

Management Report

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Comparing IBM Informix and Oracle Database for High Availability and Data Replication

International Technology Group

609 Pacific Avenue, Suite 102
Santa Cruz, California 95060-4406
Telephone: 831-427-9260
Email: Contact@ITGforInfo.com
Website: ITGforInfo.com

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Executive Summary

The Informix Alternative

Demands for 24/7 availability continue to expand. Not only conventional transaction processing systems, but also, increasingly, data warehouses, e-commerce, social media, CRM and other applications are becoming “business-critical” in the sense that downtime must be avoided.

Organizations are faced with the need to put high availability clusters in place for a growing number of systems. But these may be expensive. Costs of software licenses, as well as of implementation, operation and support may prove daunting even for large, well-funded IT operations. For small and midsize businesses, costs may be prohibitive.

These issues are familiar to organizations considering deployment of Oracle Databases and Real Application Clusters (RAC). They should, however, be aware that there is an alternative. IBM Informix offers enterprise-class database availability in a significantly less complex, less expensive manner.

IBM Informix is one of the world’s most widely used databases. Its more than 200,000 customers range from Fortune 100 corporations to small businesses. Its growth has outpaced the relational market as a whole. Informix is supported by more than 3,000 IBM business partners, and enjoys exceptional levels of customer satisfaction and loyalty.

Informix deployment has been driven by its strengths in replication – Informix employs one of the industry’s most scalable and efficient replication architectures – and data management. It also combines strengths in embedded data management with low administrative overhead, highly effective use of server resources and enterprise-class resilience.

Established Informix strengths have been significantly reinforced by regular new releases over the years. Informix Flexible Grid offers compelling capabilities for highly efficient change management, workload balancing, and enterprise-class failover and recovery in distributed database networks. Moreover, it may be deployed and provisioned on heterogeneous, commodity hardware, supporting different operating systems and database versions.

Other features provide high value in centralized environments. In both types of deployment, Informix represents an alternative to Oracle databases and Real Application Clusters (RAC). In addition to functional benefits, Informix offers significantly lower costs.

In representative distributed deployments detailed in this report, for example, three-year costs for use of Informix Flexible Grid averaged almost two-thirds less than for use of Oracle Database 12c and RAC. For centralized high availability deployments, Informix costs averaged 45 percent less.

Informix Flexible Grid

One major area of Informix popularity has been in geographically distributed database applications. Customers include some of the world’s largest retailers, financial services companies, hotel chains, distributors, manufacturers, insurers and government agencies. Installations with thousands of remote nodes are common, with the largest exceeding 10,000 nodes.

The introduction of Informix Flexible Grid in October 2010 significantly expanded Informix capabilities for such applications. It introduced the ability for organizations to create grid topologies that enable transparent, any-to-any application failover across diverse platforms at any number of sites.

Informix Flexible Grid employs large-scale mechanisms that allow servers to be easily provisioned, updated and removed. Data definition language (DDL) operations may be performed, tables updated and workloads balanced across the entire grid. Data may be backed up to, and restored from cloud storage.

Customers include not only large companies and government agencies, but also small and midsize organizations. The largest Informix Flexible Grid users surveyed for this report employed 1,000+ nodes, and the smallest reported significant gains in supporting two remote sites. Similar experiences were reported for installations in the 5- to 100-site range.

For organizations of all sizes, Informix Flexible Grid provides a more cost-effective alternative to topologies built around Oracle RAC.

For example, in representative large installations in six industries, overall three-year costs for use of Informix Flexible Grid averaged 69 percent less than for use of Oracle Database 12c with RAC. Figure 1 illustrates these results.

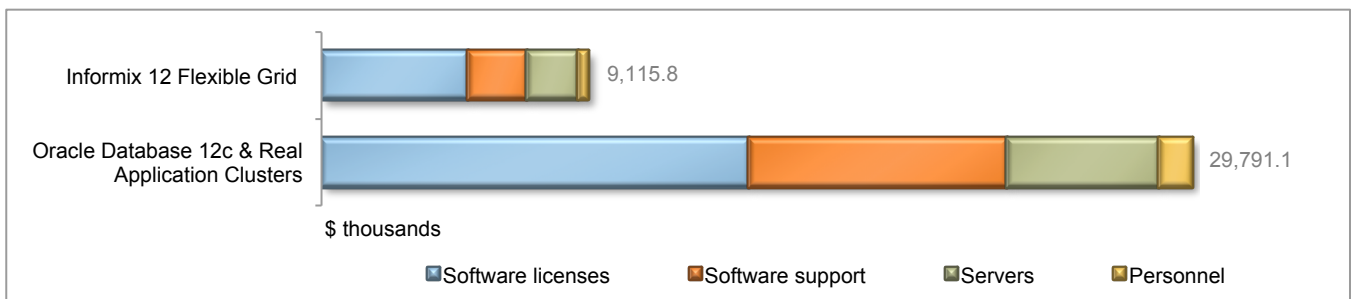


Figure 1: Three-Year Costs for Use of Informix 12 Flexible Grid versus Oracle Database 12c and Real Application Clusters for Distributed Deployments – Large Installations

In six midsize installations in these and other industries, overall three-year costs for use of Informix Flexible Grid averaged 43 percent less. Figure 2 illustrates these results.

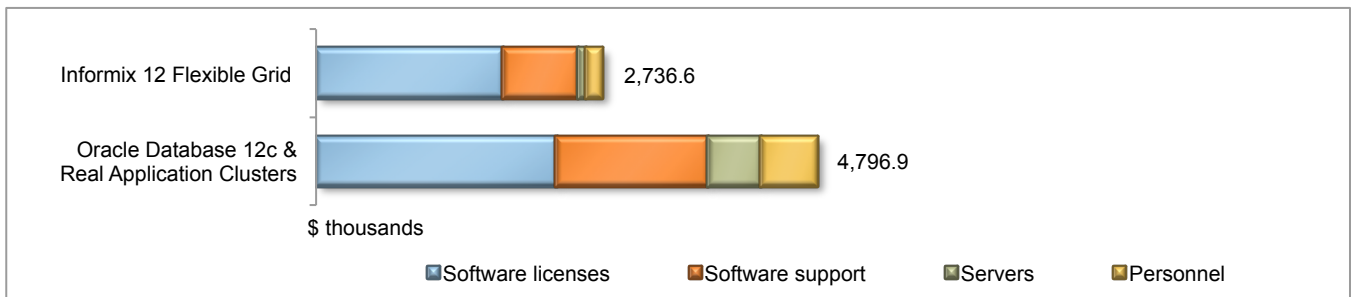


Figure 2: Three-Year Costs for Use of Informix 12 Flexible Grid versus Oracle Database 12c and Real Application Clusters for Distributed Deployments – Midsize Installations

Cost calculations are based on topologies built around Informix 12 Enterprise Edition and Oracle Database 12c Enterprise Edition with RAC in larger sites; and Informix Workgroup Edition and Oracle Database 12c Standard Edition, which includes RAC, in smaller sites.

It would be prohibitively expensive to employ Oracle Database Enterprise Edition at small sites. The costs of Oracle’s preferred replication solution, GoldenGate, would also be unrealistic. For this reason, Oracle Database Standard Edition and a less expensive third-party replication tool were employed.

