



wellcome trust  
**sanger**  
institute

**Oracle Database 12c**

**at**

**Wellcome Trust Sanger Institute (WTSI)**

**Oracle Open World - 2013**

**Kalyan Kallepally**

**Principal Database Administrator**

# About Me

- Working as Principal Database Administrator at
  - Wellcome Trust Sanger Institute
- 12 years of experience in Oracle (8-11gr2)
- 6 years of experience in MySQL, SQL Server & PostgreSQL
- Active member in 12C beta testing program
- Recently started blogging
  - [www.dbakalyan.wordpress.com](http://www.dbakalyan.wordpress.com)
  - You can reach me on [dba\\_kkk@yahoo.co.uk](mailto:dba_kkk@yahoo.co.uk)

# Wellcome Trust Sanger Institute



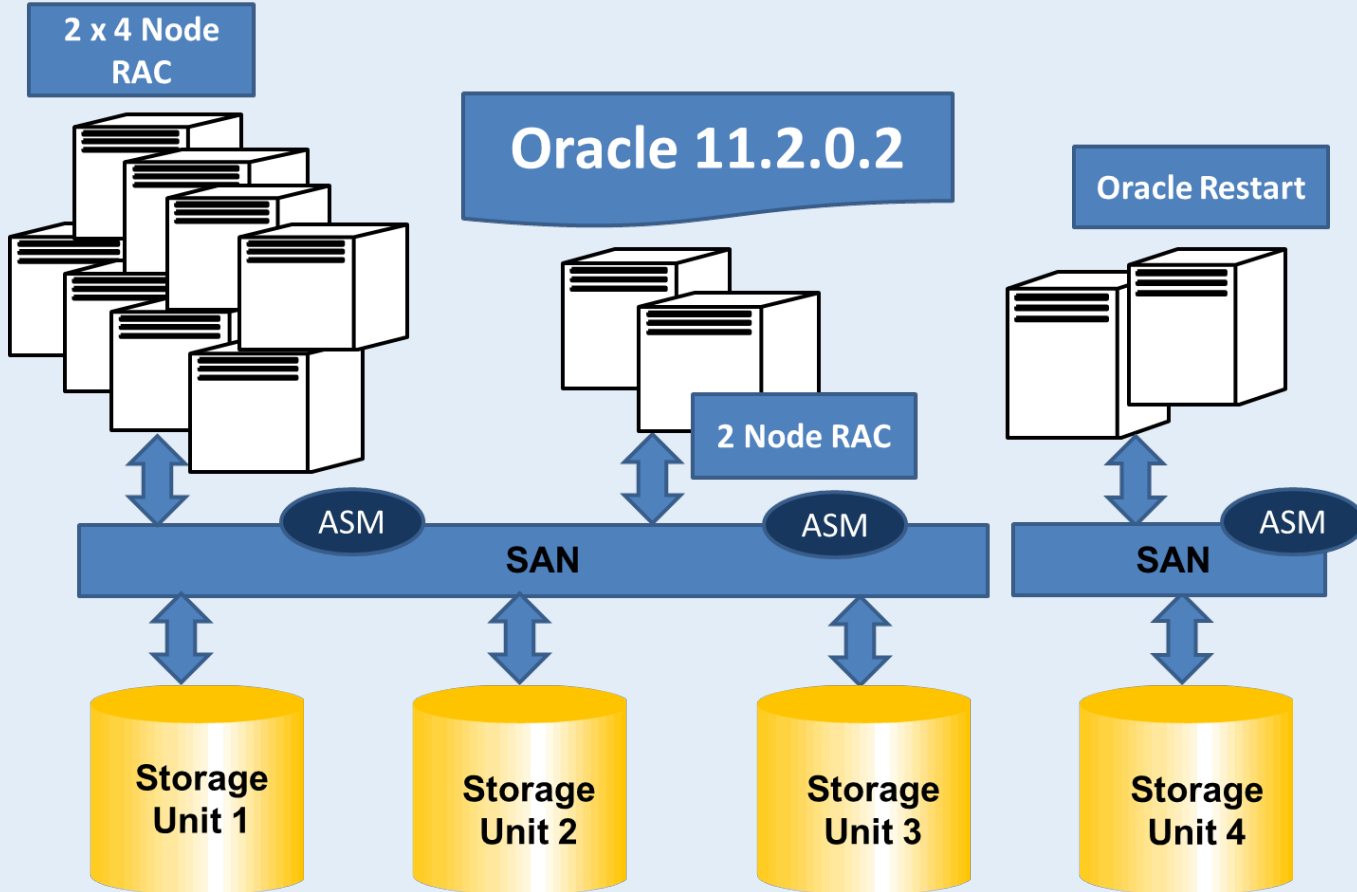
- One of the leading and most published genome institutions in the world
- Located in Hinxton, south of Cambridge, UK
- Founded in 1993 by the Wellcome Trust and the UK Medical Research Council (MRC)
- Primarily funded by the Wellcome Trust
- The institute is named after Dr Fred Sanger – The double Nobel prize-winning biochemist
- Main aim is to ensure scientific data is freely available
- Responsible for the completion of 1/3 of the human genome

