

# AN UNIFIED METHODOLOGY TO ATTAINMENT INDICATORS IN SAP/ERP EXECUTION PROCESSES

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**Abstract** - *The fundamental technology continuous upgraded in the way users need to evaluate / analyze business in terms of the SAP ERP system during pre- post implementation of SAP project implementation is by incorporation of business scenarios in SAP standard as well bespoke functional & technical solutions. This paper describes performance analysis and success indicators in manufacturing organizations using integrated and process-oriented approaches to overcome the technical consequences of complex problem, end user resistance and conflicts between stakeholders of SAP ERP. The study further examines the pre and post implementation period of SAP ERP implementation in Indian manufacturing organizations, with the aim of understanding and explaining the practical day-to-day system performance issues and resolutions. Organizations get benefits from the system after sufficient training, post implementation support, and acceptability of change management procedures. The description of the case is followed by a practical analysis using the structure of rational model of technology. The study also deeply examines performance analysis using integrated approach during pre and post implementation period based on the experience made in real life situations, and working with some selected SAP systems in production operations. In the scientific investigation, the in-depth interviews, process and documentation analysis has been considered in order to analyze a successful SAP and ERP implementation in true logic.*

**Keywords** - *Enterprise Resource Planning (ERP), Execution process, Business Process Management (BPM), Systems Applications and Products in Data Processing (SAP), Integrated Approach*

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## I. INTRODUCTION

Enterprise Resource Planning (ERP) is a set of integrated business applications used to carry out the most common business functions. ERP systems have evolved over the past 40 years. The study of SAP and ERP Implementation focuses on addressing, in view of the Increasing Business Volume, the need to adopt modern technology in any fast growing organization plan with the intent to implement SAP, ECC 6.0

and ERP across the Group location companies, starting with Core business areas. There are no longer needs to subject a customer's query or order to be inputted into the different databases which support different processes at considerable efforts of non-value added work the purpose of seeking answers and solutions. Such approach often causes delays that can turn way or frustrate the customers. In this space age, everything is sought with extreme sense of urgency and there is no room for duplication of data inputs and serial processing. In contrast, the systematic, proactive optimization of performance considerably increases the value of e-business application. The performance of a data processing system is defined as the system's ability to fulfill given requirements concerning response time and data throughput. The system may, for example, be required to achieve a throughput of 10,000 printed invoices in one hour or a response time of less than one second for the creation of a sales order. Good performance is, however, not an absolute characteristic of an e-business application. Rather, it should always be viewed as relative to the demands made on the application.

One basic problem with companies is that they go for SAP/ERP at a stretch. This might be one potential reason in the case of backfiring. The requirement of each organization is entirely different. Forms of organizational change refer mainly to the frequency of change taking place throughout the lengthy process of SAP implementation, which sometimes lasts years. This ongoing change of varying magnitude can occur in diverse forms at different paces. It has been claimed that the intention of any organization changes is to move the organization from its present situation to a more desirable one [1]. Thus, there is need for coexistence of SAP and ERP solutions and well-founded legacy systems. This predicament poses new challenges to SAP implementers. Added to this is the human resistance to change. Without change and reengineering of various processes, it is difficult to achieve implementation of SAP and ERP solutions.

## II. REVIEW OF LITERATURE

SAP is a fully integrated enterprise wide resource planning software package, which links all business activities of an organization. The software suppliers and the products considered for the decision process show clearly the dominant position of SAP in the marketplace (considered by 87.5 percent of the organization) [2]. On the other hand, ERP is a strategic tool, which helps the company to gain competitive edge by integrating all business processes and optimizing the resources available. SAP computes real costs of every transaction based upon actual consumption of resources. Balance sheet is updated online for every transaction. The purpose of this study is to identify the Performance Analysis and Success Indicators in SAP and ERP implementations using integrated approach projects, describe the total project life cycle associated with enterprise-wide/ERP (enterprise resource planning) projects, and identifies the risk factors in ERP projects, which are unique to these projects. Some of the unique challenges in managing SAP enterprise-wide projects which were highlighted through the findings include: the challenge of re-engineering business processes to 'fit' the process which the ERP software supports, investment in recruiting and re-skilling technology professionals, the challenge of using external consultants and integrating their application-specific knowledge and technical expertise with existing teams, the risk of technological bottlenecks through client-server implementation, and the challenge of recruiting and retaining business analysts who combine technology and business skills.

