

white paper

Monitoring Microsoft SQL Server with VISUAL Message Center

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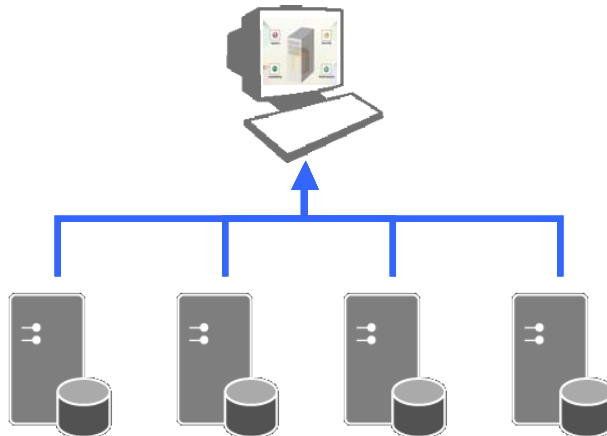
Overview of Microsoft SQL Server Monitoring

VISUAL Message Center offers a full range of monitoring capabilities for one or several SQL Server database engines.

It supports SQL Server 7 and SQL Server 2000 versions running on Windows 2000 or Windows 2003 Server Edition.

Our solution's wide range of monitoring capabilities include control and management of:

- Database Availability
- Database Performance
- Database Security, Regulatory Compliance and Auditing
- Business Services that use SQL Server as an application component



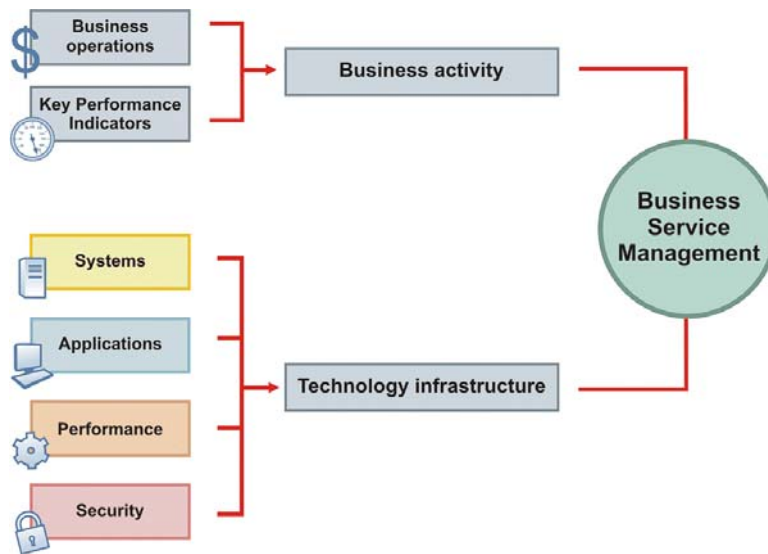
Microsoft SQL Server

A comprehensive tool for Business Service Management

VISUAL Message Center uses several technologies to proactively alert Database Administrators (DBAs), technical staff, and even Line of Business managers of events and potentially dangerous trends before that they become a problem.

The exclusive features of the VISUAL Message Center SmartConsole provide a unique way to easily model business services and understand the impact of a failure on each affected service.

VISUAL Message Center provides unlimited ways to consolidate events and metrics coming from different environments, infrastructure elements, applications and platforms. As a result, It is a valuable solution that enables the implementation of Business Service Management (BSM) strategies in companies of practically any size and sector, helping them achieve the most strict Service Level Agreements (SLAs).



Comprehensive SQL Server Monitoring¹

VISUAL Message Center can alert in real time or near real time of events coming from a comprehensive list of sources, including, among others:

- SQL Server WMI performance providers
- SQL Server internal performance indicators
- SQL Server logs
- Windows Event Log
- SQL Server Processes and Services statuses
- Synthetic transactions (see details below)
- Transaction Logs
- Auditing events
- SQL Transactions
- SNMP variables provided by SQL Server
- SQL Server objects included in System Monitor
- Other Microsoft and third-party monitoring products, such as MOM
- Critical Operating System and Server hardware performance, availability, and security indicators for the servers where SQL Server resides
- Networked devices and related infrastructure services that may affect SQL Server
- Business Services affected by database status

Usually there is no need to use all of these methods at once (in fact, some of them will retrieve exactly the same data), but is important to notice that VISUAL Message Center is flexible enough to use the best monitoring strategies for each customer or scenario.