# Data Centre at WTSI

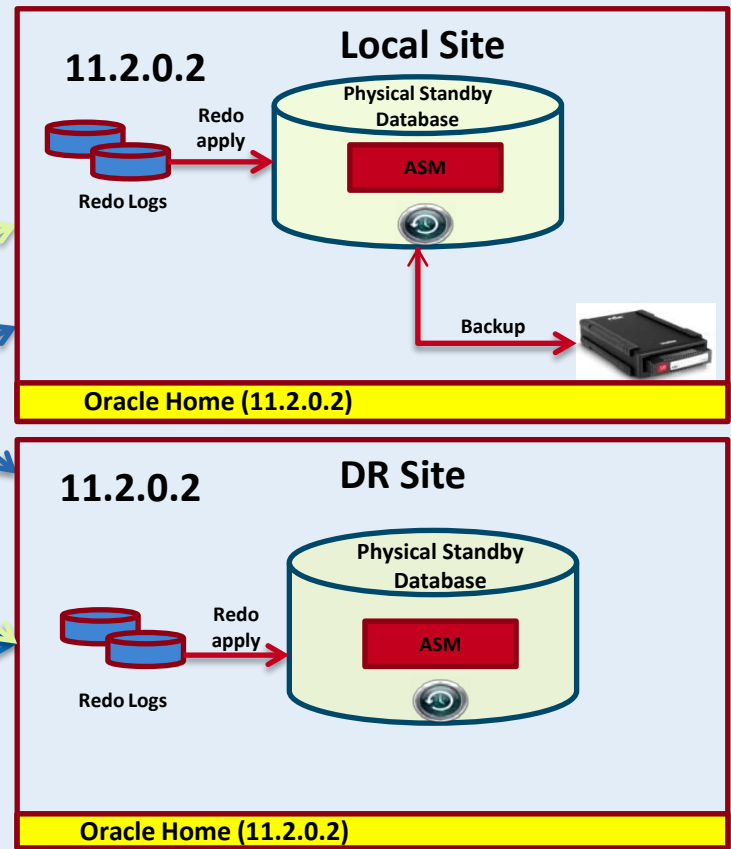
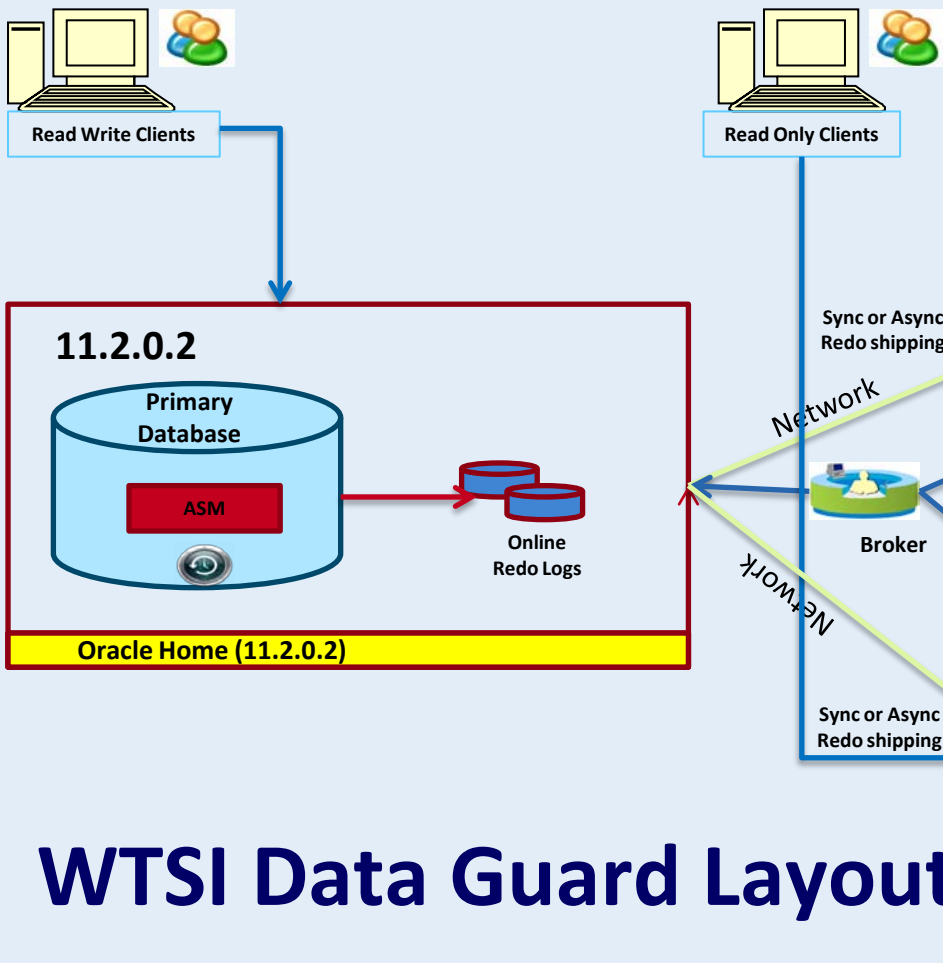
- 1000m<sup>2</sup> of Datacentre space split into 4 quadrants
- Current computational capacity - 16.5K cores and 20PB of storage
- 24/7 reliability with DR setup
- Going Green initiative – Implemented Virtualization, MAID storage, data compression using algorithms and storage solutions
- Power consumption constant at 1.2MW since May 2009 despite 20 fold data storage increase



# WTSI Oracle Grid Infrastructure - 11gR2



- Primary Site
  - 2 X 4 Node RAC clusters
  - 2 Node RAC Cluster
  - Oracle Restart Nodes
- DR Site
  - 4 Node RAC cluster
  - Oracle Restart

