



ARDENT PERFORMANCE COMPUTING

**Premier League Peek:**

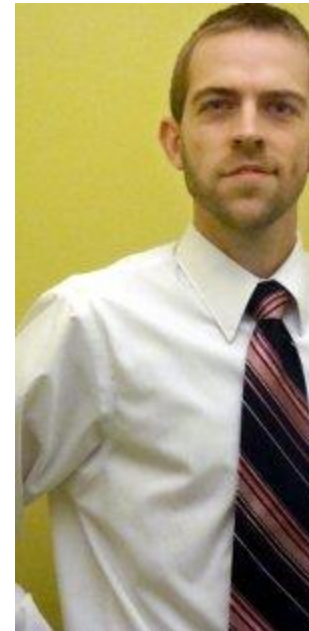
# **Wide Scale ASM Adoptions and Lessons Learned**

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Chicago  
ENFJ

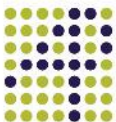
Music  
Theology  
Swing Dancing  
Motorcycles



# Survey



- Are you using ASM in production?
- How many instances of Oracle is your business running?
- How often do you provision a database or server?
- How many people are involved in provisioning one new server and database?



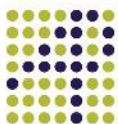
# Goals

This presentation is **NOT**:

- Blanket recommendations for current or future decisions
- Comprehensive industry research (like Gartner)

This presentation **IS**:

- Summary of past decisions and experiences
- A handful of medium and large companies with whom I worked or corresponded



# Large Scale ASM Adoptions

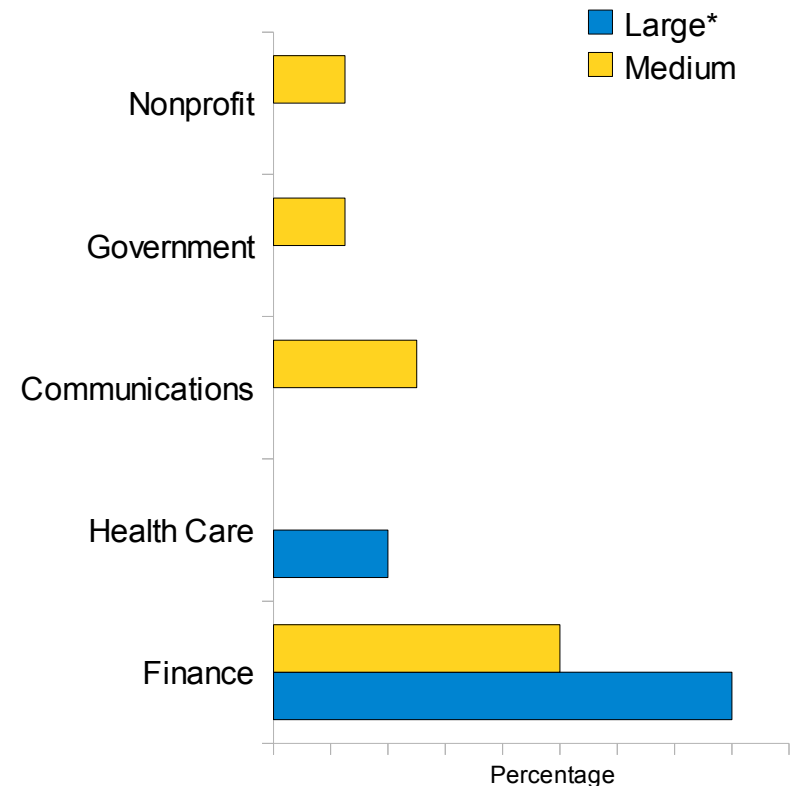
- **About the Companies**
- Business Drivers
- Change Management and Process
- Platforms, Versions and Features
- Specific Challenges and Strategies
- Summary of Lessons Learned



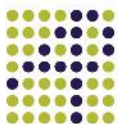
# About the Companies

- Example 1
  - Project started 2004
  - Now  $\approx$  700 of 1700 instances on ASM
- Example 2
  - Project started 2008
  - Now  $\approx$  700 of 8000 instances on ASM
- Example 3
  - Project started 2009
  - Now  $\approx$  30 of 1000 instances on ASM

