Hardware requirements

The hardware requirements for Redis Enterprise Software are different for development and production environments.

- In a development environment, you can test your application with a live database.
  
  If you want to test your application under production conditions, use the production environment requirements.

- In a production environment you must have enough resources to handle the load on the database and recover from failures.

Development environment

You can build your development environment with non-production hardware, such as a laptop, desktop, or small VM or instance, and with these hardware requirements:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Minimum Requirements</th>
<th>Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodes per cluster</td>
<td>You can install on one node but many features require at least two nodes.</td>
<td>1 node</td>
<td>&gt;= 2 nodes</td>
</tr>
<tr>
<td>RAM per node</td>
<td>The amount of RAM for each node.</td>
<td>4GB</td>
<td>&gt;= 8GB</td>
</tr>
<tr>
<td>Storage per node</td>
<td>The amount of storage space for each node.</td>
<td>10GB</td>
<td>&gt;= 20GB</td>
</tr>
</tbody>
</table>

Production environment

We recommend these hardware requirements for production systems or for development systems that are designed to demonstrate production use cases:

<table>
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<tr>
<td>Nodes per cluster’</td>
<td>At least three nodes are required to support a reliable, highly available deployment that handles process failure, node failure, and network split events in a consistent manner.</td>
<td>3 nodes</td>
<td>&gt;= 3 nodes (Must be an odd number of nodes)</td>
</tr>
<tr>
<td>Cores’ per node</td>
<td>RS is based on a multi-tenant architecture and can run multiple Redis processes (or shards) on the same core without significant performance degradation.</td>
<td>4 cores</td>
<td>&gt;=8 cores</td>
</tr>
<tr>
<td>RAM’ per node</td>
<td>Defining your RAM size must be part of the capacity planning for 15GB your Redis usage.</td>
<td>&gt;=30GB</td>
<td></td>
</tr>
</tbody>
</table>
### Ephemeral Storage
- Used for storing replication files (RDB format) and cluster log files.
- Used for storing snapshot (RDB format) and AOF files over a persistent storage media, such as AWS Elastic Block Storage (EBS) or Azure Data Disk.

### Persistent Storage
- RAM x 2
- RAM x 3
- In-memory >= RAM x 4 (except for extreme 'write' scenarios);
  - Redis on Flash >= (RAM + Flash) x 5.

### Network
- 1G
- >=10G

### Additional considerations:
- **Nodes per Cluster:**
  - To ensure synchronization and consistency, Active-Active deployments with three node clusters are strongly discouraged from using quorum nodes. Because quorum nodes do not store data shards, they cannot support replication. In case of a node failure, replica shards aren't available for Active-Active synchronization.

- **Cores:**
  - When the CPU load reaches a certain level, Redis Enterprise Software sends an alert to the operator.
  - If your application is designed to put a lot of load on your Redis database, make sure that you have at least one available core for each shard of your database.
  - If some of the cluster nodes are utilizing more than 80% of the CPU, consider migrating busy resources to less busy nodes.
  - If all the cluster nodes are utilizing over 80% of the CPU, consider scaling out the cluster by adding a node.

- **RAM:**
  - Redis uses a relatively large number of buffers, which enable replica communication, client communication, pub/sub commands, and more. As a result, you should ensure that 30% of the RAM is available on each node at any given time.
  - If one or more cluster nodes utilizes more than 65% of the RAM, consider migrating resources to less active nodes.
  - If all cluster nodes are utilizing more than 70% of available RAM, consider adding a node.
  - Do not run any other memory-intensive processes on the Redis Software node.

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**Updated:** March 2, 2021