Methods for retrieving information include Agent-based or Agent-less monitoring, and it is possible to mix both methods in a final deployment.

Critical database servers can be monitored in high detail, while a basic set of the most relevant indicators can be used to monitor other less critical servers.

Non-relevant events can be filtered at source or at the SmartConsole to save CPU resources, network bandwidth and the need for operator-attended supervision. Only relevant events are highlighted and brought to the operators attention, to avoid the difficulty of sorting out critical information amongst great amounts of not relevant technical data.

¹ SQL Server monitoring supports SQL Server 7 and SQL Server 2000 versions running on Windows 2000 or Windows 2003 Server Edition. Requires VISUAL Service Manager 1.0 or later. Estimated date of release, 2Q 2004.

Synthetic Transactions: End to End SQL Server probing

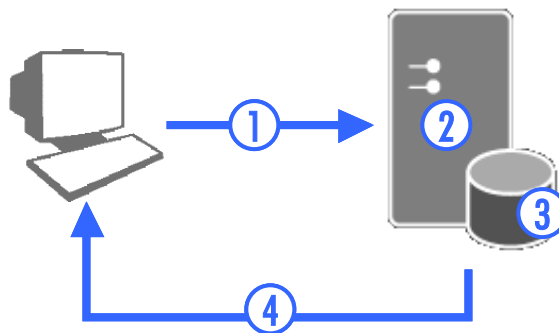
VISUAL Message Center can generate end-to-end accesses to the database to verify that it is responding effectively, either locally or remotely. This technique is usually referred to as “**synthetic transactions**”.

VISUAL Message Center can emulate simple or complex end-user queries continuously (i.e., one test every minute or two) and verify that they are properly accomplished, check the integrity of retrieved fields, the size of record sets, and even the time the query took to run—data that are extremely valuable in Service Level Management (SLM).

This kind of testing is very effective to determine whether the database is responsive or not, since there could be situations when the monitored elements are not showing a critical condition, but it is not possible to successfully conduct any kind of SQL access to the database engine (for instance, when there is a problem with the underlying operating system).

In other cases, synthetic transactions can reflect a performance problem that can be inspected by the associated collected performance metrics. That means that the problem can be investigated and a drill-down analysis can be conducted immediately to find the root causes (such as an unusual number of simultaneous user connections or an abusive query being ran).

This approach saves time since deviations that are not causing a performance or availability problem (such as a high CPU usage) do not need to be further investigated, unless they are actually affecting the accomplishment of service levels.



Besides availability checks, synthetic transactions are often used to accurately measure a system's actual response time. This is the result of adding the time needed to request a query (1), having it processed by a server (2) accessing a database (3), and bring the result back to the user through a network (4).

Relevant Operational Health Monitors

Based on predefined parameters, real-time alerts can be escalated (and actions can be performed automatically) to prevent business services disruption and to increase availability.

Among the hundreds of different technical parameters that can be monitored with VISUAL Message Center, there are a number of relevant indicators that should be considered when planning a monitoring strategy.

Tango/04 software architecture allows other monitors and alerts to be easily and quickly developed and deployed to meet the specific needs of companies of any size and industry.

These are some of the most critical events and checks performed by the Tango/04 SQL Server Agent, which provide an overview of the broad functionality offered by the product to companies running SQL Server databases.

Service Availability, SLAs and Operating Health

By conducting synthetic transactions, monitoring error messages and retrieving other important events (such as a server disk getting full, failed backups, restore errors, job corruption, etc.), it is possible to monitor SQL Server availability. Service Levels can be controlled by comparing a synthetic transaction (which is a test of database response time) against a predetermined threshold. These tests can be executed local or remotely, with the user being allowed to define the criteria (SELECT statement to be executed, login account, database to query, etc.).

SQL Server / Agent Services

Periodically checks that the relevant SQL Server services are running properly. Services not running can optionally be restarted following a custom calendar schedule.

Database Space

It is extremely important to monitor the remaining space in both databases and transaction logs. Different custom thresholds can be set for proactive delivery of alerts.

Service Pack Compliance

Checks installed service packs against a custom default.

Security, Auditing and Law Compliance

It is advisable to monitor failed logins, configuration problems, user creation and maintenance, connection history and other auditing data. A tradeoff must be made on the number of events that can be produced against the level of auditing data that should be kept. Security information can produce a very high number of events rapidly on busy servers, which translates into CPU, disk, and bandwidth overhead.

