

Oracle Flex Clusters

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Objectives

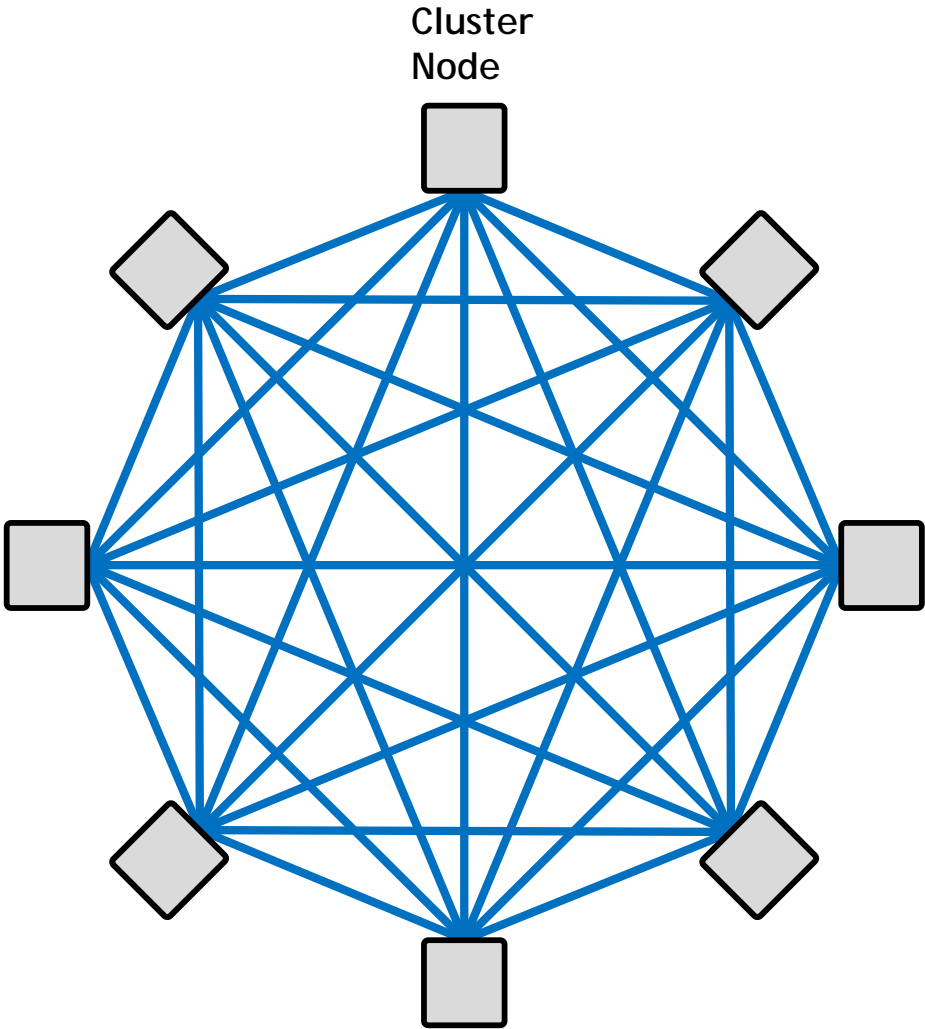
In this lecture, you will learn how to perform the following:

- Understand the advantage of Flex Clusters
- Describe Oracle Flex Cluster Architecture
- Create a Flex Cluster database
- Understand the difference between Hub and Leaf nodes
- Convert a cluster to Flex cluster
- Manage Oracle Flex clusters
- Describe Oracle Flex ASM

