[**Apache Spark Interview Questions**](http://www.hadoopexam.com/spark/training/docs/Apache_Spark_Interview_Questions_Book.pdf)

**1.**       **Why Spark, even Hadoop exists?**

**Ans:** Below are few reasons.

         **Iterative Algorithm:**Generally MapReduce is not good to process iterative algorithms like Machine Learning and Graph processing**.**Graph and Machine Learning algorithms are iterative by nature and less saves to disk, this type of algorithm needs data in memory to run algorithm steps again and again or less transfers over network means better performance.

         **In Memory Processing:**MapReduce uses disk storage for storing processed intermediate data and also read from disks which is not good for fast processing**. .**Because Spark keeps data in Memory (Configurable), which saves lot of time, by not reading and writing data to disk as it happens in case of Hadoop.

         **Near real-time data processing:**Spark also supports near real-time streaming workloads via Spark Streaming application framework.

**2.**       **Why both Spark and Hadoop needed?**

**Ans:**  Spark is often called cluster computing engine or simply execution engine. Spark uses many concepts from Hadoop MapReduce. Both Spark and Hadoop work together well. Spark with HDFS and YARN gives better performance and also simplifies the work distribution on cluster. As HDFS is storage engine for storing huge volume of data and Spark as a processing engine (In memory as well as more efficient data processing).

**HDFS**: It is used as a Storage engine for Spark as well as Hadoop.

**YARN**: It is a framework to manage Cluster using pluggable scedular.

**Run other than MapReduce:** With Spark you can run MapReduce algorithm as well as other higher level of operators for instance **map(), filter(), reduceByKey(), groupByKey() etc.**

**3.**    **Which all kind of data processing supported by Spark?**

**Ans:** Spark offers three kinds of data processing using **batch**, **interactive** (Spark Shell), and **stream processing** with the unified API and data structures.

**4.**       **How do you define SparkContext?**

**Ans:** It’s an entry point for a Spark Job. Each Spark application starts by instantiating a Spark context. A Spark application is an instance of SparkContext. Or you can say, a Spark context constitutes a Spark application.

**SparkContext** represents the connection to a Spark execution environment (deployment mode).

A Spark context can be used to create RDDs, accumulators and broadcast variables, access Spark services and run jobs.

A Spark context is essentially a client of Spark’s execution environment and it acts as the master of your Spark.

**5.**     **How can you define SparkConf?**

**Ans:** Spark properties control most application settings and are configured separately for each application. These properties can be set directly on a [SparkConf](http://spark.apache.org/docs/latest/api/scala/index.html#org.apache.spark.SparkConf) passed to your SparkContext. SparkConf allows you to configure some of the common properties (e.g. master URL and application name), as well as arbitrary key-value pairs through the set() method. For example, we could initialize an application with two threads as follows:

Note that we run with local[2], meaning two threads - which represents “minimal” parallelism, which can help detect bugs that only exist when we run in a distributed context.

**val** conf **=** **new** **SparkConf**()

             .setMaster("local[2]")

             .setAppName("CountingSheep")

**val** sc **=** **new** **SparkContext**(conf)

**6.**       **Which all are the, ways to configure Spark Properties and order them least important to the most important.**

**Ans:** There are the following ways to set up properties for Spark and user programs (in the order of importance from the least important to the most important):

         conf/spark-defaults.conf - the default

         --conf - the command line option used by spark-shell and spark-submit

         SparkConf

**7.**       **What is the Default level of parallelism in Spark?**

**Ans:** Default level of parallelism is the number of partitions when not specified explicitly by a user.

**8.**   **Is it possible to have multiple SparkContext in single JVM?**

**Ans:** Yes, **spark.driver.allowMultipleContexts** is true (**default: false** ). If true Spark logs warnings instead of throwing exceptions when multiple SparkContexts are active, i.e. multiple SparkContext are running in this JVM. When creating an instance of SparkContex.

9**.**       **Can RDD be shared between SparkContexts?**

**Ans:** **No**, When an RDD is created; it belongs to and is completely owned by the Spark context it originated from. RDDs can’t be shared between SparkContexts.

10**.**       **In Spark-Shell, which all contexts are available by default?**

**Ans:** SparkContext and SQLContext

1**1.**       **Give few examples , how RDD can be created using SparkContext**

**Ans:** SparkContext allows you to create many different RDDs from input sources like:

         **Scala’s collections**: i.e. sc.parallelize(0 to 100)

         **Local or remote filesystems** : sc.textFile("README.md")

         **Any Hadoop InputSource** : using sc.newAPIHadoopFile

1**2.**       **How would you brodcast, collection of values over the Sperk executors?**

**Ans:** sc.broadcast("hello")

1**3.**       **What is the advantage of broadcasting values across Spark Cluster?**

**Ans:** Spark transfers the value to Spark executors once, and tasks can share it without incurring repetitive network transmissions when requested multiple times.

