# Oracle Hardware Deployment Schematics for the Sun Trust Atlas Data Lake




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*DISCLAIMER: Please note that as a partner of Oracle, BIAS uses existing Oracle Support Notes at times through this document to be consistent with Oracle documentation and best practices. In those cases, BIAS does provide context around that documentation to share specific relevance to Sun Trust and experiences elsewhere in actual implementations.*



## Overview of the Oracle H/W Atlas Data Lake Deployment

This document describes the hardware specifications in use for the Atlas Data Lake. The document should serve as a quick reference guide and be updated as the deployment continues to evolve.

Attention is made towards detailing each environment's setup and ability to expand while offering high availability at the server, storage, and Hadoop cluster tiers.

Logical drawings and schematics are presented to illustrate key deployment features and to expand upon how the hardware features are specifically utilized within the Sun Trust environments.

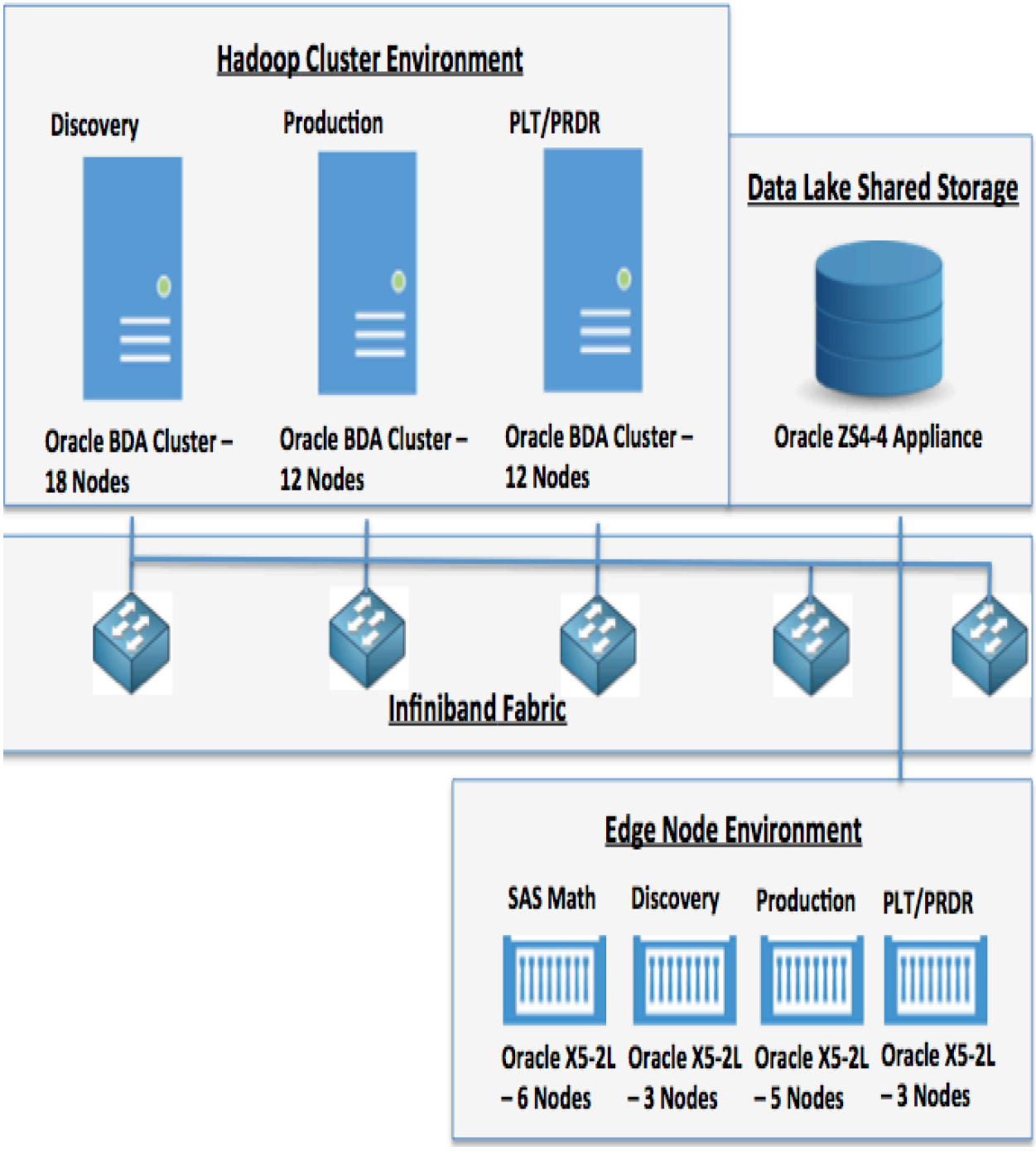
## Big Data Hardware Scalability

Oracle H/W throughout the Data Lake takes full advantage of CPU Hypthreading via processor chips from Intel. Hyperthreading increases the number of program instructions that can be executed independently by the CPU. This enables workloads (such as the Sun Trust ETL/ELT ingestion sprints or SAS Analytics for risk modeling) to scale in a fashion where computational idle time is minimized.

To stay current with Intel Chipset evolution, Oracle enables the mixing of different BDA models within the same Hadoop Cluster. For example, Sun Trust now uses the Oracle BDA X5-2 that has more CPU threads available than the Intel chipsets in the older Oracle BDA X4-2. As described further in the Schematic #1 and #2 drawings that follow, Sun Trust mixes X4-2 and X5-2 hardware in the Discovery and DEV02 BDA environments.

One Oracle BDA Appliance contains 6 to 18 possible server Nodes. Scalability is enhanced even more with the ability to form Hadoop clusters across Racks and across Appliances. As illustrated in Schematic #7, as Nodes are added, the Infiniband fabric is easily expanded to accommodate the scalability and to continue to offer high speed 40 Gbps bandwidth.

