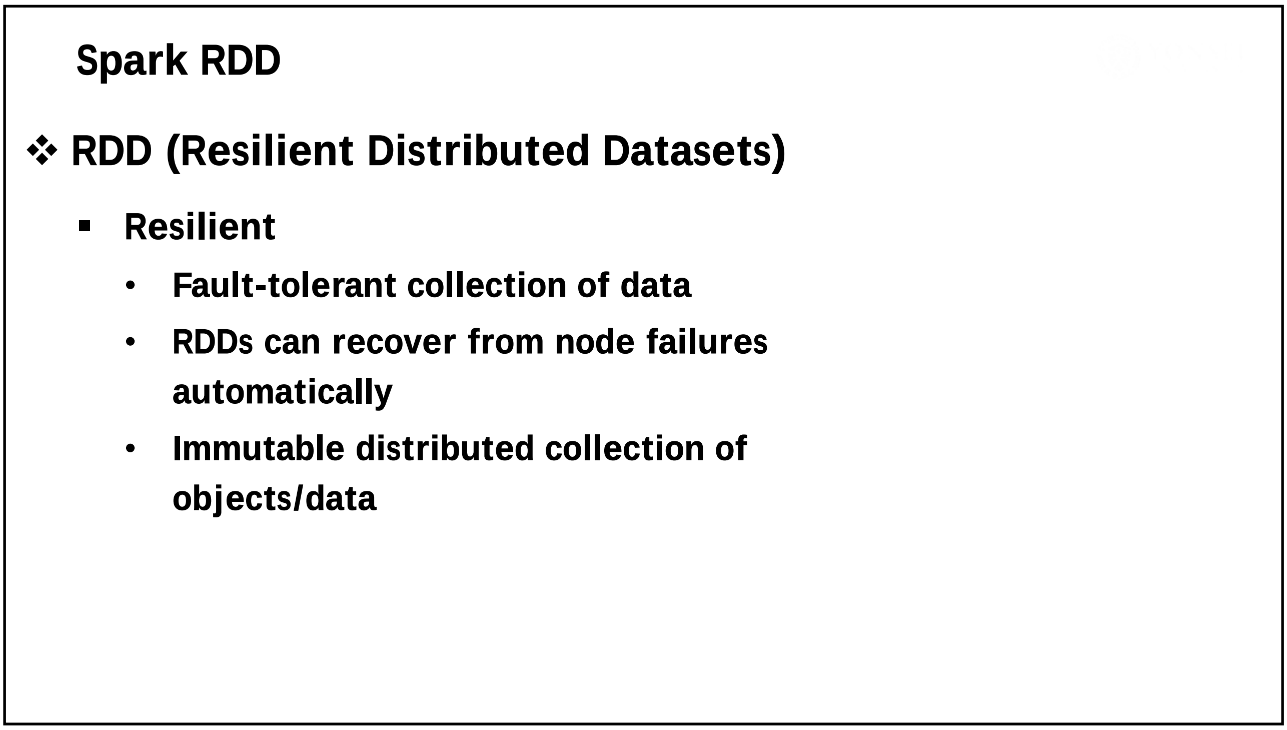
Big Data

Spark RDD

Spark RDD

❖ RDD (Resilient Distributed Datasets)

- RDD General Characteristics
  - Sequence of deterministic Transformations & Actions are conducted on a
    - Stored dataset
    - Another RDD
    - Group of RDDs
  - RDD = Resilient + Distributed + Datasets