1**4.**       **Can we broadcast an RDD?**

**Ans:** Yes, you should not broadcast a RDD to use in tasks and Spark will warn you. It will not stop you, though.

1**5.**       **How can we distribute JARs to workers?**

**Ans:** The jar you specify with SparkContext.addJar will be copied to all the worker nodes.

1**6.**       **How can you stop SparkContext and what is the impact if stopped?**

**Ans:** You can stop a Spark context using SparkContext.stop() method. Stopping a Spark context stops the Spark Runtime Environment and effectively shuts down the entire Spark application.

1**7.**       **Which scheduler is used by SparkContext by default?**

**Ans:** By default, SparkContext uses DAGScheduler , but you can develop your own custom DAGScheduler implementation.

**18 .How would you the amount of memory to allocate to each executor?**

**Ans:** SPARK\_EXECUTOR\_MEMORY sets the amount of memory to allocate to each executor.

**19.**       **How do you define RDD?**

**Ans:** A Resilient Distributed Dataset (RDD), the basic abstraction in Spark. It represents an immutable, partitioned collection of elements that can be operated on in parallel. Resilient Distributed Datasets (RDDs) are a distributed memory abstraction that lets programmers perform in-memory computations on large clusters in a fault-tolerant manner.

         **Resilient**: Fault-tolerant and so able to recomputed missing or damaged partitions on node failures with the help of RDD lineage graph.

         **Distributed**: across clusters.

         **Dataset**: is a collection of partitioned data.

**20.**       **What is Lazy evaluated RDD mean?**

**Ans:** Lazy evaluated, i.e. the data inside RDD is not available or transformed until an action is executed that triggers the execution.

**21.**       **How would you control the number of partitions of a RDD?**

Ans You can control the number of partitions of a RDD using **repartition** or **coalesce** operations.

**22.**       **What are the possible operations on RDD**

**Ans:** RDDs support two kinds of operations:

         **transformations** - lazy operations that return another RDD.

         **actions** - operations that trigger computation and return values.

**23.**       **How RDD helps parallel job processing?**

**Ans:** Spark does jobs in parallel, and RDDs are split into partitions to be processed and written in parallel. Inside a partition, data is processed sequentially.

**24.**       **What is the transformation?**

**Ans:** A transformation is a lazy operation on a RDD that returns another RDD, like map , flatMap , filter , reduceByKey , join , cogroup , etc. Transformations are lazy and are not executed immediately, but only after an action have been executed.

**25.**       **How do you define actions?**

**Ans:** An action is an operation that triggers execution of RDD transformations and returns a value (to a Spark driver - the user program). They trigger execution of RDD transformations to return values. Simply put, an action evaluates the RDD lineage graph.

You can think of actions as a valve and until no action is fired, the data to be processed is not even in the pipes, i.e. transformations. Only actions can materialize the entire processing pipeline with real data.

**26.**       **How can you create an RDD for a text file?**

**Ans:** SparkContext.textFile

**27.**       **Please tell me , how execution starts and end on RDD or Spark Job**

**Ans:** Execution Plan starts with the earliest RDDs (those with no dependencies on other RDDs or reference cached data) and ends with the RDD that produces the result of the action that has been called to execute.

**32.**       **Give example of transformations that do trigger jobs**

**Ans:** There are a couple of transformations that do trigger jobs, e.g. sortBy , zipWithIndex , etc.

**33.**       **Data is spread in all the nodes of cluster, how spark tries to process this data?**

**Ans:** By default, Spark tries to read data into an RDD from the nodes that are close to it. Since Spark usually accesses distributed partitioned data, to optimize transformation operations it creates partitions to hold the data chunks

**34.**       **How would you hint, minimum number of partitions while transformation ?**

**Ans:** You can request for the minimum number of partitions, using the second input parameter to many transformations.

scala> sc.parallelize(1 to 100, 2).count

Preferred way to set up the number of partitions for an RDD is to directly pass it as the second input parameter in the call like rdd = sc.textFile("hdfs://… /file.txt", 400) , where400 is the number of partitions. In this case, the partitioning makes for 400 splits that would be done by the Hadoop’s TextInputFormat , not Spark and it would work much faster. It’salso that the code spawns 400 concurrent tasks to try to load file.txt directly into 400 partitions.

**35.**       **How many concurrent task Spark can run for an RDD partition?**

**Ans:** Spark can only run 1 concurrent task for every partition of an RDD, up to the number of cores in your cluster. So if you have a cluster with 50 cores, you want your RDDs to at least have 50 partitions (and probably 2-3x times that).

As far as choosing a "good" number of partitions, you generally want at least as many as the number of executors for parallelism. You can get this computed value by calling

sc.defaultParallelism .

**36.**       **Which limits the maximum size of a partition?**

**Ans:** The maximum size of a partition is ultimately limited by the available memory of an executor.

**37.**   **When Spark works with file.txt.gz, how many partitions can be created?**

**Ans:** When using textFile with compressed files ( file.txt.gz not file.txt or similar), Spark disables splitting that makes for an RDD with only 1 partition (as reads against gzipped files cannot be parallelized). In this case, to change the number of partitions you should do repartitioning.

