Genisys Software - Oracle Competency Overview

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GENISYS' ORACLE COMPETENCY

Genisys has a dedicated team of Oracle developers and architects who have many considerable years of experience between them. We pride ourselves on the currency of our technical skills and bring to all our projects extensive experience in the preferred enterprise application development platform – Oracle. However, knowing the tools of our trade is only the beginning. Genisys has the experience and the knowledge to determine when and how to use these tools and technical capabilities to fulfill the business needs of our Customers.

At Genisys, ever since inception, there has been a continuous investment in Oracle competency development, deployment, training and support. Our dedicated Oracle Technology Center [OTC] is committed to:

- Developing and continuously improving our Oracle knowledge base
- Evolving and refining estimation guidelines for development
- Achieving a targeted productivity improvement through a continuously growing, reusable Oracle code base
- Critical review of architectural design, data and process models on all development projects [participation in FTR and Fagan Inspection]
- Supporting project teams on technical issues during development [with critical Service Level Agreements]
- Consulting services to clients, technical architects and product evaluation teams
- Keeping abreast of benchmark results of Oracle products vis-à-vis competition
- Training and development of an in-house expert pool in Oracle DB Administration, Development & Remote support for onsite implementation teams

TECHNOLOGY STRENGTHS

We have in-depth expertise and experience in a range of platforms, tools and technologies including Sun Solaris, AIX, HP-UX, Linux, Windows NT / Windows 2000 and the following:

- Oracle 8i / 9i RDBMS
- Oracle 9i Application Server
- Oracle Designer 2000 / 6I
- Developer 2000 / 6I
- Oracle Developer Suite

ORACLE SERVICES FROM GENISYS

- Architecture of enterprise-wide distributed systems using Oracle products
- Application conception, design ,development, implementation and maintenance
- Re-engineering of legacy systems to Oracle
- Migration and porting of Oracle applications to newer versions
- Product support
- Production support [onsite and offshore]
- Database administration & performance tuning consulting
- Web-enabling legacy applications

We have considerable expertise in contemporary web technologies including:

- Web Services Development using SOAP, XML
- Object Oriented Analysis Design and Development
- Java & J2EE technologies
- J2EE application servers such as Oracle9iAS, IBM WebSphere & BEA WebLogic
- Microsoft Technologies such as .NET, ASP, VB, C#.
- Legacy Integration

STRATEGIC ALLIANCES

Genisys has been an early starter of Oracle database technologies and has been continuously working with Oracle as an Alliance Partner. This partnership gives us access to the latest technical and architectural support, software releases, deployment & testing support.

DATABASE ADMINISTRATION

Genisys offers a full range of database administration services for a wide variety of database products including Oracle, DB2 and SQL Server. We provide everything from installation and configuration of the database software product to back-up and recovery strategy and procedures. We can help your organization take the risk out of managing your mission critical data. We will work with you to develop an effective database administration strategy based on your business requirements. We can structure our database support on a full-time, part-time, or on an 'as-needed' basis depending on your business requirements.

KEY BENEFITS

- ✔ Rapid Database Installation and configuration
- ✔ Minimization of risk in managing mission critical data
- ✔ Low cost alternative for ongoing database support

SERVICES

- **Database Software Selection**

  Selecting the right database software is an important first step in the process of implementing an effective data management strategy. Genisys can save your organization time and money by assisting you to evaluate and select the best database for your specific requirements.

- **Database Installation and Configuration**

  Database installation and configuration can be a very tedious and time-consuming task. It is very critical that it be done correctly; otherwise you run the risk of having costly disruptions as well as jeopardizing company data. Genisys can minimize your risks by providing the expertise necessary for the proper installation and configuration of your selected database software. We strive to provide rapid database installation and configuration services at a low cost to our clients. It is our goal to maximize the return on our clients' investments in database software, and the best way for us to do that is to properly install and configure the software as quickly as possible.

