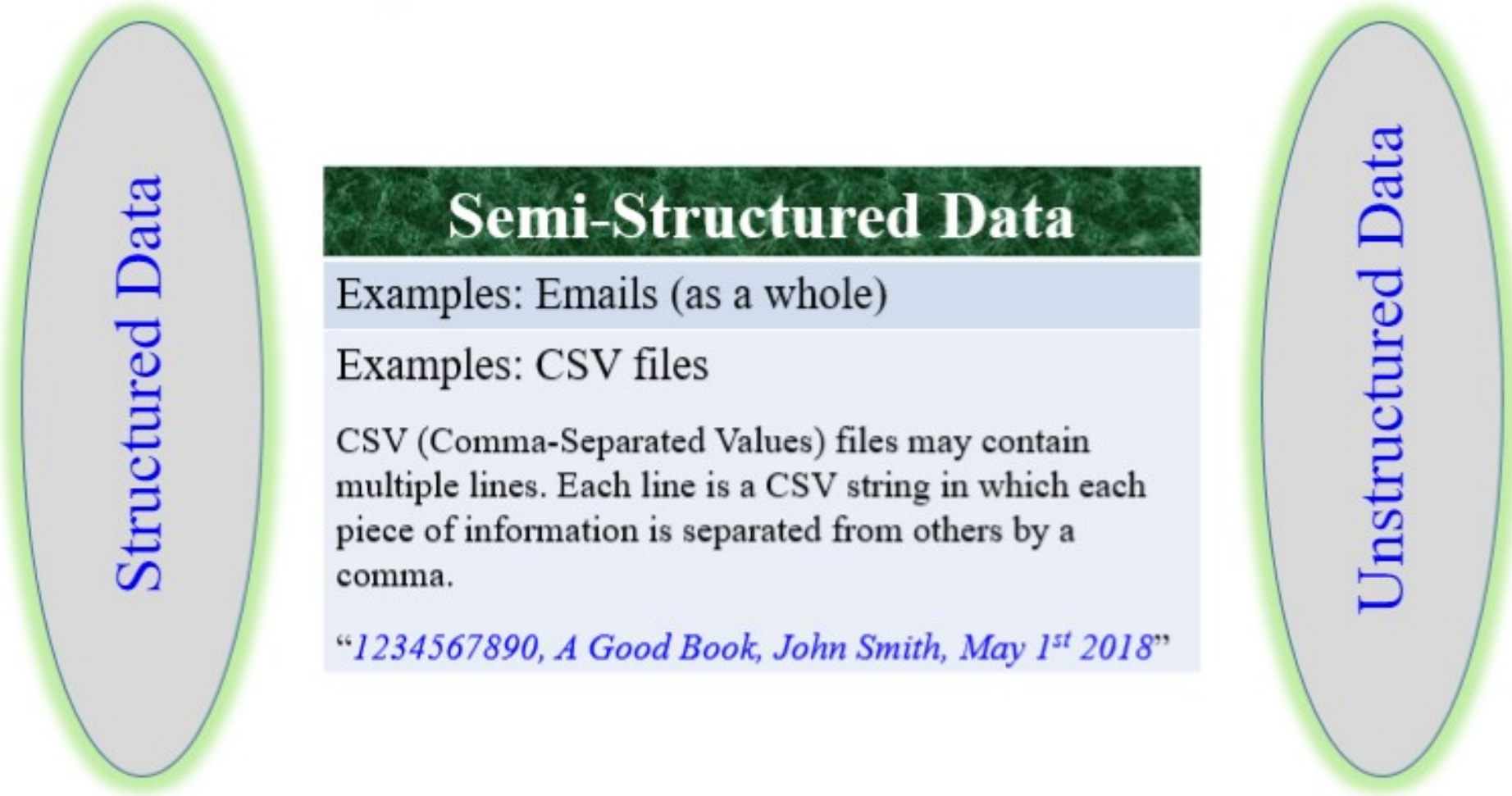
Slide 9: Big Data: Structured and Unstructured Data



