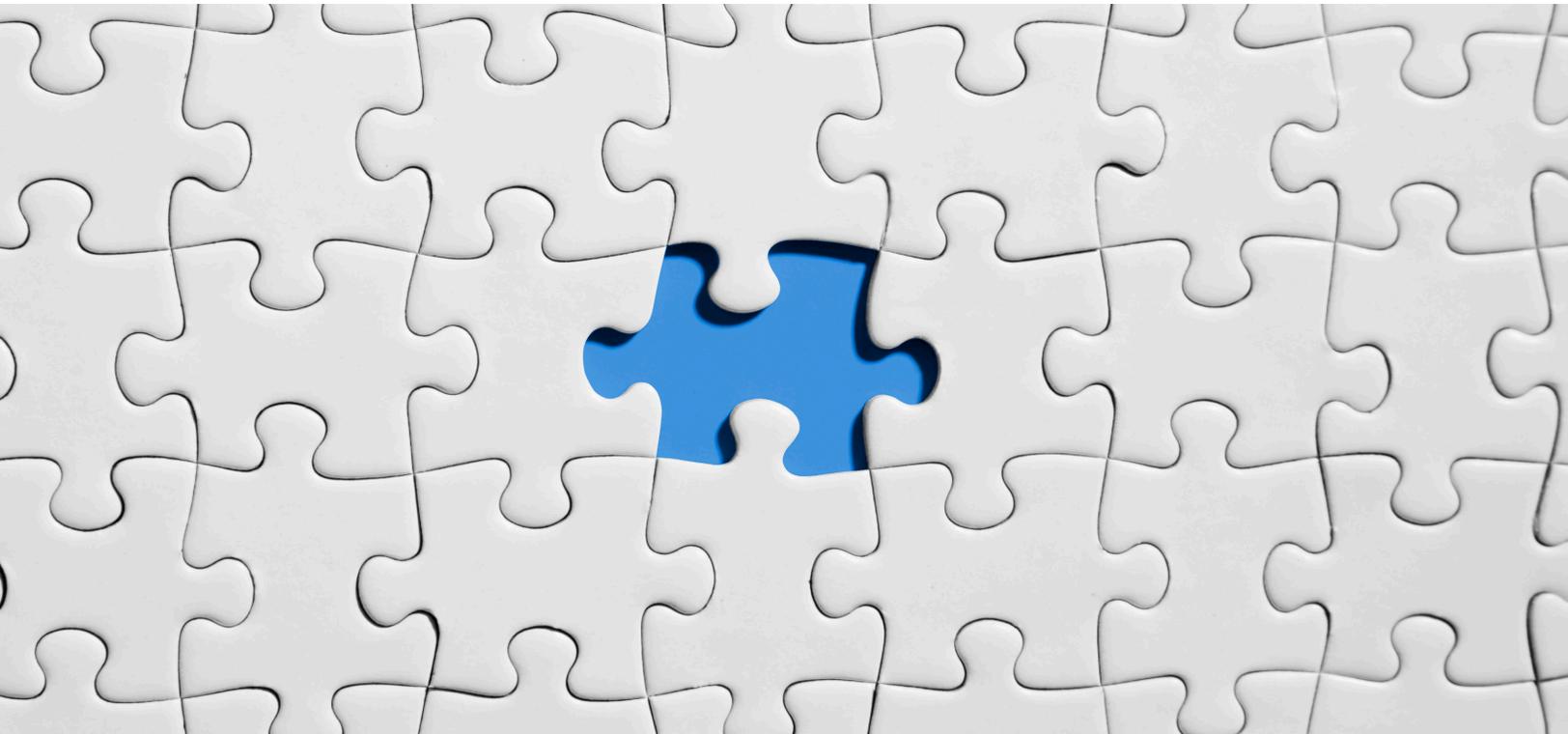


ENHANCED NETWORKER (AI) TO WOW CUSTOMER EXPERIENCE

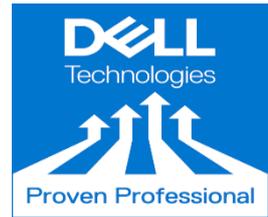


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Introduction

NetWorker supports a wide range of devices, i.e. Advanced File Systems, Tape Library, Cloud, and Data Domain – Disk Devices.