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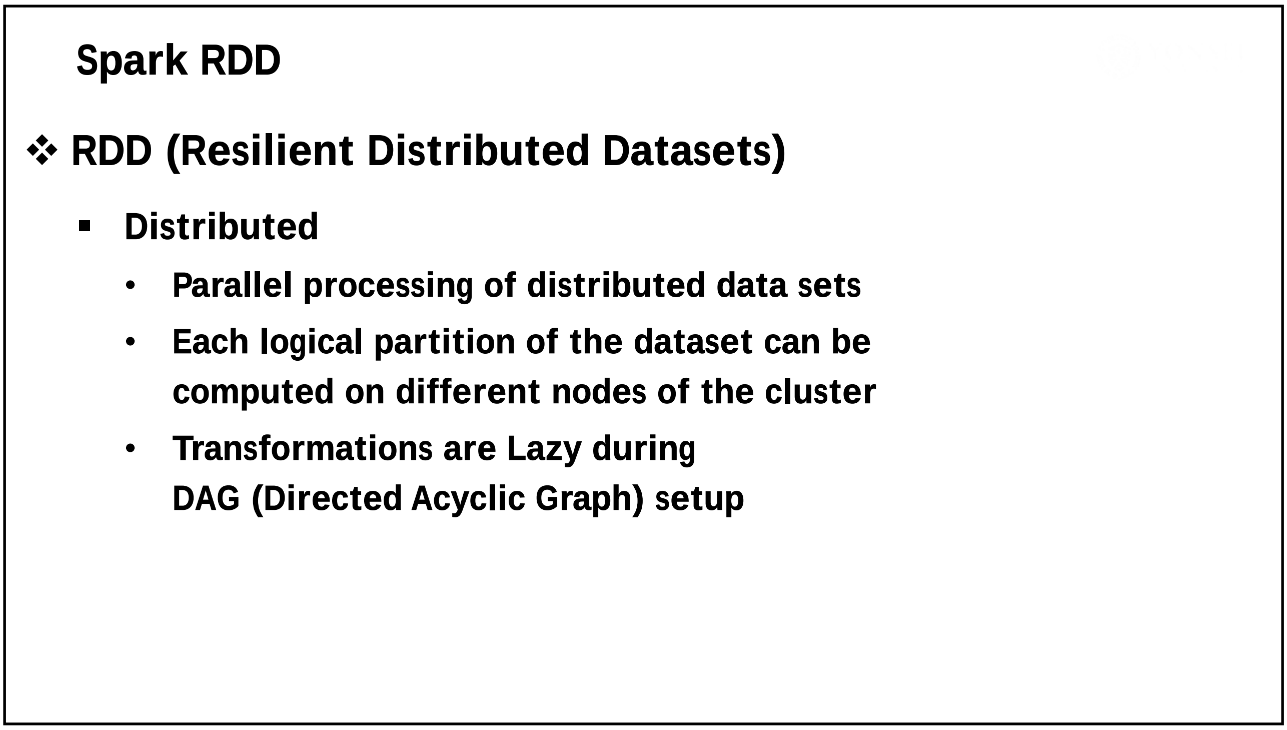
❖ **RDD (Resilient Distributed Datasets)**

- **Resilient**
  - **Fault-tolerant collection of data**
  - **RDDs can recover from node failures automatically**
  - **Immutable distributed collection of objects/data**