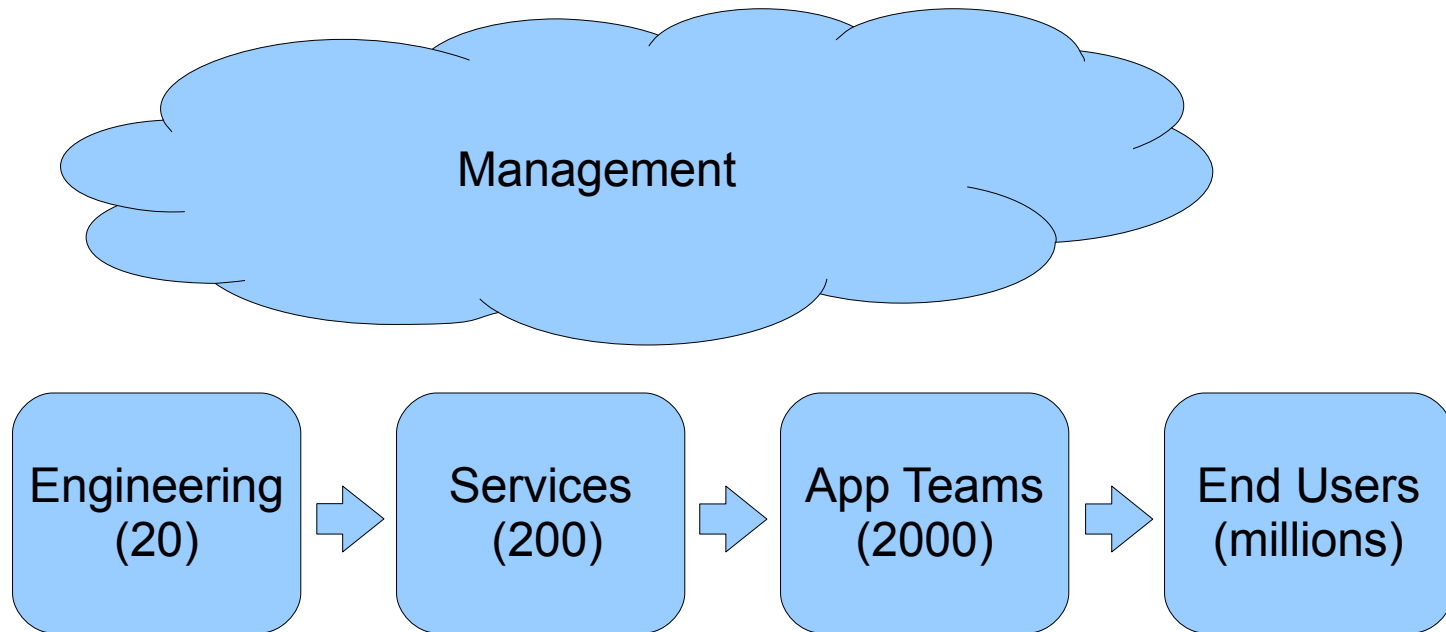
United Kingdom, United States, Saudi Arabia,  
Austria, Switzerland, Australia, Bulgaria