Looking forward to Performance issues, Application Monitor's user profiles initial screen shows the current number of users for the different SAP modules. The user profile in the Application Monitor is especially useful when you wish to check whether logging on with logon groups is functioning correctly, so that users are logged on to application servers independently of one another. The Workload Monitor enables you to make detailed statements about, the distribution of response times not only across different system components, such as the database, hardware, and SAP Basis components, but also across different transactions and programs. This helps you avoid jumping to the wrong conclusion if a superficial analysis of the Workload Monitor indicates a performance problem where, in fact, there is no real problem. It also avoids the opposite situation of not noticing that the Workload Monitor is indicating a performance problem that is readily apparent to users.

## III. METHODOLOGY

In this study an appraisal of various implementation issues encountered and the manner by which these were resolved after researching into various implementations have been presented. Further research tried to validate the results using case study method and interviews with people of various roles involved in SAP Implementation projects. However, we think that this step should be done with the information provided by case studies, and not only based on theoretical assumptions. Several case studies at inter-organizational and intra-

organizational level have been analyzed to support the finding of the research. The present study is exploratory in nature which identifies critical failure factors for the failure of SAP ERP Implementations at Indian SMEs along with the KCF's (Key Critical Failure Factors) by the mean of ranking of those CFF's. This exploratory research formulated problems more precisely, clarified concepts, gathered explanations, gained insights, eliminated ideas and then formulated hypothesis and tested. Exploratory research here is performed by a survey [3].

## IV. SIGNIFICANCE OF SAP/ERP IMPLEMENTATION

Companies have to clearly know what enterprise resource is planning before thinking of implementing them. The catchword of SAP/ERP implementation is speed. The faster it is implemented the quicker and better are the advantages and delivery in terms of results. This early process has another hold. The returns are sought at a shorter period. This deviation from the conventional practice has become the order of the day as far as many companies are concerned. Formerly business process reengineering played a vital role with respect to SAP implementation. It is important to know the components of ERP. Merely defining enterprise resource planning will not help in comprehending its scope in terms of integrated business application. The findings hold significance for any organization in the small and medium scale sector which wishes to leverage the benefits of integration of business processes by implementing an ERP system in their organization. Literature shows many instances of ERP implementation which failed to deliver the business returns and in some cases the entire project implementation cost has been a sunk cost for the organization getting no return on their investment. This outcome much more acute in case of SME because of their inherent peculiarities [4].

This naturally paved way to development of gaps between the actual results and the one derived during the process of foreseeing. Tuning ERP as per the whims and fancies of the practices followed in the company became a routine affair. This led to slogging and dragging beyond the time limits permitted. It was monetarily pinching and played havoc in the customer's trust. It is also necessary to understand that mere SAP/ERP planning does not guarantee the benefit of SAP/ERP. It has to be implemented as planned after understanding the components of enterprise resource planning. In spite of having improved the implementation issues what remains static and unfettered is the manner in which companies go ahead with SAP/ERP implementation. They do it for the sake of it and without following systematic procedures. In fact they don't even check the desirability of going into SAP/ERP. ERP packages touch many aspects of a company's internal and external operations. Consequently, successful deployment and use of ERP systems are critical to organizational performance and survival (Markus et al., 2000b). Potential benefits include drastic declines in inventory, breakthrough reductions in working capital, abundant information about customer wants and needs, along with the ability to view and manage the extended enterprise of suppliers, alliances and customers as an integrated whole (Chen, 2001). In the manufacturing sector, ERP implementation has reduced inventories anywhere from 15 to 35 per cent [5].



Figure 1: ASAP Roadmap

V. CHALLENGES FACED BY SAP/ERP

Several multilateral challenges have been faced by SAP/ERP system, for example: large dollar investments for setup; Implementation and maintenance even for small ERP projects; painful and lengthy implementation and debugging; lack of high level of expertise for implementation and debugging; multiple difficulties are hidden leading do “doubling the time and tripling the cost” estimates for the project. In addition, there are: difficulties amplify organizational resistance to change; strategic benefits are hard to quantify; targets are rarely achieved; plans are too ambitious (time and \$\$\$ invested); expectations are unrealistic; lack of understanding of strategic benefits of ERP implementation (follow the crowd mentality); superficial implementation with a lack of necessary infrastructure support; confusion and a general lack of knowledge about the new system throughout the organization. Also, the production and inventory control department, as well as the SAP help desk, and IS department were pummeled with a lot of questions that they did not have the capacity to answer. The system is plagued with unacceptable consultant turnover leading to instability; data had been inaccurate, incomplete, overlooked or was not entered into the system causing many errors (garbage-in, garbage-out); confidence in the system amongst internal and external customers was undermined; insufficient time and money necessary to successfully implement the project; management pushed for a quick transition to a new system to save money on current system software licenses; and finger-pointing and blame shifting for poor system performance and many more were among the identified challenges.