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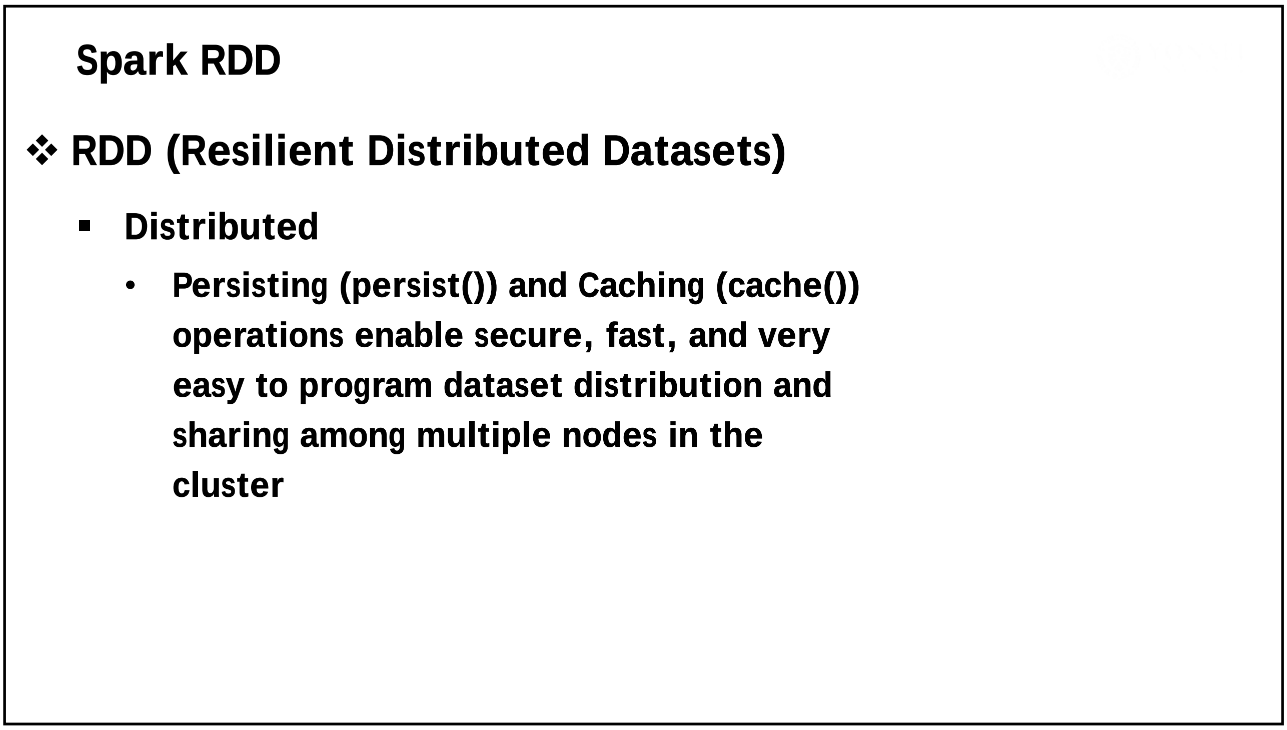
❖ **RDD (Resilient Distributed Datasets)**

- **Distributed**
  - **Parallel processing of distributed data sets**
  - **Each logical partition of the dataset can be computed on different nodes of the cluster**
  - **Transformations are Lazy during DAG (Directed Acyclic Graph) setup**



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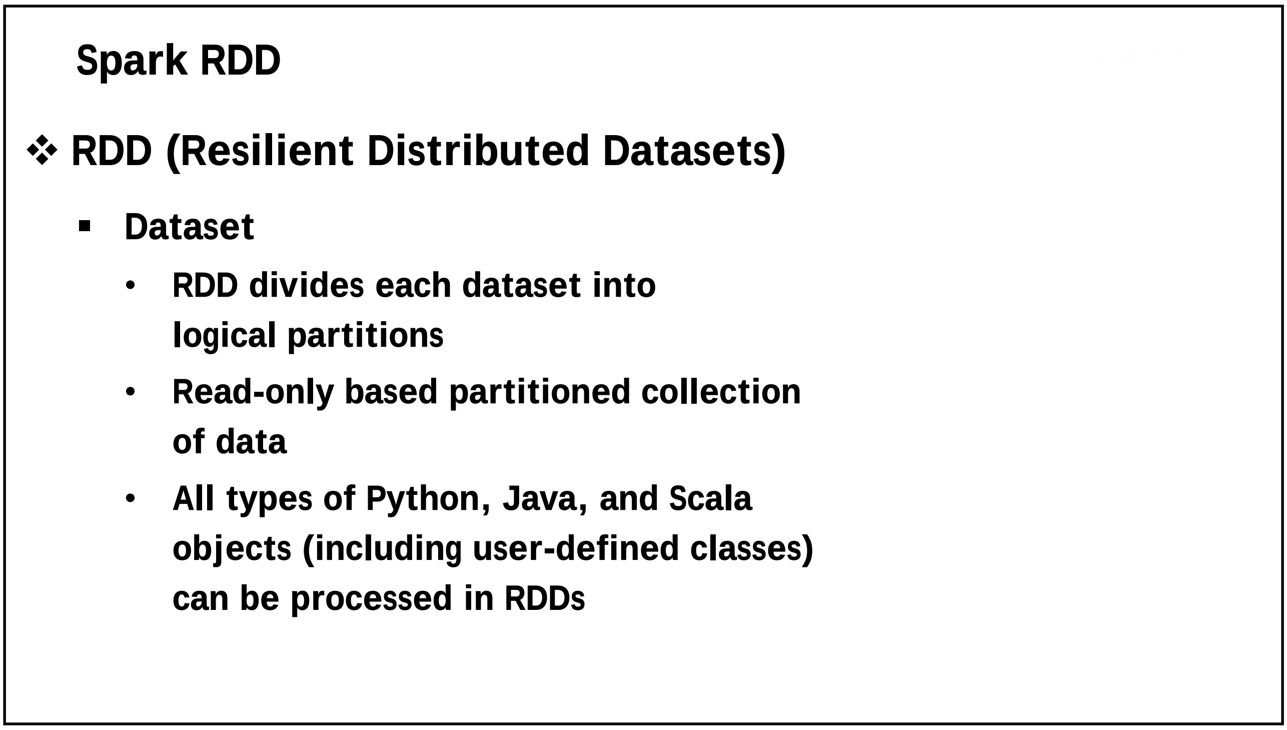
❖ RDD (Resilient Distributed Datasets)