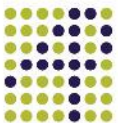
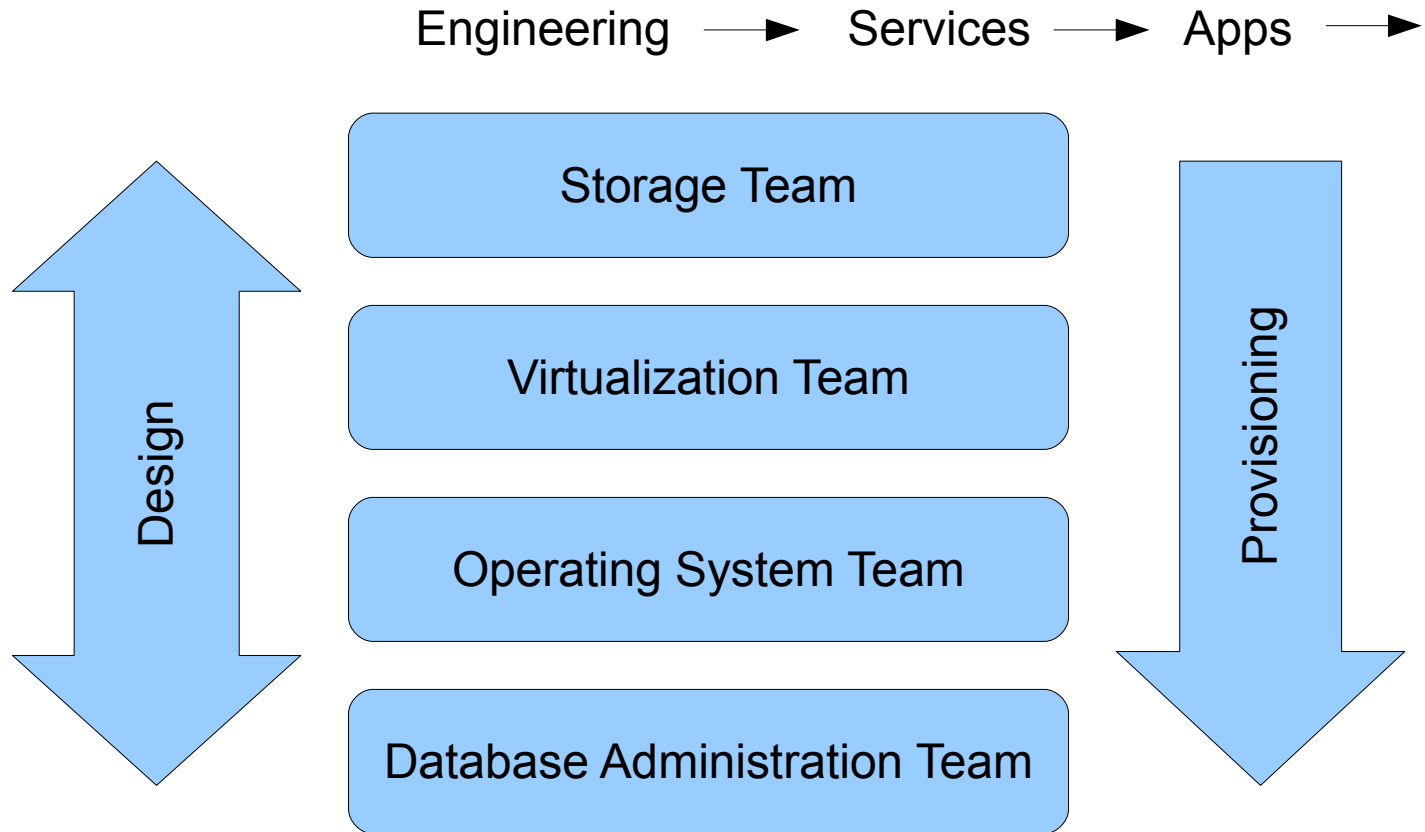
\*Large: at least 1000 instances



# Large Companies



# Large Companies



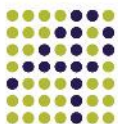
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# Business Drivers

- (#1) Strong Statements about Strategic Direction from Oracle
- (#2) Total Licensing Cost
- Fewer Vendors and Support Organizations in the Stack
- RAC and Linux
- Huge Amounts of Local Disk and Linux
- Comparable performance to RAW, supports needed management functions
- Ease of use