Users, Locks and Processes

Full information on processes and users can be obtained including information about locks, waits, long-running jobs, and abusive usage per individual users.

SQL Server Performance

Several indicators can be retrieved. Synthetic transactions can be used to determine actual end-user response time, while the collection of performance metrics helps in identifying the root causes of a response below expected time. These include abusive CPU usage, deadlocks, number of simultaneous user connections, number of full table scans, disk response, etc.

Supported Technical Parameters

Amongst the parameters that can be monitored in Microsoft SQL Server 2000², we can mention the following.

SQL Server Information

General Information

- General Operational Health (CPU, memory, available disk, etc.)
- SQL Server version
- SQL Server Service Pack installed
- SQL Server services activity

Process Information

- Run status
- Memory usage
- CPU usage
- Login account used
- Start / End time

Instances status

- SQL Server Databases Status
- Used Space
- Free Space

Transaction Log

- Transaction log space used
- Transaction log space available
- Status

Users

- User information
- User roles

SQL Server Configuration Values

- Recovery Interval
- Allow Updates
- User Connections
- Locks
- Open Objects
- Fill Factor
- Nested Triggers
- Remote Access
- Default Language
- Language In Cache
- Max Async I/O
- Max Worker Threads
- Index Create Mem
- Spin Counter
- Priority Boost
- Remote Login Timeout
- Remote Query Timeout
- Cursor Threshold
- Set Working Set Size
- Resource Timeout
- User Options
- Processor Affinity Mask
- Max Text Repl Size
- Media Retention

² A great number of monitored parameters may have a negative effect on overall performance and can increase disk consumption, so try to collect only relevant operational health indicators. Complete list valid for SQL Server 2000. For SQL Server 7, the parameters are a subset of these. Some technical parameters may not be available depending on the retrieval method (WMI, internal performance tables, SNMP, logs, etc.).

- Network Packet Size
- Show Advanced Option
- Remote Proc Trans
- Remote Conn Timeout
- Time Slice
- Default Sort order Id
- Unicode Local ID
- Unicode Comparison Style
- Language Neutral
- Two Digit Year Cutoff
- Cost Threshold For Parallelism
- Max Degree Of Parallelism
- Min Memory Per Query
- Query Wait
- VLM Size
- Min Memory
- Max Memory
- Query Max Time
- Lightweight Pooling

SQL Server Performance

- Active Transactions
- Auto-Param Attempts/sec
- Average Latch Wait Time (ms)
- Average Latch Wait Time Base
- Average Wait Time (ms)
- Average Wait Time Base
- AWE lookup maps/sec
- AWE stolen maps/sec
- AWE unmap calls/sec
- AWE unmap pages/sec
- AWE write maps/sec
- Backup/Restore Throughput/sec
- Batch Requests/sec
- Buffer cache hit ratio
- Buffer cache hit ratio base
- Bulk Copy Rows/sec
- Bulk Copy Throughput/sec
- Cache Hit Ratio
- Cache Hit Ratio Base
- Cache Object Counts
- Cache Pages
- Cache Use Counts/sec
- Checkpoint pages/sec
- Connection Memory (KB)
- Data File(s) Size (KB)
- Database pages
- DBCC Logical Scan Bytes/sec
- Log File(s) Size (KB)
- Log File(s) Used Size (KB)
- Log Flush Waits/sec
- Log Flushes/sec
- Log Growths
- Log Shrinks
- Log Truncations
- Logins/sec
- Logouts/sec
- Log reader: Delivered Cmds/sec
- Log reader: Delivered Transactions/sec
- Log reader: Delivery Latency
- Maximum Workspace Memory (KB)
- Memory Grants Outstanding
- Memory Grants Pending
- Mixed page allocations/sec
- Number of Deadlocks/sec
- Optimizer Memory (KB)
- Page Deallocations/sec
- Page life expectancy
- Page lookups/sec
- Page reads/sec
- Page writes/sec
- Pages Allocated/sec
- Percent Log Used
- Probe Scans/sec
- Procedure cache pages