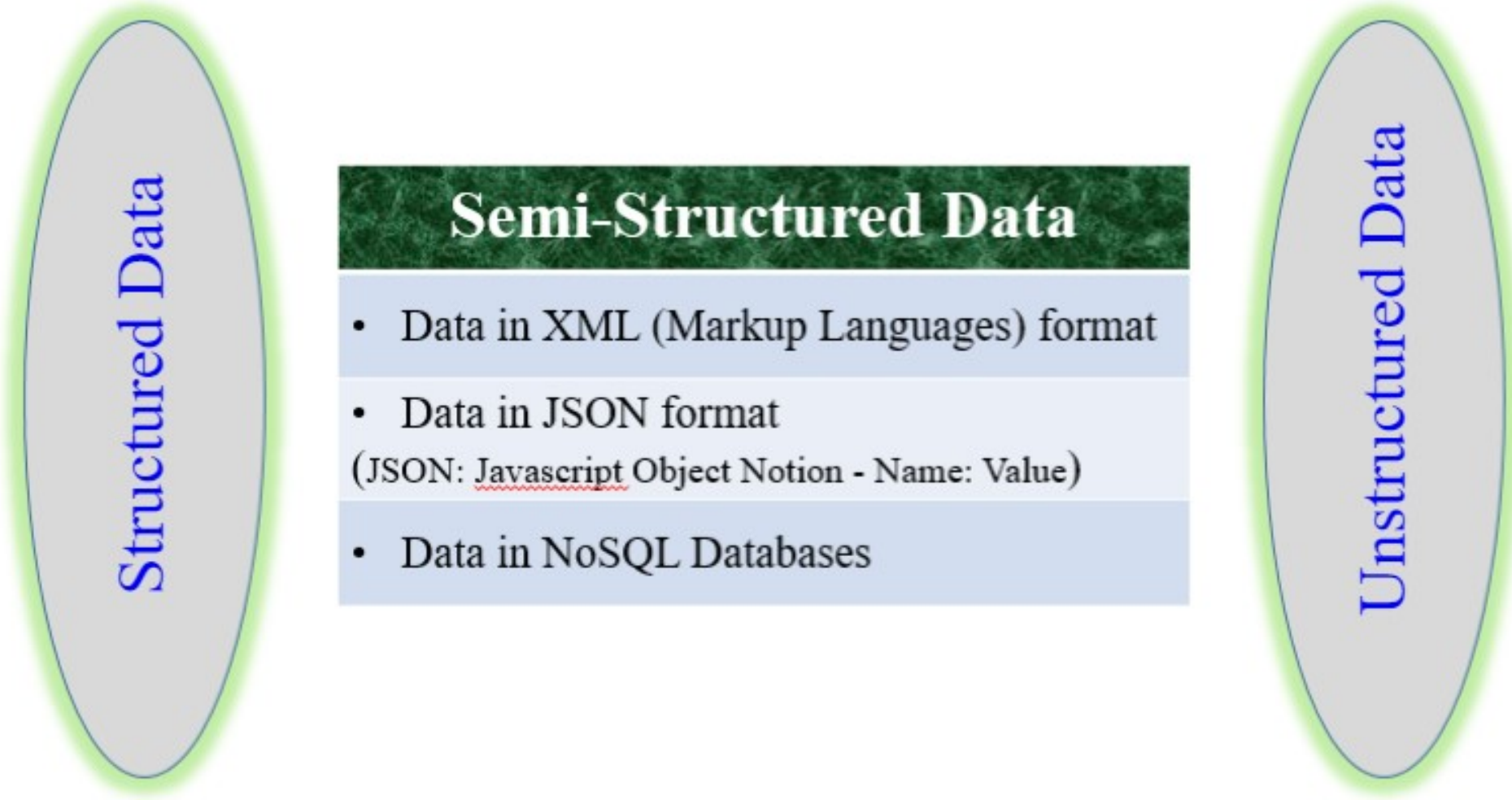
Slide 10: Big Data: Structured and Unstructured Data