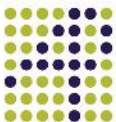
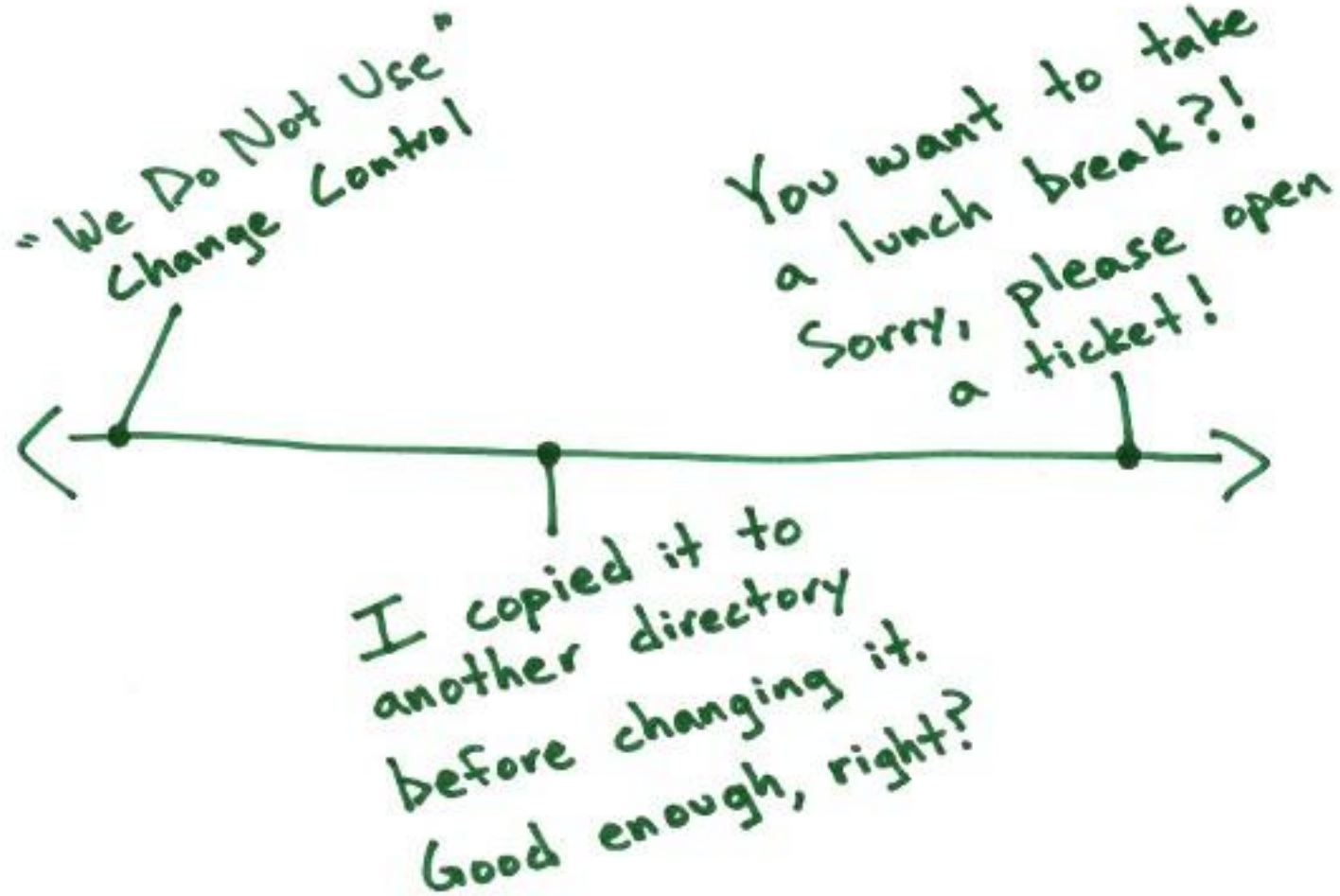


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# Change Management and Process



# Change Management and Process

## Process\*

- Always required at large companies
  - Little mention of specific principles or benefits from survey respondents
  - Sometimes a separate group was responsible for process
- Common to use abbreviated version for ASM deployment
  - Minimal requirements engineering
  - Minimal prototyping beyond proof of concept



\*Derived from ITIL, CMMI, Lean, Six Sigma, Agile, etc



# Change Management Tools

## Version Control

- Seems common to check-in scripts and files somewhere
- Free and commercial tools have both been used
- Distributed SCM not common