- Dist: Delivered Cmds/sec
- Dist Delivered Trans/sec
- Dist: Delivery Latency
- Extent Deallocations/sec
- Extents Allocated/sec
- Failed Auto-Params/sec
- Forwarded Records/sec
- Free list empty/sec
- Free list requests/sec
- Free list stalls/sec
- Free pages
- Free Space Page Fetches/sec
- Free Space Scans/sec
- Full Scans/sec
- Granted Workspace Memory (KB)
- Index Searches/sec
- Latch Waits/sec
- Lazy writes/sec
- Lock Blocks
- Lock Blocks Allocated
- Lock Memory (KB)
- Lock Owner Blocks
- Lock Owner Blocks Allocated
- Lock Requests/sec
- Lock Timeouts/sec
- Lock Wait Time (ms)
- Lock Waits/sec
- Log Bytes Flushed/sec
- Log Cache Hit Ratio
- Log Cache Hit Ratio Base
- Log Cache Reads/sec
- Log Flush Wait Time
- Page Splits/sec
- Query
- Range Scans/sec
- Readahead pages/sec
- Repl. Pending Xacts
- Repl. Trans. Rate
- Reserved pages
- Running
- Safe Auto-Params/sec
- Scan Point Revalidations/sec
- Shrink Data Movement Bytes/sec
- Skipped Ghosted Records/sec
- Snapshot:Delivered Cmds/sec
- Snapshot:Delivered Trans/sec
- SQL Cache Memory (KB)
- SQL Compilations/sec
- SQL Re-Compilations/sec
- Stolen pages
- Table Lock Escalations/sec
- Target pages
- Target Server Memory(KB)
- Total Latch Wait Time (ms)
- Total pages
- Total Server Memory (KB)
- Transactions/sec
- Unsafe Auto-Params/sec
- User Connections
- Workfiles Created/sec
- Worktables Created/sec
- Worktables From Cache Base
- Worktables From Cache Ratio

Availability and Security Auditing

Users and roles

- User creation, modification and deletion
- Role creation, modification and deletion

Access auditing

- User connections
- User disconnects
- Connection errors
- Connection being killed

Stored Procedures Monitoring

- Store Procedure Preparation
- Store Procedure Execution
- Store Procedure End

Full SQL Statement Monitoring (per Statement)

- Statement preparation
- Statement Execution
- Statement End

Full Lock Monitoring (Per Lock)

- Lock acquisition
- Lock release
- Timeout errors
- Lock cancellation
- Deadlocks

Table Scans Monitoring (All events)

- Scan Start
- Scan End

Cursor Activity Monitoring

- Cursor Open
- Cursor Preparation
- Cursor Execution
- Cursor recompiles
- Cursor Cleaning
- Cursor Closes

Object Monitoring

- Creation
- Deletes
- Open
- Closes

Error Management

- SQL Server events sent to the Event Log
- Events sent to the SQL Server Error Log
- OleDB errors
- ODBC errors
- Internal errors

Transaction Log Monitoring

- Writes to the Transaction Log
- Transaction log contents (transaction information and actual modified data)

Monitoring all corporate databases from a single screen

Creating customized Enterprise Views is a very simple process, using the mouse and predefined or custom backgrounds that can be geographical maps, factory blueprints, etc. Logical grouping can be done, and the status of each element is shown in real time or near real time.

REAL TIME DATABASE STATUS

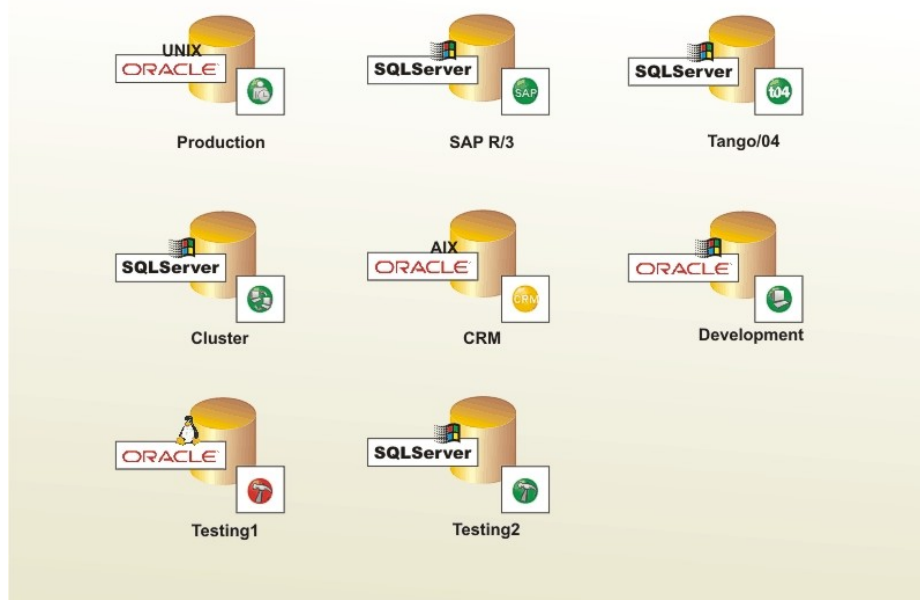


Figure 1- The status of several databases can be shown in real time, helping Database Administrators to manage multiple DBMS in multiple platforms, local or remotely. By clicking on a database status icon, it is possible to drill down to the root cause of the failure rapidly.