- **Database Management and Support**

  Once the database software has been installed and configured properly, Genisys can provide database management and support services on a full-time, part-time, or on an 'as-needed' basis depending on your company's requirements. Examples of specific services provided include, among other things, management of database access and security, management and monitoring of critical log files, management and monitoring of table spaces, performing database back-ups on a regular basis, and restoring data from back-ups when necessary.

- **User Training**

  Genisys offers various training and education programs to meet the needs of our clients. We can provide high quality focused / detailed as well as high level overview training on a variety of database products such as Oracle, DB2 and Microsoft SQL Server.

PERFORMANCE MANAGEMENT

We recognized the potential opportunities thrown up by performance problems way back in 1996 and built up expertise in various areas of application and database tuning. We employ a group of experienced professionals whose main area of expertise / specialization is database tuning, with emphasis on the more widely used databases such as Oracle. This team has successfully executed projects that involved tuning applications with database sizes as large as 25 gigabytes. The performance gains we have demonstrated have met and many a time exceeded customer expectations. Brief summaries of some of these projects have been presented as case studies later in this document.

Performance tuning, for most organisations, is an after-thought and good performance is seen as an add-on or frill. There is also a reluctance to go through the performance tuning exercise especially since it requires a lot of management commitment. A well-tuned system can, however, deliver tremendous benefits to an organisation.

Performance tuning becomes a contractual obligation when there are Service Level Agreements (SLAs) on performance between the various interested parties. Even when not bound by a SLA, some of the many benefits that may be derived by tuning an application for performance are listed below.

WHAT CAUSES PERFORMANCE PROBLEMS

There is a need to clearly understand the causes for inadequate performance in order to provide complete and long-term solutions. Performance problems may arise when there is inadequate focus on performance in any of the Software Development Life Cycle activities (from requirements definition down to production support).

Direct Causes

- **Incomplete Requirements Analysis**
  Causal analysis of most performance problems point to a lack of clarity in requirements, during the initial stages of the project. This may be due to:
  - Difficulty in forecasting performance requirements
  - An incomplete understanding of the functional requirements for the system
  - An incomplete understanding of the constituencies of the application

- **Inadequate capacity planning and monitoring**
  - Insufficient capacity planning
  - Use of non-scalable resources
  - Lack of monitoring

- **Poor design**
  - Performance not a design goal
  - Incorrect implementation of database design principles
  - Generic design

- **Improper database installation**
  - Improper setting of any one of the many parameters used during the creation of the database
  - A badly organised database (E.g. improper choice of table spaces)

- **Lack of standards for development**
  - Lack of standards for code development and design, especially with respect to efficient database access.

Aggravators

- **Use of non-mirrored environment**
  Performance problems go undetected till the applications are installed in end-user environments. This is mainly due to the following reasons:
  - The latest development tools (usually a suite of tools) require a significant amount of computing resources to function optimally. The developers, therefore, work on higher specification hardware that may or may not mirror the end-user environment.
  - Developers use small sample data sets to carry out functionality tests. The volumes of data used for testing are not representative of the volumes generated and used by the business. To add to the problem, very few applications are subjected to rigorous volume tests.

- **Poor Quality control**
  - Early detection of performance problems increases the probability of putting in a solution that is less expensive and more elegant.
  - Poor or inadequate quality control in any of the software development lifecycle stages (e.g. poor design reviews) will compound these problems during the later stages of development.

- **Non-availability of tuning skills**
  - Performance tuning is a specialised skill and development teams find it difficult to address them and put together an acceptable and long-lasting solution.

TANGIBLE BENEFITS

Most of the tangible benefits from performance tuning are derived through reduction in costs expenditure and / or productivity gained due to savings in time spent using the applications.

- A well-tuned system produces faster response times and better throughput within the organisation thus making the users of the system more productive.
- A thorough tuning of a system often eliminates the need to buy additional and, more importantly, expensive equipment and software.
- A well tuned application often takes lesser computing resources than an un-tuned one. This may in turn provide opportunities to re-use resources for other purposes, saving money.

INTANGIBLE BENEFITS

The human benefits derived from performance tuning may not be readily visible, but are nevertheless significant.