## Document Control

- In-house solutions very common
  - Sometimes integrated with project management, stages/phases and signoffs

## Provisioning and Release Management

- In-house solutions very common (scripts & directories)
  - Repackage oracle home, similar to clone
  - Silent install
- Third party solutions for full automation were mentioned
- No mention of Grid Control Provisioning Pack



# Processes

- Two Approaches
  - New Platform Introduction
    - Still useful to have design document dedicated to ASM
    - Much engineering needs to be done early in process
  - Independent Introduction
    - Might be hard to find early adopters
- Timeframe (from project start to active production usage)
  - 10-18 months: comfortable
  - 6 months: feels fast, had to learn things in production

## Important Notes:

- Leverage previous experience (individual and corporate)
- Competent engineers can have the Oracle stack up and running very quickly
- Focus testing on business integration (scripts and stack), not ASM product itself
- Crucial: start talking about ASM with all engineering & service teams on day 1 – involve system and storage groups from the beginning



# Large Scale ASM Adoptions

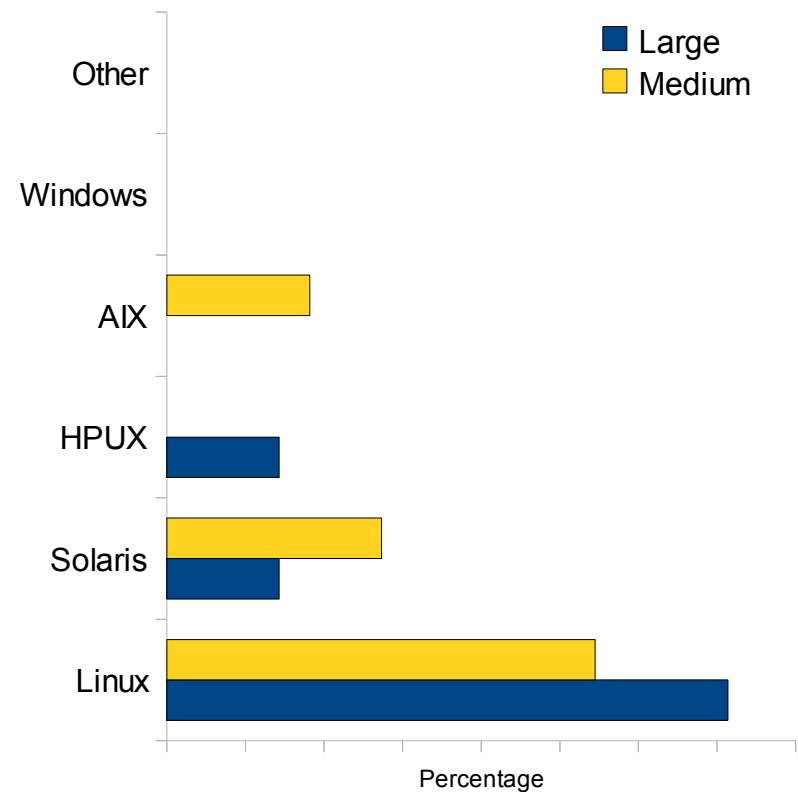
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# Platforms