VI. MAJOR SAP IMPLEMENTATION ISSUES TO BE CONSIDERED

Some of the critical issues for implementation of the SAP are considered here. It is considered significant to always develop back up strategies and computer infrastructure systems considering performance issues; review and understand the current processes and need before defining the need for a system (Choose or design a system around your business needs); support and drive from executive staff to change corporate culture is a must, and training is again a headache. As noted earlier, most empirical studies on success factors have been based upon perceptions of managerial level employees and not so much on end-users. It is possible that by focusing only on the perception of managers, an accurate assessment of the effectiveness of the intervention might not be obtained. This is because managerial perceptions might be influenced by the roles that those managers played in designing those interventions [6].

VII. CHANGE MANAGEMENT AND SAP/ERP IMPLEMENTATION

The success of the SAP/ERP implementation largely depends upon how change is being managed. In introducing SAP/ERP system, industries recognize very early stage of the project that the biggest challenge will come from change management. The key was to view the business from a process perspective, much the way and respect the people issues as equally significant. Change management is about setting expectations that lessen the pain of change. People involved in a change expect to go from A to B. Perhaps where they are actually going is to C. Change management is about getting them used to the idea that C is the real or ultimate destination. Measuring attitudinal changes is not a complicated process. Properly managed, we can see how people feel about the changes over a period of time, and how they shift in their expectations. The results of money spent on change management can be seen. Not putting in the effort before implementation will cost an organization after implementation. To give an example, any new system is bound to have teething problems. If users expect that all is not going to run smoothly on day 1, and that they may be working back late for the first week because of problems bedding in the new system, they are less likely to reject the system when it does go wrong. On the other hand telling staff that this is going to be a great new system with no problems can only lead to disappointment and rejection when bugs appear. As such, change management is measurable. What is the cost to an organization of a system that is forced upon people, and with which they feel little ownership? They will either sink it, or ensure it never reaches its potential. Either way, the organization will never get the return on investment it imagined.

VIII. SOFTWARE CUSTOMIZATION AND BUSINESS PROCESS REDESIGN

Process modeling which is used to align product software and organizational structures, involves a major issue when the conclusion is drawn that the product software and the organizational structure do not align well enough for the software to be implemented. In this case, two alternatives are possible: the customization of the software, or the redesign of the organizational structure. Customizing the SAP/ERP actually transforms the product software in tailor-made software, as the idea of standardized software no longer applies. This may result in loss of support on the software and the need to acquire consultancy when issues arise in the usage of the SAP/ERP. Customizing however results in a situation where the organizational integrity is not adjusted, which puts less pressure on the end users, as less changes or shifts in workflows are required. This may positively add to the acceptance of any new add-on software application used and may thus decrease the implementation time and budget planning on the soft side of the implementation process. Redesigning business processes is more sensible for causing resistance in the usage of product software, as altered business processes will alter tasks and responsibilities for the end users of the product software. However, while the product software is not altered, factors like better support, training, and service levels are possible, because the support was created for the

specific integrity of the software. In figure 2 below, an Operational Assortment Planning and Control (OAPC)\* process is described dramatically to help explain the SAP business implementation redesign. The need to adjust the SAP/ERP system according to business reality is obvious. Large software packages offer many ways on how to use parameter control for processes, implementation templates, and even industry specific solutions [7].

IX. TEN (10) COMMON CAUSE OF DISASTER

- Change Management and Training.
- Poor Planning / Performance Optimization
- Underestimating IT skills
- Poor Project Management
- Technology Trials
- Underestimating Resources
- Insufficient Software Evaluation
- Employee Morale
- Implementation Cost & Time.
- Organization Change Process.

X. PROACTIVE PERFORMANCE MANAGEMENT

By Performance optimization, in this paper, it refers to a process that includes five phases. The first two phases are: the understanding of the business processes, and setting and quantifying performance goals. These steps involve all participating parties, that is to say, technicians and application experts. Optimization can only be successful on the basis of these prerequisites. Phase's three to five involve the systematic monitoring, identifying and analysis of problems, the implementation of optimization measures, and further analysis to verify the success of the measures introduced (see the Figure 3 below). We warn against randomly tinkering with configuration parameters and similar impulsive tuning measures. Rather, the objective of this paper is to enable you to identify and analyze performance problems in order to deal with them purposefully.