- Distributed
  - Persisting (persist()) and Caching (cache()) operations enable secure, fast, and very easy to program dataset distribution and sharing among multiple nodes in the cluster



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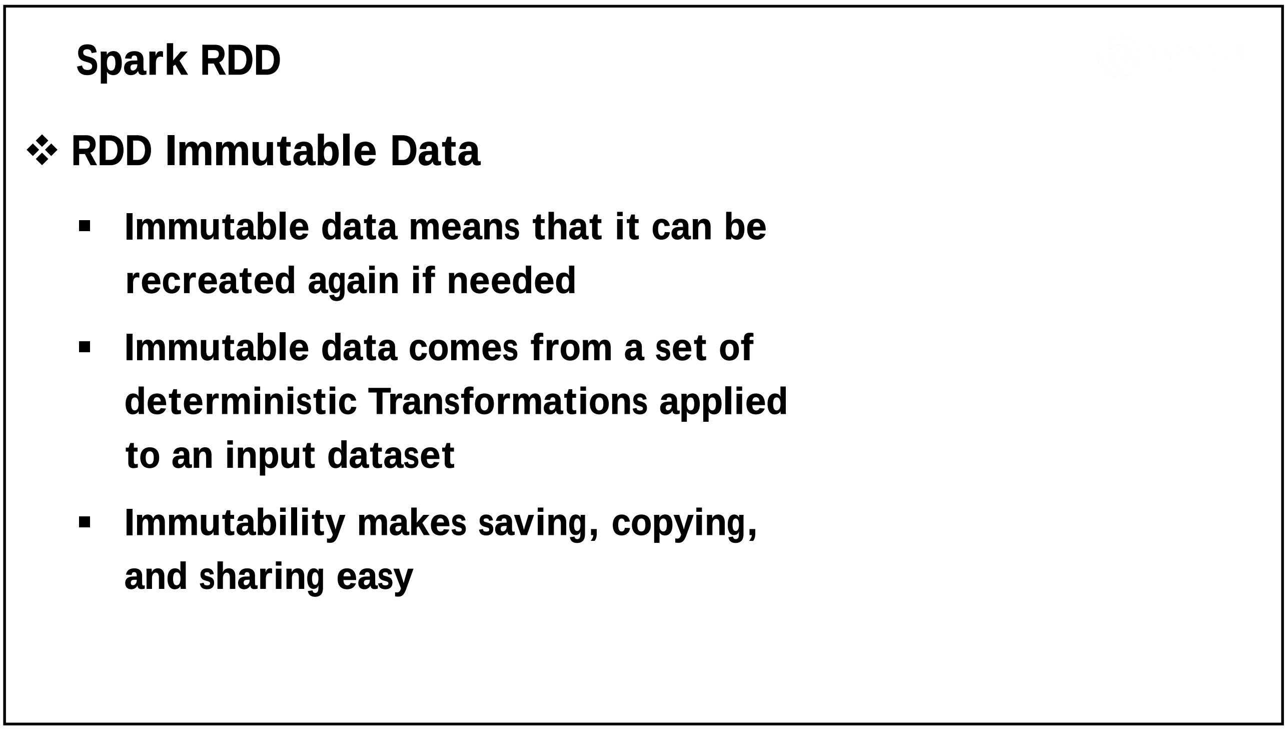
❖ RDD (Resilient Distributed Datasets)

