```
pool3      3702                  3.0        92124M  0.0000

TARGET RATIO  EFFECTIVE RATIO  BIAS  PG_NUM  NEW PG_NUM  AUTOSCALE
                                1.0       1              on
                                1.0      32              on
                                1.0      32          64  warn
```

The previous table is split in two parts to make it easier to read on this page. The first two pools have the `AUTOSCALE` feature set to `on`, with Ceph automatically adjusting the number of PGs. The third pool is configured to provide a health alert if the number of PGs needs adjusting. The `PG_NUM` parameter is the current number of PGs in each pool or the number of PGs that the pool is working towards. The `NEW PG_NUM` parameter is the number of PGs that Ceph recommends to set in the pool.

# Designing the Cluster Architecture

When designing a Ceph cluster, consider scaling choices to match your future data requirements and to facilitate sufficient throughput with the correct network size and architecture.

## Scalability

You can scale clustered storage in two ways:

- **Scale out** by adding more nodes to a cluster.
- **Scale up** by adding more resources to existing nodes.

Scaling up requires that nodes can accept more CPU and RAM resources to handle an increase in the number of disks and disk size. Scaling out requires adding nodes with similar resources and capacity to match the cluster's existing nodes for balanced operations.

## Networking Best Practices

The network interconnecting the nodes in a Ceph cluster is critical to good performance, because all client and cluster I/O operations use it. Red Hat recommends the following practices:

- To increase performance and provide better isolation for troubleshooting, use separate networks for OSD traffic and for client traffic.
- At a minimum, use 10 GB networks or larger for the storage cluster. 1 GB networks are not suitable for production environments.
- Evaluate network sizing based on both cluster and client traffic, and the amount of data stored.
- Network monitoring is highly recommended.
- Use separate NICs to connect to the networks where possible, or else use separate ports.

*Figure 12.1* is a representation of such a network architecture.