Calculations include software license and three-year support costs for databases, clustering and replication tools. Personnel costs are for full time equivalent database administrators (FTE DBAs). These are calculated based on prevailing average salaries for individuals with appropriate skill sets.

Allowance is also made for differences in server costs. Informix Flexible Grid requires single servers at remote sites, and in many cases allows existing hardware to be employed. Oracle RAC requires a dual-server cluster of identical hardware and software configurations, resulting in a higher percentage of server upgrades as well as addition of a second server.

Calculations allow for replacement of between 15 and 100 percent of existing servers, depending on installations, along with second RAC servers. Costs include acquisition of x86 server hardware – primarily Dell, Hewlett-Packard (HP) and IBM machines – and operating system (Microsoft Windows Server or Linux) software, as well as three years of hardware maintenance and software support.

Six large installations employed for cost comparisons are in banking, government, hospitality, insurance, logistics services and retail organizations with between 100 and more than 1,000 remote sites. Six midsize installations are in agribusiness, government, manufacturing, retail, transportation and wholesale distribution organizations with between 8 and 80 remote sites.

Representative installations were constructed using input from 42 Informix and 40 Oracle RAC users in these industries. The basis of these calculations, including descriptions of installations and methodology, is outlined in the Detailed Data section. Detailed cost breakdowns may also be found in this section.

Centralized Deployments

Informix has also been widely deployed for high availability clusters supporting centralized business-critical systems. In this role, Informix offers equivalent functionality to Oracle RAC at a significantly lower cost. This is the case whether it is deployed on UNIX or on x86 Windows or Linux servers.

In representative UNIX server installations in six industries, for example, three-year costs for use of the latest Informix 12 averaged 54 percent less than for use of Oracle Database 12c with RAC. Figure 3 illustrates these results.

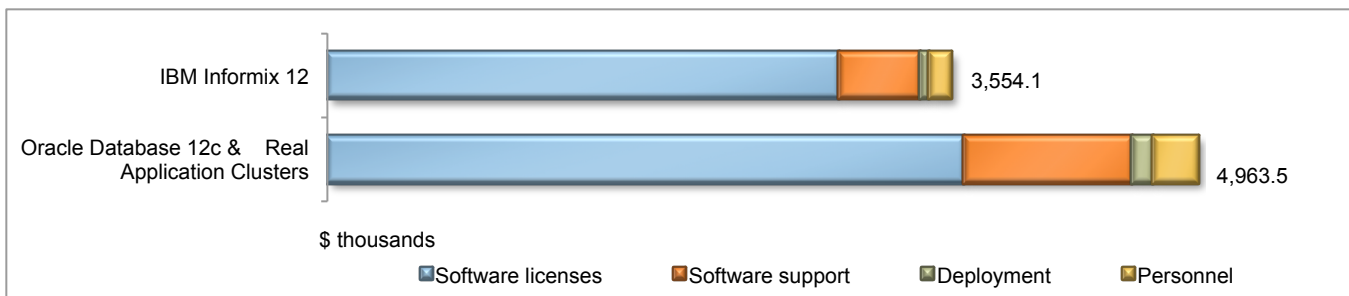


Figure 3: *Three-Year Costs for Use of Informix 12 versus Oracle Database 12c and Real Application Clusters for Centralized UNIX Server Deployments*

In x86 server installations in these and other industries, three-year costs for use of Informix 12 averaged 28 percent less. Figure 4 illustrates these results.

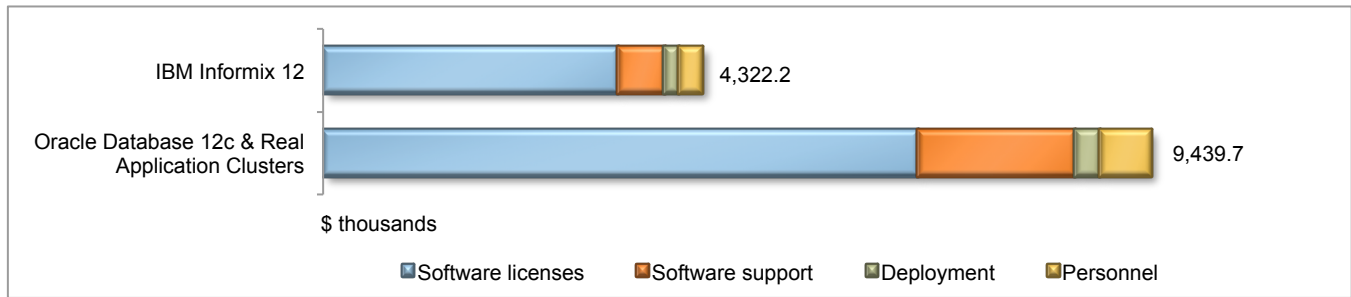


Figure 4: *Three-Year Costs for Use of Informix 12 versus Oracle Database 12c and Real Application Clusters for Centralized x86 Server Deployments*

Calculations include license and support costs for Informix 12 Enterprise Edition, and for Oracle Database 12c Enterprise Edition with RAC plus GoldenGate and/or Active Data Guard where appropriate. Personnel costs are for FTE DBAs for a three-year period. Deployment costs are for external assistance during implementation.

UNIX server installations employ IBM Power or Oracle SPARC T5 or M Series systems. x86 servers include Intel E5- and E7-based models with Windows or Linux.

Because Oracle's pricing model tends to favor Intel-based platforms, Oracle software costs relative to Informix 12 are lower for x86 than UNIX servers. Informix 12 personnel costs, however, averaged 55 percent and 52 percent less for UNIX and x86 servers respectively, while deployment costs averaged 41 percent and 58 percent less.

Lower Informix 12 personnel costs reflect the greater complexity and lower automation levels of the Oracle database and RAC environment. Among organizations surveyed for this report, FTE DBA staffing for centralized Informix deployments was typically estimated at two or more times less than for Oracle databases with RAC.

Degrees of complexity also affect deployment times. For example, Oracle RAC users reported that systems were brought into production in two weeks to 10 months – most responses were in the four-week to six-month range – with an average of around 118 days. In comparison, Informix users reported eight days to three months, with an average of around 57 days.

Installations were based on input from a 29 Oracle RAC and 21 Informix high availability users in the same industries. As for distributed comparisons, the basis of these calculations, along with cost breakdowns for all installations may also be found in the Detailed Data section of this report.

Capability Differences

Core Designs

Cost disparities reflect important capability differences. Informix, for example, is built around an “object relational” design combining SQL and object-oriented architecture. This provides greater flexibility in creating and managing data structures, and has enabled Informix to integrate new data types in a comparatively simple manner.

Informix incorporates software-based virtual processors (VPs). These are dedicated to handling specific tasks such as SQL execution, threading, and memory, I/O and communications management. VPs enable high levels of configuration flexibility, materially improve the efficiency with which complex, diverse workloads are executed and contribute to performance, scalability and manageability.

In these and other areas, Informix employs streamlined, lightweight data structures that deliver high throughput and low processor overheads. Simple, automated administrative functions mean that few DBAs are required.

A further Informix characteristic is that replication, clustering and disaster recovery form part of the core Informix system architecture. In comparison, Oracle employs a “pure” relational design that has been progressively enhanced since the early 1980s through separate products and subsystems. The result is a significantly more complex environment.

Currently, Oracle high availability clustering is enabled by RAC; disaster recovery by Data Guard or the more sophisticated Active Data Guard; and replication by GoldenGate, which is now the company’s strategic direction for replication technology. Greater complexity translates into higher administrative costs and processor overhead.