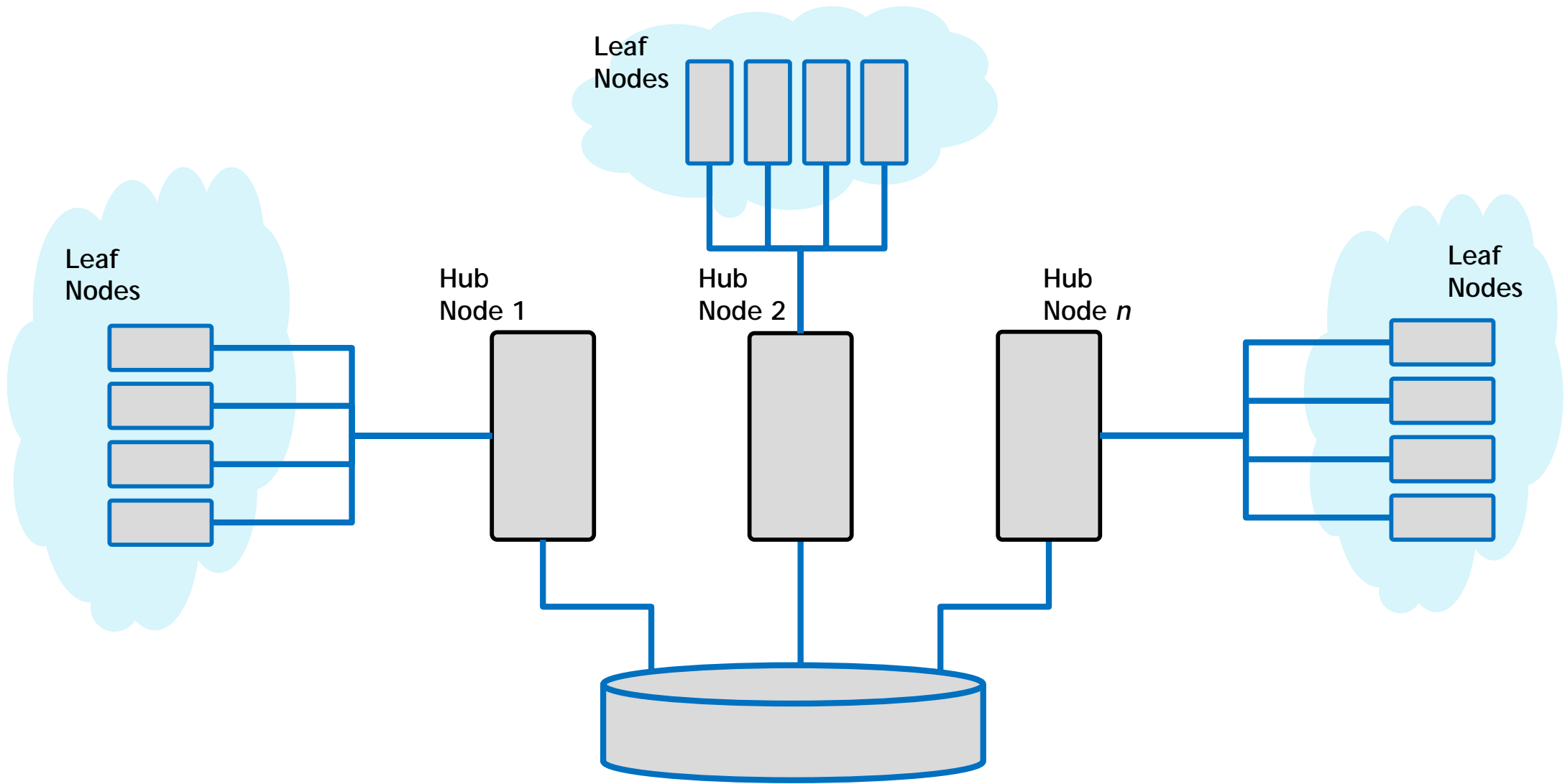
Before Oracle Flex Clusters:
Number of Interconnect links