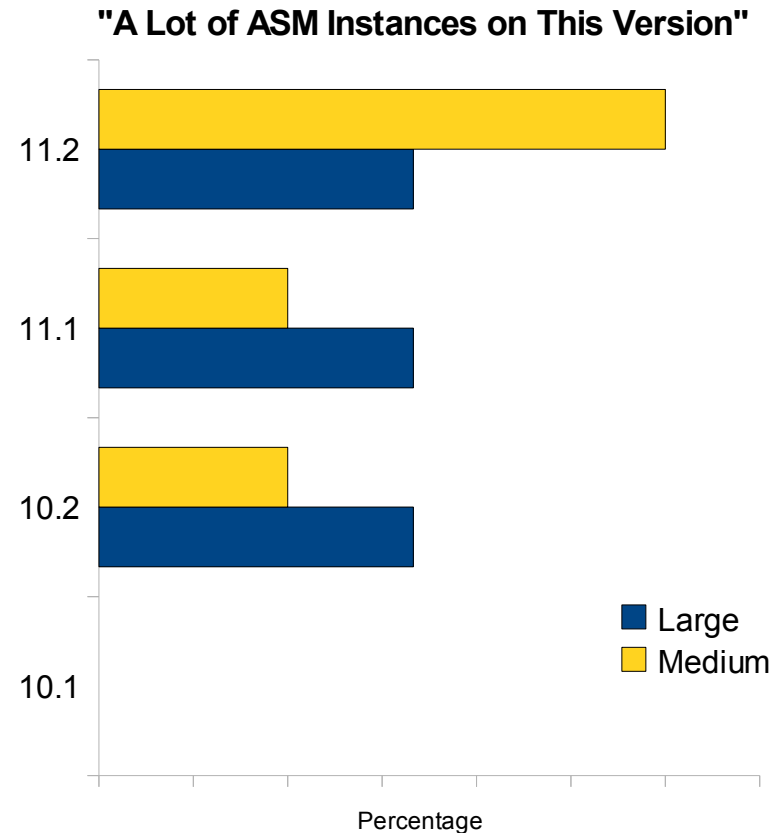
- Some companies had “a few” ASM instances on AIX, HPUX or Solaris
  - Most large companies had not yet deployed ASM on a second platform.
  - About half of medium companies were running ASM on more than one platform
- No-one I corresponded with was running ASM on Windows

"A Lot of ASM Instances on This Platform"



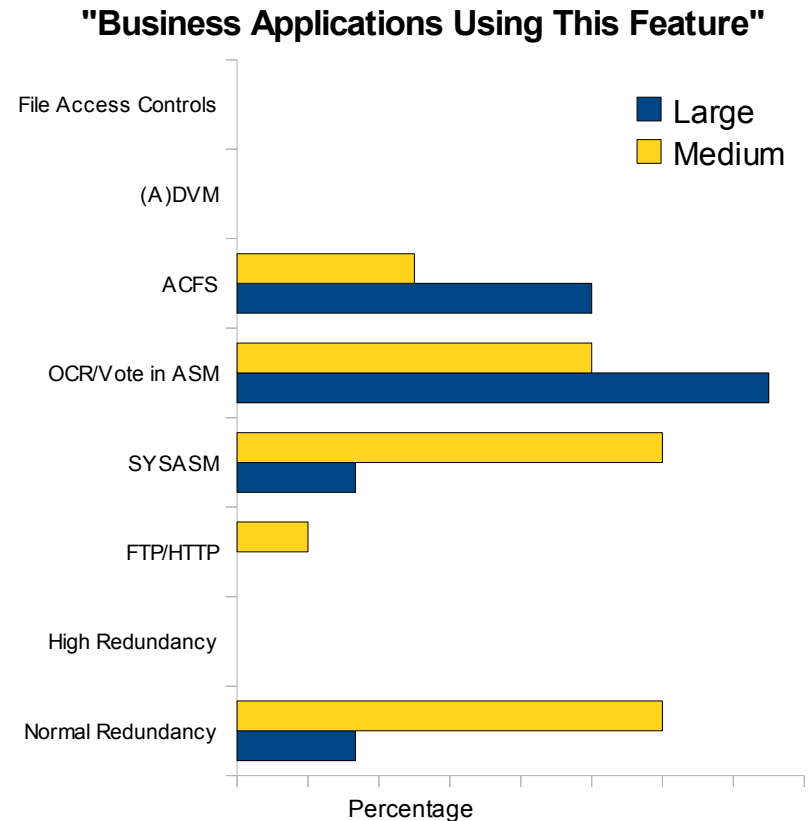
# Versions

- No-one I corresponded with was running ASM 10gR1
  - Seems that ASM uptake didn't really start until 10gR2
- Several companies run 10g databases on ASM 11g
  - Are some problem reports, yet this doesn't seem uncommon
- On shared servers, single database often drives server ASM upgrade



