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Questions and Answers

The **Big Data** technology is an umbrella term. It is emerging with time.

Apache Hadoop, **Apache Spark** is the framework for dealing with this. The revenue of Big Data is increasing exponentially. To become a part of Bigdata industry I hope these Top 50+ Apache Spark Interview Questions and Answers will help to get an edge in Bigdata Market.



*Top 50+ Apache Spark
Interview Questions and
Answers*

As a Bigdata professional, it is necessary to know the right buzzword, and the right answer to frequently asked Spark

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Spark Interview
Questions and answers
mentioned below
revolves around the
concept of **Spark Core**,
Spark Streaming,
Spark SQL, GraphX,
and **MLlib**.

Hope this blog will act ~~
a gateway to your Spark
Job.

So, let's explore top Spark
Interview Questions and
Answers.

2. Top Apache Spark Interview Questions and Answers

Here we are going to
discuss the list of Spark
interview questions and
answers. We have
classified these Apache
Spark Interview

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components-

- [Spark Basic Interview Questions](#)
- [Spark SQL Interview Questions](#)
- [Spark Streaming Interview Questions](#)
- [Spark MLLib Interview Questions](#)

a. Apache Spark Basic Interview Questions and Answers

Here are some Frequently asked Spark Interview Questions and Answers for freshers and experienced.



Q.1 What is Apache Spark?

Apache Spark is open source, wide range data processing engine. It is

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data worker to execute *streaming, machine learning or SQL* workloads. These jobs need fast iterative access to datasets. Spark provides API in various languages like **Python, R, Scala, Java**. We can run Spark by itself or on various existing [cluster manager](#). There is various deployment option in Spark. For example, **Standalone Deploy Mode, Apache Mesos, Hadoop YARN.**

The design of the Apache is so dynamic that it can integrate with all the [Big Data](#) tools. For example, Spark can access data from any of the [Hadoop](#) data source. It can also run in Hadoop data cluster. Spark does not have its own storage system. It relies on [HDFS](#) or other file storage for storing the data.

[Read about Apache Spark in detail.](#)

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into existence?

To overcome the drawbacks of **Apache Hadoop**, Spark came into the picture. Some of the drawbacks of Hadoop that Apache Spark overcomes are:

- Hadoop used only Java to build applications. Because it uses Java there were some security concerns as Java is prone to cyber crime.
- Apache Hadoop was apt only for batch processing. So, it does not support stream processing which was overcome in Spark.
- Hadoop used disk-based processing which results in slower retrieving of data. Spark overcomes this by in-memory computation.

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Q.3 What are the features of Spark?

Some of the features of Apache Spark are:

- The processing speed of Apache Spark is very high.
- Apache Spark is dynamic in nature. There are about 80 high-level operators, thus, using which we can build a parallel application.
- We can reuse code for join stream against historical data or for batch processing.
- Through RDD we achieve fault tolerance. Thus, the data recovery is possible in RDD.
- Spark support many languages like **Java**, **Scala**, **Python**, and **R**. Thus, makes it more user-friendly and is dynamic in nature.
- It can run independently and

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Hadoop YARN.

- Apache Spark is cost effective solution for Big data problem.

While Hadoop needs large storage and the large data center during replication.

[Read more Apache Sp....](#)

[Features in detail.](#)

Q.4 What are the limitations of Spark?

- Does not have its file management system. Thus, it needs to integrate with Hadoop or other cloud-based data platforms.
- In-memory capability can become a bottleneck. Especially when it comes to cost-efficient processing of Bigdata.
- Memory consumption is very high. And the issues for the same are not handled in a user-friendly manner. d. It requires large data.

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for example,
Tanimoto distance.

[Read more Apache Spark Limitations in detail.](#)

Q.5 List the languages supported by Apache Spark.

Apache Spark Supports the following Languages:
Scala, Java, R,
Python.

Q.6 What are the cases where Apache Spark surpasses Hadoop?

The data processing speed increases in the **Apache Spark**. This is because of the support of *in-memory computation* by the system. Thus, the performance of the system increase by 10x-1000x times. Apache Spark uses various languages for distributed application development. On the top of spark core,

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enable workload that uses streaming, SQL, graph and machine learning. Some of these workloads are also supported by Hadoop. Spark facilitates the development by joining them into the same application. Apache Spark adopts micro-batching. Which is essentially used for handling near real time processing data model.

Q.7 Compare Hadoop and Spark.

- **Cost Efficient** – In Hadoop, during replication, a large number of servers, huge amount of storage, and the large data center is required. Thus, installing and using Apache Hadoop is expensive. While using Apache Spark is a cost effective solution for big data environment.