- On-line response time is critical for systems that are used directly by customers and for systems that act as a front-end to an organisation. Slower response will usually lead to dissatisfaction of customers and eventually, lost business.
- A system with slow response frustrates users. The very systems that were developed with a view to increase user productivity may prove a burden regardless of how sophisticated the system is.

WHAT TO TUNE?

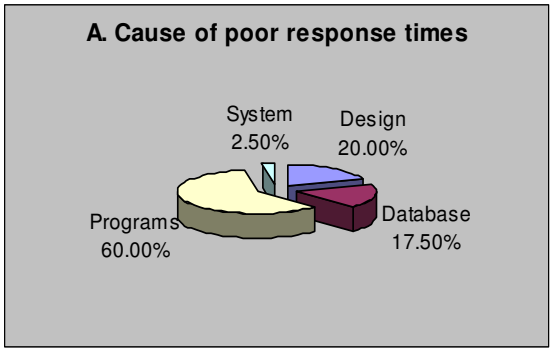
Although many components of a system can be tuned for better performance, we specialises in the following areas as we believe improving performance in these will demonstrate the maximum benefits to customers:

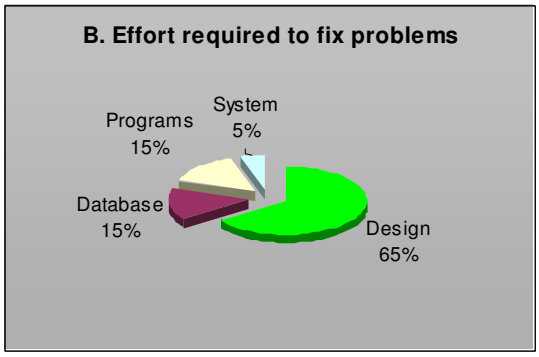
- Database and
- Application tuning

Apart from the application and the database, most current day applications also involve complex combinations and interaction with other software and hardware elements. Performance problems are usually the cumulative effect of performance problems within each of these components. Such elements may include:

- Networks
- Hardware resources like CPU, hard disk (space and access times) and memory
- Operating Systems

The tuning for optimal performance for each of these resources is a complex task and requires a high level of expertise. Though our main area of focus is tuning of databases and applications, it carries out activities in a broader context. Performance tuning is a balancing act of ensuring that all resources are utilised at their optimal levels. Where necessary, we collaborate with other recognised domain experts to deliver the best tuned systems to our customers.
Figure A, below shows one of the common patterns encountered in systems with performance problems. Note that applications (programs + design) and databases contribute to a majority (97.5% in this case) of the problems. System problems, which include an un-tuned operating system and / or inadequate hardware, contribute to the remaining 2.5%.





Source: Oracle Performance tuning by Peter Corrigan and Mark Gurry; Published by O 'Reilly & Associates Inc). Figure B shows the comparative difficulty in fixing performance problems in the areas highlighted in Figure A.

TUNING METHODS, TOOLS & TECHNIQUES

Methods

Genisys uses a number of methods and techniques to fine tune applications and databases. We also have the capability to develop specialised techniques to address specific issues for certain applications. We primarily use three basic approaches, namely:

- Tuning of the database
- Tuning of the design and code logic
- Tuning by means of data pruning

Tools

We use various tools during the different stages of the project to increase the effectiveness and the speed with which tuning activities are carried out.

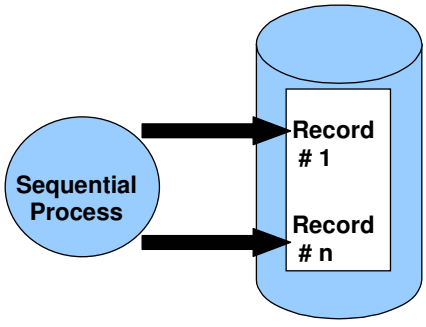
- Diagnostic and tuning tools
- Load testing tools
- Regression testing tools