Distributed Deployments

In distributed applications, a major difference is that, in an Oracle RAC environment, replication, high availability, workload management and other key functions are primarily located in the cluster. With Informix Flexible Grid, they are located in the network.

Informix Flexible Grid replication is conducted using a low-latency asynchronous log-based technique. Failover to any node within a geographically dispersed grid may occur automatically in seconds. Workloads may be spread across all nodes for more effective capacity utilization and maintenance of service quality.

This approach has proved popular among organizations that must maintain high levels of availability for remote office databases, but wish to avoid the costs and complexities of local failover clusters. It allows them to maintain local service not only in the event of unplanned outages, but also during planned outages for such tasks as software upgrades, database maintenance and patching.

Informix Flexible Grid may be deployed in topologies in which failover and recovery is handled purely within a grid. Figure 5 shows an example.

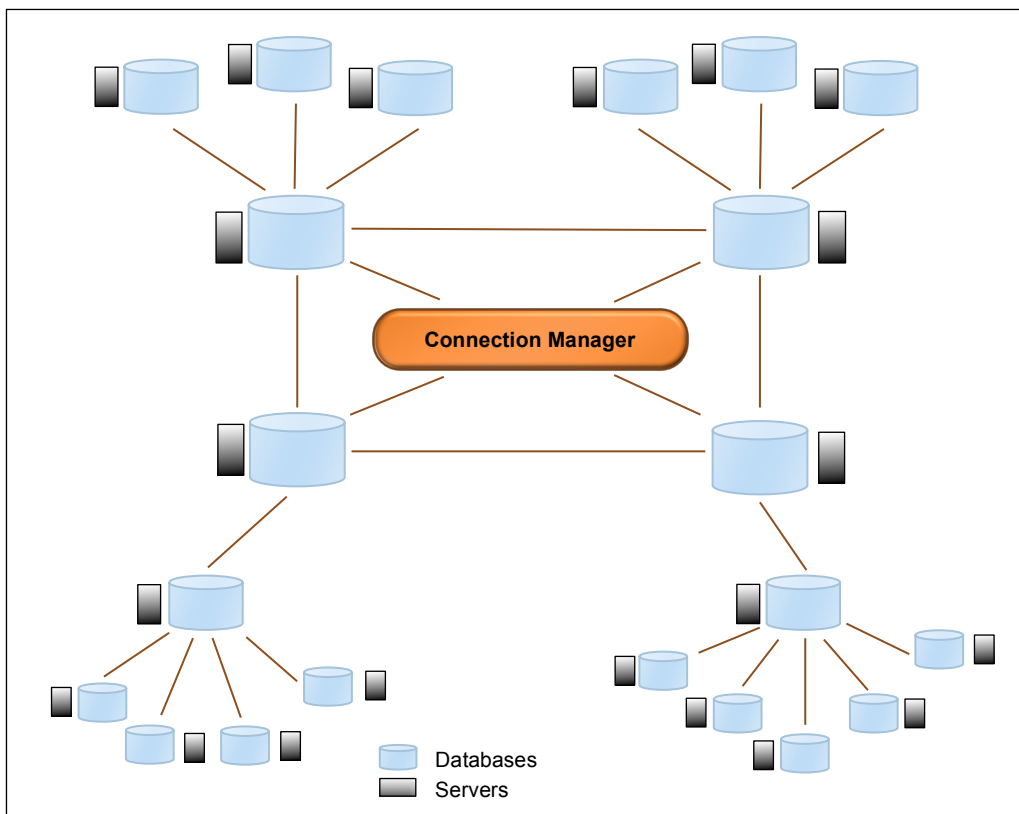


Figure 5: Informix Flexible Grid-only Topology – Example

In practice, users often combine Informix Flexible Grid with established high availability features such as High Availability Data Replication (HDR) and Remote Standby Server (RSS) in hybrid topologies.

HDR enables active-active clustering, employs high-speed synchronous or asynchronous replication to secondary databases, and enables failover between these at distances of up to 100 kilometers (km). In practice, up to 30 km is the norm. In these respects, HDR is similar to Oracle RAC.

Figure 6 shows an example of this approach in a major retail bank. In this case, HDR clusters are employed for databases at the bank's central data center and major regional centers. RSS nodes – which employ asynchronous replication – are employed to maintain secure remote copies in case a disaster causes loss of HDR servers.

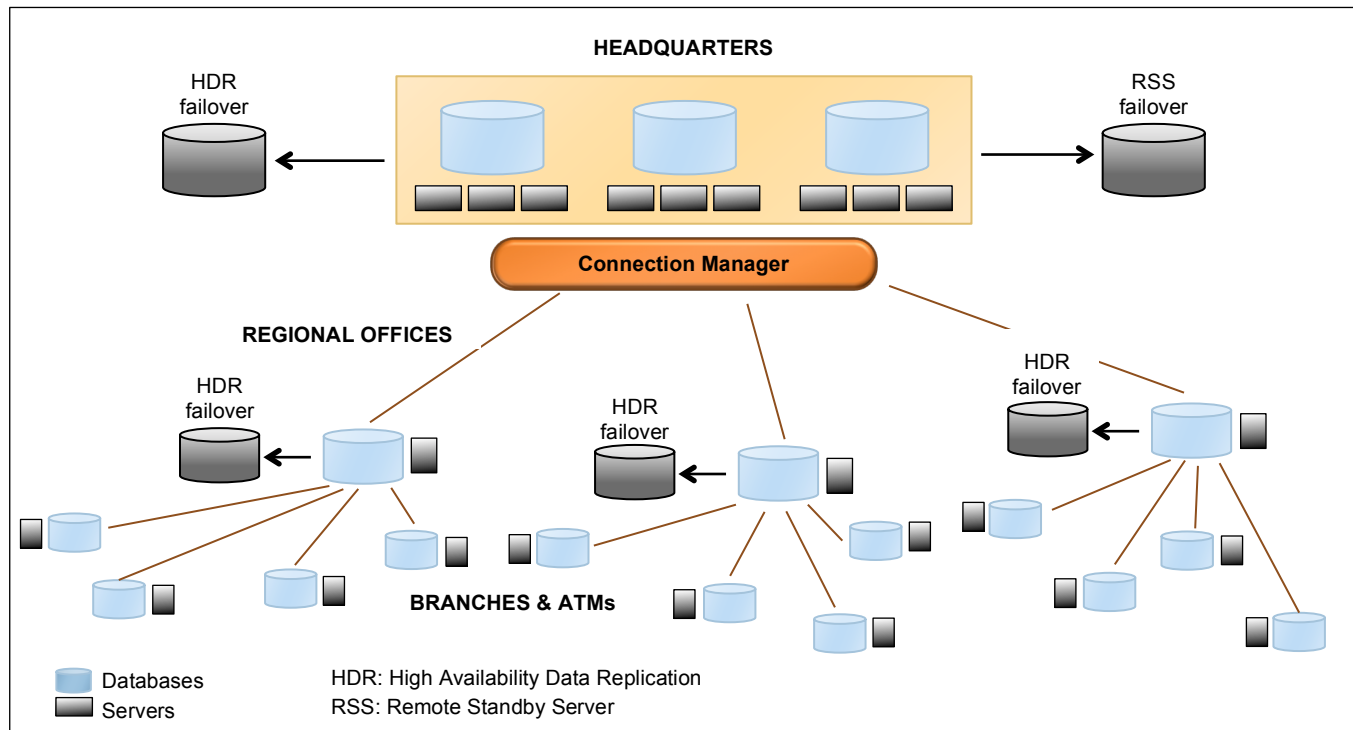


Figure 6: Informix Flexible Grid Hybrid Topology – Banking Example

Informix Flexible Grid Connection Manager forms the core of hybrid as well as grid-only topologies. It connects to all servers within a grid, including, where appropriate, HDR clusters. Statistics are collected on server characteristics, available workload capacity and status. Based on this information, client application connection requests are routed to the appropriate server based on service level agreement (SLA) targets.