# Features

- Dynamic online operations were mentioned many times
- Almost everybody had tested Normal Redundancy; significantly fewer had explored High Redundancy
- Almost nobody had explored File Access Controls or DVM (outside of ACFS)
- SAN-level copies and swinging LUNs between servers were also mentioned



Note: percentages adjusted for version usage



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# Specific Challenges and Strategies

1. Many people don't understand what ASM is or how it works
2. Storage and System Teams are resistant to accepting ASM
3. Preventing poor configuration of storage and diskgroups
4. Managing Operating System devices
5. In-house monitoring and management infrastructure
6. Migrations
7. Patching and Upgrades
8. Other Challenges



# Challenge: Many People Don't Understand What ASM Is

- Universal challenge for large companies
- Paradigm shift: ASM isn't exactly a volume manager or filesystem
- “Visibility” problem [Riyaj] – ASM seems very opaque, “black box”

## Strategies:

- Education, Lobbying, Socializing
  - Take advantage of existing forums (monthly/weekly meetings)
  - Meet with architects from all teams – whiteboard, discuss pros/cons
  - Bring in outside instructors for short training
- Clear documentation and lots of communication
- Involve all teams in decision-making to whatever extent possible



# Challenge: Storage And System Teams Are Resistant To ASM

- Ambiguity around roles and ownership of ASM
- Perceived as new and immature technology
- Sometimes fearful of job changing, becoming irrelevant

## Strategies:

- Take neutral position on decisions that are yet to be made
- Involve people in the process, keep them up-to-date
- Start early – negotiating access at one large corp took 12 months
- Look for a champion on storage/system side
- Generally, system teams did not take any interest in learning ASM...  
in the end, DBAs had responsibility for ASM
- Some companies allow DBAs root commands, others do not



# Challenge: Preventing Poor Storage And Diskgroup Configuration

- Many different kinds of storage available to ASM (underlying disks/flash, cache, RAID, size, etc)
- Poor decisions about combining storage in a diskgroup leads to unpredictable performance and other potential problems

## Strategies:

- Large organizations generally have a small menu of available storage configurations called “tiers”
- Prevalent strategy is procedural – create a “standard” or “policy” and train DBAs to follow it
- Medium-sized businesses sometimes work on a case-by-case basis
- “BAARF is a great idea, but hard to argue in a real world ;-)” [Martin]



# Challenge: Managing Operating System Devices

- Permissions and device naming must persist across system reboots and reconfigurations
- Adding and removing disks can easily cause problems
- Needs to be clear to all teams how each device is used

## Strategies:

- Coordination between systems and DBA group is essential
- Linux: ASMLib and udev both used, ASMLib seems more common
- Non-Linux: perms tend to persist, people tolerate cryptic names or use symlinks
- Naming policies important (wherever naming is possible)
- Checklists and helper scripts are useful



# Challenge: In-house Monitoring And Management Infrastructure

- Some orgs have extensive in-house scripts and software for managing and monitoring systems
- Anything filesystem-based will no longer work with ASM

## Strategies:

- Budget time to modify/enhance existing scripts
- Write scripts to simulate df and du for ASM
- One company excluded ASM from oratab
- Third party tools are becoming more common; work well with ASM

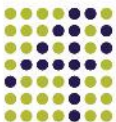


# Challenge: Migrations

- There are many existing systems which will need to be converted to use ASM

## Strategies:

- Vast majority of migrations were cross-platform (not in-place)
- Even at large companies, many are handled individually
- Vast majority use RMAN
  - Some systems not using current storage technologies (ASSM, etc) were migrated with export/import



# Challenge: Patching And Upgrades

- There are many existing systems with older version of ASM that will need to be upgraded. All will eventually need to be upgraded.
- Patching must be controlled and the number of different software configurations in the enterprise must remain manageable.