## Schematic #1 Production Deployment Topology



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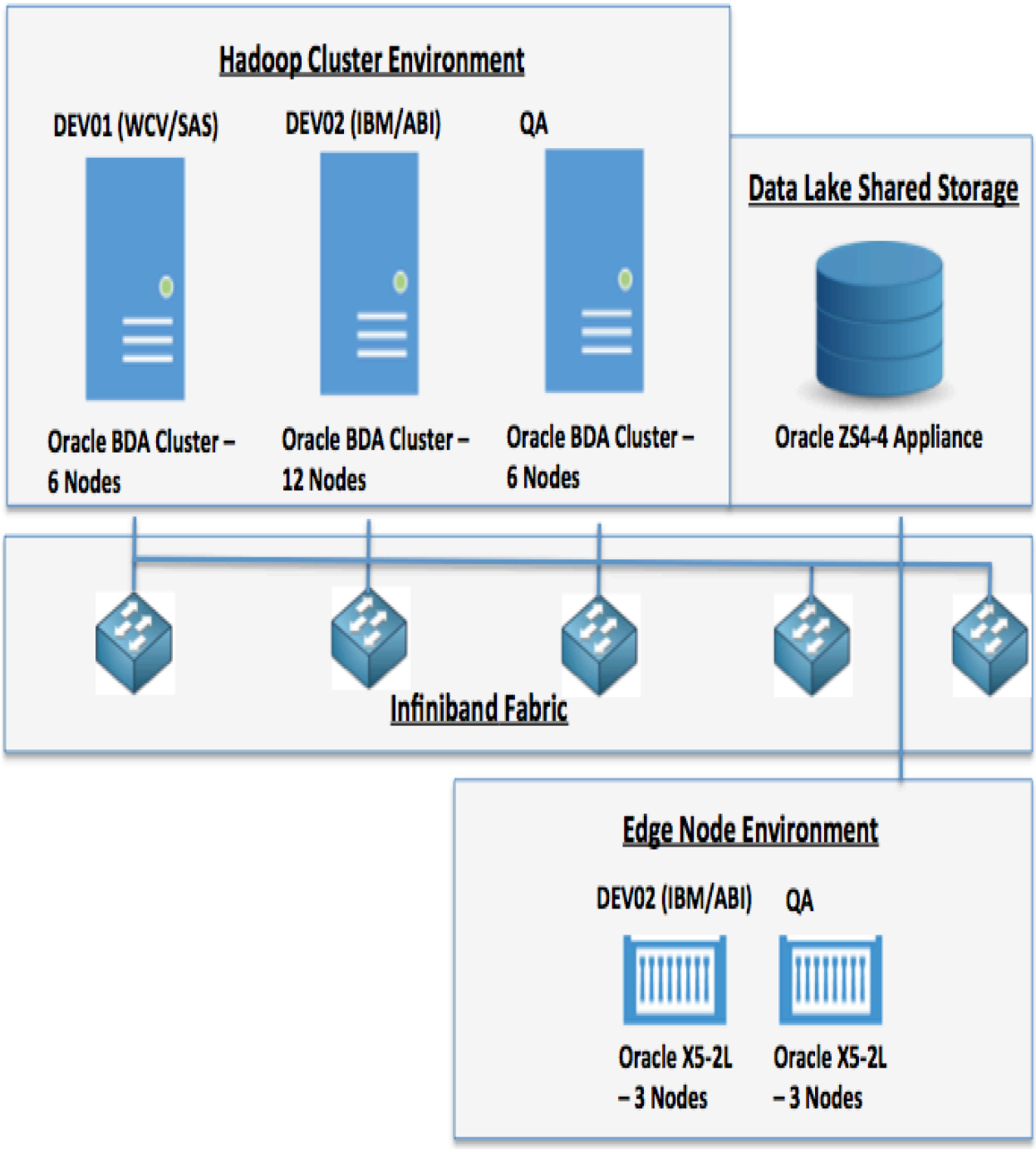
## Schematic #2 Development / QA Deployment Topology



## Schematic #3 Hardware Specifications: Oracle BDA Nodes

| | Oracle BDA X5-2 Node |
|---|---|
| **CPU Description** | 2 x 18-Core 2.3 GHz Intel ® Xeon ® E5-2699 v3<br>With Hyperthreading == 72 Logical CPUs |
| **Memory** | Present == 256GB, Expandable to 768GB |
| **Local Disk Space** | 12 x 4TB 7,200 RPM High Capacity SAS Drives<br>Total Capacity == 48TB<br>Newer drives will have 8TB each |
| **Network Connectivity** | 2 x QDR 40Gb/sec InfiniBand Ports<br>4 x 10 Gb Ethernet Ports<br>1 x ILOM Ethernet Port |

| | Oracle BDA X4-2 Node |
|---|---|
| **CPU Description** | 2 x 12-Core 2.7 GHz Intel ® Xeon ® E5-2697 v2<br>With Hyperthreading == 48 Logical CPUs |
| **Memory** | Present == 256GB, Expandable to 512GB |
| **Local Disk Space** | 12 x 4TB 7,200 RPM High Capacity SAS Drives<br>Total Capacity == 48TB |
| **Network Connectivity** | 2 x QDR 40Gb/sec InfiniBand Ports<br>4 x 10 Gb Ethernet Ports<br>1 x ILOM Ethernet Port |