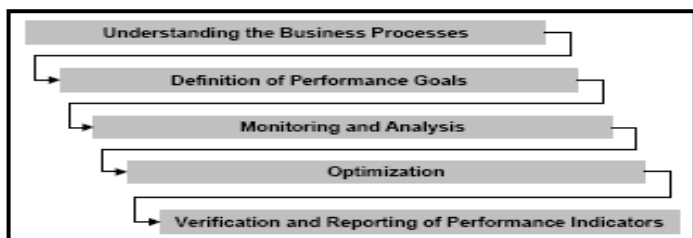


Figure 2: Performance Optimization in Five Phases

*Technical Optimization:* From a technical point of view, an e-business application is made up of many different components. On the one hand, there are the logical components: processes and services, threads or work processes, and memory areas such as buffers and user contexts. On the other, there are the physical components such as processors (CPU), main memory (RAM), hard disks and network segments. Each of these components allows for a maximum throughput and optimal response time. If the interplay between the components is not appropriately balanced or if an individual component has reached its performance limit, wait situations can occur which have a

negative effect on throughput and response time. In this paper, Technical Optimization refers to the identification, analysis and solution of such problems by tuning the components and distributing the workload that occurs within the system.

*Application Optimization:* The second important task of performance optimization is to avoid unnecessary workload. Performance can be weakened by inefficient programs or the inefficient use of programs. The optimization of individual programs is referred to as application optimization. The goal of optimization is, first of all, to improve the system settings and the applications to achieve the desired performance on the basis of the existing hardware resources. If the existing resources are not sufficient, they must be extended according to the knowledge gained in the analysis.

*How much tuning is necessary?* How much effort is involved in the performance analysis and tuning of a mySAP solution? The answer to this question depends largely on the size of the system. For a small or medium sized installation without modifications to the SAP standard and without customer developments, it is normally sufficient to do performance optimization just before and shortly after the start of production and after large-scale changes, for example, after upgrades, large data transfers or client transports, or when new mySAP solutions or additional users are introduced in the system. Of course, it is also necessary to intervene when there are acute performance problems. The tuning potential and, with it, the effort involved in analysis and optimization increases in proportion to the size of the system. Experience shows that many performance bottlenecks are caused by customer developments and modifications to the standard SAP software. The most common reason for this is insufficient testing, but problems may also arise as a result of time constraints or a lack of experience on the part of the developer. The extreme case would be a large, constantly developing installation with several hundred users, complicated process chains, a dozen or more developers (often from different consulting firms, working on the system at different times and in different places) and outsourced system management. In such a system environment, it is absolutely necessary that a small group of administrators and developers have an overview of the entire system and keep an eye on performance.

XI. SAP DIAGNOSTICS

Correlate distributed data for quick analysis and troubleshooting. The SAP Performance report summarizes the health of the run, displays the data most significant to the run, shows the response trend of the slowest 10 transactions in the test, and graphs the response trend of each transaction for a specified interval. Below, various graphs show the health run of the SAP systems that can be monitor by SAP Basis consultants on regular basis.

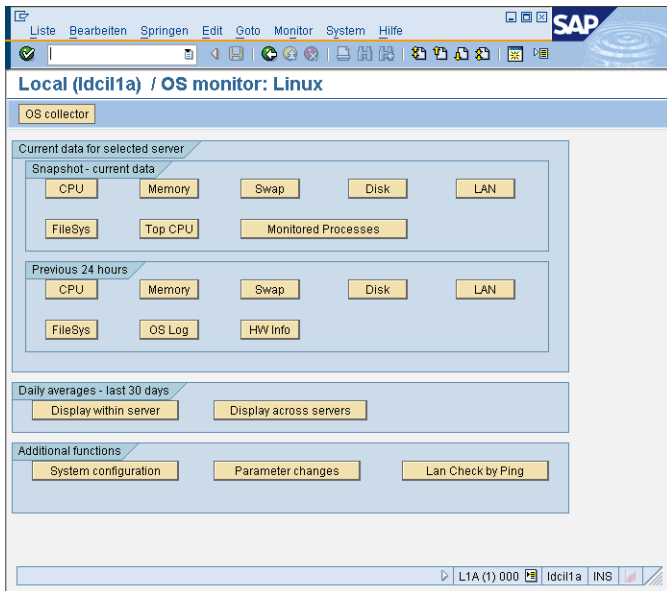


Figure 3. Monitoring Memory Resources Using Transaction – ST06

- Workload of SAP System SID

This chart displays the main task types and indicates how their workload is distributed in the system. The table below lists the detailed KPIs (key performance indicators).