Business Service Views: seeing it all in context

Another interesting feature of VISUAL Message Center is its ability to create Business Service views. There, you can model all the components of a business service, and understand the business impact of a failure in a database engine. Tango/04 software is extremely apt to create this kind of business modeling, since creating, navigating and maintaining service models is extremely easy.

A very simple example of the component of a Business Service (a online Store) is shown in the figure. Much more complex element relationships can be shown too.

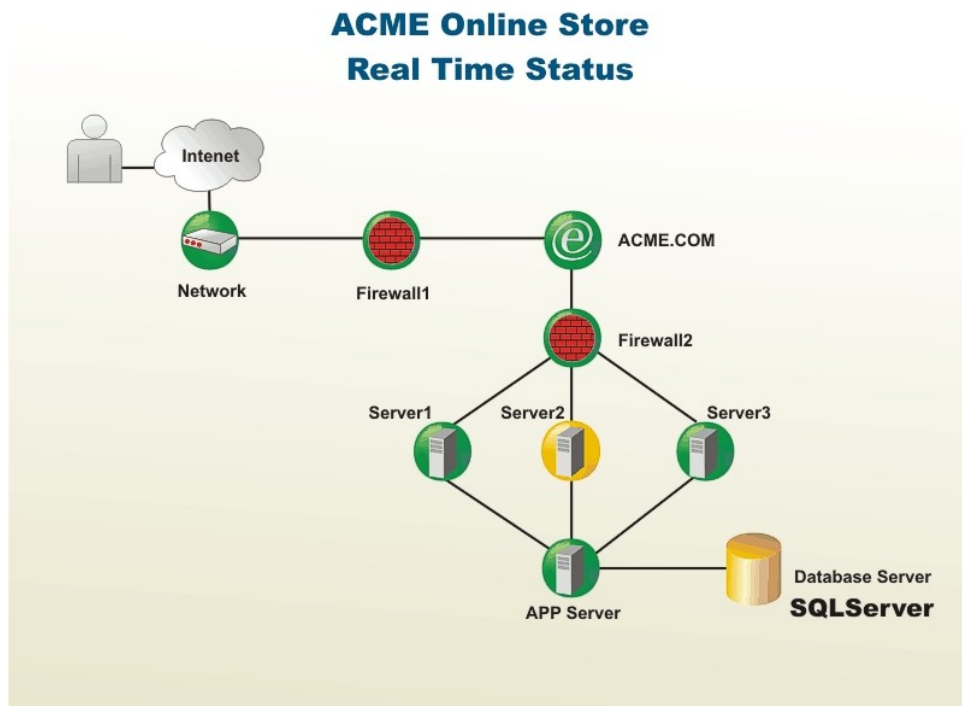


Figure 2 - A simple example of a web based store showing their components and their status. Such service views can be easily created, navigated (drill down), and modified when necessary. All the component statuses are refreshed in real time or near real time.

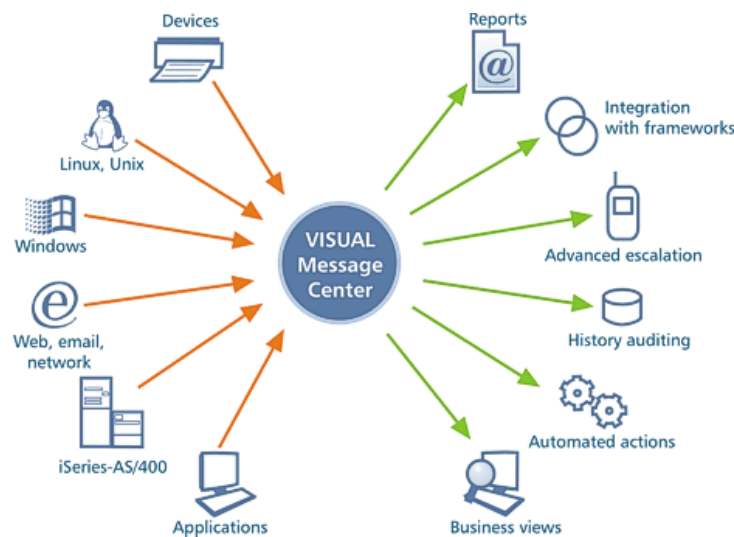
Improving IT Management with Tango/04

Improvement of IT service levels

- Dynamic system performance tuning
- Automatic problem resolution
- Real-time and historic reporting of SLA achievement