## Schematic #4 Hardware Specifications: Oracle Edge Nodes

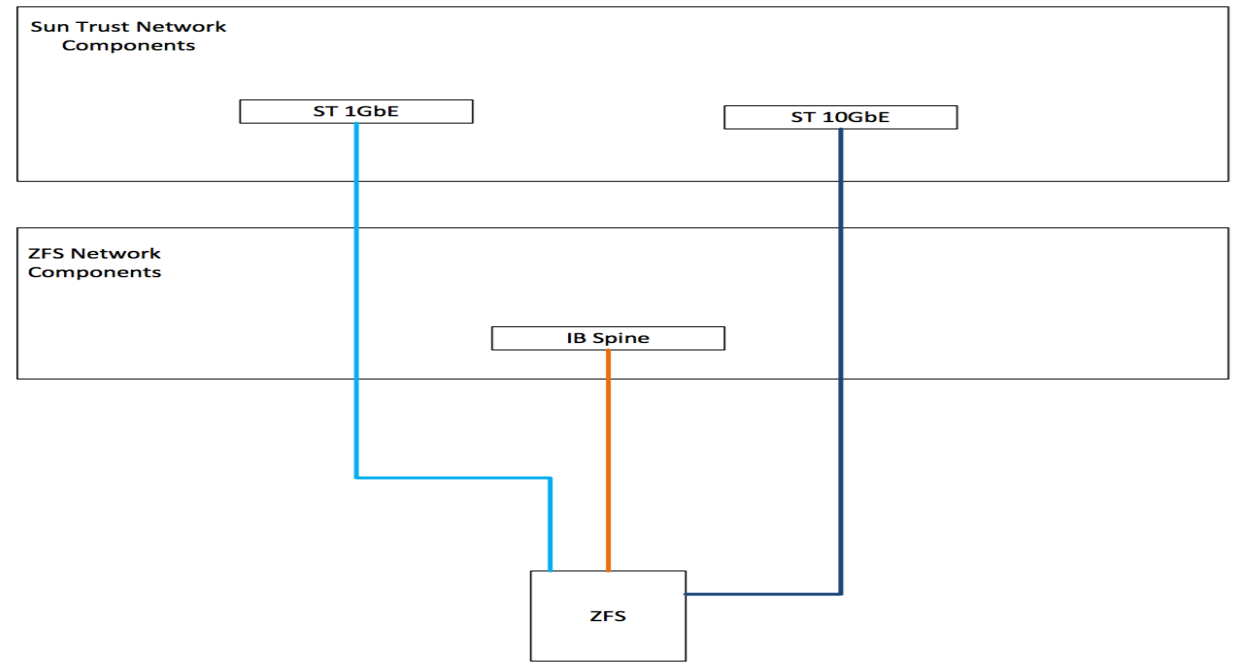
| | Oracle X5-2L Node |
|---|---|
| **CPU Description** | 2 x 12-Core 2.6 GHz Intel ® Xeon ® E5-2690 v3<br>With Hyperthreading == 48 Logical CPUs |
| **Memory** | Present == 256GB, Expandable to 768GB |
| **Local Disk Space** | 10 x 1.2 TB 10000 rpm 2.5-inch SAS-3 HDD<br>Total Capacity == 12TB |
| **Network Connectivity** | 2 x QDR 40Gb/sec InfiniBand Ports<br>4 x 10 Gb Ethernet Ports<br>1 x ILOM Ethernet Port |

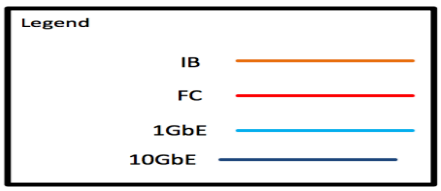
## Schematic #5 Hardware Specifications: Oracle Storage Array

| | Oracle ZFS Storage ZS4-4 Appliance |
|---|---|
| **CPU Description** | 4 x 15-Core 2.80 GHz Intel ® Xeon ® E7-8895 v2<br>With Hyperthreading == 120 Logical CPUs |
| **Memory** | 1.5TB of RAM |
| **Disk Shelf Space Capacity** | 88 x 4 TB 7200 rpm 3.5-inch SAS-2 HDD<br>Total Capacity == 352TB Mirrored, 160TB Usable<br>Expandable to 6TB - 6.9PB capacity depending upon whether HC or HP drives are used |
| **Network Connectivity** | 4 x QDR 40Gb/sec InfiniBand Ports<br>1 x GigE Ethernet Port<br>4 x 10 Gb Ethernet Ports<br>1 x ILOM Ethernet Port |

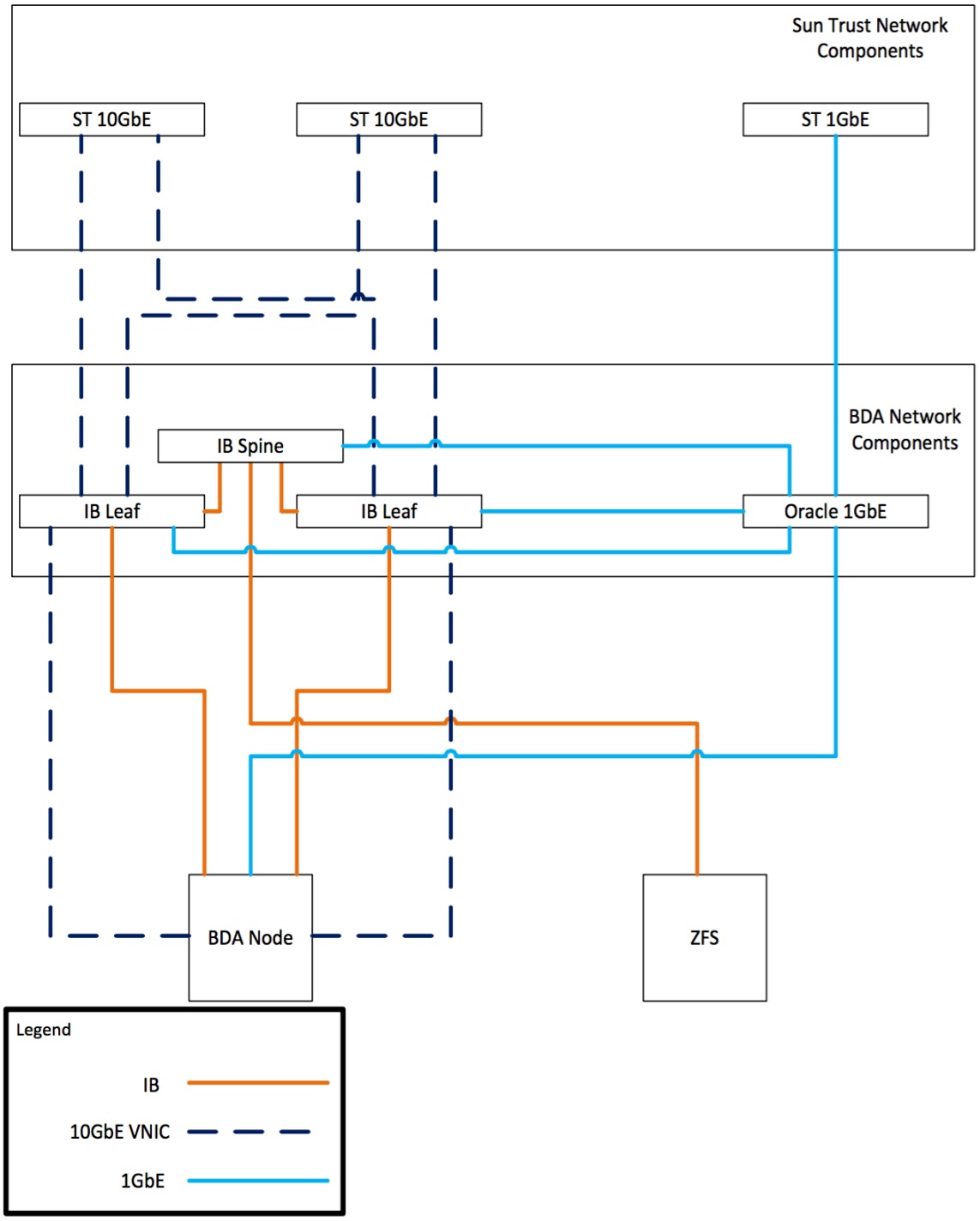
## Schematic #6 Multiprotocol Features of the Oracle Storage Array