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Spark was to improve the performance of data processing. And Spark did this to 10x-100x times. And all the credit of faster processing in Spark goes to in-memory processing of data. ~~ Hadoop, the data processing takes place in disc while in Spark the data processing takes place in memory. It moves to the disc only when needed. The Spark in-memory computation is beneficial for iterative algorithms. When it comes to performance, because of batch processing in Hadoop it's processing is quite slow while the processing speed of Apache is faster as it supports micro-batching.

- **Ease of development** – The core in Spark is the

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languages are supported by Apache Spark for distributed application development. For example, Java, Scala, Python, and R. On the top of spark core, various libraries are built that enables workload. they make use of streaming, SQL, graph and machine learning.

Hadoop also supports some of these workloads but Spark eases the development by combining all into the same application.

d.
Failure recovery: The method of Fault

- **Failure recovery –**
The method of Fault Recovery is different in both Apache Hadoop and Apache Spark. In Hadoop after every operation data is written to disk. The data objects are stored in Spark in RDD distributed

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in memory or on disk
and provides full
recovery from faults
or failure.

• **File Management System** – Hadoop

has its own File
Management System
called HDFS (Had^o_{op}).
Distributed File
System). While
Apache Spark an
integration with one,
it may be even HDFS.

Thus, Hadoop can
run over Apache
Spark.

• **Computation model** – Apache
Hadoop uses batch
processing model i.e.

it takes a large
amount of data and
processes it. But
Apache Spark adopts
micro-batching. Must
for handling near real
time processing data
model. When it
comes to

performance, because
of batch processing in
Hadoop it's
processing is quite

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faster as it supports
micro-batching.

• **Lines of code –**

Apache Hadoop has
near about 23,
00,000 lines of code
while Apache Spark
has 20,000 lines of
code.

• **Caching –** By
caching partial result
in memory of
distributed workers
Spark ensures low
latency computations.

While MapReduce is
completely disk
oriented, there is no
provision of caching.

• **Scheduler –**

Because of in-
memory computation
in Spark, it acts as its
own flow scheduler.

While with Hadoop
MapReduce we need
an extra job scheduler
like Azkaban or Oozie
so that we can
schedule complex
flows.

• **Spark API –**

Because of very Strict
API in Hadoop

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Spark discards many low-level details it is more productive.

• **Window criteria –**

Apache Spark has time-based window criteria. But Apache Hadoop does not have window criteria since it does not support streaming.

• **Faster –** Apache Hadoop executes job 10 to 100 times faster than Apache Hadoop MapReduce.

• **License –** Both Apache Hadoop and Apache MapReduce has a License Version 2.0.

• **DAGO –** In Apache Spark, there is cyclic data flow in machine learning algorithm, which is a direct acyclic graph. While in Hadoop MapReduce data flow does not have any loops, rather it is a chain of the image.

• **Memory Management –**

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management system.

While Memory

Management in

Apache Hadoop can
be either statistic or
dynamic.

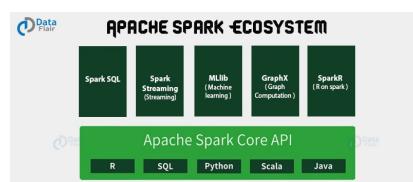
• **Iterative**

Processing – In

Apache Spark, the
data iterates in
batches. Here
processing and
scheduling of each
iteration are separate.

While in Apache
Hadoop there is no
provision for iterative
processing.

- **Latency** – The time
taken for processing
by Apache Spark is
less as compared to
Hadoop since it
caches its data on
memory by means of
RDD, thus the latency
of Apache Spark is
less as compared to
Hadoop.



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[Read Hadoop vs Spark in detail.](#)

Q.8 What are the components of Spark Ecosystem?

The various components of Apache Spark are:

- **Spark Core** – Spark Core is the foundation of the whole project. All the functionality that is in Spark, is present on the top of Spark Core.
- **Spark Streaming** – It allows fault-tolerant streaming of live data streams. It is an add-on to core Spark API. Here it makes use of micro-batching for real-time streaming. Thus it packages live data into small batches and delivers to the batch system for processing.
- **Spark SQL** – Spark SQL component is distributed

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processing. Using Spark SQL Spark gets more information about the structure of data and the computation being performed. As a result, by using this information Spark can perform extra optimization.

• **Spark MLlib –**

MLlib is a scalable learning library that discusses both: High-quality algorithm, High speed. The motive behind MLlib creation is to make machine learning scalable and easy. Thus, it contains machine learning libraries that have an implementation of various machine learning algorithms.

• **Spark GraphX –**

GraphX is API for graphs and graph parallel execution. In order to support graph computation, graphX contains set

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graph, joinvertices
and an optimized
variant of Pregel API.