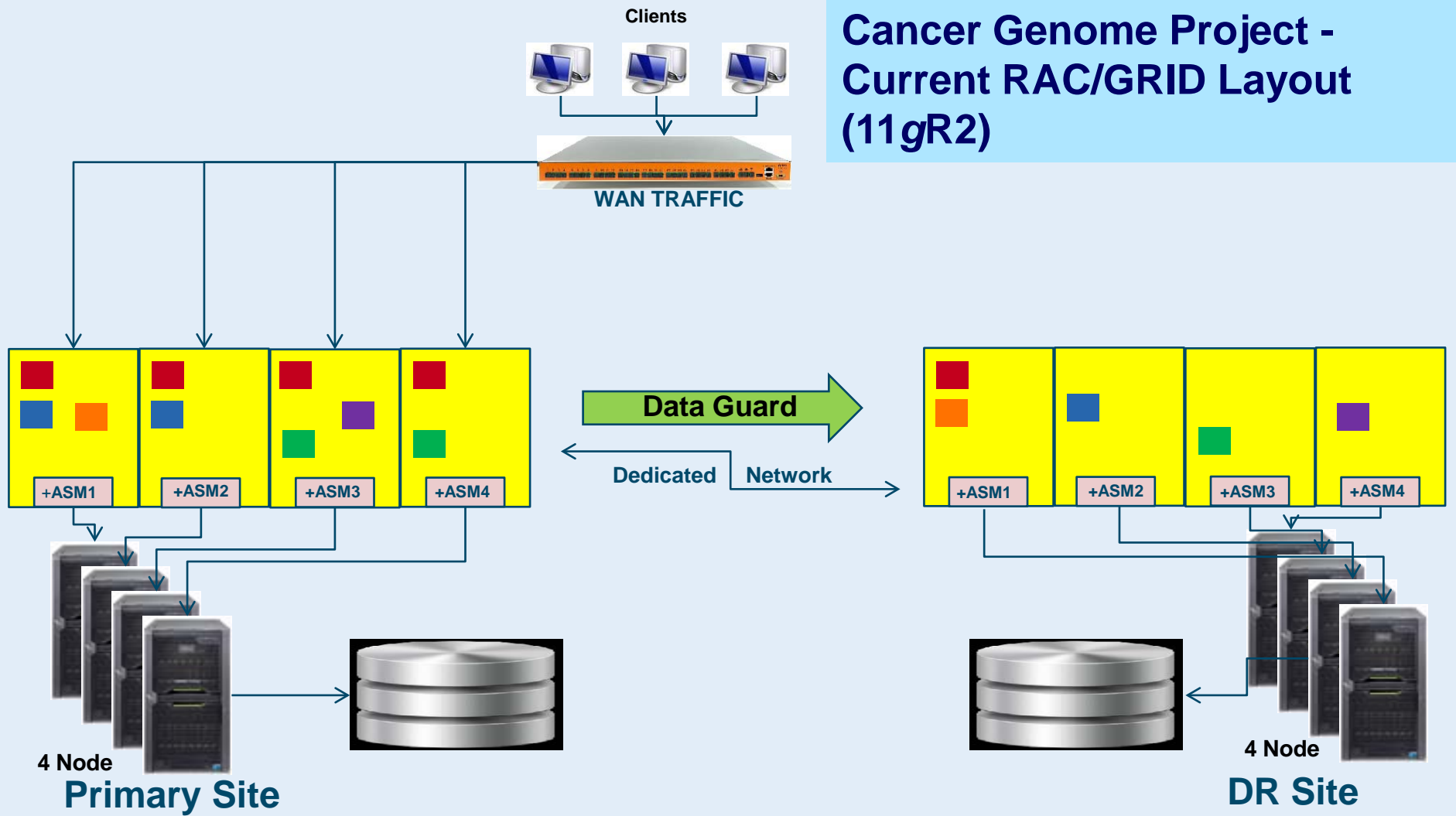


# WTSI Data Guard Layout

# Current Projects

- **Cancer Genome Project (CGP)**
  - Sanger Institute is a world leader in using DNA sequencing to identify mutations that causes cancer.
  - Make the scientific data available to the world via our websites 24x7
  - Multiple database deployments to support both laboratory and research websites
- **Laboratory Information Management System (LIMS)**
  - 24x7 multi-user laboratory information system designed to track and manage the efficient genotyping, phenotyping and production of model organisms for the purpose of scientific study
  - Backend databases play a vital role In supporting the system
  - We provide DaaS & SaaS to scientific collaborators around the world