Also, supports the Futuristic and Advanced Point-in-time Snapshots and Clones to Dell EMC's Storage Arrays and others which made the Backup Strategy simpler with making the processes more convenient.

This Knowledge Sharing article explains how the NetWorker Application can be enhanced with more flexibility and ease to enhance the Customer Support Experience and build the Resolution/Fixing in less time. This article revolves around how we can enhance the Product with Flexibility to the End User and making the Application more AI/ML-enabled to make the process easier and convenient to get information required a Technical Engineer/ Analyst as part of troubleshooting.

What is NetWorker?

NetWorker is a Data Protection tool that helps Enterprise-Level Customers back up their data to tape, disk, or cloud. It supports various Filesystem, Application, and Database-level backups for both on-premises/off-premises(Cloud).

A Unified Management Solution, NetWorker provides customers with enhanced flexibility and ease of use. It is a Cloud-enabled solution with a robust feature set which enables long-term retention while running backups to the Cloud (or) in the Cloud.

This high-performance backup and recovery solution provides the speed, security and scalability to meet Service Level Agreements (SLA) of Enterprise customers. Deduplication is best achieved with NetWorker by integrating with Data Domain devices. It supports granular-level Disaster Recoveries (DR) –to ensure that Data Protection SLA's are met.

NetWorker also supports:

- NetWorker Module for Databases and Applications (NMDA) integrates with IBM DB2, Informix, Domino (Lotus), MySQL, Oracle, and Sybase
- NetWorker Module for Microsoft (NMM) integrates with Exchange, Hyper-V, SQL Server, and SharePoint
- NetWorker Module for SAP integrates SAP and SAP Hana
- NetWorker Module for Meditech integrates with Meditech Applications
- NetWorker integration with Data Domain to achieve deduplication
- NetWorker integration with Avamar for client-based deduplication systems
- NetWorker integration with ProtectPoint

This range of support has enabled NetWorker to thrive in the market as one of the best Backup and Recovery strategies for Enterprise customers for more than 20 years.

Why we need to Enhance NetWorker with AI/ML

New customers/administrators with limited knowledge on NetWorker sometimes find it difficult to resolve Backup/Restore issues. This is especially true when collecting Debug Logs for engineers trying to understand the technical issue and where to begin troubleshooting.

NetWorker's automated process to back up by automatic schedules, policies, groups, pools, etc., eases Data Protection. NetWorker has the capability to render logs with debug-level/gathering environmental details from the Command Line and not with GUI. Currently, log analysis is done manually with no with Artificial Learning and Machine Learning integration. Enhancements covered in this article share the integration of the product with Artificial Intelligence and Machine Learning to make things easier and more flexible for end users.

This integration involves gathering debug-level logs and rendering of logs which can occur when running the CLI command with multiple switches could save lot of time spent collecting them remotely.

Gathering of basic environmental details without having direct access to that Host – as is currently done via the command line – enables sharing a report with all the basic environmental information without requiring a remote session to collect the information.

Integration of basic troubleshooting and the Log Analysis plays a major role of having Artificial Intelligence and Machine Learning, as this entirely depends on past data that is being collected. Based on the data analysis, NetWorker tries to self-repair the issue, help with a relevant knowledge article or create a case directly with Support by analysing the severity of the Service Request. All the environmental information is uploaded automatically.

These enhancements ncrease end user satisfaction with Technical Support as things happen very easy with just a click. As well, Technical Engineers become more productive as this enables to conduct in-depth research on the issue before they even start working over remote sessions.

Integration with NetWorker at Product Level

Gathering debug logs

NetWorker troubleshooting starts with the Log Analysis to understand where the issue resides, i.e. Backup, Clone, Restore, etc. Per the current architecture, NetWorker cannot retrieve Debug Level Logs from the GUI (that is, NetWorker Management Console) but only via Command Line Interface. This applies even when just a few logs without any debug levels are needed, as well.

It is important for a Technical Analyst to review the Normal or Debug Logs (1-9) to understand the issue. This is a fundamental step for resolving any issues that might occur with NetWorker Application, be it backup failure, clone failure, restore failure, etc. Currently, NetWorker doesn't have the flexibility to get the Debugged Logs from the Application Level. Instead, we need to switch to the Command-Line and redirect to a File.