Also, clustering,
classification,
traversal, searching,
and pathfinding is
possible in graphX.

- **SparkR** – SparkR is Apache Spark 1.4 release. The key component of SparkR is SparkR DataFrame. *Data frames* are a fundamental data structure for **data processing in R** and the concept of data frames extends to other languages with libraries like Pandas etc.

[Read Apache Spark Ecosystem Components in detail.](#)

Q.9 What is Spark Core?

Spark Core is a common execution engine for Spark platform. It provides *parallel* and *distributed*

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on the top of it. Spark core provides speed through *in-memory computation*. And for ease of development, it also supports Java, Scala and Python APIs.

RDD is the basic data structure of Spark Core. RDDs are immutable, a partitioned collection of record that can operate in parallel. We can [create RDDs](#) by transformation on existing RDDs. Also by loading an external dataset from stable storage like HDFS or [HBase](#), we can form RDD.

Q.10 How is data represented in Spark?

The data can be represented in three ways in Apache Spark: *RDD*, *DataFrame*, *DataSet*.

RDD: RDD stands for *Resilient Distributed Datasets*. It is also a *Read-only* partition collection of records. RDD is the fundamental data structure of Spark.

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deterministic operation
on either:

- Data in stable storage.
- Parallelizing already existing collection in driver program.
- Other RDDs. RDD allows programme, perform in-memory computations on large clusters in a fault-tolerant manner. Thus, speed up the task.

DataFrame: Unlike an RDD, the data organizes into named columns, like a table in a relational database. It is also an immutable distributed collection of data.

[**DataFrame**](#) allows developers to impose a structure onto a distributed collection of data, therefore, allowing higher-level abstraction.

DataSet: Dataset is an extension of DataFrame API which provides type-safe, object-oriented

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advantage of [Spark's Catalyst optimizer](#) by exposing expressions and data fields to a query planner.

Q.11 What are the abstractions of Apache Spark?

The main abstraction provided by Apache Spark is **Resilient Distributed Dataset**. RDDs are fault tolerant in nature. We cannot improve the changes made in RDD. RDDs creation starts with the file in a file system like Hadoop file system and then transforming it. The shared variable is the second abstraction provided by Apache Spark. We can use this in parallel operations.

[Read about Apache Spark RDD in detail.](#)

Q.12 Explain the operations of Apache

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Apache Spark RDD

supports two types of operations:

Transformations and Actions-

- **Transformations** are lazy operations on an RDD that create one or many new **RDDs**. For example *Map, filter, reduceByKey* etc creates new RDD. RDD create a new dataset from an existing one. That executes on demand. That means they compute lazily. Whenever we perform any transformation on RDD, it creates a new RDD each time.
- **Action** returns final result of RDD computations. It triggers execution using lineage graph to load the data into original RDD. After application of all the intermediate transformation, it

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writes it out to file system. Upon applying Actions on an RDD non-RDD values gets generate.

[Read about RDD transformations and Actions in detail.](#)

Q.13 How many types of Transformation are there?

There are two types of transformation namely *narrow transformation* and *wide transformation*.

• **Narrow**

Transformation is the result of *map*, *filter* and such that the data is from a single partition only. As a result, the data is self-sustained. The RDD that we get as an output has a partition with records that originate from a single partition in the parent RDD.

• **Wide transformations**

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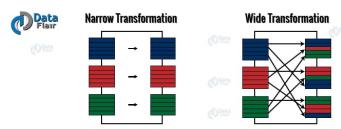
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reduceByKey. The data that we will need to compute the records in a single partition is kept at many partitions of the parent RDD.



Apache Spark Narrow and Wide Transformations

Q.14 In how many ways RDDs can be created? Explain.

There are three ways to create an RDD:

- **Parallelized collection** – In the initial stages, the RDD is generally created by parallelized collection. In this method, we take the existing collection in the program and pass it to `parallelize()` method of `SparkContext`. The thing that should be noticed in the

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partition the dataset is cut into. For each partition of the cluster, Spark will run one task. Spark set a number of partition based on our cluster. But the number of partitions can also be set manually. Pass the number of partition as the second parameter for manual partition. e.g.
`sc.parallelize(data, 20)`, here we have manually given a number of partition as 20.

- **External Datasets (Referencing a dataset) – In Spark**
one can create distributed dataset from any data source supported by Hadoop. For example the local file system, HDFS, Cassandra, HBase etc. In this, the data is loaded from the external dataset.
To create text file RDD we can use

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takes URL of the file
and read it as a
collection of line.
URL can be a local
path on the machine
or a hdfs://, s3n://,
etc.