The Oracle ZS4-4 Storage Appliance enables both block-based and file-based access methods into storage. Block-based protocols consist of techniques such as Fibre Channel Protocol (FCP) and block abstractions over Ethernet such as iSCSI. File-based access consists of TCP/IP approaches such as NFS and CIFS. This empowers the Storage Array to be reusable for Windows, Linux, and Unix clients and cater to high bandwidth utilization needs for archiving, staging, and backups as well as to low latency demands by transactional database I/O. Accordingly, Sun Trust has the flexibility to expand to the use of FCP later even though block-based protocols are not currently in use.



## Schematic #7 Oracle BDA Network Connectivity



## Hadoop Roles

Hadoop services such as Name Node functions, quorum journal management, Hive Cataloging, and others are offered by certain Nodes within the Oracle BDA Cluster. Each Node is assigned one or more Roles that determine what services it is responsible for running.

| Role | | Service |
|---|---|---|
| **B** | = | HDFS Balancer |
| **DN** | = | Data Node |
| **NN** | = | Name Node |
| **JN** | = | Journal Node |
| **FC** | = | Failover Controller |
| **G (yellow)** | = | Hive Gateway |
| **G (blue)** | = | YARN (MR2 included) Gateway |
| **SS** | = | Sentry Server |
| **S** | = | ZooKeeper Server |
| **HFS** | = | HDFS HttpFS |
| **HS2** | = | HiveServer2 |
| **HMS** | = | Hive Metastore Server |
| **WHCS** | = | Hive WebHCat Server |
| **HS** | = | Hue Server |
| **KTR** | = | Hue Kerberos Ticket Renewer |
| **NAS** | = | Cloudera Navigator Audit Server |
| **NMS** | = | Cloudera Navigator Metadata Server |
| **OS** | = | Oozie Server |
| **RM** | = | YARN Resource Manager |
| **NM** | = | YARN Node Manager |
| **S2S** | = | Sqoop 2 Server |
| **NFSG** | = | HDFS NFS Gateway |

## Schematic #8 Production Oracle BDA: Hadoop Roles By Host

### View By Host

This table is grouped by hosts having the same roles assigned to them.

| Hosts | Count | Existing Roles | Added Roles |
|---|---|---|---|
| pbda1node01.suntrust.com | 1 | B DN FC JN NN G SS G S | |
| pbda1node02.suntrust.com | 1 | DN JN G AM AP ES HM RM SM JHS RM S | |
| pbda1node[03-06].suntrust.com; pbda2node[03-06].suntrust.com | 8 | DN G NM | |
| pbda2node01.suntrust.com | 1 | DN FC HFS JN NN G NM S | |
| pbda2node02.suntrust.com | 1 | DN HMS HS2 WHCS HS KTR NAS NMS OS NM RM | |

## Schematic #9 PRDR Oracle BDA: Hadoop Roles By Host

### View By Host

This table is grouped by hosts having the same roles assigned to them.

| Hosts | Count | Existing Roles | Added Roles |
|---|---|---|---|
| prbda1node01.suntrust.com | 1 | B DN FC JN NN G SS G S | |
| prbda1node02.suntrust.com | 1 | DN JN G AM AP ES HM RM SM JHS RM S | |
| prbda1node[03-06].suntrust.com; prbda2node[03-06].suntrust.com | 8 | DN G NM | |
| prbda2node01.suntrust.com | 1 | DN FC HFS JN NN G NM S | |
| prbda2node02.suntrust.com | 1 | DN HMS HS2 WHCS HS KTR OS NM RM | |

## Schematic #10 Discovery Oracle BDA: Hadoop Roles By Host

### View By Host

This table is grouped by hosts having the same roles assigned to them.

| Hosts | Count | Existing Roles | Added Roles |
|---|---|---|---|
| dsbda2node01.suntrust.com | 1 | B DN FC JN NN G SS G S | |
| dsbda2node02.suntrust.com | 1 | DN FC HFS JN NN G G S | |
| dsbda2node03.suntrust.com | 1 | DN JN G AM AP ES HM RM SM JHS NM RM S | |
| dsbda2node04.suntrust.com | 1 | DN HMS HS2 WHCS HS KTR NAS NMS OS NM RM | |
| dsbda2node05.suntrust.com | 1 | DN G SDS NM | |
| dsbda2node[06, 08-09, 12].suntrust.com | 4 | DN G NM | |
| dsbda2node[07, 11].suntrust.com | 2 | DN NFSG G NM | |

## Hadoop High Availability Features

The Oracle BDA Appliance maintains and enhances the High Availability features common to Hadoop environments. Differentiating a BDA from commodity-based deployments is the use of Oracle Enterprise Manager (OEM) monitors to complement the health check features possible with Cloudera Manager monitors. The monitors enable failover incident and fault reporting to ensure constant awareness of when failover occurs.

Within Hadoop, the Name Node maintains the metadata and block locations of data present throughout the Hadoop Distributed Filesystem (HDFS). The Oracle BDA enables the ability to use Active and Standby Name Nodes. It uses Failover Controllers to detect hardware faults that occur on the Name Node servers. In the event of failure, the Standby Name Node takes over from the previous Active Name Node. This takeover is transparent to end users and clients, offering continuous availability of HDFS reads and writes. Journal Nodes maintain durable, persistent edit logs of all changes performed in the Name Node namespace.