# Cancer Genome Project - Current RAC/GRID Layout (11gR2)





# LIMS – Current Virtualization One-to-One Standby Layout (11gR2)

Primary Site

VMware

Active Data Guard

VMware

DR Site



DB9	DBn
Oracle home	Oracle home
Guest O/S	Guest O/S
DB7	DB8
Oracle home	Oracle home
Guest O/S	Guest O/S
DB5	DB6
Oracle home	Oracle home
Guest O/S	Guest O/S
DB3	DB4
Oracle home	Oracle home
Guest O/S	Guest O/S
DB1	DB2
Oracle home	Oracle home
Guest O/S	Guest O/S
Host O/S	

DB9	DBn
Oracle home	Oracle home
Guest O/S	Guest O/S
DB7	DB8
Oracle home	Oracle home
Guest O/S	Guest O/S
DB5	DB6
Oracle home	Oracle home
Guest O/S	Guest O/S
DB3	DB4
Oracle home	Oracle home
Guest O/S	Guest O/S
DB1	DB2
Oracle home	Oracle home
Guest O/S	Guest O/S
Host O/S	



# Current Challenges

- **Databases in consolidated environments compete for shared computing resources**
  - CPU, memory, sessions, parallel execution servers, I/O
- **Provisioning and management of many discrete databases**
  - Cloning
  - Managing a large number of virtual environments
  - Managing large number of standbys for HA
  - Backups
- **Patching and upgrading Oracle database/software binaries**
  - Many dependencies

# 12c Optimal Solution to Current Challenges

“Multitenant Architecture”

# LIMS Today - Virtualization and One-to-One Standby Layout (11gR2)

Primary Site

VMware

Active Data Guard

VMware

DR Site



DB9	DB10
Oracle home	Oracle home
Guest O/S	Guest O/S
DB7	DB8
Oracle home	Oracle home
Guest O/S	Guest O/S
DB5	DB6
Oracle home	Oracle home
Guest O/S	Guest O/S
DB3	DB4
Oracle home	Oracle home
Guest O/S	Guest O/S
DB1	DB2
Oracle home	Oracle home
Guest O/S	Guest O/S
Host O/S	

DB9	DB10
Oracle home	Oracle home
Guest O/S	Guest O/S
DB7	DB8
Oracle home	Oracle home
Guest O/S	Guest O/S
DB5	DB6
Oracle home	Oracle home
Guest O/S	Guest O/S
DB3	DB4
Oracle home	Oracle home
Guest O/S	Guest O/S
DB1	DB2
Oracle home	Oracle home
Guest O/S	Guest O/S
Host O/S	



# LIMS – Using Oracle Multitenant with Oracle Database 12c

## Primary Site



**Oracle  
Multitenant**

PDB9	PDB10
PDB7	PDB8
PDB5	PDB6
PDB3	PDB4
PDB1	PDB2
Container Database	
Oracle home	
Host O/S	

**Active Data Guard**



## DR Site

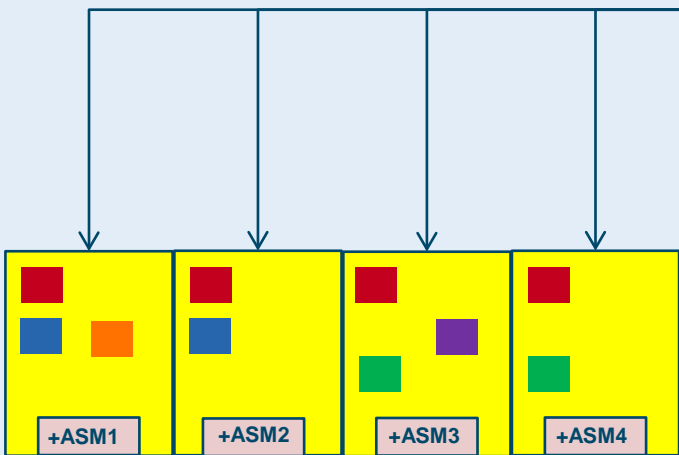
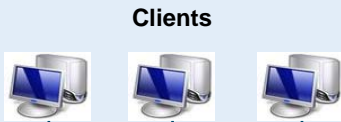