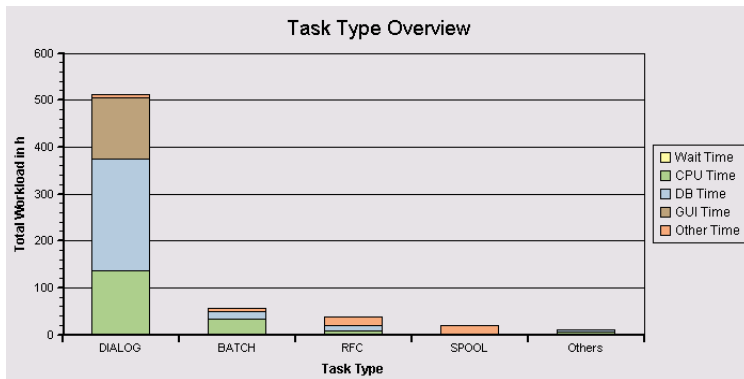


Figure 4. Total Workload of SAP SID

Table 1.  
Response Time Components in Hours

- Workload by Application Module

The following diagrams show how each application module contributes to the total system workload. Two workload aspects are shown: (a) CPU time: total CPU load on all servers in the system landscape, (b) Database time: total database load generated by the application

All programs that are not classified in the SAP Application Hierarchy (*transaction SE81*) are summarized in the "Not-Assigned" category. Customer programs, industry solutions, and third-party add-on developments fall into this category

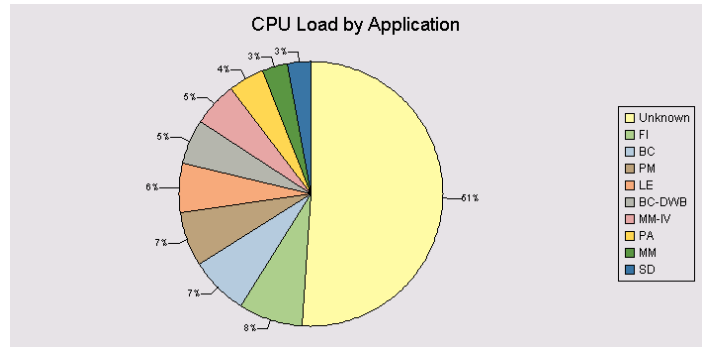


Figure 5. CPU Load diagram

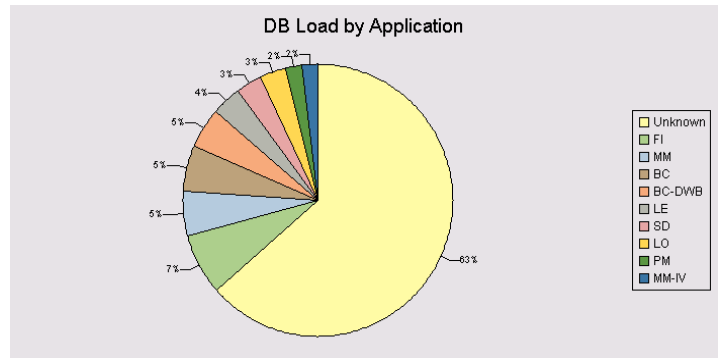


Figure 6. Database Load Diagram

- System Activity

The following diagrams show the system activity over time. The "Transaction Activity" diagram below depicts transaction activity in the system over time.

- Total Activity: Transaction steps performed each week (in thousands)
- Dialog Activity: Transaction steps performed in dialog task each week (in thousands)
- Peak Activity: Transaction steps (in thousands) during the peak hour; this peak hour is calculated as the hour with the maximum dialog activity in the ST03 time profile divided by 5 working days per week. (Peak Activity is absent if "Activity Data" is taken from ST03 data directly).

Task Type	Response Time	Wait Time	CPU Time	DB Time	GUI Time
DIALOG	511,1	1,6	134,7	237,7	131,4
BATCH	55,8	0,0	33,8	15,9	0,0
RFC	37,4	0,5	8,4	11,1	0,0
SPOOL	19,9	0,0	0,2	0,2	0,0
Others	10,0	1,5	3,7	4,2	0,0

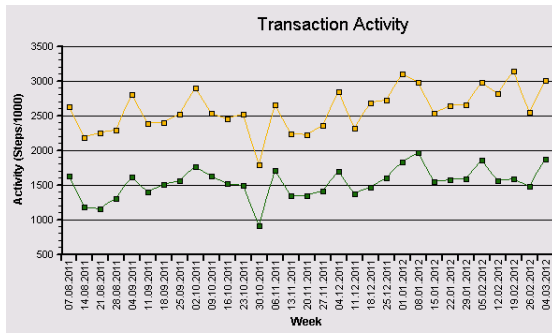


Figure 7. The "User Activity" diagram below shows the user activity on the system over time.