Data protection is possible for HDFS data in the Atlas Data Lake environments via the use of 3-times replication in the Oracle BDA. Data Nodes can fail within a Hadoop Cluster without the risk of data loss. Even though data loss is avoided, Sun Trust should be advised that computational power is lost when a Data Node fails. A failed Data Node should be identified, fixed, or replaced as soon as possible. OEM monitors facilitate quick detection of failures. Oracle Auto Service Request (ASR) enables automated service troubleshooting.

Job High Availability is possible via the use of YARN HA in the Oracle BDA. Jobs being managed by one Resource Manager (RM) can failover to another Resource Manager in the event of a hardware fault on the Node running the RM processes. Jobs continue to execute, maintaining state and progress.

Sun Trust uses Hive for SQL-like abstraction to access HDFS data. Metadata about Hive table and object structures are kept within a Hive Metastore using MySQL as a backend. MySQL replication is used within the Oracle BDA to ensure that another MySQL instance on a different Node can manage the Metastore if the primary Node fails.

## Oracle ZS4-4 Storage High Availability

As illustrated on the drawings that follow, Schematic #11 and Schematic #12, the Oracle Storage Array uses Cluster interconnections to failover resources from one Storage Controller when catastrophic issues occur. The Oracle ZS4-4 Storage Appliance enables both automated and manual failover.

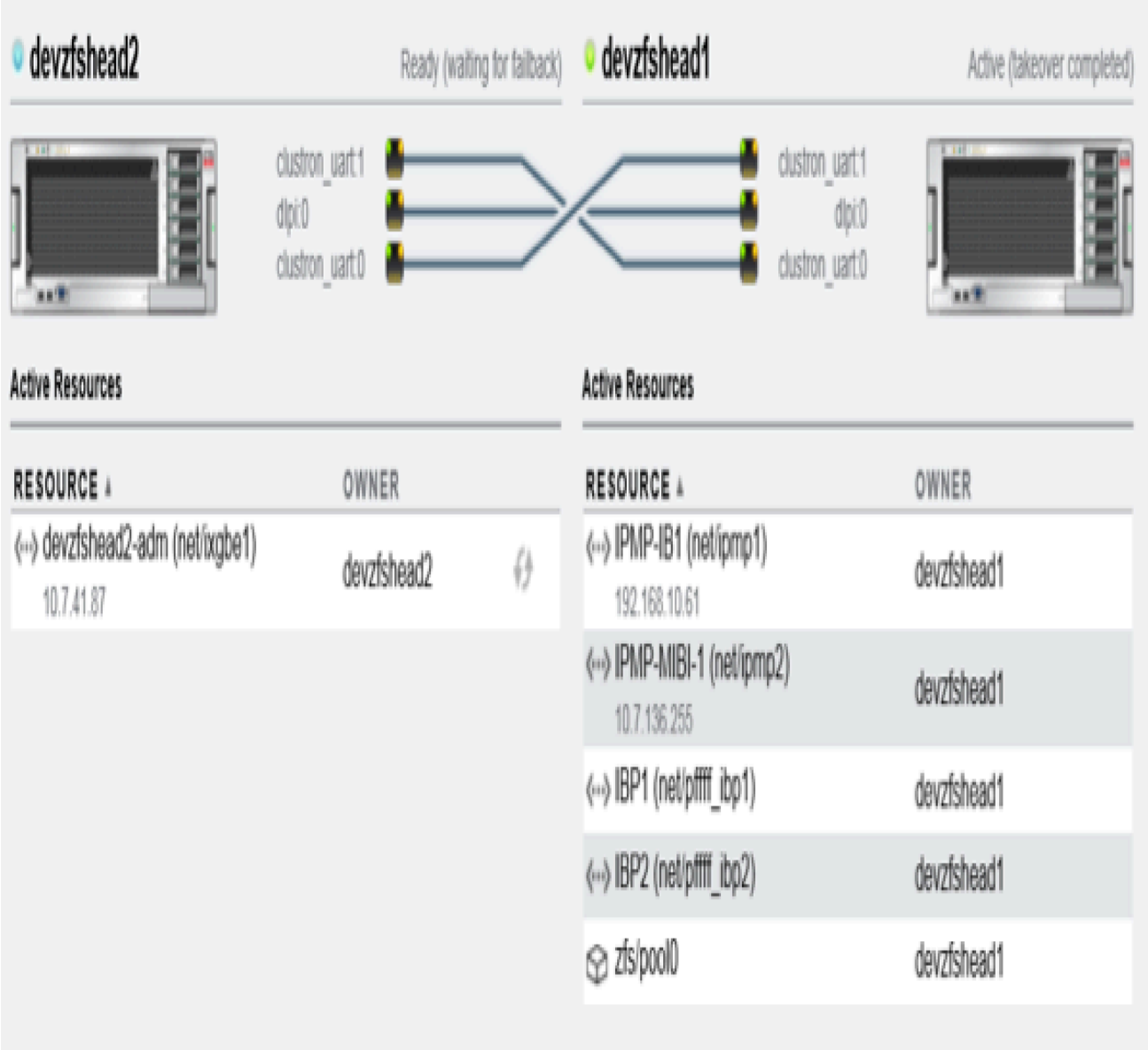
At any one time, only one Storage Controller actively controls access to a Shared Storage Pool. If that Active Controller fails, the other Passive Controller takes over ownership of the Shared Storage Pool. When a takeover occurs, the IP addresses in use by Storage Consumers (i.e. client machines, the BDA Cluster, etc) float from the failed Controller to the surviving Controller. From the client's perspective, the failover is usually transparent as the IP addresses will be quickly available on the new Active Controller.

Note, even though only one Controller manages the Shared Pool at any one time, both Controllers are still accessible via management interfaces on the network.