**Oracle  
Multitenant**

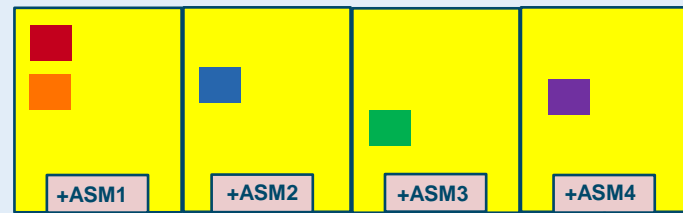
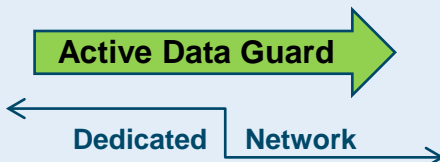
PDB9	PDB10
PDB7	PDB8
PDB5	PDB6
PDB3	PDB4
PDB1	PDB2
Container Database	
Oracle home	
Host O/S	



# CGP – Current RAC/GRID Layout (11gR2)

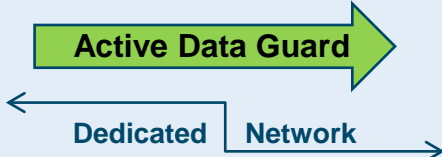
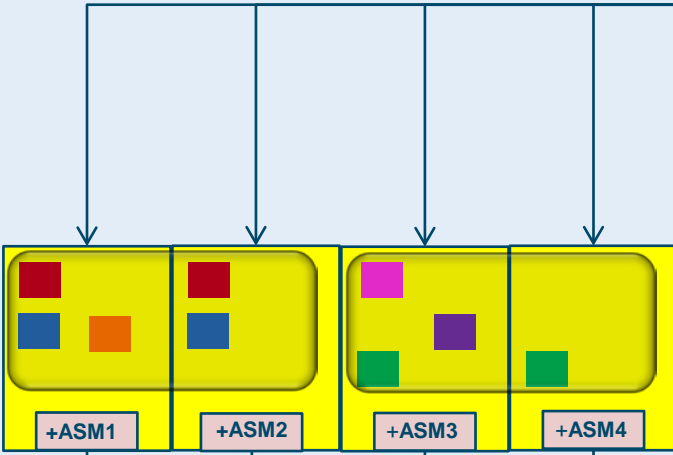
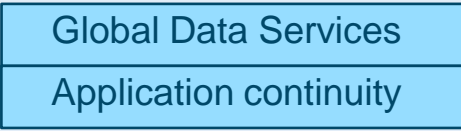
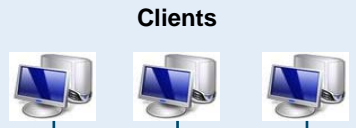


Primary Site

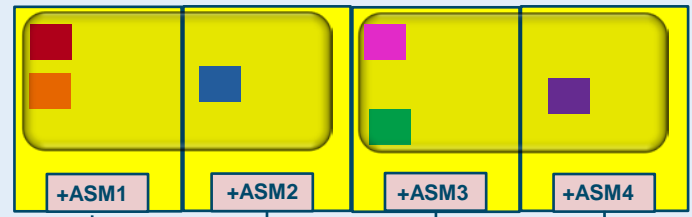


DR Site

# CGP – Oracle Multitenant (12C) with RAC



- Only two container databases
- More efficient resource utilization
  - Same RAC Advantages
- Manage as one
  - Backups and standbys
- New PDBs replicated automatically
- Move, Upgrade & Patch



4 Node  
Primary Site

4 Node  
DR Site

# A Smarter way to Consolidate

- **More efficient resource utilization**
  - Higher density and greater scalability
- **Manage many databases as one**
  - Manage, upgrade & patch
- **Backups are done at the container level**
  - Backed up as one, flexibility to restore & recover at PDB level
- **Standby is configured at CDB level**
  - All PDB's with in CDB are automatically replicated



# Summary

Looking forward to life with Oracle Database  
12c at WTSI 😊