Changing the above product design of NetWorker – like implementing a Log Gathering from the Job's or Processes – can be implemented on the Application level itself as an Option. This enables customers to directly perform the task from NetWorker Console instead of going to Command Line as not all customers know the Commands. This also frees the Technical Engineer / Analyst from having to join a remote session just to gather the logs from the customer environment.

To avoid the long process of uploading the logs individually, there should be an individual process running from the customer's NetWorker Server to directly upload these logs to the FTP site with the Service Request number. This enables the Engineer to download from the FTP directly instead of asking the customer to upload to the incident via Salesforce, speeding the time to resolve the issue and enhancing the customer experience.

Rendering the logs

NetWorker log data is in the form of raw File Extension not in Human Readable format. To convert to Human Readable data, a command on the NetWorker Installed System must be executed to convert that to .txt/.log file.

Instead of doing it from the Command Line every time, it can also be integrated at the NetWorker Management Console level. Having the Client Package installed on the NMC Host makes it possible to execute the following command (nsr_render_log) and convert the log file.

This rendering from the NetWorker Application level will increase efficiency in terms of time and flexibility. Using this built-in NetWorker feature quickens log collection and saves time spent otherwise typing CLI commands.

An option can be integrated to Share the Time Period to render the logs as required by using the -S Switch with the nsr_render_log command. . This will enable the Engineer to collect only the point in time logs to understand what caused the issue at a specific time.

This Render option should be provided directly on the NetWorker Management Console which will itself take the OS installation path of the NetWorker Application by integrating with the output being actuated by "SC QC NSRD" (for NetWorker Server), "SC QC NSREXECD" (for NetWorker Client / Storage Node). This is only if we require the daemon logs to be reviewed.

If we require the GSTD log files to be rendered, we can integrate the OS Installation path of NetWorker Management Console installed host with the command SC QC GSTD (for NMC Host).

Integrating this specific option will ease the operation to collect the logs instead of always redirecting to the application path from OS level via Command Prompt normally, which will reducing the time spent to do this manually.

Gathering Basic Environmental Details

When customers create an incident for an issue, there will be no proper environmental details. This impacts the time for the Engineer who may then need to join a remote session with the customer to understand environmental details, i.e. OS version, NetWorker version, Hostname, etc.

This can be more improvised from Application level to collect all the information of the environment in the form of .pdf,.xml, etc. NSREXECD is the base process that will be executed on all the Hosts associated with NetWorker (NetWorker Server/Storage Node/Client). Basic environmental details can be integrated with that connection from the NetWorker Server itself, rather than via remote session with the Client/Storage Node.

This report should hold the entire NetWorker Data Zone Systems that associated with a NetWorker Server. This information will help the Engineer understand which Client is failing and with that information, they can proceed with the Log review which will be much easier and more flexible. This can also be updated on the FTP site like the Debug Logs gathering.

Supplementing this Basic Environmental Details Report with more, i.e. Error Messages on the Client via which it is Failing, will also help the Engineer quickly understand the issue without reviewing the logs which, in turn, reduces Resolution Time to completion.

As shown in Figure 2.3.1 the Main Process that runs on all the NetWorker Installed Hosts in a Data Zone would be NSREXECD (NetWorker Server/Storage Node/Client). per our enhancement, a Connection with the Host via an NetWorker Process is required to collect the basic environmental details, that can happen with NSREXECD Service as we will be able to get the details with the NSRADMIN with that Specific Host (nsradmin P Type: NSRLA).

The current NetWorker Server can make these things happen with the CLI Itself, but my outcome here is to get an Environmental Report which will basically enhance flexibility and save time to execute the commands.

These reports can be uploaded to Support directly, minimizing the time and Effort of an Technical Engineer to remotely check the basic configuration information.