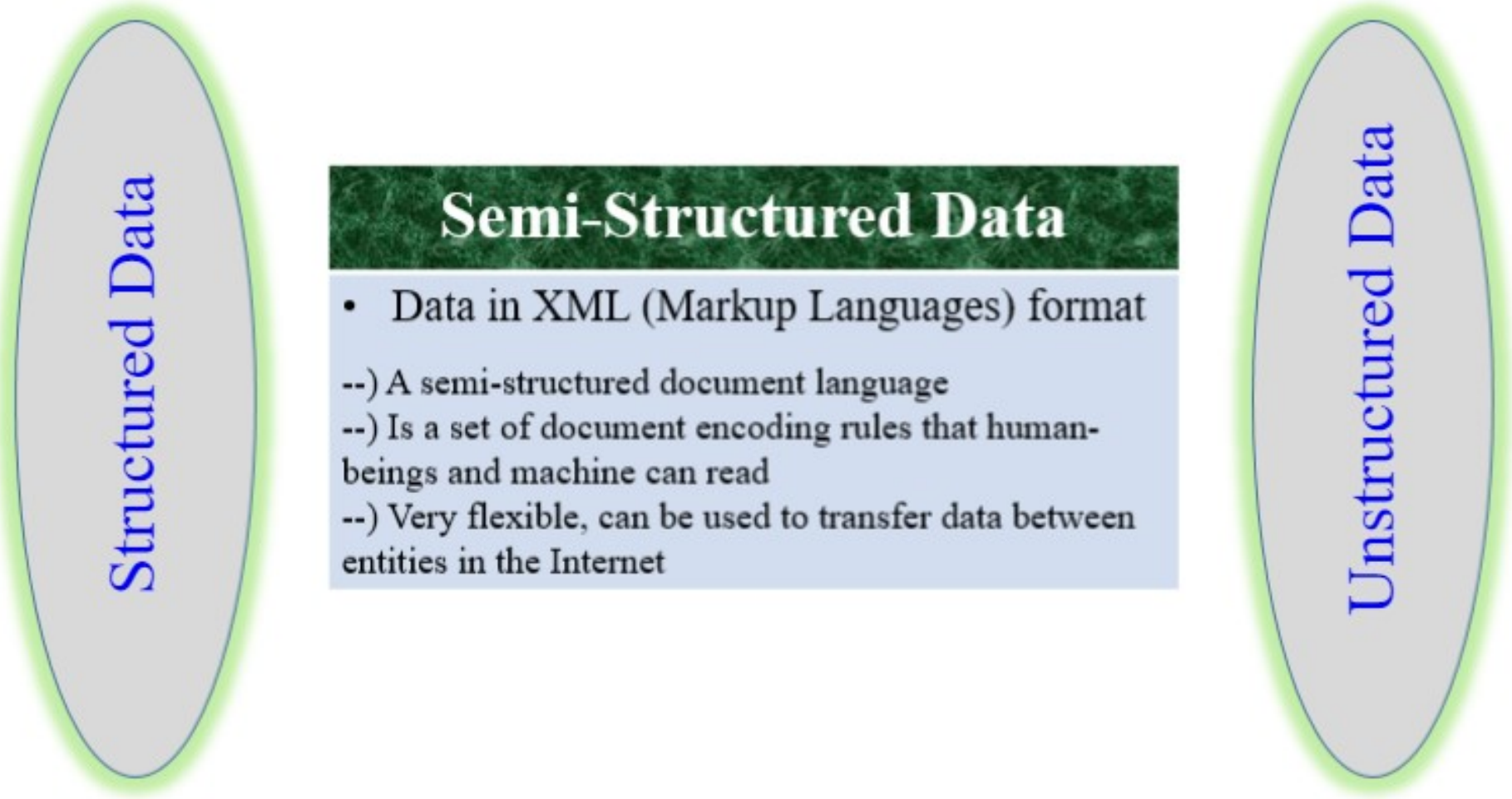
Slide 11: Big Data: Structured and Unstructured Data