• **Creating RDD from existing RDD**

– Transformation
converts one RDD
into another RDD. By
using transformation
we can create an RDD
from existing RDD.
Transformation acts
as a function that
intakes an RDD and
produces one.

[Read the ways to create
RDD in Spark in detail.](#)

**Q.15 What are Paired
RDD?**

Paired RDDs are the
RDD-containing *key-value pair*. A key-value
pair (KVP) contains two
linked data item. Here
Key is the identifier and
Value are the data
corresponding to the key
value.

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processing in Spark?

In **in-memory computation**, we keep data in random access memory in place of some slow disk drives. The processing of data is in parallel. Using this we can also identify the pattern, analyze large data Spark offers in in-memory capabilities. As a result, this increases the processing speed because it retrieves the data from memory in place of the disk. Also, the execution time of the process decreases. Keeping the data in-memory improves the performance by the order of magnitudes.

The main abstraction of Spark is its **RDDs**. Also, we can cache RDD using the ***cache()*** or ***persist()*** method. In *cache()* method all the RDD are in-memory. The dissimilarity between *cache()* and *persist()* is the default storage level.

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in *persist()* there are various storage levels like:

- MEMORY_ONLY,
- MEMORY_AND_DISK,
- MEMORY_ONLY_SER
- MEMORY_AND_DISK_SER
- DISK_ONLY

[Read Spark in-memory processing in detail.](#)

Q.17 How is fault tolerance achieved in Apache Spark?

The basic fault-tolerant semantic of Spark are:

- Since all RDD is an immutable data set. Each RDD keeps track of the lineage of the deterministic operation that employe on fault-tolerant input dataset to create it.
- If any partition of an RDD is lost due to a worker node failure, then that partition can be re-computed from the original fault-tolerant dataset

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- Assuming that all of the RDD transformations are deterministic, the data in the final transformed RDD will always be the same irrespective of failures in the [Spark cluster](#).

To achieve fault tolerance for all the generated RDDs, the achieved data replicates among multiple Spark executors in worker node in the cluster. This result in two types of data that should recover in the event of failure:

- **Data received and replicated** – In this, the data replicates on one of the other nodes. Thus we can retrieve data when a failure occurs.
- **Data received but buffered for replication** – the data does not replicate. Thus the only way to recover

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source.

Failure can also occur in worker and driver nodes.

- **Failure of worker**

node – The node which runs the application code on the cluster is work node. These are the slave nodes. Any of the worker nodes running executor can fail, thus resulting in loss of in-memory data. If any receivers were running on failed nodes, then their buffer data will vanish.

- **Failure of driver**

node – If the driver node running the Spark Streaming application fails, then there is the loss of **SparkContent**. All executors along with their in-memory data vanishes.

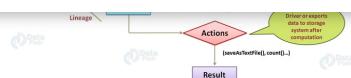
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*Spark Interview Questions and
Answers – Lazy Evaluation
Feature*

[Read about Spark Fault tolerance in detail.](#)

Q.18 What is Directed Acyclic Graph(DAG)

RDDs are formed after every transformation. At high level when we apply action on these RDD, Spark creates a **DAG**. DAG is a finite directed graph with *no directed cycles*.

There are so many vertices and edges, where each edge is directed from one vertex to another. It contains a sequence of vertices such that every edge is directed from earlier to later in the sequence. It is a strict generalization of [MapReduce](#) model. DAG lets you get into the stage

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In the stage view, the details of all RDDs that belong to that stage are expanded.

[Read DAG in Apache Spark in detail.](#)

Q.19 What is lineage graph?

Lineage graph refers to the graph that has all the parent RDDs of an RDD. It is the result of all the transformation on the RDD. It creates a logical execution plan.

A ***logical execution plan*** is a plan that starts with the very first RDD. Also, it does not have any dependency on any RDD. It then ends at the RDD which produces the result of an action that has been called to execute.

Q.20 What is lazy evaluation in Spark?

The **lazy evaluation** known as *call-by-need* is a strategy that delays the execution until one requires a value. The

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evaluate them lazily. When we call some operation in RDD it does not execute immediately; Spark maintains the graph of which operation it demands. We can execute the operation at any instance by calling the action on the data. The data does not loads until it is necessary.

[Read about Spark Lazy Evaluation in detail.](#)

Q.21 What are the benefits of lazy evaluation?

Using lazy evaluation we can:

- Increase the manageability of the program.
- Saves computation overhead and increases the speed of the system.
- Reduces the time and space complexity.
- provides the optimization by

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Q.22 What do you mean by Persistence?

RDD persistence is an optimization technique which saves the result of RDD evaluation. Using this we save the intermediate result for further use. It reduces the computation overhead. We can make persisted RDD through ***cache()*** and ***persist()*** methods.