- Dataset
  - RDD divides each dataset into logical partitions
  - Read-only based partitioned collection of data
  - All types of Python, Java, and Scala objects (including user-defined classes) can be processed in RDDs



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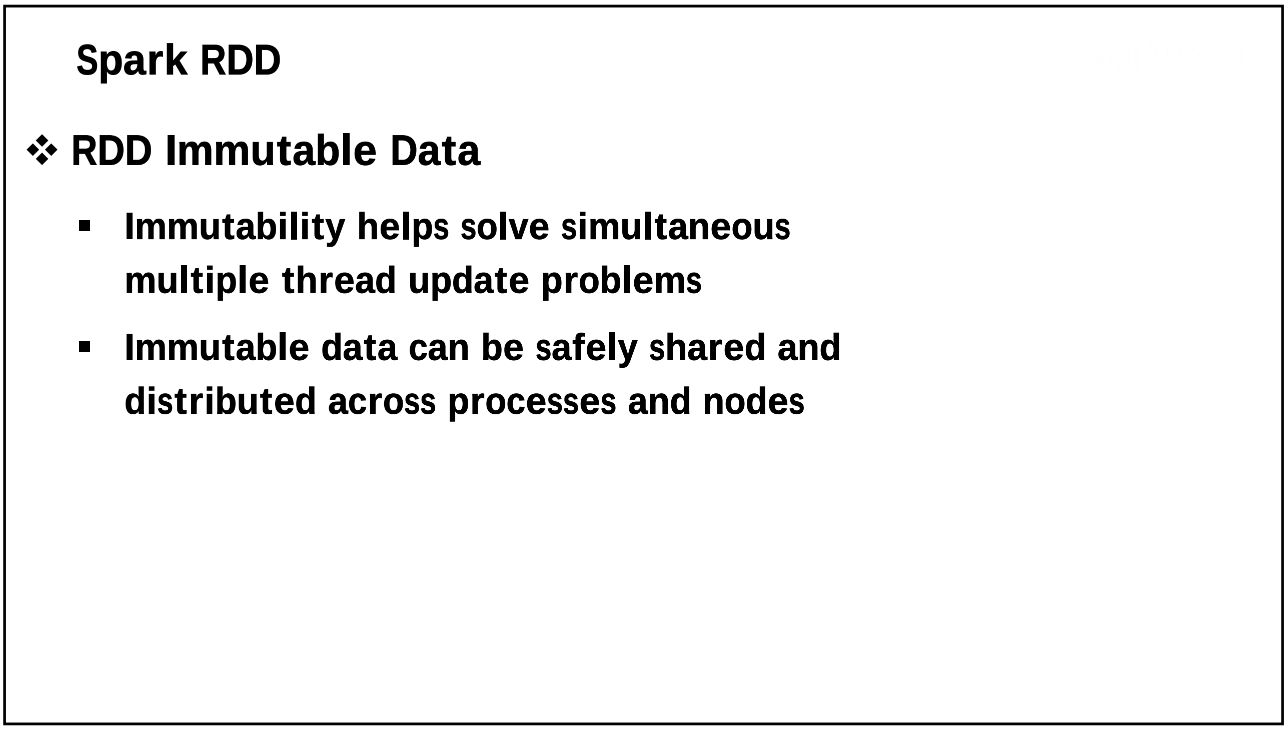
❖ RDD Immutable Data

- Immutable data means that it can be recreated again if needed
- Immutable data comes from a set of deterministic Transformations applied to an input dataset
- Immutability makes saving, copying, and sharing easy



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❖ RDD Immutable Data

- Immutability helps solve simultaneous multiple thread update problems
- Immutable data can be safely shared and distributed across processes and nodes

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❖ RDD Persistence

- **Persisting (or Caching) a dataset in memory enhances data processing speed across multiple operations**
- **Persisted RDD makes a node(s) store its Transformed data in its partition memory to quickly reuse it for other Actions processed on that dataset**