Number of Interconnect
Links = $N * (N-1)/2$

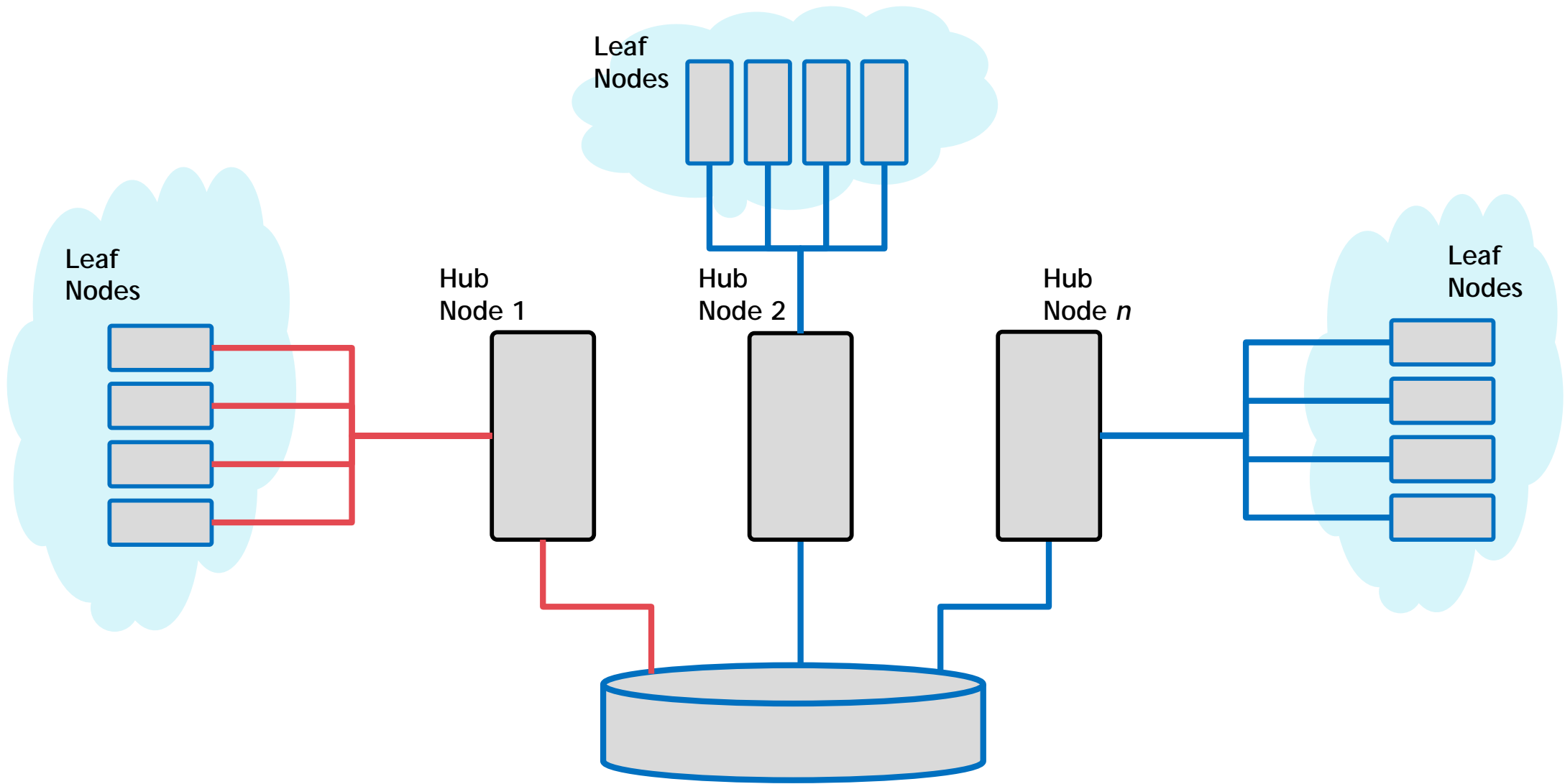
For 100 nodes: 4950



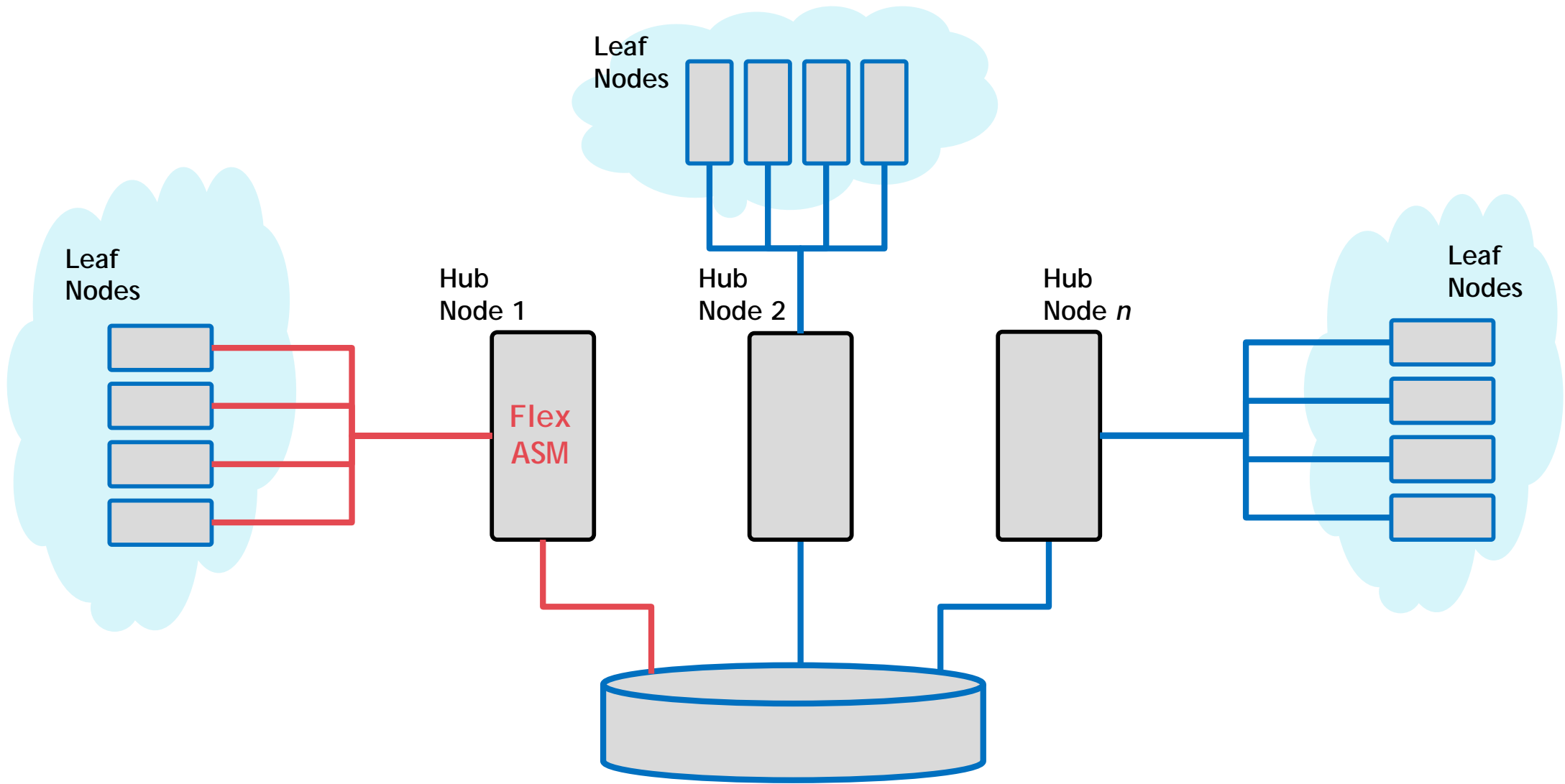
Oracle Flex Clusters Architecture



Oracle Flex Clusters Architecture



Oracle Flex Clusters Architecture



Oracle Flex Cluster Architecture Concepts

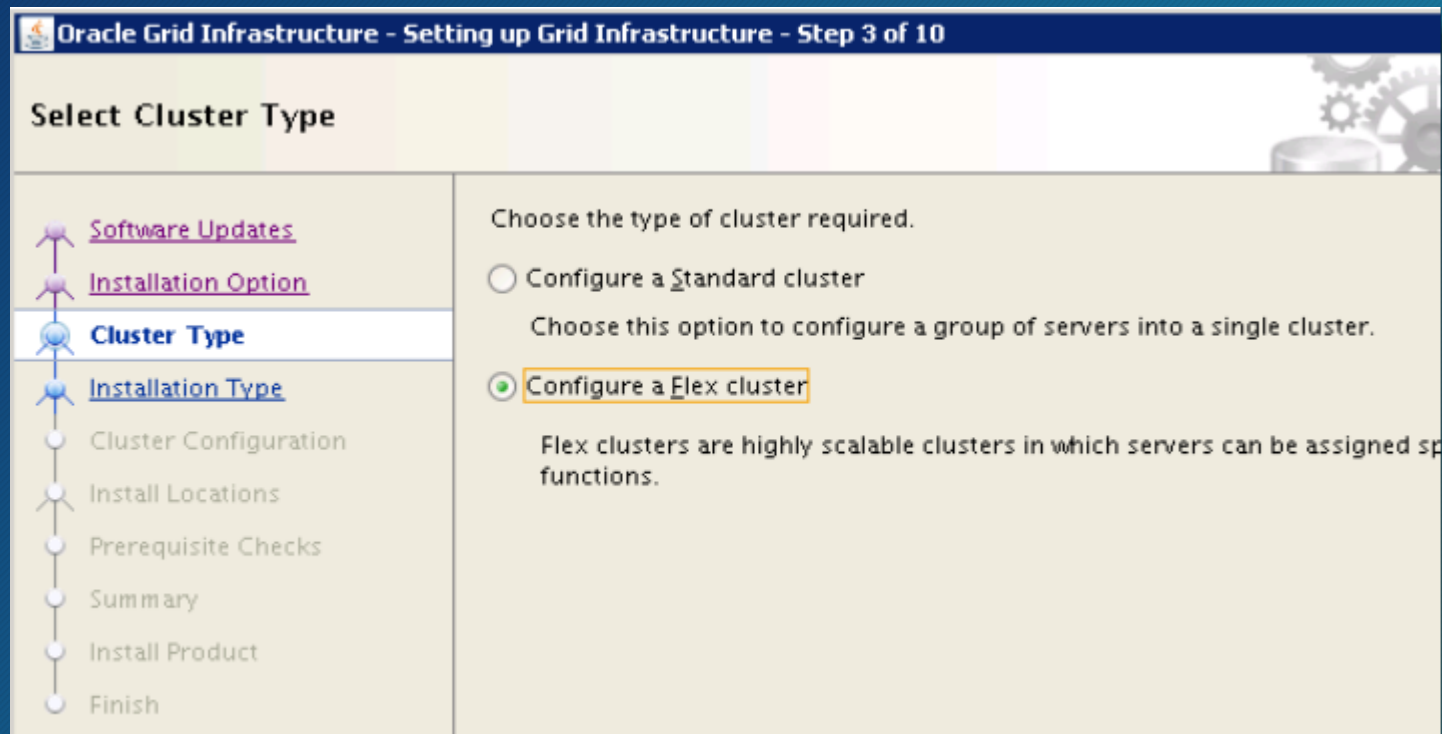
- A Leaf node connects to the cluster through a Hub node
- The cluster heartbeats for Leaf nodes occur between Leaf nodes and their attached Hub nodes
- Reduces number of interconnect paths among cluster nodes:
 - 16-node RAC: requires 120 connection paths
 - With 4 hub nodes and 12 leaf nodes: 6 interconnect among the hubs + 12 interconnect among the leaves = 18 connection paths
- Provides high scalability when the number of nodes is high
- Requires Flex ASM

Oracle Flex Cluster Architecture Concepts (cont)

- If a hub node fails, its leaf nodes fail, unless they are designed to failover to another hub node
- If a leaf node fails, the services running on it fail over to the other leaf nodes that are connected to the same hub node
- Can be configured:
 - When you create a new cluster configuration
 - Change an existing cluster from standard mode to Flex Cluster
- GNS must be configured:
 - Standard: GNS VIP and a subdomain delegation are configured in DNS
 - Static: GNS VIP along and all cluster names, VIP names, and their addresses are static and registered in DNS

Creating a Flex Cluster

- When installing Grid Infrastructure:



Creating a Flex Cluster (cont)

- GNS must be configured:

Oracle Grid Infrastructure - Setting up Grid Infrastructure - Step 5 of 17

Grid Plug and Play Information

Software Updates
Installation Option
Cluster Type
Product Languages
Grid Plug and Play
Cluster Node Information
Network Interface Usage
Grid Infrastructure Management
Create ASM Disk Group
ASM Password
Operating System Groups

Single Client Access Name (SCAN) allows clients to use one name in connection strings to connect to the cluster as a whole. Client connect requests to the SCAN name can be handled by any cluster node.