It is a key tool for the interactive algorithm. Because, when RDD is persisted each node stores any partition of it that it computes in memory. Thus makes it reusable for future use. This process speeds up the further computation ten times.

[Read about RDD Persistence and Caching Mechanism in detail.](#)

Q.23 Explain various level of persistence in Apache Spark.

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level:

- **MEMORY_ONLY**

– Store RDD as serialized Java objects. If the RDD does not fit in memory, then some partitions will not be cached and will recompute on the fly each time needed.

This is the default level.

- **MEMORY_AND_DISK**

– Store RDD as serialized Java objects. If the RDD does not fit in memory, store the partitions that don't fit on the disk, and read them from there when they're needed.

- **MEMORY_ONLY_SER
(Java and Scala) –**

Store RDD as serialized Java objects. This is more space-efficient than serialized objects, especially when using a fast serializer, but it

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- **MEMORY_AND_DISK_SER(Java and Scala)** – Like MEMORY_ONLY_SER, but spills partitions that don't fit in memory to disk.
- **DISK_ONLY** – It stores the RDD partitions only on disk.
- **MEMORY_ONLY_2, MEMORY_AND_DISK_2**
 - It replicates each partition on two cluster nodes.
- **OFF_HEAP** – Like MEMORY_ONLY_SER, but store the data in off-heap memory. This requires enabling of off-heap memory.

Q.24 Explain the run-time architecture of Spark?

The components of the [**run-time architecture of Spark**](#) are as follows:

- a. The driver
- b. Cluster manager
- c. Executors

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The Driver – The

main() method of the program runs in the driver. The process that runs the user code which creates RDDs performs transformation and action, and also creates *SparkContext* is called diver. When the Spark Shell is launched, this signifies that we have created a driver program. The application finishes, as the driver terminates.

Finally, driver program splits the Spark application into the task and schedules them to run on the executor.

Cluster Manager –

Spark depends on cluster manager to launch executors. In some cases, even the drivers are launched by cluster manager. It is a pluggable component in Spark. On the cluster manager, the Spark scheduler schedules the jobs and action within a spark application in FIFO fashion. Alternatively, the

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fashion. The resources used by a Spark application can also be dynamically adjusted based on the workload. Thus, the application can free unused resources and request them again when there is a demand. This is available on all coarse-grained [cluster managers](#), i.e. **standalone mode**, **YARN mode**, and **Mesos** coarse-grained mode.

The Executors – Each task in the Spark job runs in the *Spark executors*. thus, Executors are launched once in the beginning of Spark Application and then they run for the entire lifetime of an application. Even after the failure of Spark executor, the Spark application can continue with ease.

There are two main roles of the executors:

- Runs the task that makes up the

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the driver.

- Provide in-memory storage for RDDs that the user program cache.

Q.25 Explain various cluster manager in Apache Spark?

The various cluster managers supported by Apache Spark are Standalone, Hadoop YARN, Apache Mesos.

- **Standalone Cluster Manager –**

Standalone is a simple cluster manager of Spark that makes it easy to setup a cluster. In many cases, it is the simplest way to run Spark application in a clustered environment. It has masters and number of workers with the configured amount of memory and CPU cores. In standalone cluster mode, Spark allocates resources

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that only one executor can be allocated on each worker per application.

• **Hadoop YARN –**

YARN became the sub-project of Hadoop in the year 2012. The key idea behind YARN is to bifurcate the functionality of resource manager and job scheduling into different daemons. The plan is to have a Global

Resource Manager

(RM) and per-

application

Application

Master (AM). An application is either a **DAG** of graphs or an individual job. The data computation framework is a combination of the ResourceManager and the

NodeManager.

• **Apache Mesos –**

Apache Mesos

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environment. It is healthful for deployment and management of applications in large-scale cluster environments. Mesos clubs together the existing resource of the machines/nodes into a cluster, as a result from this a variety of workloads may utilize. This is known as node abstraction, thus it decreases an overhead of allocating a specific machine for different workloads.

It is resource management platform for Hadoop and **Big Data** cluster.

In some way, Apache Mesos is the reverse of virtualization.

Because in virtualization one physical resource divides into multiple virtual resources, while in Mesos multiple physical

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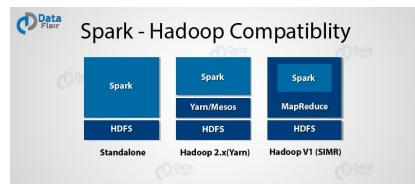
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resource.



*Spark Interview Questions and
Answers – Hadoop
Compatibility*

[Read about Spark Cluster
Managers in detail.](#)

Q.26 In how many ways can we use Spark over Hadoop?

