New York Stock Exchange
Oracle Exadata – Our Journey

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New York Stock Exchange (NYSE) and Intercontinental Exchange (ICE)

- NYSE - world’s largest stock exchange by market capitalization ($28 trillion)
- NYSE is owned by Intercontinental Exchange (ICE) - Architects of the world’s markets
- 11 exchanges, 7 clearing houses 12,000 + listed contracts and securities
- Diverse markets span futures & options on interest rates, commodities, indexes and FX, as well as equities and equity options.
- We transact on average in <200 mics.
DATA ENVIRONMENT

- Data volume: ~50-60 billion transactions per day (at peak)
- Data size: ~ 15 TB of data per day (at peak)
- All data for equities, ETFs, options markets and the feed to the street
- Data for trading system latency, other markets
- Data services responsible for managing all the data and data platforms including Exadata
oracle database environment on EXadata

- Oracle - primary transactional database platform supporting all NYSE businesses
- OLTP and Data Mart environments - 250+ databases, over 500 instances
- Total database size - 350+ TB
- Daily transaction volume - ~1000 million transactions
- Large transactional databases: ~10-20 TB databases generating about ~300 GB of log per day
- Large Data Mart: >100 TB in size (after HCC compression for historical data)
CONSOLIDATION TO EXADATA

2004:

2006:

RAC Node 1
RAC Node 2
RAC Node 3
SAN Storage
SAN Storage
SAN Storage

2014:

17 Exadata – 12 for NYSE
NYSE Exadata footprint
Some examples:

- **Dev**: ~60 databases consolidated on a full rack of X3-2 with an average size of 1.6 TB
- **QA**: ~70 QA consolidated on a full rack of X3-2 with an average size of 2 TB
- **Prod**: ~50 databases consolidated on a full rack of X3-2 with an average size of 9.5 TB
- Mix of OLTP and data marts
leveraging exadata for performance

- Performance gains of 2x – 25x
- Trade Reports database – 180,000 messages/sec - ~ 50% increase in processing speed
- For the same application, completion time decreased by 66%
- Data Mart - daily transactions of 2 TB applied to standby in real-time
- Data Loads – processing times decreased by 50%
- Data Mart – hybrid columnar compression - 4x compression gain vs ACO.
- 15-16x compression achieved on raw data using HCC
- Full Backup time of a ~150 TB data mart reduced by 85% (over Infiniband switches)
- Utilize SmartScan capabilities
Consolidation planning

Database load compatibility analysis
setup appropriate resources – parameters, limits

Migration to Exadata using Data Guard, RMAN Closing and RMAN Duplicate

Plan hardware - Dedicated network

Test it out – connectivity, test with application and RAT testing for performance validation
CONSIDERATIONS

- Coordinate downtime

- Risk Mitigation:
  - Manage capacity
  - Oracle Homes – 2
  - Load Isolation
  - Instance caging, IORM deployed to manage resources consolidated

- Security isolation

- Rolling upgrades of databases

- Rolling Exadata bundle patches – cell servers, components, compute nodes and clusterware

- Observe utilization

- Re-evaluate database parameters
BENEFITS OF CONSOLIDATION

- Reduced time to market
- Platform as a service
- Database as a service
- Reduced cost
  - Hardware, licensing
  - Operations