Connection Manager also implements a virtualization layer that insulates Informix databases from underlying server hardware and operating systems. There is no Oracle equivalent.

Centralized Deployments

In centralized environments, a primary Informix server acts as the focal point. It may be coupled with a secondary HDR node in a classic local failover cluster; with one or more RSS nodes; and with a third node type, Secondary Data Server (SDS), which allows multiple servers to share a common disk array.

RSS has been adopted in a variety of roles. Large organizations often employ it at “bunker” locations designed to protect against events disabling both primary and secondary sites. It also offers near-HDR capability for organizations whose secondary sites are too far away for synchronous replication, or who wish to minimize network bandwidth costs.

HDR and SDS also allow users to offload read-only processing to secondary servers. This capability is commonly used to handle query and reporting workloads.

These options, illustrated in figure 7, offer a great deal of configuration flexibility.

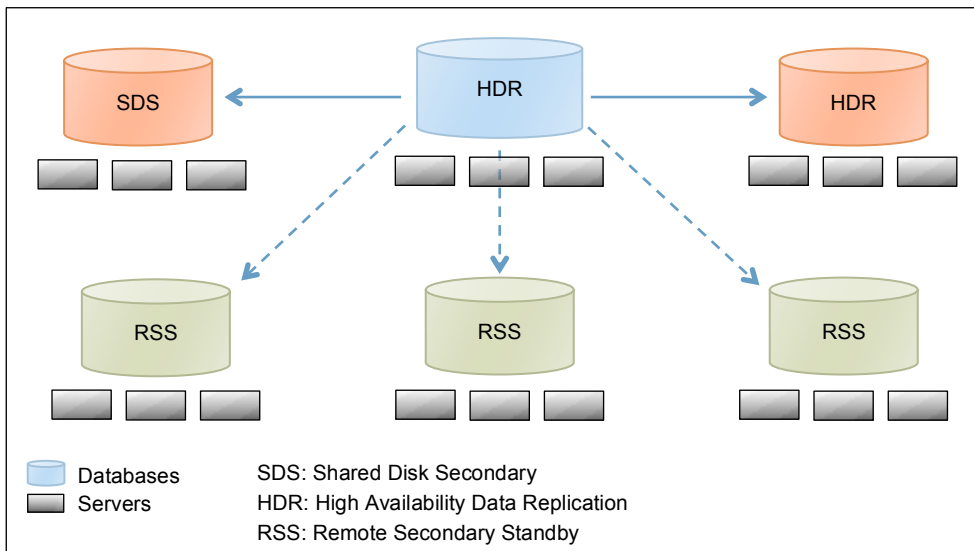


Figure 7: Informix 12 HDR Cluster Options

Informix centralized high availability solutions provide the same level of capability as Oracle RAC. The principal differences are that the overall Informix environment is less complex, and that acquisition and operating costs are significantly lower.

Conclusions

The capabilities of Informix 12 provide clear-cut value as an alternative to Oracle Database and RAC in distributed as well as centralized deployments. They also, however, have broader implications.

Growth in conventional data volumes and the emerging world of Big Data are making replication an increasingly critical feature of the IT landscape. At the same time, pressures to accelerate collection, interpretation and delivery of information are placing new stresses on database and data warehouse infrastructures.

These trends make integrated database and replication architecture – which is unique to Informix – increasingly attractive. Organizations may accelerate data management and movement processes while minimizing use of server resources and network bandwidth, reducing administrative complexities, maintaining availability and operating transparently across diverse hardware and software bases.

Organizations with longstanding Oracle commitments may argue that Oracle is their database standard. However, as far as costs are concerned, “sole source” procurements seldom represent a best practice in the IT world. Informix 12 offers an opportunity for greater cost-effectiveness.

Costs are not the only issue. Legacy data structures leave organizations ill equipped to deal with the challenges of data growth and sophistication, as well as of real-time delivery of information. Even where these challenges can be met with new add-ons and overlays, software stacks will grow increasingly complex and inefficient, and costs will escalate.

Where database infrastructures must meet the challenges of the future, Informix is an obvious candidate.

Technology View

State of Informix

Under IBM management, Informix has received a steady stream of upgrades and enhancements, including Informix 11.7 (which introduced Flexible Grid) in October 2010 and Informix 12 in March 2013. Successive versions have provided a wide range of new features and functions.

Informix has developed a very large “ecosystem.” There are at least 4,500 businesses worldwide, including more than 3,000 IBM Business Partners that offer Informix tools and solutions. There is also an active peer community – for example, the International Informix Users Group (IIUG) has more than 25,000 members – that provides extensive information, advice and assistance to users.

Informix has been widely deployed on UNIX platforms, including HP Integrity, IBM Power and Oracle SPARC; on x86 Windows and Linux (it is supported for Red Hat Enterprise Linux and Novell SuSE Linux Enterprise); and on MacOS X servers.

The industry’s principal hypervisors are supported. These include x86 hypervisors such as VMware, Microsoft Hyper-V and KVM, as well as HP Virtual Server Environment (VSE), IBM PowerVM and Workload Partitions (WPARs) for Power Systems and Solaris Zones for Oracle Sun servers.

Replication Technologies

Since 1996, Informix Enterprise Replication (ER) has formed the basis of replication, clustering and disaster recovery capabilities for this database. ER forms part of the core Informix architecture, and is not separately charged.

In comparison, Oracle has offered different features and products to provide comparable capabilities. Earlier replication features, Advanced Replication and Streams, were widely adopted by Oracle users for local as well as remote replication, but are no longer supported in Database 12c.

Oracle has moved to GoldenGate, which was acquired by the company in 2009, as its strategic replication product. GoldenGate is a more functional product, but is separately charged.

Since the 1990s, Oracle Databases and RAC has been widely deployed with Oracle Data Guard for disaster recovery, a no-charge database option. Although the company has indicated that it will continue to enhance and support Data Guard, its strategic focus is now on Active Data Guard for Database 11g and 12c. Active Data Guard, which includes GoldenGate, allows read-only access to standby databases while data is being rebuilt. It is again a separately charged option.

GoldenGate is list priced by Oracle at \$17,500 per core or \$350 per named user, and Active Data Guard at 11,500 per core or \$230 per named user. Although actual fees may vary based on individual license agreements, and on server platforms employed, Oracle users clearly face a significant escalation of costs.

Data Compression

Informix data compression, introduced in Informix 11.5 and expanded in Informix 12, is one of the industry's newest compression technologies. It extends to tables, table fragments, log files, large objects (LOBs) and indexes, and is coupled with highly effective mechanisms for consolidation and reallocation of freed space, and defragmentation of table extents.