Techniques

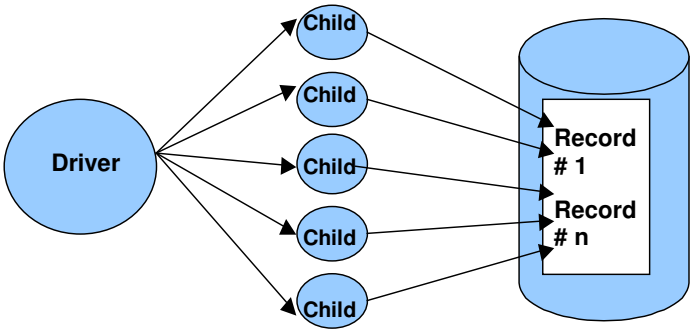
We use sophisticated optimiser modes (cost-based / rule-based) to determine the most efficient data access path. While switching to a particular optimiser mode may improve performance in some situations (even when there are un-tuned SQL statements), manual tuning cannot be entirely avoided. Most of the techniques discussed in the following page improve performance significantly regardless of the optimiser mode

Database tuning	Database reorganisation and parameter tuning:
Design change	A variety of techniques may be used to fine-tune the design; most of them are related to normalisation or de-normalisation of the logical design. Some examples • Creating extract tables for reporting purposes • Index management
Code tuning	Process optimisation requires changes to the code and therefore involves development and testing effort. The focus of process optimisation is to increase the efficiency of data access - the main bottleneck in most programs. Very little benefit is derived from fine tuning other (non database-access related) parts of the program (e.g. the C code in a Pro *C program). A few of the techniques used by Genisys to optimise processes are: • Internal parallelism • Reduction of parsing • Check pointing Processed records are committed (database COMMIT) to the database at pre-defined intervals • External parallelism • Code optimisation • SQL tuning (Oracle's documentation provides a set of tips and elaborate techniques for SQL tuning. By writing SQL statements in a particular way, one may force the optimiser to choose an execution plan of one's choice.) • Use of host arrays • Resolution of resource contention. (In multi-user systems, locking or resource contention often leads to performance problems).
Data-pruning	The number of rows within a table largely dictates the time taken to access a specific record. Since there is a direct relationship between the access time and the cardinality (no. of rows) of the table, it is necessary to manage data volumes by periodically purging old and now-redundant records.
Data partitioning / Internal parallelism	Data partitioning and internal parallelism is a very good and proven technique to speed up processing. The figure below depicts performance improvements from process parallelism.

(a) Sequential Process



(b) Internal Parallelism



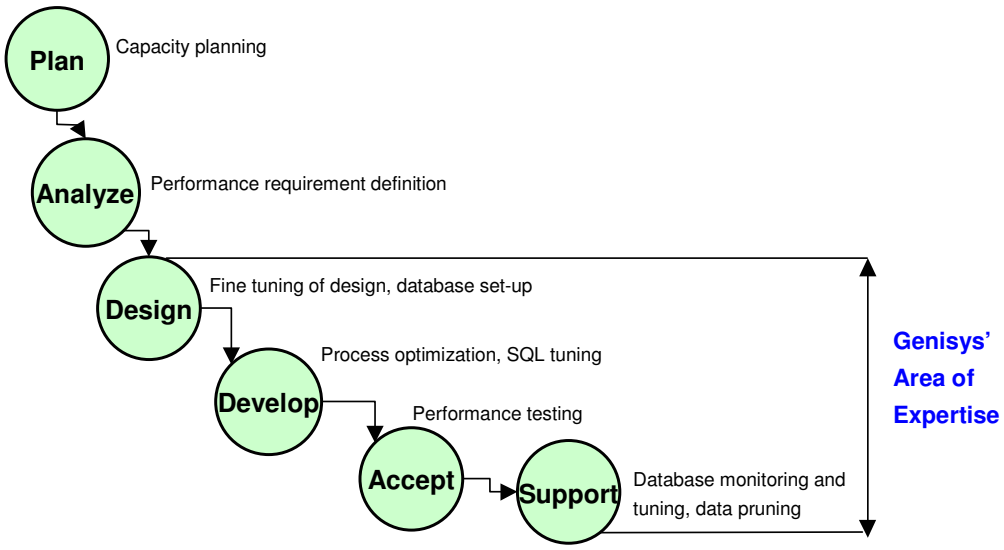
LIFECYCLE

Performance tuning (planning, as well as execution) can be carried out in all the phases of the system's development and maintenance lifecycle. Further, it is a continuous and iterative process.