Cluster Name:

SCAN Name:

SCAN Port:

☒ **Configure GNS**

☒ Configure nodes Virtual IPs as assigned by the Dynamic Networks

☒ Create a new GNS

GNS VIP Address:

GNS Sub Domain:

Creating a Flex Cluster (cont)

- Defining the hub and leaf nodes:

The screenshot shows the 'Cluster Node Information' step of the Oracle Grid Infrastructure setup. The left sidebar contains a navigation tree with the following items: [Software Updates](#), [Installation Option](#), [Cluster Type](#), [Product Languages](#), [Grid Plug and Play](#), **Cluster Node Information** (selected), [Network Interface Usage](#), [Grid Infrastructure Management](#), and [Create ASM Disk Group](#). The main content area has the title 'Cluster Node Information' and a sub-header 'Provide the list of nodes to be managed by Oracle Grid Infrastructure with their Public Virtual Hostname.' Below this is a table with columns 'Public Hostname', 'Role', and 'Virtual Hostname'. The table contains four rows: three 'HUB' nodes and one 'LEAF' node. The 'Role' column has a dropdown menu open, showing 'HUB' and 'LEAF' options. The 'Virtual Hostname' column has a dropdown menu open, showing 'AUTO' and 'MANUAL' options.

Public Hostname	Role	Virtual Hostname
	HUB	AUTO
	HUB	AUTO
	HUB	AUTO
	LEAF	

Converting Cluster Mode to Flex Cluster

- Make sure GNS is configured:

```
srvctl status gns
```

```
GNS is running on node hsrv1  
GNS is enabled on node hsrv2
```

- To configure the GNS:

```
srvctl add gns -vip <VIP_address> -domain <domain_name>
```

- Enable Oracle Flex ASM option using ASMCA utility.

Converting Cluster Mode to Flex Cluster (cont)

- As root, convert the standard cluster to Flex Cluster:

```
crsctl set cluster mode flex
```

- Restart the Clusterware technology stack:

```
crsctl stop crs  
crsctl start crs -wait
```

Obtain Information about Flex Cluster

- To check the role of the current cluster node:

```
crsctl get cluster mode status  
Cluster is running in "flex" mode
```

- To list hub and leaf nodes:

```
crsctl get node role status -all  
  
Node 'hsrv1' active role is 'hub'  
Node 'lsrv1' active role is 'leaf'  
Node 'lsrv2' active role is 'leaf'  
...
```

Managing Oracle Flex Clusters

- To change the role of a node:

```
crsctl set node role [-node node_name] {hub | leaf}
```

- To display the role of current node:

```
crsctl get node role config
```

- To display the role of a particular node:

```
crsctl get node role status -node srv2
```