Informix compression can in principle reduce disk capacity by up to 90 percent, although most organizations have preferred levels of 60 to 80 percent. With such levels, performance gains in the 10 to 20 percent range are common, depending on database and workload characteristics. Processor overhead is no more than a few percent.

Oracle Advanced Compression is built upon block-level techniques employed in legacy databases, and tends to be most effective in compressing indexes. Although high levels of compression may in principle be realized with this technology, performance degradation tends to occur more rapidly than for Informix.

In production transaction processing environments, Oracle Database 11g users typically realized 20 to 40 percent compression, and Database 12c levels appear to be similar. Oracle Advanced Compression tends to require more DBA intervention than Informix.

Oracle also employs Hybrid Columnar Compression (HCC) technology. This is, however, restricted to the company's Exadata Database Machine, and to use with Oracle Sun ZFS Storage Appliances and Pillar Axiom Storage Systems. As columnar technology is primarily designed for high-volume analytics applications, HCC would not be a candidate for the deployments covered in this report.

Administration and Automation

Informix Experiences

For most of Informix's history, exceptionally low levels of DBA staffing have been the norm. For example, one of the largest Informix users employs fewer than 10 FTE DBAs to administer more than 15,000 instances at 8,000 locations, supporting more than 30 major applications. Other large users report ratios of one FTE DBA or less per 1,000 instances.

Among organizations that contributed to this report, FTE DBA staffing for Informix was estimated at two to four times lower than for Oracle for equivalent applications, and ratios of up to 8:1 were cited. Many smaller users do not employ an Informix DBA – database administration tasks are undertaken on a part-time basis by other IT staff.

Administrative features allow DBAs to perform tasks with fewer, simpler actions, in less time than with competitive databases. These features are reinforced by high levels of automation, including use of key IBM autonomic technologies.

Autonomic computing – meaning the application of artificial intelligence to IT administration and optimization tasks – is applied to a variety of system tasks, including VP, memory and storage allocation, workload scheduling, error handling, compression and space reclamation, system and storage capacity management, performance optimization, installation and configuration and others.

The OpenAdmin Tool (OAT), introduced in 2008, is an open source, platform-independent graphical tool that provides a streamlined, browser-based interface for the full range of Informix administration and automation functions. A key benefit is that, even in very large distributed topologies, administrators may monitor and manage multiple Informix instances through the same interface.

Comparing with Oracle

Oracle administrative mechanisms are widely – and accurately – seen as more “labor-intensive” than those of Informix. This is the case a wide range of Oracle functions, including routine database administration, replication and storage management, tuning, compression and others.

The complexity of the Oracle RAC environment, in particular, translates into deployment and ongoing administrative overhead that is higher – by wide margins – than for Informix equivalents.

These effects are considerable in centralized environments, but in geographically distributed deployments, their impact is greater. Part-time administrators cannot easily handle management of RAC clusters at a remote site with a few, or even a few dozen business users. A great deal of remote DBA intervention is required.

For Oracle Standard Edition users, challenges are compounded by the fact that Oracle’s principal DBA tools – Diagnostics, Tuning and Database Lifecycle Management Packs – are not supported for this version. (Database Lifecycle Management Pack includes Change Management, Configuration Management and Provisioning and Patch Automation Packs.)

In comparison, Informix DBA tools are fully supported across all database offerings, including the entry-level Workgroup Edition as well as the high-end Advanced Enterprise Edition.

Packaging and Pricing

Informix 12

Informix 12 is offered in a number of different editions, including Workgroup (supported on one- or four-socket servers with a total of up to 16 cores and 16 GB RAM) and Enterprise editions (no configuration limits). Current editions, which are summarized in figure 8, fully support Informix Flexible Grid and high availability clustering using HDR, SDS and RSS.

Features	Workgroup Edition	Advanced Workgroup Edition	Enterprise Edition	Advanced Enterprise Edition
HDR/SDS/RSS	2 secondary nodes (any type)	2 secondary nodes (any type)	Unlimited nodes	Unlimited nodes
Informix Flexible Grid	Included	Included	Included	Included
Informix Warehouse Accelerator	N/A	Included	N/A	Included
Storage Optimization Feature (compression)	N/A	N/A	Optional	Included
Advanced Access Control (LBAC)	Included	Included	Included	Included
Database Encryption Expert, InfoSphere Change Data Capture, solidDB Universal Cache, Enterprise Gateway Manager, MaxConnect, I-Spy	N/A	N/A	Optional	Optional
Database extensions: TimeSeries, Spatial, Video, Basic Text Search, JSON	Included	Included	Included	Included
Database extensions: Excalibur Text Search, Data Director for Web	Optional	Optional	Optional	Optional
License options	Authorized User, LU Socket, PVU	PVU	Authorized User, PVU	PVU

LU Socket: Limited Use Socket

PVU: Processor Value Unit

Figure 8: *Principal Informix 12 Editions*

Advanced Workgroup and Advanced Enterprise editions are designed for use with *Informix Warehouse Accelerator* (IWA), a software add-on designed for high-performance analytics applications. IWA employs a combination of in-memory database, columnar, high-performance cache, advanced compression and other new techniques to boost query performance.

Major database extensions include *Informix TimeSeries*, which enables processing of time-stamped machine data from such sources as meters, sensors and RFID tags in a highly efficient manner; *Informix Spatial* for management of geospatial data; and support for the *JavaScript Object Notation* (JSON) data interchange format, which has proved popular as an alternative to XML among Big Data users.

Numerous other extensions have been developed by third parties, users and IBM directly. Most Informix tools, as well as database extensions, are available free of charge. There are a few exceptions, such as Storage Optimization Feature (data compression) and Excalibur Text Search (which enables full text indexing and search across a wide range of document types).

In addition, IBM offers a low-end Express Edition designed primarily for embedded applications (in which Informix is an industry leader); and a variant of Enterprise Edition, Hypervisor Edition, optimized for use with IBM PureSystem appliances.

Informix Workgroup may be licensed using several metrics: Authorized User Single Install (per user), Limited Use Socket (per socket, up to four sockets) and Processor Value Unit (PVU), which is based on IBM values for different types of processor. Enterprise Edition may be licensed only using PVU metrics.

Oracle Databases and RAC

Oracle's principal database versions are Standard Edition One (supported on servers with up to two sockets), Standard Edition (up to four sockets) and Enterprise Edition (no configuration limits). Oracle RAC is not supported for Standard Edition One; is included in Standard Edition; and is available as a separately priced option for Enterprise Edition.

There are variations between editions in support for key Oracle tools that are summarized in figure 9.

Features	Standard Edition One	Standard Edition	Enterprise Edition
Real Application Clusters	Optional	Included	Optional
Diagnostics Pack	N/A	N/A	Optional
Tuning Pack	N/A	N/A	Optional
Database Lifecycle Management Pack	N/A	N/A	Optional
Data Guard	N/A	N/A	Optional
Active Data Guard	N/A	N/A	Optional
Advanced Security	N/A	N/A	Optional
Label Security	N/A	N/A	Optional
Advanced Compression	N/A	N/A	Optional
GoldenGate	Optional	Optional	Optional

Figure 9: Support for Key Oracle Tools by Database 12c Editions

Oracle Standard Edition can in principle be employed with RAC for high availability clustering. However, many of the key features of Oracle Database 11g and 12c – including Data Guard and Active Data Guard – are not supported. This is also the case for the company's principal DBA tools.