Please note that Spark disables splitting for compressed files and creates RDDs with only 1 partition. In such cases, it’s helpful to use sc.textFile('demo.gz') and do repartitioning using rdd.repartition(100) as follows:

rdd = sc.textFile('demo.gz')

rdd = rdd.repartition(100)

With the lines, you end up with rdd to be exactly 100 partitions of roughly equal in size.

**38.**       **What is coalesce transformation?**

**Ans:** The coalesce transformation is used to change the number of partitions. It can trigger RDD shuffling depending on the second shuffle boolean input parameter (defaults to false ).

**39.**       **What is the difference between cache() and persist() method of RDD**

**Ans:** RDDs can be cached (using RDD’s cache() operation) or persisted (using RDD’s persist(newLevel: StorageLevel) operation). The cache() operation is a synonym of persist() that uses the default storage level MEMORY\_ONLY .

**40.**       **What is Shuffling?**

**Ans:** Shuffling is a process of repartitioning (redistributing) data across partitions and may cause moving it across JVMs or even network when it is redistributed among executors.

Avoid shuffling at all cost. Think about ways to leverage existing partitions. Leverage partial aggregation to reduce data transfer.

**41.**       **Does shuffling change the number of partitions?**

**Ans:** No, By default, shuffling doesn’t change the number of partitions, but their content

**42.**       **What is checkpointing?**

**Ans:** Checkpointing is a process of truncating RDD lineage graph and saving it to a reliable distributed (HDFS) or local file system. RDD checkpointing that saves the actual intermediate RDD data to a reliable distributed file system.

You mark an RDD for checkpointing by calling **RDD.checkpoint()** . The RDD will be saved to a file inside the checkpoint directory and all references to its parent RDDs will be removed. This function has to be called before any job has been executed on this RDD.

**43.**   **Which script will you use Spark Application, using spark-shell ?**

**Ans:** You use spark-submit script to launch a Spark application, i.e. submit the application to a Spark deployment environment.

**44.**  **What is Task, with regards to Spark Job execution?**

**Ans:** Task is an individual unit of work for executors to run. It is an individual unit of physical execution (computation) that runs on a single machine for parts of your Spark application on a data. All tasks in a stage should be completed before moving on to another stage.

         A task can also be considered a computation in a stage on a partition in a given job attempt.

         A Task belongs to a single stage and operates on a single partition (a part of an RDD).

         Tasks are spawned one by one for each stage and data partition.

**45.**   **What is Speculative Execution of a tasks?**

**Ans:** Speculative tasks or task stragglers are tasks that run slower than most of the all tasks in a job.

Speculative execution of tasks is a health-check procedure that checks for tasks to be speculated, i.e. running slower in a stage than the median of all successfully completed tasks in a taskset . Such slow tasks will be re-launched in another worker. It will not stop the slow tasks, but run a new copy in parallel.

**45.**       **What is master URL in local mode?**

**Ans:** You can run Spark in local mode using local , local[n] or the most general local[\*].

The URL says how many threads can be used in total:

         local uses 1 thread only.

         local[n] uses n threads.

         local[\*] uses as many threads as the number of processors available to the Java virtual machine (it uses Runtime.getRuntime.availableProcessors() to know the number).

**46.**       **Define components of YARN?**

**Ans:** YARN components are below

**ResourceManager**: runs as a master daemon and manages ApplicationMasters and NodeManagers.

**ApplicationMaster**:  is a lightweight process that coordinates the execution of tasks of an application and asks the ResourceManager for resource containers for tasks. It monitors tasks, restarts failed ones, etc. It can run any type of tasks, be them MapReduce tasks or Giraph tasks, or Spark tasks.

**NodeManager** offers resources (memory and CPU) as resource containers.

**NameNode**

**Container**:  can run tasks, including ApplicationMasters.

**47.**       **What is a Broadcast Variable?**

**Ans:** Broadcast variables allow the programmer to keep a read-only variable cached on each machine rather than shipping a copy of it with tasks.

**48.**       **How can you define Spark Accumulators?**

**Ans:** This are similar to counters in Hadoop MapReduce framework, which gives information regarding completion of tasks, or how much data is processed etc.

**49.**       **What all are the data sources Spark can process?**

**Ans:**

         Hadoop File System (HDFS)

         Cassandra (NoSQL databases)

         HBase (NoSQL database)

         S3 (Amazon WebService Storage : AWS Cloud)

**50.**   **What is Apache Spark Streaming?**

**Ans:** Spark Streaming helps to process live stream data. Data can be ingested from many sources like Kafka, Flume, Twitter, ZeroMQ, Kinesis, or TCP sockets, and can be processed using complex algorithms expressed with high-level functions like map, reduce, join and window.