In three ways we can run
Spark over Hadoop:
Standalone, YARN, SIMR

- **Standalone** – In this, we can either divide resource on all machines or subset of machines in [Hadoop cluster](#).
- **YARN** – We can run Spark on YARN without any prerequisites. Thus, we can integrate Spark in Hadoop stack and take an advantage of facilities of Spark.

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Another way to do this is by launching Spark job inside Map reduce. With SIMR we can use Spark shell in few minutes after downloading it.

This reduces the overhead of deployment, and we can play with Spark.

[Read about Spark](#)
[Hadoop Compatibility in detail.](#)

Q.27 What is YARN?

YARN became the sub-project of *Hadoop* in the year 2012. It is also known as MapReduce 2.0. The key idea behind YARN is to bifurcate the functionality of resource manager and job scheduling into different daemons. The plan is to have a Global *Resource Manager(RM)* and per-application *Application Master (AM)*. An application is either a **DAG** of graphs or an individual job.

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combination of the ResourceManager and the NodeManager.

The **Resource**

Manager manages resource among all the applications in the system. The Resource Manager has schedules and *Application Manager*. The Scheduler allocates resource to the various running application. The Scheduler is pure Scheduler if it performs no monitoring or tracking of the status of the application. The

Application Manager manages applications across all the nodes.

NodeManager contains ApplicationMaster and container. A **container** is a place where a unit of work happens. Each task of MapReduce runs in one container. The per-application

ApplicationMaster is a framework specific library. It negotiates

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continues with
NodeManager(s) to execute and watch the tasks. Application or job requires one or more containers. NodeManager looks after containers, resource usage (CPU, memory, disk, and network) and reporting this to the ResourceManager.

[Read about YARN in detail.](#)

Q.28 How can we launch Spark application on YARN?

There are two deployment modes to launch Spark application on YARN: the *cluster mode* and the *client mode*.

- **In cluster mode,** the Spark driver runs inside Application Master Process and this is managed by YARN on the cluster.
- **In client mode,** the driver runs in the

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requests a resource from YARN. And it provides it to the driver program.

Q.29 Define Partition in Apache Spark.

Partition refers to, a logical block of large distributed Dataset.

Logically partitioning the data and distributing it over the cluster provides parallelism. It also minimizes network traffic for sending data between executors. It determines how to access the entire hardware resources during job execution.

RDD is automatically partitioned in Spark. We can change the size and number of the partition.

[Read Spark Catalyst Optimizer in detail.](#)

Q.30 What are shared variables?

Shared variables are one of the abstractions of Apache Spark. Shared

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Whenever Spark runs a function in parallel as a set of tasks on different nodes, each variable that is used in function are circulated to each task.

Sometimes there is a need to share the variables across the tasks or between the task and the driver program.

Apache Spark supports two types of shared variables namely ***broadcast variable*** and ***accumulator***.

Using broadcast variables we cache a value in memory on all nodes while we add accumulators to, such as counters and sums.

Q.31 What is Accumulator?

The ***accumulator*** is the type of Shared variable that is only added through associative and commutative operations. Using accumulator we can update the value of

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implement counters (as in MapReduce) or sums using an accumulator.

Users can create named or unnamed accumulator.

We can create numeric accumulator by calling

SparkContext.longAccumulator()

or

SparkContext.doubleAccumulator()

for Long or Double.

Q.32 What is the difference between DSM and RDD?

a) READ

- **RDD:** In RDD the read operation is *coarse grained* or *fine grained*. In **coarse-grained** we can transform the whole dataset but not an individual element. While in **fine-grained** we do the transformation of an individual element on a dataset.

- **Distributed Shared Memory:** The read operation in Distributed shared

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b) Write:

- **RDD:** The write operation is coarse-grained in RDD.
- **Distributed Shared Memory:**
In distributed shared system the write operation is fine grained.

c) Consistency:

- **RDD:** The consistency of RDD is trivial meaning it is immutable in nature. Any changes made to an RDD cannot roll back, it is permanent. So the level of consistency is high.
- **Distributed Shared Memory:**
The system guarantees that if the programmer follows the rules, the memory will be consistent. It also guarantees that the results of memory operations will be predictable.

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- **RDD:** Using lineage graph at any point in time we can easily find the lost data in an RDD.

- **Distributed Shared Memory:**

Fault tolerance is achieved by a checkpointing technique. It allows applications to roll back to a recent checkpoint rather than restarting.

e) Straggler

mitigation: Stragglers, in general, are those tasks that take more time to complete than their peers.

- **RDD:** in RDD it is possible to mitigate stragglers using backup task.

- **Distributed Shared Memory:** It is quite difficult to achieve straggler mitigation.

f) Behavior if not enough RAM:

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RDD in RAM then the

RDDs are shifted to
disk.