Effective implementation and operation remain more dependent on manual DBA intervention than is the case for Oracle Database Enterprise Edition. Oracle support is also generally weaker than for the latter.

For both versions, Oracle offers pricing options based on numbers of named users or numbers of processor cores. In principle, per user pricing might reduce costs for remote site installations supporting small numbers of users. However, in practice, if per user licensing is employed, licenses and support are subject to the minimums shown in figure 10.

Product	Minimum number users	Price per user (\$)
Database Enterprise Edition	25/core	950
Real Application Clusters	25/core	460
Diagnostics Pack	25/core	100
Tuning Pack	25/core	100
Database Lifecycle Management Pack	25/core	240
Active Data Guard	25/core	230
Advanced Compression	25/core	230
Standard Edition	5	350
GoldenGate	25/core	350

Figure 10: Oracle Minimums for Per User Pricing

The cost impact may be substantial. In a remote office installation of Oracle Enterprise Edition, for example, the minimum list price for the database, RAC, DBA tools and GoldenGate replication on a dual-socket, eight-core Intel-based server would be \$220,000, plus three-year support costs of \$145,200.

This calculation allows for an Oracle Process Core Factor of 0.5 for Intel processors; i.e., the number of cores is halved for pricing purposes. As the company applies a Core Factor of 1.0 for RISC-based servers, the minimum license and three-year list price for such a platform would be \$730,400.

The only realistic option would be to employ Oracle Standard Edition, for which there is only a five-user minimum. However, use of Oracle GoldenGate replication, which is subject to a 25-user per core minimum, would significantly increase costs.

A further point should be noted. In addition to clustering and disaster recovery, Informix Enterprise Edition offers, at no additional cost, DBA tooling and label-based security features for which Oracle requires the separately charged tools shown in figure 11.

Product	Price per core (\$)	Price per user (\$)
Diagnostics Pack	5,000	100
Tuning Packs	5,000	100
Database Lifecycle Management Pack	12,000	240
Label Security	11,500	230

Figure 11: Additional Separately Charged Oracle Database 12c Enterprise Edition Tools Providing Capabilities Equivalent to Those Included in Informix 12 Enterprise Edition

Allowance was made for these tools in cost comparisons for use of Informix 12 and Oracle Database 12c Enterprise editions presented in this report.

Detailed Data

Distributed Deployments

Installations

Cost comparisons were based on the installations summarized in figures 12 and 13.

	Diversified Bank	Retail Chain	Government Agency
Business profile	\$100+ billion assets 10,000+ employees 6 regional offices 1,000+ branches 10+ million customers	\$5+ billion sales 20,000+ employees 3 warehouses 500+ stores 7,000+ SKUs/store	Maintains population data, ID records & electoral registers 6,000+ employees 145 municipal offices 650 local offices
Application(s)	Personal banking & ATM (branches); investment banking & mortgages (regional offices); consolidate customer & transaction data (HQ)	Back-office including receiving, inventory & pricing (stores); replicate product & pricing changes to warehouses & stores (HQ)	Maintain & update local records (offices); consolidate data & respond to queries from field offices & other agencies (HQ)
Configurations	HQ 3 x IBM Power 780, AIX Informix: HDR cluster, RSS, Flexible Grid Node Oracle: RAC + Active Data Guard REGIONAL OFFICES Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication BRANCHES Informix: x86 2-socket, Flexible Grid Node Oracle: 2 x x86 2-socket, RAC + replication	HQ & DISTRIBUTION CENTERS 2 x IBM Power 750 AIX Informix: HDR cluster, Flexible Grid Node Oracle: RAC + replication STORES Informix: x86 2-socket Linux, Flexible Grid Node Oracle: 2 x x86 2-socket Linux, RAC + replication	HQ 2 x Oracle Sun M8000 Solaris Informix: HDR cluster + RSS, Flexible Grid Node Oracle: RAC + Active Data Guard MUNICIPAL & LOCAL OFFICES Informix: x86 2-socket Linux, Flexible Grid Node Oracle: 2 x x86 2-socket Linux, RAC cluster + replication
FTE DBAs	Informix Flexible Grid: 1.0 Oracle RAC + replication: 3.5	Informix Flexible Grid: 0.5 Oracle RAC + replication: 2.0	Informix Flexible Grid: 1.25 Oracle RAC + replication: 3.5
	Hotel Chain	Logistics Services Provider	Insurance Company
Business profile	\$600+ million sales 8,000+ employees 350 properties 30,000+ rooms	\$5+ billion sales 25,000+ employees 275 service centers 25 bulk fuelling, maintenance & support centers	Property & casualty insurer \$15+ billion sales 25,000+ employees & agents 25 customer response centers 100+ field offices
Application(s)	Front office system, room data, reporting (hotels), reservations (HQ)	Fleet operations, inventory management, labor scheduling & other applications (local centers); central management, scheduling & routing (HQ)	Accident claims entry & query look-up (response centers); customer-specific databases (field offices); central claims processing (HQ)
Configurations	HQ 2 x IBM Power 570 AIX Informix: HDR cluster, Flexible Grid Node Oracle: RAC + replication HOTELS Informix: x86 2-socket, Flexible Grid Node Oracle: 2 x x86 2-socket, RAC cluster + replication	HQ 2 x HP Integrity HP-UX Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication LOCAL SERVICE & SUPPORT CENTERS Informix: x86 2-socket, Flexible Grid Node Oracle: 2 x x86 2-socket, RAC + replication	HQ 2 x IBM Power 570 AIX Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication CUSTOMER RESPONSE CENTERS & FIELD OFFICES Informix: x86 2-socket, Flexible Grid Node Oracle: 2 x x86 2-socket, RAC + replication
FTE DBAs	Informix Flexible Grid: 0.75 Oracle RAC + replication: 2.5	Informix Flexible Grid: 0.5 Oracle RAC + replication: 1.5	Informix Flexible Grid: 0.3 Oracle RAC + replication: 1.0