What Genisys can do for you:

- We can bring our expertise into the development lifecycle with minimal disruption to the conduct of your project. We can successfully tune applications:
  - that are mid-way through the code development i.e. in parallel with the development
  - prior to release into production
  - during their support lifecycle
- We can help in situations where performance tuning has been given attention only towards the closing stages of a project.
- We can tune applications produced by other teams.

The figure below shows typical tuning activities carried out during the various stages of the Software Life Cycle and areas where we can bring in our expertise:



APPROACH

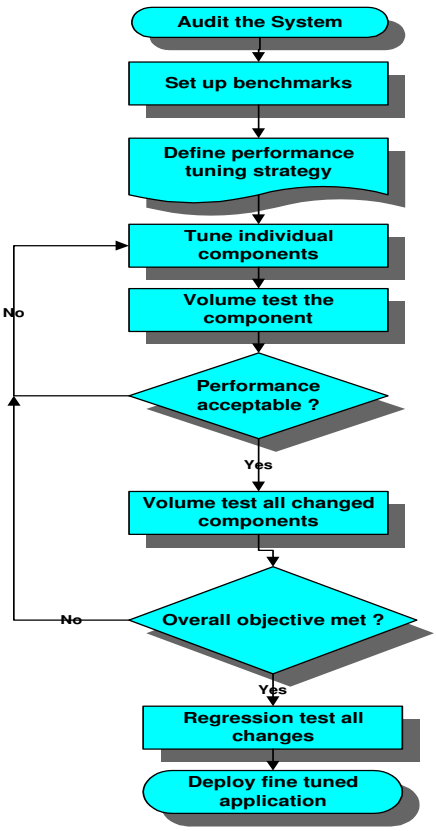
Genisys uses its own development models to systematically carry out performance tuning. These models have been developed internally and fine-tuned with experience gained from numerous projects. The diagram below shows a high level view of a typical model used by Genisys to carry out performance tuning.

- **Auditing**
  The main objectives of this activity are:
  - To measure the performance of the existing system
  - To find performance bottlenecks within the system
  - To establish system load patterns especially the peaks and troughs of transaction load
  - To provide a basis for setting benchmarks for the tuning exercise

- **Setting up Performance Benchmarks**
  - Set specific and measurable objectives for the expected performance of the system.
  - Set the stop criterion for the performance tuning activity (with a reasonable amount of tolerance) based on these benchmark figures.
    The stop criteria is normally based on good sense rather than pure mathematical calculations. It has been our experience that the returns on effort, and investment diminish very rapidly after an application has reached a particular level of performance.

- **Defining the Tuning Strategy**
  - The Performance tuning strategy document details the high-level solution approach to the performance problem.

- **Tuning, Volume Testing and Regression Testing**
  - System components with performance bottlenecks (identified during the audits) are tuned using various performance tuning techniques.
  - Volume tests are then carried out with representative data samples and the performance of components are measured against benchmarks set earlier.
  - Regression tests are carried out to ensure that the existing functionality has not been affected by the performance tuning changes.
  - The performance tuning activity is stopped at a stage when the costs incurred in carrying out tuning activities do not justify the benefits derived.