Reduction of management costs

- Automation IT operations tasks
- Prioritization of IT incidents according to business impact
- More effective user support



Protection of data, applications and processes

- Real-time security audit
- Self-protection of IT assets
- Historical analysis and risk management
- Regulatory compliance (Sarbanes-Oxley, HIPAA, Basel II, etc.)

Increased visibility of business processes

- Assessment of business impact of technology problems
- Cross-platform integration of operational status
- Generation of high-level management reports

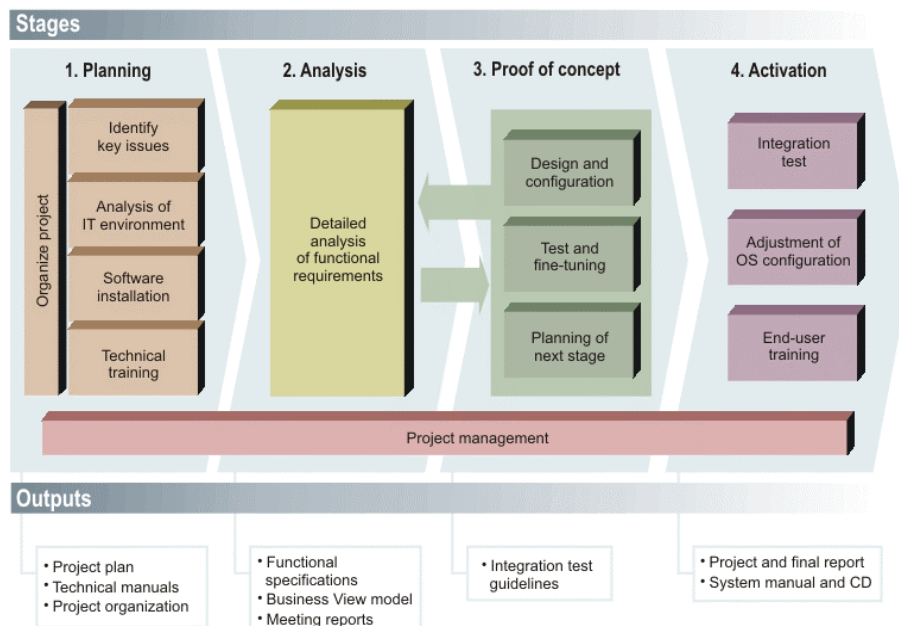
Tailoring our solutions to meet your specific needs

Our SafeDeploy™ methodology helps our Business Partners implement tailored solutions that meet the specific needs of our customers. It takes advantage of a collection of best practices and provides a framework for the reuse of real-life-proven solutions by our consultants.

SafeDeploy™ consists of four stages, each consisting of professional services that deliver a number of products. By working closely with our consultants, IT staff members, IT managers, and supervisors at other company departments, can take a close look at the tangible results they can expect before the solution is fully deployed.

This first-hand experience with the solution provides valuable information that can help in justifying the need and benefits of the project in front of the CFO, the CEO, or other non-technical decision makers.

Tango/04 Safe Deploy™ Methodology



About Tango/04 Computing Group

Tango/04 Computing Group is one of the leading developers of systems management and automation software. Tango/04 software helps companies maintain the operating health of all their business processes, improve service levels, increase productivity, and reduce costs through intelligent management of their IT infrastructure.

Founded in 1991 in Barcelona, Spain, Tango/04 is an IBM Business Partner and a key member of IBM's Autonomic Computing initiative. Tango/04 has more than a thousand customers who are served by over 35 authorized Business Partners around the world.

Alliances



Partnerships

- IBM Premier Business Partner
- IBM Autonomic Computing Business Partner
- IBM PartnerWorld for Developers Advanced Membership
- IBM ISV Advantage Agreement
- IBM Early code release
- IBM Direct Technical Liaison
- Microsoft Developer Network
- Microsoft Early Code Release

Awards



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