1. Difference between Mule projects and Domain projects?

* Mule project is a MuleSoft project which have all the dependencies defined in itself, it doesn’t share its resources or use shared resources. Domain project will have all the properties that need to share with other projects in the same domain
* Domain project cannot be deployed to Cloudhub whereas Mule projects can be deloyed to Cloudhub
* There is no message flow in domain project. Has only global elements and configuration.xml
* Configuration.xml file starts with domain tag in domain project whereas it starts with mule tag in mule project
* Pom file packaging is also different. In domain project it is domain package and in mule project it is mule-application package

1. What is logging? What is the relation of log4j2 with logging?

Logging helps you to monitor and troubleshoot your application and server.

There are many ways to log some are log4j, slf4j, JSON Logger. Mule internally use slf4j logging.

Log4j is a java logging utility.

The log4j. properties file is a log4j configuration file which keeps properties in key-value pairs.

1. What do you mean by Appenders?

Log4j2 File has appenders to specify where we need to log data whether in file or splunk or database

1. Differentiate between App logs and Runtime logs.

**App logs**:

The log contains information about any errors raised in the app (unless you have app logic to handle those errors). It also contains anything you want to explicitly log, if you build the logic in the app.

You can view an app log as follows:

* If you’re running an app from Anypoint Studio, the output from the app log is visible in Anypoint Studio’s console window.
* If you’re using Mule from the command line to run an app, the app log is visible in your OS console.

**Runtime logs**:

The runtime log (mule\_ee.log) contains information about app and lifecycle events. For example, the log records an entry when a Mule service or app starts, deploys, stops, or undeploys.

The runtime log configuration is located in the log4j2.xml file, in the /conf directory. You can customize this file when running the server in standalone mode.

1. What are other debug options for a Mule application outside of Anypoint studio?

* Use MUnit to Test an App
* Activate remote debugging
  + You can start Mule with the **-debug** option to activate remote debugging, as shown in this Linux example:

$MULE\_HOME/bin/mule -debug

* With this option, Mule starts normally and remotely debuggable on port 5005

1. How can one share Mule applications with other developers?

To share applications, follow these steps:

1. Document the name and content of the properties file that each application is expecting to use.  
   The administrators who deploy and run the Mule application can encrypt the properties file. Administrators must keep the decryption key of the properties file secure.
2. Generate the file used to share the application in one of the following two ways:

* Export the application from Anypoint Studio and generate a deployable archive .jar file.
* Package your application into one of the following three types of .jar files using the Mule Maven Plugin:
  + Deployable archive .jar file to deploy into a running Mule runtime engine.
  + Mule app package .jar file to import into Studio.
  + Mule app lightweight package .jar file to then import it into Studio.

1. Share the .jar file with other developers, as appropiate.
2. Differentiate between Message Id and Correlation Id?

A Correlation ID can be defined as an 'identifier value attached to messages and request headers which allows referencing a particular transaction or event

Correlation is part of event context if it is present then it will take that, otherwise will

randomly generate the correlation ID. When a HTTP request is received, it will check for “X-

Correlation-Id" header

* If "X-Correlation-Id" header is present, HTTP connector uses this as the

Correlation Id.

* If "X-Correlation-Id" header is NOT present, a Correlation Id is randomly generated.

1. How can the Correlation Id be maintained even after making an external HTTP request?

You can propagate the existing Correlation Id to downstream APIs. By default,

all outgoing HTTP Requests send "X-Correlation-Id" header.

However, you can choose to set a different value to "X-Correlation-Id" header or set "Send Correlati on

Id" to NEVER.

9. What are the standards to be followed when versioning of assets in Exchange? Explain

various versioning models? What is the impact of versioning to the consumers using the API?

Semantic Versioning is a universal standard which is followed to do versioning of software system. It is having four components: Major release number, minor release number, patch release number and an optional service pack number.

Format: **MAJOR.MINOR.PATCH**

**Major:**

Whenever we made enhancements or changes in already existing API’s or new API’s in such a way that it will break the previous API’s functionality. Like in Mule Major version changes from 3 to 4 because there are several functionalities introduced which were not compatible or not supported and break the functionality. Like Exception strategies totally changed.

**Minor:**

We need to change Minor number, when we introduce enhancement which are backward compatible.

**Patch:**

As soon as we fix bugs and do deployment this version we need to increment.

**Important Points to consider while doing versioning**:

* Major, Minor and Patch should be non-negative, must not contains leading

zeros and should be incremented. Like 1.10.0 → 1.11.0

* Once version is published content should not change, then new version will

be published

If you are still developing your API’s then you can start with 0.1.0, and so on. Once application gets finalized and ready for production for first release, then must be 1.0.0.

1. Discuss various control flows in Mule 4?

**Choice**

The Choice router dynamically routes messages through a flow according to a set of DataWeave expressions that evaluate message content.

**First successful**

The First Successful router iterates through a list of configured processing routes until one of the routes executes successfully. If any processing route fails execution (throws an error), the router executes the next configured route.

If none of the configured routes execute successfully, the First Successful router throws an error.

**Round Robin**

The Round Robin router iterates through a list of two or more routes in order, but it only routes to *one* of the routes each time it is executed. It keeps track of the previously selected route and never selects the same route consecutively

**Scatter Gather**

The routing message processor Scatter-Gather sends a request message to multiple targets concurrently. It collects the responses from all routes, and aggregates them into a single message.

1. How can one introduce content based routing in a flow?

In Mule, the choice flow control is used to achieve content-based routing where routing will be done based on the message content, like inbound properties, flow variables, and payload. A choice router will always choose only one route. If no route matches, then the default route is used.

1. Differentiate between mapObject, map and flatMap functions?

* mapObject Iterates over an object using a mapper that acts on keys, values
* Iterates over each item in an array and flattens the results.
* flatMap Iterates over each item in an array and flattens the results.
* Flatten only acts on the values of the arrays, while flatMap can act on values and indices of items in the array.

1. How to convert an Object into Array?

Using Pluck

1. How to convert a nested array into a normal array?

Using flatMap or Flatten

1. Difference between flatten and flatMap?

Flatten turns a set of sub-array into a single flattened array. It flattens only the forst level of subarrays and omits the empty subarray

1. Describe the various Error handling mechanisms and when to use them?

On-Error Propagate

* Roll back previous transaction
* processes the error message and re-throws the error to its parent flow.
* The HTTP listener returns an error response.

On-Error Continue

* + Commit previous transaction
  + catches the error and does not report it as an error
  + The HTTP listener returns a successful response

1. What are the available Transaction Types in Mulesoft? Explain citing examples?

Mule supports Single Resource (Local, the default) and Extended Architecture (XA) transaction types (transactionType). The only components that can define the transaction type are message sources (For example, jms:listener and vm:listener) and the Try scope.

**Single Resource (Local)**

* Performs better than XA transactions.
* Does not support nested transactions.
* The operation must support transactions.
* All operations inside the transaction must belong to the same Connector. (For example jms:listener, jms:consume and jms:publish).
* All operations must use the same Global Configuration (config-ref).

**Extended Architecture(XA)**

* Involves using a two-phase commit protocol (2PC).
* Slower but more reliable than Single Resource transactions.
* Supports nested transactions.
* The operation must support transactions.