- **Distributed**

Shared Memory:

In this type of system
the performance
decreases if the RAM
runs out of storage

**Q.33 How can data
transfer be
minimized when
working with Apache
Spark?**

By minimizing data
transfer and avoiding
shuffling of data we can
increase the
performance. In Apache
Spark, we can minimize
the data transfer in three
ways:

- **By using a
broadcast variable**

– Since broadcast
variable increases the
efficiency of joins
between small and
large RDDs. the
broadcast variable
allows keeping a
read-only variable

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shipping a copy of it with tasks. We create broadcast variable v by calling *SparkContext.broadcast(v)* and we can access its value by calling the value method.

• **Using Accumulator –**

Using accumulator we can update the value of a variable in parallel while executing.

Accumulators can only be added through the associative and commutative operation. We can also implement counters (as in MapReduce) or sums using an accumulator.

Users can create named or unnamed accumulator. We can create numeric accumulator by calling

SparkContext.longAccumulator()

or

SparkContext.doubleAccumulator()

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- By avoiding operations like ByKey, repartition or any other operation that trigger shuffle. we can minimize the data transfer.

Q.34 How does Apache Spark handle accumulated Metadata?

By triggering automatic cleanup Spark handles the automatic Metadata. We can trigger cleanup by setting the parameter “***spark.cleaner.ttl***“. the default value for this is infinite. It tells for how much duration Spark will remember the metadata. It is periodic cleaner. And also ensure that metadata older than the set duration will vanish. Thus, with its help, we can run Spark for many hours.

Q.35 What are the common faults of the developer while using Apache Spark?

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- Customer hit web-service several time by using multiple clusters.
- Customer runs everything on local node instead of distributing it.

Q.36 Which among the two is preferable for the project- Hadoop MapReduce or Apache Spark?

The answer to this question depends on the type of project one has. As we all know Spark makes use of a large amount of RAM and also needs a dedicated machine to provide an effective result. Thus the answer depends on the project and the budget of the organization.

Q.37 List the popular use cases of Apache Spark.

The most popular use-cases of Apache Spark are:

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3. interactive Analysis
4. fog computing
5. Using Spark in the real world

Q.38 What is Spark.executor.memory in a Spark Application?

The default value for this is 1 GB. It refers to the amount of memory that will be used per executor process.

We have categorized the above Spark Interview Questions and Answers for Freshers and Experienced-

- Spark Interview Questions and Answers for Fresher – Q.No.1-8, 37
- Spark Interview Questions and Answers for Experienced – Q.No. 9-36, 38

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Interview

Questions and Answers

In this section, we will discuss some basic Spark SQL Interview Questions and Answers.

Q.39 What is DataFrames?

It is a collection of data which organize in named columns. It is theoretically equivalent to a table in relational database. But it is more optimized. Just like RDD, DataFrame evaluates lazily. Using lazy evaluation we can optimize the execution. It optimizes by applying the techniques such as bytecode generation and predicate push-downs.

[Read about Spark DataFrame in detail.](#)

Q.40 What are the advantages of DataFrame?

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easier. Data Frame also allows developers to impose a structure onto a distributed collection of data. As a result, it allows higher-level abstraction.

2. Data frame is both space and performance efficient.
3. It can deal with both structured and unstructured data formats, for example, Avro, CSV etc . And also storage systems like HDFS, HIVE tables, MySQL, etc.
4. The DataFrame API's are available in various programming languages. For example Java, Scala, Python, and R.
5. It provides Hive compatibility. As a result, we can run unmodified Hive queries on existing Hive warehouse.
6. Catalyst tree transformation uses DataFrame in four

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references. b) Logical plan optimization c) Physical planning d) Code generation to compile part of the query to Java bytecode.

7. It can scale from kilobytes of data on the single laptop to petabytes of data on the large cluster.

Q.41 What is DataSet?

Spark Datasets are the extension of Dataframe API. It creates object-oriented programming interface and type-safety. Dataset is Spark 1.6 release. It makes use of Spark's catalyst optimizer. It reveals expressions and data fields to a query optimizer. Dataset also influences fast in-memory encoding. It also provides provision for compile time type-safety. We can check for errors in an application when they run.

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DataSets?

- It provides run-time type safety.
- Influences fast in-memory encoding.
- It provides a custom view of structured and semi-structured data.
- It owns rich semantics and an easy set of domain-specific operations, as a result, it facilitates the use of structured data.
- Dataset API decreases the use of memory.
As Spark knows the structure of data in the dataset, thus it creates an optimal layout in memory while caching.

Q.43 Explain Catalyst framework.