## Strategies:

- Upgrades are done by installing to new home.
  - Rolling upgrades and maintenance windows are both used.
- Several large companies regularly apply PSUs to all systems.
- Most companies manually run opatch (rather than automating)
- Large companies maintain list of patches applied to all instances



# Other Challenges

## Non-Technical:

- Keep pace with Oracle Corp's general practices
  - Dir structure, users/groups, etc
  - Some tools have assumptions about where files will be
  - Smooth interaction w/support
- Interactions with third-party
  - Multipath, device drivers, etc
  - Important to consider full stack; discuss w/all vendors
- High rate of change
- Training

## Technical:

- “ASM is pretty simple, mostly just works” [Matt]
- Networking problems for clusters
- Instance crashes on clusters in worst cases
- Handful of ASMCMD issues
- Headaches with third party software
- ASM does have bugs; keep it patched



# Large Scale ASM Adoptions

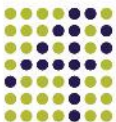
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# What Was Hard

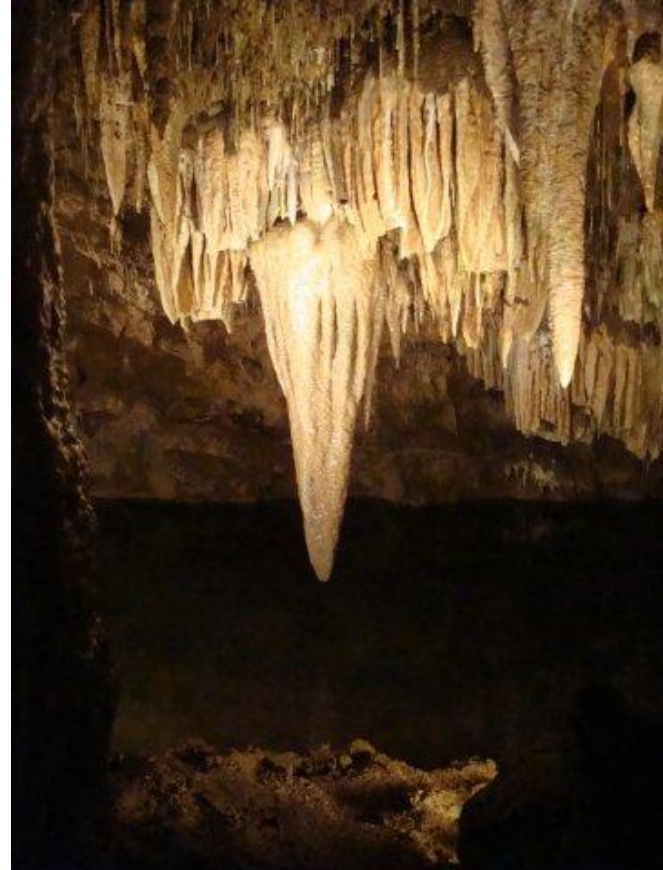


- (#1) Buy-in from system teams; social acceptance
  - Getting high-level access for storage management
  - Roles and responsibilities
- Misconceptions about visibility into ASM
- Business processes integrated with filesys-based approach
- Determining proper naming standards, device mappings



# What Didn't Work At All

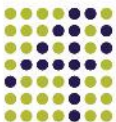
- All filesystem-based operations and processes
  - Clone or copy operations
  - CSV for ETL
  - User-managed backup
- Bugs (e.g. 10gDB & 11gASM)
  - Rare cases of corruption/loss
  - Instance crash possible
- Relying on stable default device names across reboots
- Several people recommend against ASM mirroring



# What Was Easy



- Adding/removing disks online
- Very little tuning required
- Created a toolkit for managing ASM, modeled after LVM
- Oracle has been pretty responsive with bugs in ASM
- Once scripts were in place, easy to rapidly provision
- Good internal documentation paid off
- Very few problems in general



# Lessons Learned

- In large businesses, organizational stuff is the “biggest nut to crack”
  - Political battle to use it in the first place
  - Understand the server/OS perspective
- Follow Oracle recommendations; do things the “Oracle” way
- Choose simpler configuration when practical
  - Uniform LUN sizes, fewer diskgroups, same versions
- Tweaking of maintenance scripts can be a big challenge
- Can work well to train only a few DBAs on ASM – not whole team
- Pay good attention to sizing (also in backup strategies)
- Don't neglect patching



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Thank You:

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