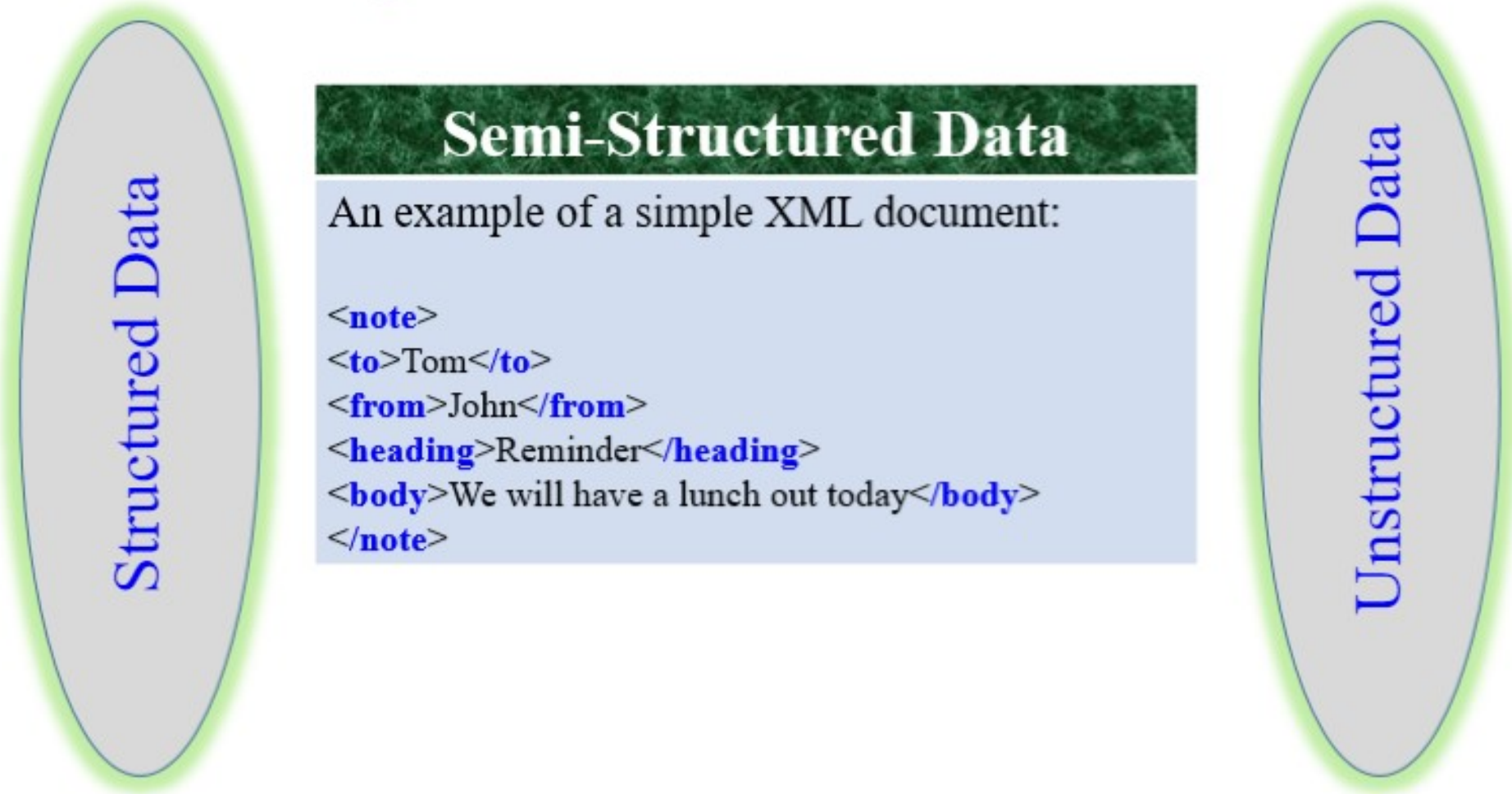
Slide 12: Big Data: Structured and Unstructured Data