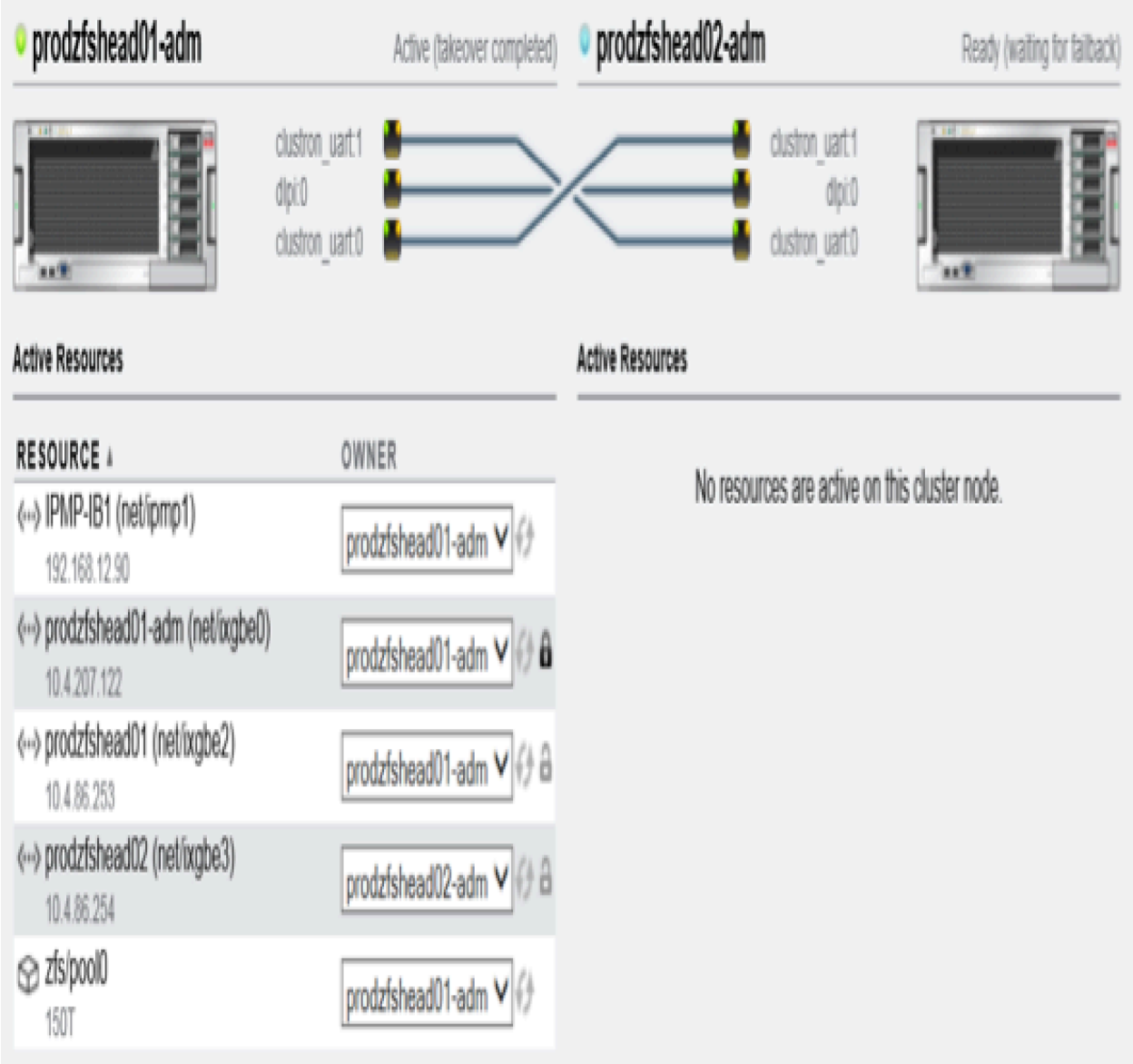
As the Schematic drawings reveal, the Active Controller uses IPMP for the Sun Trust MIBI public and the Infiniband interfaces. IPMP is IP Multipathing. As noted previously on Schematic #5, the Oracle ZS4-4 Appliance contains 4 Infiniband ports and 4 x 10Gb Ethernet ports. The Ethernet ports are aggregated together to act as one network device in the form of an IPMP group. This group is then assigned one IP address on the Sun Trust MIBI network. Another grouping is done on the four Infinband ports. IPMP enables high availability and resiliency so that an IP address is still accessible even if a failure occurs on one of the interfaces in the group.

Schematic #11 and Schematic #12 also reveal how the cluster controls the Shared Storage Pool named zfspool0. High Availability at the underlying storage level is maintained via the use of RAID-1. RAID-1 mirrors all of the storage in zfspool0 to offer the ultimate resiliency in the form of complete data protection. At Sun Trust's request, RAID-1 was utilized even though it causes only half of the total raw storage to be usable. Given the focus upon data protection and the relative ease of adding more storage space in the future, this choice is prudent.

## Schematic #11 Oracle ZS4-4 Appliance: Dev/QA Environment (Durham)



## Schematic #12 Oracle ZS4-4 Appliance: Prod/PRDR/Discovery Environment (Atlanta)



## PRDR IP Addresses and Host Names

| | |
|---|---|
| prabinitio01-ilom.suntrust.com | 10.4.207.109 |
| prabinitio01-adm.suntrust.com | 10.4.207.106 |
| prabinitio01.suntrust.com | 10.4.86.245 |
| prabinitio02-ilom.suntrust.com | 10.4.207.110 |
| prabinitio02-adm.suntrust.com | 10.4.207.107 |
| prabinitio02.suntrust.com | 10.4.86.246 |
| prabinitio03-ilom.suntrust.com | 10.4.207.111 |
| prabinitio03-adm.suntrust.com | 10.4.207.108 |
| prabinitio03.suntrust.com | 10.4.86.247 |
| prbda1node01.suntrust.com | 10.4.86.212 |
| prbda1node01-ilom.suntrust.com | 10.4.207.46 |
| prbda1node01-adm.suntrust.com | 10.4.207.40 |
| prbda1node02.suntrust.com | 10.4.86.213 |
| prbda1node02-ilom.suntrust.com | 10.4.207.47 |
| prbda1node02-adm.suntrust.com | 10.4.207.41 |
| prbda1node03.suntrust.com | 10.4.86.214 |
| prbda1node03-ilom.suntrust.com | 10.4.207.48 |
| prbda1node03-adm.suntrust.com | 10.4.207.42 |
| prbda1node04.suntrust.com | 10.4.86.215 |
| prbda1node04-ilom.suntrust.com | 10.4.207.49 |
| prbda1node04-adm.suntrust.com | 10.4.207.43 |
| prbda1node05.suntrust.com | 10.4.86.216 |
| prbda1node05-ilom.suntrust.com | 10.4.207.50 |
| prbda1node05-adm.suntrust.com | 10.4.207.44 |
| prbda1node06.suntrust.com | 10.4.86.217 |
| prbda1node06-ilom.suntrust.com | 10.4.207.51 |
| prbda1node06-adm.suntrust.com | 10.4.207.45 |
| prbda2node01.suntrust.com | 10.4.86.218 |
| prbda2node01-ilom.suntrust.com | 10.4.207.58 |
| prbda2node01-adm.suntrust.com | 10.4.207.52 |
| prbda2node02.suntrust.com | 10.4.86.219 |
| prbda2node02-ilom.suntrust.com | 10.4.207.59 |
| prbda2node02-adm.suntrust.com | 10.4.207.53 |
| prbda2node03.suntrust.com | 10.4.86.220 |
| prbda2node03-ilom.suntrust.com | 10.4.207.60 |
| prbda2node03-adm.suntrust.com | 10.4.207.54 |