- a. Total Users: Total users that logged on in one week.
- b. Active Users: Users who performed more than 400 transaction steps in one week.

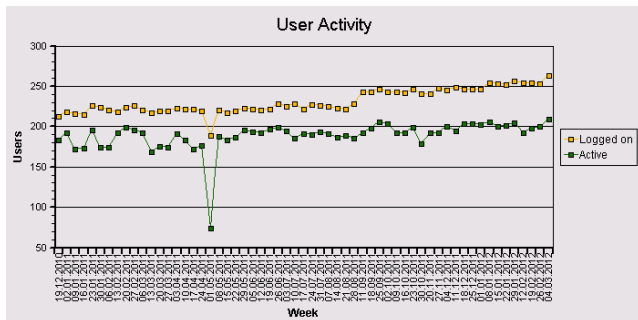


Figure 8. User wise activity log

• Response Times

The following diagrams show how the response time varies over time.

- a. The "System Performance" diagram below shows the average response time in dialog tasks for particular week period.

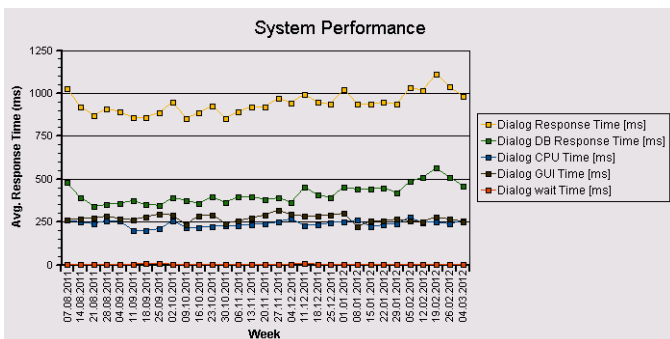


Figure 9. System performance Diagram

- b. The "Database Performance" diagram below shows the average DB response time in dialog tasks.

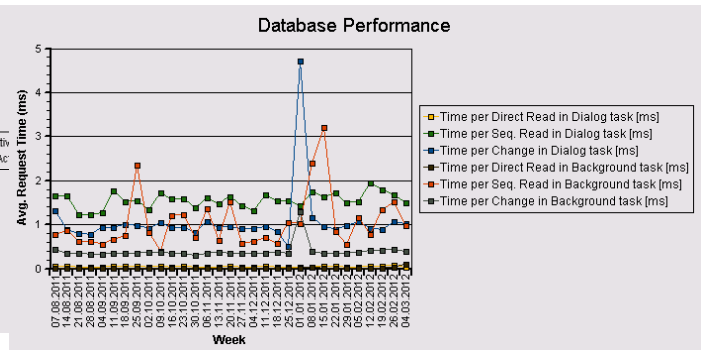


Figure 10. Database performance Diagram

XII. CONCLUSION

SAP/ERP solutions are revolutionizing the way companies produce goods and services. SAP/ERP implementation brings a lot of benefits to organizations by tightly integrating various departments of the organization. It helps to develop a system exploitation strategy as identify projects that utilize the base infrastructure and deliver the biggest benefits and find people who understand the business and its processes, and the technology. SAP/ERP system is very large and complex and requires a careful planning and execution of their implementation. The other important factors are the issues relating to reengineering the business processes and integrating the other business applications to the ERP backbone. Upper management plays a key role in managing the change an SAP/ERP brings into an organization. Organizational commitment is paramount due to possible lengthy implementation and huge costs involved. Integrating different software packages poses a serious challenge, and the integration patchwork is expensive and difficult to maintain. Organizations could reduce the total cost of implementation if they reduce customization by adapting to the ERP's built in best practices as much as possible. A well-designed and properly integrated ERP system allows the most updated information as well, and performance monitoring capability allows administrators to not only be proactively notified of any response time problems with the SAP service, but also to determine which step(s) is causing the slowdown to be shared among various business functions; thereby resulting in tremendous cost savings and increased efficiency.

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