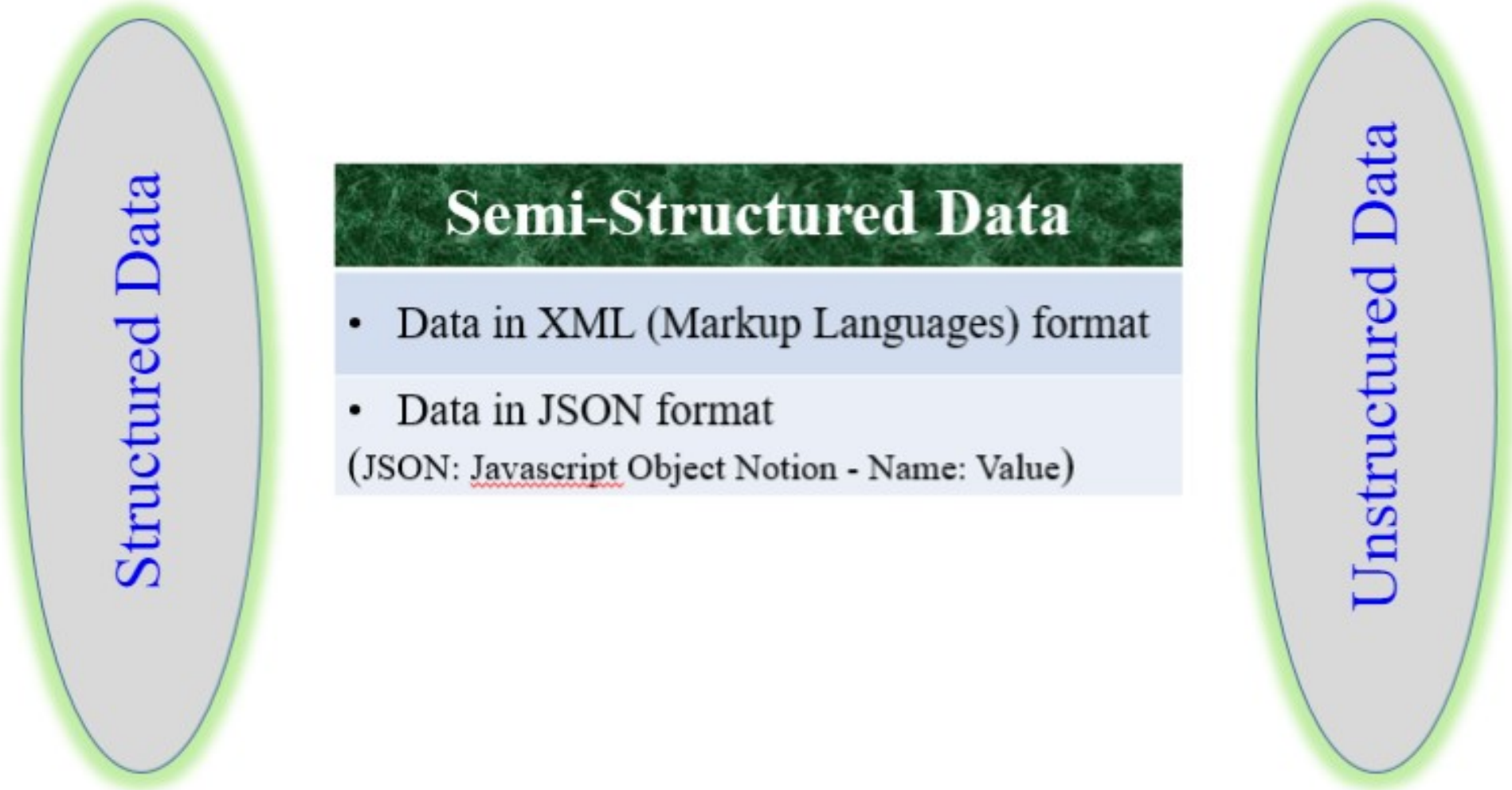
Slide 13: Big Data: Structured and Unstructured Data