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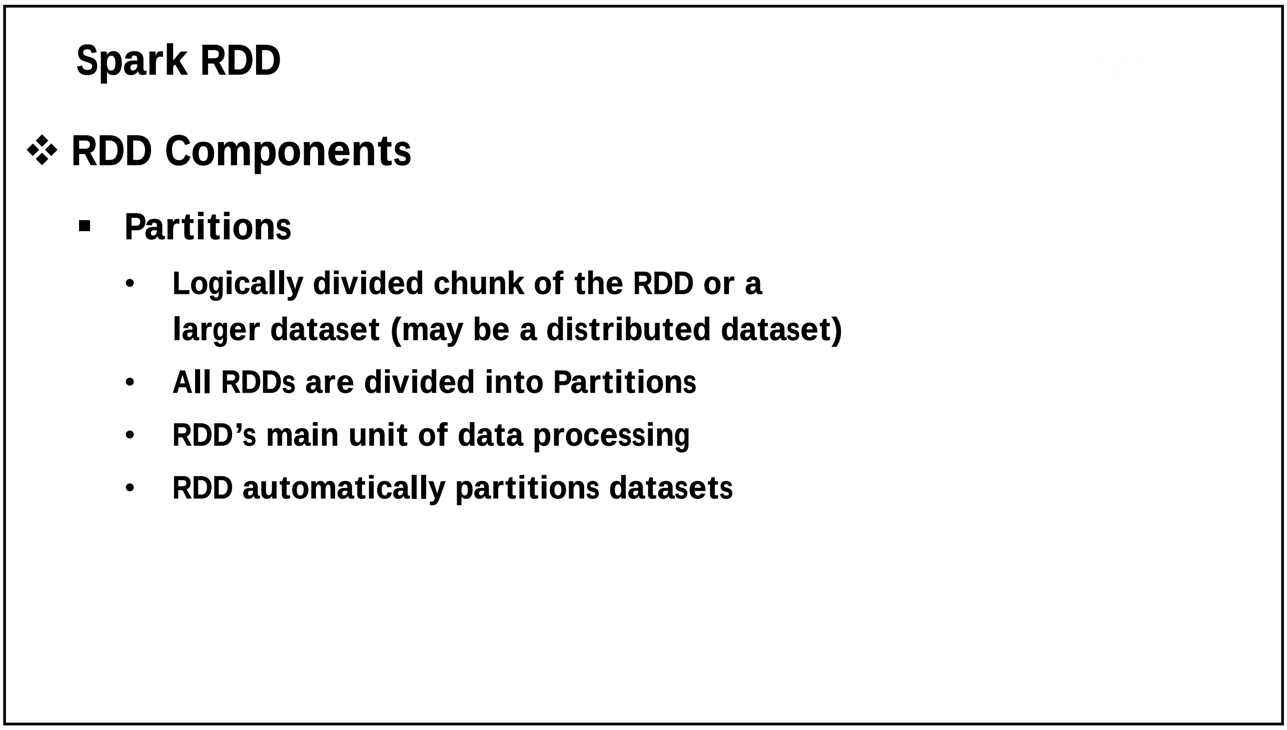
❖ RDD Persistence

- **Using a DAG (Directed Acyclic Graph) and having Lazy Transformations helps to schedule optimized RDD Persisting for multiple Actions to be executed more efficiently**