Figure 12: Large Distributed Installations Summary

	Government Agency	Transportation Company	Retail Chain
Business profile	Handles tax registration, payments & administration 3 regional offices 80+ local offices	\$400 million+ sales 5 regional offices 60+ local offices 1,500+ employees	\$400+ million sales 50 stores 2 distribution centers 2,500+ employees
Application(s)	Tax registration, payments & queries (local offices); administration (regional offices), data consolidation, centralized processing, audit & tracking (HQ)	Receiving & dispatch, inventory management, labor scheduling (branch offices); logistics & scheduling (regional offices), data consolidation, management & administration (HQ)	Store operations applications (stores); warehouse management (distribution centers); replicate product & pricing changes to distribution centers & stores (HQ)
Configurations	HQ 2 x x86 8-socket Windows Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication REGIONAL & LOCAL OFFICES Informix: x86 2-socket, Flexible Grid Node Oracle: 2 x x86 2-socket, RAC cluster + replication	HQ 2 x x86 4-socket Windows Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication BRANCH & REGIONAL OFFICES Informix: x86 2-socket Windows, Flexible Grid Node Oracle: 2 x x86 2-socket Windows, RAC cluster + replication	HQ 2 x Power 740 AI Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication STORES & DISTRIBUTION CENTERS Informix: x86 2-socket Windows, Flexible Grid Node Oracle: 2 x x86 2-socket Windows, RAC cluster + replication
FTE DBAs	Informix Flexible Grid: 0.3 Oracle RAC + replication: 0.85	Informix Flexible Grid: 0.5 Oracle RAC + replication: 1.75	Informix Flexible Grid: 0.45 Oracle RAC + replication: 1.35
	Agribusiness	Distributor	Manufacturer
Business profile	Agricultural co-operative 27 members	Industrial distributor \$200+ million sales 15 distribution centers 1,000+ employees	Building supplies manufacturer \$50+ million sales 8 distribution centers 500+ employees
Application(s)	Management: crop, yields, labor, materials (production centers); access & aggregate data from production centers, ERP, central management & logistics (HQ)	Warehouse management system (distribution centers); replicate product & pricing changes to distribution centers, consolidate inventory data (HQ)	Shipping & receiving, picking/placing, inventory management, labor scheduling (distribution centers); replicate product, pricing & schedule changes to distribution centers, consolidate operational data (HQ)
Configurations	HQ 2 x x86 4-socket Windows Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication PRODUCTION CENTERS Informix: x86 2-socket Windows, Flexible Grid Node Oracle: 2 x x86 2-socket Windows, RAC cluster + replication	HQ 2 x x86 8-socket Windows Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster DISTRIBUTION CENTERS Informix: x86 2-socket Windows, Flexible Grid Node Oracle: 2 x x86 2-socket Windows, RAC cluster + replication	HQ 2 x IBM Power 550 Linux Informix: HDR cluster, Flexible Grid Node Oracle: RAC cluster + replication DISTRIBUTION CENTERS Informix: IBM Power 520 Linux, Flexible Grid Node Oracle: 2 x IBM Power 720 Linux, RAC cluster + replication
FTE DBAs	Informix Flexible Grid: 0.25 Oracle RAC + replication: 0.95	Informix Flexible Grid: 0.25 Oracle RAC + replication: 1.05	Informix Flexible Grid: 0.35 Oracle RAC + replication: 0.85

Figure 13: Midsize Distributed Installations Summary

Cost Calculations

Costs were calculated as follows:

- *License and support costs* for Informix 12 Flexible Grid are for Enterprise and Workgroup editions. Calculations were based on PVU or, in smaller sites, Authorized User Single Install (per user), or Limited Use Socket (per socket) pricing, whichever was less.

For Oracle, costs are for Database 12c Enterprise and Standard editions. Calculations were based on Processor or Named User pricing, whichever was less. Allowance was made for applicable Processor Core Factors and, where appropriate, minimum numbers of users per processor core.

For Oracle Database 12c installations, costs include RAC and (where appropriate) Active Data Guard, along with Diagnostics, Tuning and Database Lifecycle Management Packs and Label Security, providing functionality equivalent to Informix 12 Enterprise Edition. Costs also include licenses and support for a widely used third-party replication tool.

- *Server costs* include hardware acquisition and three-year maintenance, along with licenses and three-year support for operating systems. Costs are for new equipment only; i.e., calculations do not include costs of existing servers that are retained to host new Informix 12 or Oracle Database 12c instances.

Calculations do not include redundant server configurations employed at headquarters (HQ) sites for all installations, and at regional centers for the diversified bank.

For dual-socket x86 servers at small sites, server costs are for (1) existing servers requiring replacement in order to support Informix 12 Workgroup Edition or Oracle Database 12c Standard Edition with RAC, and (2) secondary servers required for RAC clusters.

In the manufacturer installation, Informix 12 Flexible Grid is deployed on existing IBM Power 520 servers at distribution centers – these are not included in server costs. It is necessary, however, to replace these with dual Power 720 servers (520 models are no longer offered by IBM) to support Oracle Database 12c RAC clusters – these are included in server costs.

Where appropriate, operating system costs allow for transferability of existing licenses.

- *Personnel costs* were calculated for the numbers of FTEs shown in figures 12 and 13 based on annual salaries of \$95,655 for Informix 12 Flexible Grid DBAs, and \$102,698 for Oracle 12c and RAC DBAs. Salaries were increased by 55.48 percent to allow for bonuses, benefits and other per capita costs, and multiplied for three years.

All cost values are for the United States.

Cost Breakdowns

These are summarized in figures 14 and 15.

	Diversified Bank	Retail Chain	Government Agency	Hotel Chain	Logistics Services Provider	Insurance Company
IBM INFORMIX 12 FLEXIBLE GRID						
Software licenses	13,761,347	1,880,736	5,397,008	2,569,408	1,085,120	5,397,008
Software support	5,504,539	752,294	2,158,803	1,027,763	434,048	2,158,803
Servers	7,286,639	469,065	945,261	1,689,868	173,074	85,509
Personnel	446,173	223,087	557,716	334,630	223,087	133,852
TOTAL (\$)	26,998,698	3,325,182	9,058,788	5,621,669	1,915,329	7,775,172
ORACLE DATABASE 12c WITH REAL APPLICATION CLUSTERS						
Software licenses	38,531,360	12,182,000	10,547,000	11,190,400	4,915,200	10,547,000
Software support	23,653,896	7,443,384	6,239,292	6,417,984	2,844,192	6,239,292
Servers	15,049,855	4,410,027	5,196,264	4,809,560	1,211,278	612,380
Personnel	1,676,588	958,050	1,676,588	1,197,563	718,538	479,025
TOTAL (\$)	78,911,699	24,993,461	23,659,144	23,615,507	9,689,208	17,877,697

Figure 14: Three-year Costs Breakdowns for Use of Informix 12 Flexible Grid versus Oracle Database 12c and Real Application Clusters for Distributed Deployments – Large Installations

	Government Agency	Transportation Company	Retail Chain	Agribusiness	Distribution Company	Manufacturing Company
IBM INFORMIX 12 FLEXIBLE GRID						
Software licenses	3,451,744	1,463,398	899,856	1,161,510	3,441,280	320,200
Software support	1,380,698	585,359	359,942	464,604	1,376,512	128,080
Servers	53,680	104,022	160,723	54,467	76,284	–
Personnel	133,852	223,087	200,778	111,543	111,543	156,161
TOTAL (\$)	5,019,974	2,375,866	1,621,299	1,792,124	5,005,619	604,441
ORACLE DATABASE 12c WITH REAL APPLICATION CLUSTERS						
Software licenses	4,132,000	2,535,600	1,483,200	920,240	3,801,600	922,200
Software support	2,655,888	1,632,168	865,008	524,652	2,447,232	567,996
Servers	666,127	596,711	1,041,277	299,280	235,529	197,222
Personnel	407,171	838,294	646,684	455,074	502,976	407,171
TOTAL (\$)	7,861,186	5,602,773	4,036,169	2,199,246	6,987,337	2,094,589

Figure 15: Three-year Costs Breakdowns for Use of Informix 12 Flexible Grid versus Oracle Database 12c and Real Application Clusters for Distributed Deployments – Midsize Installation

Centralized Deployments

Installations

Cost comparisons were based on the installations summarized in figures 16 and 17.