DATABASE MIGRATION

Genisys has capabilities in providing end-to-end services in Database Migration including:

- Project Management
- Data Architecture, Modelling & Design
- Programming & Testing
- Documentation
- DBMS utilities for loading / unloading
- Sort utilities
- Tuning database applications and queries
- Tuning database structures
- Building control processes
- Overall training

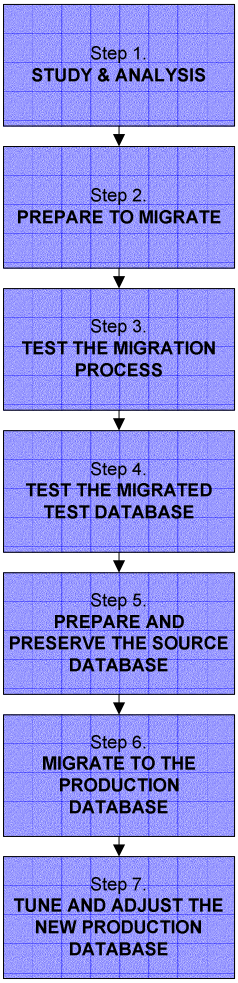
We also look at the motivators for migration, which will help customers with improved performance, reduced operating costs, higher levels of database reliability, improved data integration and easy maintainability.

APPROACH

Genisys uses a planned strategic approach for migrating data and applications from one database to another providing immediate returns to our customers. This involves the following stages:

- Strategy
- Analysis
- Design
- Testing
- Implementation
- Revision
- Maintenance

The migration process itself can be executed by way of using ETL (Extraction, Transformation and Loading) tools or developing programs and scripts internally. During the migration process, based on customer requirements and data size, activities like data cleaning, scrubbing, validating and sampling, etc can be carried out.



Step 1: Study and Analysis

During the requirements study conducted at customer premises, we undertake the following:

- Identify the high level objectives of migration
- Identify business processes supported by the existing database
- Identify the data model supporting the business processes
- Identify transaction and data volumes
- Identify the reasons for change, which will become the objectives for the actual migration
- Identify the availability of tools for automatic conversion
- Understand the expectations related to schedules, deadlines and milestone events
- Identify the methodology for migration
- Identify the strategy for data migration
- Outline the testing and acceptance strategy
- Understand the hardware set up
- Identify the skill requirements for various stages of the project
- Ascertain ballpark cost and effort estimates
- Outline an overall project timeline
- Identify the risks and the steps for mitigation

Step 2: Prepare to Migrate

- Become familiar with the features of the database to be migrated
- Estimate and secure the system resources required for migration.
- Decide which migration method to use, based on considerations involving the current production database, customers migration objectives, and the behavior and capabilities of available migration methodologies.
- Develop a plan for testing the migration with a new test database and a plan for testing the migrated new production database.
- Prepare a backup strategy so that there is a quick recovery from any unexpected problems or delays.

Step 3: Test the Migration Process

- Perform a test migration using an old test database. The test migration would be conducted in an environment created for migration testing and would not interfere with the original production database.

Step 4: Test the Migrated Test Database

- Perform the tests that were planned during Step 2 on the pre-migration old test database and on the old test database that was migrated to the new database.
- Compare results, noting anomalies between test results on the pre-migration old test database and on the old test database that was migrated to the new database.
- Investigate ways to correct any anomalies you find and then implement the corrections.
- Repeat Step 2, Step 3, and the first parts of Step 4, as necessary, until the migration is completely successful and works with all required applications.

Step 5: Test the Migrated Test Database

- Prepare the current production database as appropriate to ensure that its migration to the new database will be successful.
- Schedule the downtime required for backing up and migrating the old production database to the new database.
- Perform a full backup of the current production database. *This step is required only if a Migration Utility is used for the migration.*

Step 6: Migrate the Production Database

- Migrate the old production database to the new database.
- After the migration, perform a full backup of the production database.

Step 7: Tune and Adjust the New Production Database

- Tune the new production database. The new production database should perform as good as, or better than, the old database.
- Determine which new features of the new database are appropriate to use with your data and update your applications accordingly.
- Develop new database administration procedures as needed.
- Do not migrate production users to the new database until all applications have been tested and operate properly.

Each of these stages will have definite deliverables such as strategy documents, test plans, results of test execution, database logs etc.

CASE STUDY 1

The Problem:

- To reduce the day-end batch processing time from 72 hours to be able to run overnight.
- The system was in the final stages of development. Performance tuning had to be carried out in tandem with the regular development work and before the final release of the product.
- Tuning was to be carried out for projected volumes of over 200,000 agreements (the main unit of transaction within the system).