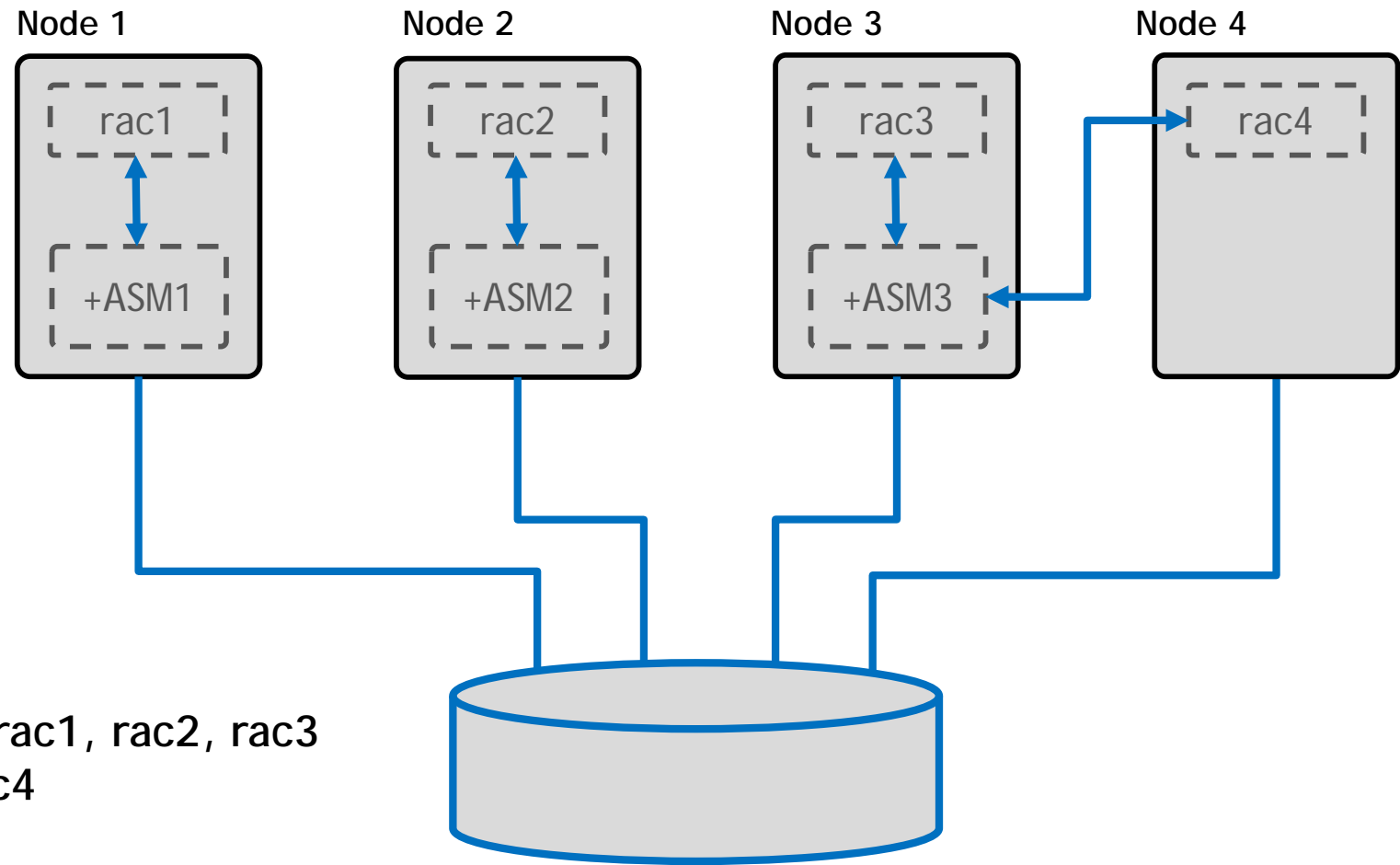
- To check the hubsize of the Flex Cluster:

```
crsctl get cluster hubsize
```


About Oracle Flex ASM

- Introduced in 12c
- Standard Oracle ASM (the only option on 11g):
 - ASM instance must run in every database RAC node
 - ASM instance consumes from the node resources
 - ASM instance failure causes the database instance to fail
- On Oracle Flex ASM:
 - Not all database instances have ASM instances running in them
 - A network must be configured to connect the ASM instances
 - Database instances with no ASM instances use this network

Oracle Flex ASM Architecture



Oracle ASM Clients: rac1, rac2, rac3
Flex ASM Clients: rac4

Flex ASM and Flex Cluster

- Oracle Flex Cluster requires Flex ASM
- If Flex Cluster was enabled during Grid installation, then Flex ASM is automatically enabled
- If you intend to convert a standard cluster to Flex Cluster, you must configure Flex ASM first
- When Flex ASM is enabled: not all Hub nodes have ASM instances
- Oracle Flex ASM can run on a standard cluster

Summary

In this lecture, you should have learnt how to perform the following:

- Understand the advantage of Flex Clusters
- Describe Oracle Flex Cluster Architecture
- Create a Flex Cluster database
- Understand the difference between Hub and Leaf nodes
- Convert a cluster to Flex cluster
- Manage Oracle Flex clusters
- Describe Oracle Flex ASM

Oracle Continuing Education

Oracle Maximum Availability technologies:

- Oracle Data Guard
- Oracle GoldenGate
- Oracle Multitenant Architecture
- Oracle Automatic Storage Management
- Oracle Database Cloud