The **Catalyst** is a framework which represents and manipulate a DataFrame graph. Data flow graph is a tree of relational

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of catalyst are:

- It has a `TreeNode` library for transforming tree. They are expressed as Scala case classes.
- A logical plan representation for relational operator.
- Expression library.

The `TreeNode` builds a query optimizer. It contains a number of the query optimizer.

Catalyst Optimizer

supports both *rule-based* and *cost-based optimization*. In rule-based optimization the optimizer uses a set of rules to determine how to execute the query. While the cost based optimization finds the most suitable way to carry out SQL statement.

In cost-based optimization, many plans are generated using rules.

And after this, it computes their cost.

Catalyst optimizer makes use of standard features

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Q.44 List the advantage of Parquet files.

- It is efficient for large scale queries.
- It supports various efficient compression and encoding Scheme.
- It consumes less space.

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- **Spark Interview Questions and Answers for Fresher – Q.No. 39-42**
- **Spark Interview Questions and Answers for Experienced – Q.No. 43, 44**

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Streaming Interview Questions and Answers

In this section, we will discuss some basic Spark Interview Questions and Answers based on Spark Streaming.

Q.45 What is Spark Streaming?

Through **Spark streaming**, we achieve fault tolerant processing of live data stream. The input data can be from any source. For example, like *Kafka, Flume, kinesis, twitter or HDFS/S3*. It gives the data to filesystems, databases, and live dashboards after processing. The working of Spark Streaming is as under:

- Spark Streaming takes in the live data.
- The input data stream is divided into

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processes the batches of input data. The final result is also in batches.

Q.46 What is DStream?

DStream is the high-level abstraction provided by *Spark Streaming*. It represents a continuous stream of data. Thus, DStream is internally a sequence of RDDs. There are two ways to create DStream:

- by using data from different sources such as Kafka, Flume, and Kinesis.
- by applying high-level operations on other DStreams.

Q.47 Explain different transformation on DStream.

DStream is a basic abstraction of Spark Streaming. It is a continuous sequence of RDD which represents a continuous stream of

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transformations which are available on normal Spark RDD. For example, *map(func)*, *flatMap(func)*, *filter(func)* etc.

Q.48 Does Apache Spark provide checkpointing?

Yes, Apache Spark provides checkpointing. Apache supports two types of checkpointing:

- **Reliable Checkpointing:** It refers to that checkpointing in which the actual RDD is saved in the reliable distributed file system, e.g. HDFS. To set the checkpoint directory call:

`SparkContext.setCheckpointDir(directory: String)`. When running on the cluster the directory must be an HDFS path since the driver tries to recover the checkpointed RDD

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files are actually on
the executor's
machines.

- **Local**

Checkpointing: In
this checkpointing, in
Spark Streaming or
GraphX we truncate
the RDD lineage
graph in Spark. In
this, the RDD is
persisted to local
storage in the
executor.

Q.49 What is write ahead log(journaling)?

The **write-ahead log** is a technique that provides durability in a database system. It works in the way that all the operation that applies on data, we write it to write-ahead log. The logs are durable in nature. Thus, when the failure occurs we can easily recover the data from these logs. When we enable the write-ahead log Spark stores the data in fault-tolerant file system.

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unreliable receiver in Spark?

- **Reliable Receiver**

– A reliable receiver acknowledges to the source on receiving data and stores it. Implementing this receiver involves examining of the semantics of source acknowledgments.

- **Unreliable**

Receiver – An unreliable receiver does not send an acknowledgment to a source. It is for sources that do not bear an acknowledgment. It is also for reliable sources when one does not want to enter the complexity of acknowledgment.

We have categorized the above Spark Interview Questions and Answers for Freshers and Experienced-

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**Answers for
Fresher – Q.No.**

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- **Spark Interview Questions and Answers for Experienced – Q.No. 48-50**

d. Spark MLlib Interview Questions and Answers

Here are some Spark Interview Questions and Answers for freshers and experienced based on MLlib.

Q.51 What is Spark MLlib?

MLlib is the name of *Spark's machine learning library*. The various tools provided by MLlib are:

- **ML Algorithms:** It contains common learning algorithms such as classification, regression, etc.

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extraction,
dimensionality
reduction, and
selection. It also has
tools for constructing,
evaluating and tuning
ML Pipelines.

Q.52 What is Sparse Vector?

A local vector contains both the integer type and o-based indices. It also has double-typed values, which is stored on a single machine. In **MLlib** two types of local vectors are a supportive namely Dense and Sparse vector. The sparse vector is one in which most of the entries are zero.

Q.53 How to create a Sparse vector from a dense vector?

```
Vector sparseVector =  
Vectors.sparse(4, new  
int[] {1, 3}, new double[]  
{3.0, 4.0});
```

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