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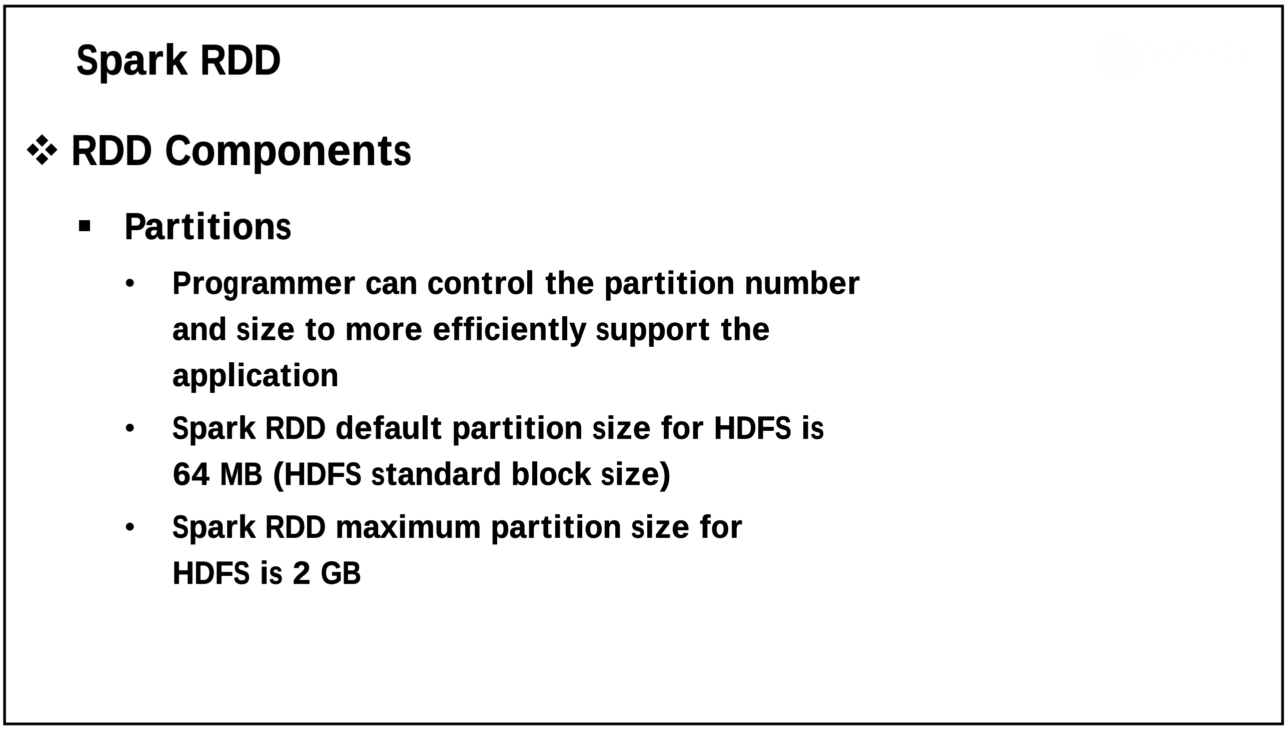
❖ RDD Components

- **Partitions**
  - **Logically divided chunk of the RDD or a larger dataset (may be a distributed dataset)**
  - **All RDDs are divided into Partitions**
  - **RDD’s main unit of data processing**
  - **RDD automatically partitions datasets**



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❖ RDD Components

- **Partitions**
  - **Programmer can control the partition number and size to more efficiently support the application**
  - **Spark RDD default partition size for HDFS is 64 MB (HDFS standard block size)**
  - **Spark RDD maximum partition size for HDFS is 2 GB**

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❖ RDD Components

- **Metadata & Data Type**
  - **Data and object type considered in the RDD partitioning and data placement**
  - **Structured data, Semi-structured data, and Unstructured data**
- **Task & Transformation**
  - **Function applied to process the data partition**
  - **Parent RDD ➔ Function ➔ Child RDD**
    - **Parent : Child ➔ 1:1, N:1, 1:M, N:M**

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❖ RDD Types

- **HadoopRDD**
  Each HDFS block is a partition
- **FilteredRDD**
  Child RDD partitions are same as the parent RDD partitions
- **JoinedRDD**
  One partition per Reduce task
- **MappedRDD**
- **PairRDD**
- **ShuffledRDD**
- **UnionRDD**
- **PythonRDD**
- **DoubleRDD**
- **JdbcRDD**
- **JsonRDD**
- **SchemaRDD**
- **VertexRDD**
- **EdgeRDD**
- **CassandraRDD**
- **GeoRDD**
- **EsSpark**
  ElasticSearch
- **etc.**

Spark RDD

❖ SchemaRDD

- RDD that has an associated schema
- Has all standard RDD functions and also can be used in relational queries

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❖ SchemaRDD creation methods

- Loading data in from external sources to SchemaRDD form
- Methods of converting a standard RDD into a SchemaRDD
- Importing a SQLContext
- Apply the createSchemaRDD function on SQLContext

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❖ SchemaRDD

- SchemaRDD can be registered as a table in the SQLContext it was imported from
- SchemaRDD registered as a table can be used in SQL statements

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References

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