Genisys' approach:

- Design optimisation. Selected techniques were used to minimise the impact on the existing design.
- Process optimisation. Significant changes were made to the code to implement the various optimisation techniques.

Overview of the techniques used:

- Parallelism was introduced to exploit the multiprocessing features of the Dynix / PTX operating system and the Sequent machine.
- Internal parallelism was introduced in many programs.
- SQL tuning and other Code optimisation techniques were used.
- Indexes were introduced / removed / modified / disabled & enabled as necessary.
- Extract tables were created and reports modified to speed up the reporting.
- Different database set-ups were used for online and batch processing.

Benefits

- The batch window was reduced from 72 hours to 6 hours, resulting in a tremendous gain for Lombard North Central.

Client
Lombard North Central, UK.

Project
Batch performance tuning for PanCredit systems.

System Description
A front-office and back-office system used by Lombard North Central, one of the leading finance houses in the UK. This system is core to their business, used in 32 branches throughout the UK.

Database
Oracle 7, Pro*C 1.6, SQL Forms 3.0

Operating System
Dynix / PTX

Hardware
Sequent

Team Composition
Onsite: 1 project manager and 1 system analyst
Offshore: 1 project manager, 2 lead analysts and 8 developers

Project Size
1,400 person days.

CASE STUDY 2

The Problem:

- The applications response time was very high as the database (exceeding 25 GB) was badly organised.
- Backup and restore procedures were not well organised and were time consuming.

Genisys' approach:

- Database re-organisation. Badly organised Oracle database objects were identified and were re-organised and tuned.
- Streamlining and automating the backup and recovery procedures. More efficient, dynamic and script-driven backup and restore procedures were set-up.

Overview of the techniques used:

- Table space reorganisation and removal of fragmentation
- Index reorganisation
- Table resizing - storage parameters were changed to reduce fragmentation
- Rollback segments reorganisation
- Tuning of the System Global Area (SGA) parameters

Benefits

- A well tuned database
- A menu driven, efficient, backup and restore procedures
- Virtually eliminated all database exceptions such as insufficient extents.

Client
Timet, UK

Project
Oracle Financials, HYPAX

Database
Oracle 6

Operating System
Unix

Hardware
NCR

Team Composition
Onsite: 1 Lead Analyst and 1 Developer analyst

Project Size
200 person days.

CASE STUDY 3

The Problem:

- Wipro's Intranet was used by more than 15,000 of their employees spread around the world.
- Wipro was facing availability, scalability and performance issues on functional modules critical to day-to-day functioning.
- The complexity and criticality of the system meant that a high degree of the expertise was required.
- Genisys was called in to provide an independent evaluation of the problems in the system and provide recommendations for improvement based on our expertise.

Genisys' approach:

As the number of systems to be studied was large, a focused approach was taken given the duration of the study.

Having chosen the applications, functional modules within each of the applications were chosen by rating them on dimensions of business criticality & usage levels on a scale of Low, Medium and High. The project managers responsible for the development of the specific applications carried out these ratings. The team started with the modules with high business criticality and high usage and moved towards systems with lesser business criticality and usage levels.

The following cross-section of people were interviewed

- Project managers of the particular applications
- Selected developers
- Team QC representatives
- Database administration team
- Web server & application server administrators
- Developers and administrators from the SAP development group

A number of problems were identified and recommendations put forth. These range from making process improvements to techniques on SQL tuning. The recommendations being wide ranging, are being implemented by Wipro in a phased manner. Many have been implemented and Wipro has expressed extreme levels of satisfaction with the performance improvements seen as a result of our recommendations.

Client
Wipro Technologies

Project
Performance Tuning of key modules on the Corporate Intranet

System Description
The Intranet acted as the Employee Self-Service portal which provided a wide range of features including time-sheet logging, viewing of payslips etc.

Database
Oracle 7, 8i, 9i

Operating System
Windows 2000 Advanced Server & Sun Solaris

Hardware
Intel, Sun

Team Composition
Onsite: 1 Project Manager and 2 Lead Analysts

Project Size
60 person days.