| | |
|---|---|
| prbda2node04.suntrust.com | 10.4.86.221 |
| prbda2node04-ilom.suntrust.com | 10.4.207.61 |
| prbda2node04-adm.suntrust.com | 10.4.207.55 |
| prbda2node05.suntrust.com | 10.4.86.222 |
| prbda2node05-ilom.suntrust.com | 10.4.207.62 |
| prbda2node05-adm.suntrust.com | 10.4.207.56 |
| prbda2node06.suntrust.com | 10.4.86.223 |
| prbda2node06-ilom.suntrust.com | 10.4.207.63 |
| prbda2node06-adm.suntrust.com | 10.4.207.57 |

## PRODUCTION IP Addresses and Host Names

| | |
|---|---|
| pabinitio01-ilom.suntrust.com | 10.4.207.117 |
| pabinitio01-adm.suntrust.com | 10.4.207.112 |
| pabinitio01.suntrust.com | 10.4.86.248 |
| pabinitio02-ilom.suntrust.com | 10.4.207.118 |
| pabinitio02-adm.suntrust.com | 10.4.207.113 |
| pabinitio02.suntrust.com | 10.4.86.249 |
| pabinitio03-ilom.suntrust.com | 10.4.207.119 |
| pabinitio03-adm.suntrust.com | 10.4.207.114 |
| pabinitio03.suntrust.com | 10.4.86.250 |
| pabinitio04-ilom.suntrust.com | 10.4.207.120 |
| pabinitio04-adm.suntrust.com | 10.4.207.115 |
| pabinitio04.suntrust.com | 10.4.86.251 |
| pabinitio05-ilom.suntrust.com | 10.4.207.121 |
| pabinitio05-adm.suntrust.com | 10.4.207.116 |
| pabinitio05.suntrust.com | 10.4.86.252 |
| pbda1node01.suntrust.com | 10.4.86.224 |
| pbda1node01-ilom.suntrust.com | 10.4.207.70 |
| pbda1node01-adm.suntrust.com | 10.4.207.64 |
| pbda1node02.suntrust.com | 10.4.86.225 |
| pbda1node02-ilom.suntrust.com | 10.4.207.71 |
| pbda1node02-adm.suntrust.com | 10.4.207.65 |
| pbda1node03.suntrust.com | 10.4.86.226 |
| pbda1node03-ilom.suntrust.com | 10.4.207.72 |
| pbda1node03-adm.suntrust.com | 10.4.207.66 |
| pbda1node04.suntrust.com | 10.4.86.227 |
| pbda1node04-ilom.suntrust.com | 10.4.207.73 |
| pbda1node04-adm.suntrust.com | 10.4.207.67 |



| | |
|---|---|
| pbda1node05.suntrust.com | 10.4.86.228 |
| pbda1node05-ilom.suntrust.com | 10.4.207.74 |
| pbda1node05-adm.suntrust.com | 10.4.207.68 |
| pbda1node06.suntrust.com | 10.4.86.229 |
| pbda1node06-ilom.suntrust.com | 10.4.207.75 |
| pbda1node06-adm.suntrust.com | 10.4.207.69 |
| pbda2node01.suntrust.com | 10.4.86.230 |
| pbda2node01-ilom.suntrust.com | 10.4.207.82 |
| pbda2node01-adm.suntrust.com | 10.4.207.76 |
| pbda2node02.suntrust.com | 10.4.86.231 |
| pbda2node02-ilom.suntrust.com | 10.4.207.83 |
| pbda2node02-adm.suntrust.com | 10.4.207.77 |
| pbda2node03.suntrust.com | 10.4.86.232 |
| pbda2node03-ilom.suntrust.com | 10.4.207.84 |
| pbda2node03-adm.suntrust.com | 10.4.207.78 |
| pbda2node04.suntrust.com | 10.4.86.233 |
| pbda2node04-ilom.suntrust.com | 10.4.207.85 |
| pbda2node04-adm.suntrust.com | 10.4.207.79 |
| pbda2node05.suntrust.com | 10.4.86.234 |
| pbda2node05-ilom.suntrust.com | 10.4.207.86 |
| pbda2node05-adm.suntrust.com | 10.4.207.80 |
| pbda2node06.suntrust.com | 10.4.86.235 |
| pbda2node06-ilom.suntrust.com | 10.4.207.87 |
| pbda2node06-adm.suntrust.com | 10.4.207.81 |