	Financial Services Company	Government Agency	Manufacturing Company
Business profile	Diversified retail bank \$50+ billion assets 40,000+ employees 2,000+ branches	State IT services agency Supports 50+ agencies 3 data centers 20+ local facilities	Electronics manufacturer \$2.5+ billion sales 8,000+ employees 5 manufacturing plants
Application(s)	Core banking, EFT	Multiple applications	ERP & supply chain, reporting
Configurations	3 x IBM Power 780 AIX Informix: HDR cluster + RSS Oracle: RAC cluster + Active Data Guard	2 x Oracle M9000 Solaris Informix: HDR cluster + RSS Oracle: RAC cluster + Active Data Guard	2 x IBM Power 750 AIX Informix: HDR cluster Oracle: RAC cluster
FTE DBAs	Informix: 0.95 Oracle: 2.25	Informix: 0.85 Oracle: 1.9	Informix: 0.65 Oracle: 1.25
Deployment time	Informix: 6 months Oracle: 10 months	Informix: 4+ months Oracle: 8 months	Informix: 3 months Oracle: 6 months
	Retail Company	Telecommunications Company	Energy Company
Business profile	Computers & consumer electronics \$5+ billion sales 20,000+ employees 800+ stores, online sales	Landline, cellular & Internet services \$400+ million sales 1,500+ employees 5 million customers	Independent oil & gas producer \$2 billion sales 2,000+ employees
Application(s)	Data warehouse	CRM system	ERP & financial applications
Configurations	2 x Oracle T5-4 Solaris Informix: HDR cluster Oracle: RAC cluster	2 x IBM Power 740 Informix: HDR cluster Oracle: RAC cluster	2 x Oracle M5000 Informix: HDR cluster Oracle: RAC cluster
FTE DBAs	Informix: 0.5 Oracle: 0.85	Informix: 0.4 Oracle: 0.75	Informix: 0.15 Oracle: 0.25
Deployment time	Informix: 2 months Oracle: 3 months	Informix: 5 weeks Oracle: 2 months	Informix: 2 weeks Oracle: 3 weeks

Figure 16: Centralized UNIX Server Installations Summary

	Online Services Company	Life Sciences Company	Manufacturing Company
Business profile	Internet travel & entertainment booking, financial services 400+ employees	Pharmaceuticals developer & manufacturer \$4 billion+ sales 5,000+ employees	Textiles manufacturer \$400+ million sales 1,500+ employees 3 manufacturing plants
Application(s)	Online reservations, insurance & payments processing	Clinical data management system	ERP & supply chain management systems
Configurations	2 x x86 8-socket Linux Informix: HDR cluster Oracle: RAC cluster + GoldenGate	2 x x86 4-socket Windows Informix: HDR cluster Oracle: RAC cluster	2 x x86 4-socket Windows Informix: HDR cluster Oracle: RAC cluster
FTE DBAs	Informix: 0.5 Oracle: 1.15	Informix: 0.25 Oracle: 0.45	Informix: 0.4 Oracle: 0.7
Deployment time	Informix: 9 weeks Oracle: 6 months	Informix: 4 weeks Oracle: 2 weeks	Informix: 5 weeks Oracle: 10 weeks
	Retail Company	Health Care Provider	Insurance Company
Business profile	Specialty retailer \$5+ billion sales 2,000 employees 200+ stores, online sales	Medical & dental services provider 20+ service locations 200,000+ members	Specialty insurance company \$200 million sales 400+ employees 2 million policies
Application(s)	ERP system	Online appointment scheduling & medical records system	Call center system
Configurations	2 x x86 2-socket Windows Informix: HDR cluster Oracle: RAC cluster	2 x x86 2-socket Linux Informix: HDR cluster Oracle: RAC cluster	2 x x86 2-socket Windows Informix: HDR cluster Oracle: RAC cluster
FTE DBAs	Informix: 0.25 Oracle: 0.5	Informix: 0.1 Oracle: 0.15	Informix: 0.15 Oracle: 0.25
Deployment time	Informix: 2 weeks Oracle: 3 weeks	Informix: 2 weeks Oracle: 3 weeks	Informix: 6 days Oracle: 2 weeks

Figure 17: Centralized x86 Server Installations Summary

Cost Calculations

Costs were calculated as follows:

- *License and support costs* are for Informix 12 Enterprise Edition and Oracle 12c Enterprise Edition. Calculations employed IBM PVU and Oracle Processor Core Factors respectively.

Where indicated, Oracle 12c calculations include additional licenses for use of Oracle Active Data Guard or GoldenGate for disaster recovery, and additional Informix 12 licenses for use of RSS in an equivalent role. Oracle costs for all installations include Diagnostics, Tuning and Database Lifecycle Management Packs and Label Security.

Support costs for Informix 12 are for two years of paid coverage (the first year is included in the license fee) while support costs for Oracle software are for three years.

- *Personnel costs* were calculated for the numbers of FTEs shown in figures 16 and 17 based on the same values as for distributed deployments.
- *Deployment costs* were calculated for time spent by external professional services staff during the deployment times shown in figures 16 and 17, charged at \$2,000 per person-day plus travel and entertainment (T&E) expenses.

All cost values are again for the United States.

Cost Breakdowns

These are summarized in figures 18 and 19.

	Financial Services Company	Government Agency	Manufacturing Company	Retail Company	Telecom Company	Energy Company
IBM INFORMIX 12						
Software licenses	10,114,560	4,214,400	2,809,600	1,685,760	983,360	351,200
Software support	1,618,330	674,304	449,536	269,722	157,338	56,192
Deployment	407,748	283,753	131,131	75,956	64,035	24,688
Personnel	423,864	379,247	290,012	223,087	178,469	66,926
TOTAL (\$)	12,564,502	5,551,704	3,680,279	2,254,525	1,383,202	499,006
ORACLE DATABASE 12c WITH REAL APPLICATION CLUSTERS						
Software licenses	20,704,000	7,764,000	6,656,000	1,664,000	3,328,000	624,000
Software support	5,465,856	2,049,696	1,757,184	439,296	878,592	164,736
Deployment	578,734	525,682	286,104	143,052	95,368	41,039
Personnel	1,077,806	910,148	598,781	407,171	359,269	119,756
TOTAL (\$)	27,826,396	11,249,526	9,298,069	2,653,519	4,661,229	949,531

Figure 18: Three-year Costs Breakdowns for Use of Informix 12 versus Oracle Database 12c and Real Application Clusters – UNIX Server Installations

	Online Services Company	Life Sciences Company	Manufacturing Company	Retail Company	Health Care Provider	Insurance Company
IBM INFORMIX 12						
Software licenses	8,428,000	2,809,600	3,512,000	983,360	983,360	773,520
Software support	1,348,480	449,536	561,920	157,338	157,338	123,763
Deployment	140,400	23,842	59,605	38,301	23,842	14,136
Personnel	223,087	111,543	178,469	111,543	44,617	66,926
TOTAL (\$)	10,139,967	3,394,521	4,311,994	1,290,542	1,209,157	978,345
ORACLE DATABASE 12c WITH REAL APPLICATION CLUSTERS						
Software licenses	9,720,000	3,328,000	4,160,000	1,664,000	1,664,000	1,248,000
Software support	2,566,080	878,592	1,098,240	439,296	439,296	329,472
Deployment	401,472	61,068	119,210	71,526	35,763	23,842
Personnel	550,879	215,561	335,318	239,513	71,854	119,756
TOTAL (\$)	13,238,431	4,483,221	5,712,768	2,414,335	2,210,913	1,721,070

Figure 19: Three-year Costs Breakdowns for Use of Informix 12 versus Oracle Database 12c and Real Application Clusters – x86 Server Installations

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