Slide 14: Big Data: Structured and Unstructured Data



Slide 15: Big Data: Structured and Unstructured Data



Slide 16: Big Data: Structured and Unstructured Data

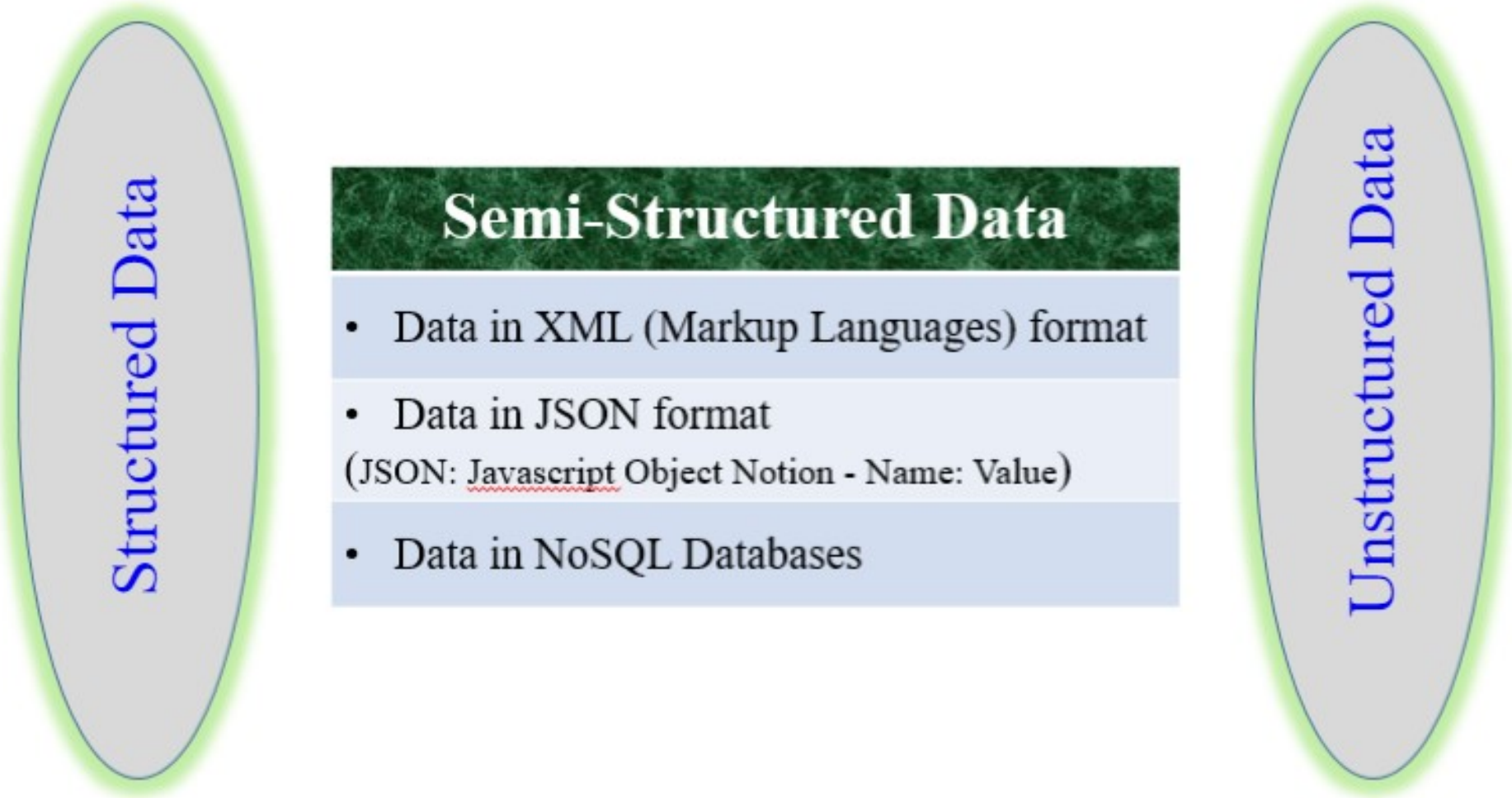
Semi-Structured Data

An example of a simple piece of data in JSON:

{ "**name**":"John", "**age**":30, "**car**": "GM" }

- JSON objects are surrounded by curly braces {}.
- JSON objects are written in key/value pairs.
- Keys must be strings, and values must be a valid JSON data type (string, number, object, array, boolean or null).
- Keys and values are separated by a colon.
- Each key/value pair is separated by a comma.
- Very flexible
- The structure is interchangeable among languages, JSON excels at transmitting data between web applications and servers

Slide 17: Big Data: Structured and Unstructured Data



Slide 18: Big Data: Structured and Unstructured Data