## DISCOVERY IP Addresses and Host Names

| | |
|---|---|
| discabinitio01-ilom.suntrust.com | 10.4.207.103 |
| discabinitio01-adm.suntrust.com | 10.4.207.100 |
| discabinitio01.suntrust.com | 10.4.86.242 |
| discabinitio02-ilom.suntrust.com | 10.4.207.104 |
| discabinitio02-adm.suntrust.com | 10.4.207.101 |
| discabinitio02.suntrust.com | 10.4.86.243 |
| discabinitio03-ilom.suntrust.com | 10.4.207.105 |
| discabinitio03-adm.suntrust.com | 10.4.207.102 |
| discabinitio03.suntrust.com | 10.4.86.244 |
| discsas01.suntrust.com | 10.4.86.236 |
| discsas01-ilom.suntrust.com | 10.4.207.94 |



| | |
|---|---|
| discsas01-adm.suntrust.com | 10.4.207.88 |
| discsas02.suntrust.com | 10.4.86.237 |
| discsas02-ilom.suntrust.com | 10.4.207.95 |
| discsas02-adm.suntrust.com | 10.4.207.89 |
| discsas03.suntrust.com | 10.4.86.238 |
| discsas03-ilom.suntrust.com | 10.4.207.96 |
| discsas03-adm.suntrust.com | 10.4.207.90 |
| discsas04.suntrust.com | 10.4.86.239 |
| discsas04-ilom.suntrust.com | 10.4.207.97 |
| discsas04-adm.suntrust.com | 10.4.207.91 |
| discsas05.suntrust.com | 10.4.86.240 |
| discsas05-ilom.suntrust.com | 10.4.207.98 |
| discsas05-adm.suntrust.com | 10.4.207.92 |
| discsas06.suntrust.com | 10.4.86.241 |
| discsas06-ilom.suntrust.com | 10.4.207.99 |
| discsas06-adm.suntrust.com | 10.4.207.93 |
| dsbda2node01.suntrust.com | 10.4.86.200 |
| dsbda2node01-ilom.suntrust.com | 10.4.207.28 |
| dsbda2node01-adm.suntrust.com | 10.4.207.16 |
| dsbda2node02.suntrust.com | 10.4.86.201 |
| dsbda2node02-ilom.suntrust.com | 10.4.207.29 |
| dsbda2node02-adm.suntrust.com | 10.4.207.17 |
| dsbda2node03.suntrust.com | 10.4.86.202 |
| dsbda2node03-ilom.suntrust.com | 10.4.207.30 |
| dsbda2node03-adm.suntrust.com | 10.4.207.18 |
| dsbda2node04.suntrust.com | 10.4.86.203 |
| dsbda2node04-ilom.suntrust.com | 10.4.207.31 |
| dsbda2node04-adm.suntrust.com | 10.4.207.19 |
| dsbda2node05.suntrust.com | 10.4.86.204 |
| dsbda2node05-ilom.suntrust.com | 10.4.207.32 |
| dsbda2node05-adm.suntrust.com | 10.4.207.20 |
| dsbda2node06.suntrust.com | 10.4.86.205 |
| dsbda2node06-ilom.suntrust.com | 10.4.207.33 |
| dsbda2node06-adm.suntrust.com | 10.4.207.21 |
| dsbda2node07.suntrust.com | 10.4.86.206 |
| dsbda2node07-ilom.suntrust.com | 10.4.207.34 |
| dsbda2node07-adm.suntrust.com | 10.4.207.22 |
| dsbda2node08.suntrust.com | 10.4.86.207 |
| dsbda2node08-ilom.suntrust.com | 10.4.207.35 |
| dsbda2node08-adm.suntrust.com | 10.4.207.23 |



| | |
|---|---|
| dsbda2node09.suntrust.com | 10.4.86.208 |
| dsbda2node09-ilom.suntrust.com | 10.4.207.36 |
| dsbda2node09-adm.suntrust.com | 10.4.207.24 |
| dsbda2node10.suntrust.com | 10.4.86.209 |
| dsbda2node10-ilom.suntrust.com | 10.4.207.37 |
| dsbda2node10-adm.suntrust.com | 10.4.207.25 |
| dsbda2node11.suntrust.com | 10.4.86.210 |
| dsbda2node11-ilom.suntrust.com | 10.4.207.38 |
| dsbda2node11-adm.suntrust.com | 10.4.207.26 |
| dsbda2node12.suntrust.com | 10.4.86.211 |
| dsbda2node12-ilom.suntrust.com | 10.4.207.39 |
| dsbda2node12-adm.suntrust.com | 10.4.207.27 |

## DEV01 IP Addresses and Host Names

| | |
|---|---|
| dbda1node01.suntrust.com | 10.7.136.188 |
| dbda1node02.suntrust.com | 10.7.136.189 |
| dbda1node03.suntrust.com | 10.7.136.190 |
| dbda1node04.suntrust.com | 10.7.136.191 |
| dbda1node05.suntrust.com | 10.7.136.192 |
| dbda1node06.suntrust.com | 10.7.136.193 |

## DEV02 IP Addresses and Host Names

| | |
|---|---|
| d2bda1node01.suntrust.com | 10.7.136.182 |
| d2bda1node02.suntrust.com | 10.7.136.183 |
| d2bda1node03.suntrust.com | 10.7.136.184 |
| d2bda1node04.suntrust.com | 10.7.136.185 |
| d2bda1node05.suntrust.com | 10.7.136.186 |
| d2bda1node06.suntrust.com | 10.7.136.187 |
| d2bda1node07.suntrust.com | 10.7.136.246 |
| d2bda1node08.suntrust.com | 10.7.136.247 |
| d2bda1node09.suntrust.com | 10.7.136.248 |
| d2bda1node10.suntrust.com | 10.7.136.249 |
| d2bda1node11.suntrust.com | 10.7.136.250 |
| d2bda1node12.suntrust.com | 10.7.136.251 |

| | |
|---|---|
| devabinitio1.suntrust.com | 10.7.136.252 |
| devabinitio2.suntrust.com | 10.7.136.253 |
| devabinitio3.suntrust.com | 10.7.136.254 |

## QA IP Addresses and Host Names

| | |
|---|---|
| qbda1node01.suntrust.com | 10.7.137.4 |
| qbda1node02.suntrust.com | 10.7.137.5 |
| qbda1node03.suntrust.com | 10.7.137.6 |
| qbda1node04.suntrust.com | 10.7.137.7 |
| qbda1node05.suntrust.com | 10.7.137.8 |
| qbda1node06.suntrust.com | 10.7.137.9 |
| qaabinitio1.suntrust.com | 10.7.137.1 |
| qaabinitio2.suntrust.com | 10.7.137.2 |
| qaabinitio3.suntrust.com | 10.7.137.3 |