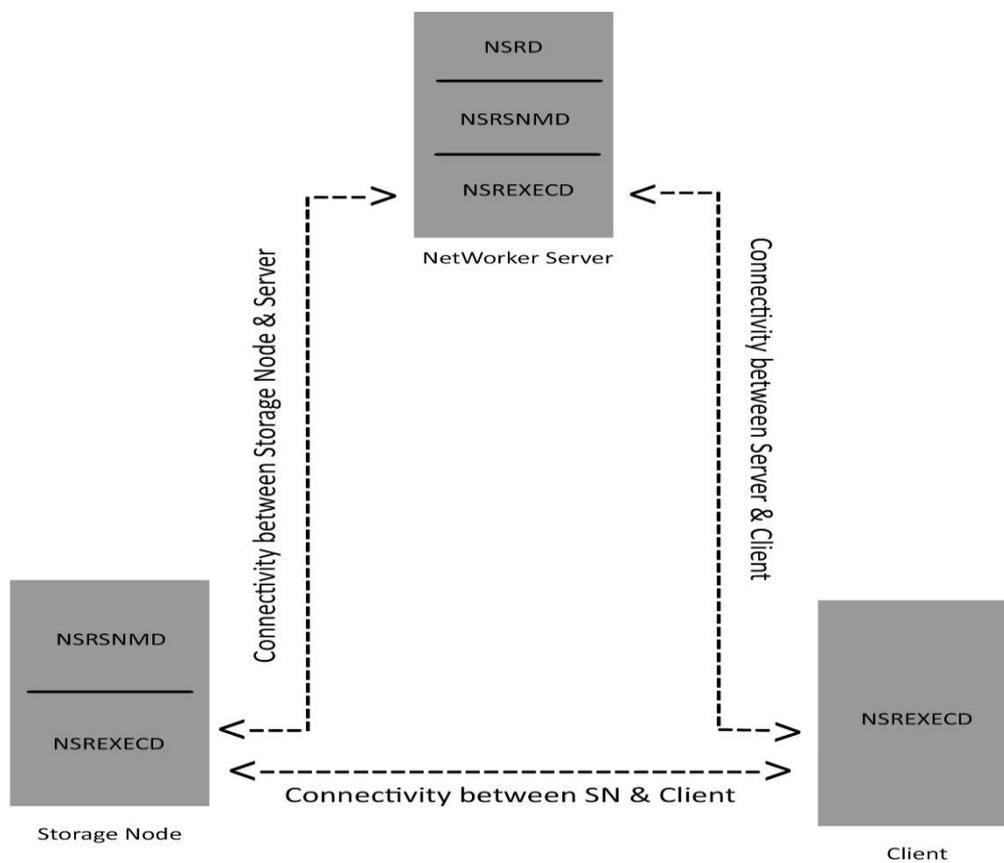


Figure 2.3.1

Basic Troubleshooting with AI/ML

All hosts in a Data Zone will hold the nsrexecd process running which is the main process either on the NetWorker Server, Storage Node or the Client. NetWorker can be implemented with a Product-level change to check basic connectivity like ping, nslookup, etc., from the NetWorker Console itself instead of going to that specific host's command line and doing it.

As NetWorker Server is connected with all the hosts to Backup (Client) or Send the Data (Storage Node), this can be easily implemented at the Application level to do basic troubleshooting.

This can be more deeply improvised with AI/ML scripts in the backend. There should be a different process working in the backend to check the status of the jobs running from the NetWorker Management Console. If some failure of jobs is detected, this process should gather the error message to which the job has failed and it should be associated with the Salesforce and Convo Search / support.emc.com to find relevant Knowledge Based articles to help the customer resolve the issue.

If the Error Message, for example Connectivity Errors, seems to be already available, the Process itself should check the Connectivity and ports and share the Connectivity Report with the customer.

After a customer receives a Knowledge-Based Article to resolve the issue that occurred, the Process should ask the customer if the Article helped resolve the issue. If the answer is "No", then this Process should automatically create an Incident/Service Request with the Support Team describing the errors and uploading the Report on FTP along with the Service Request Number.

This process will help the customer resolve the issue without contacting Support. But even if it does not and the issues persists, the Support Team with the Application expertise can be called in to resolve the issue.

Artificial Intelligence/Machine Learning enables this process. The Application needs to be trained to retrieve the appropriate error messages by keeping it with the proper data to be reviewed as many times NetWorker Error Messages are often the same but Resolutions might differ. In essence, this basic troubleshooting needs to be trained with the Resolutions that can be achieved to resolve the incident or to provide relevant knowledge-base articles from Salesforce / Convo Search.

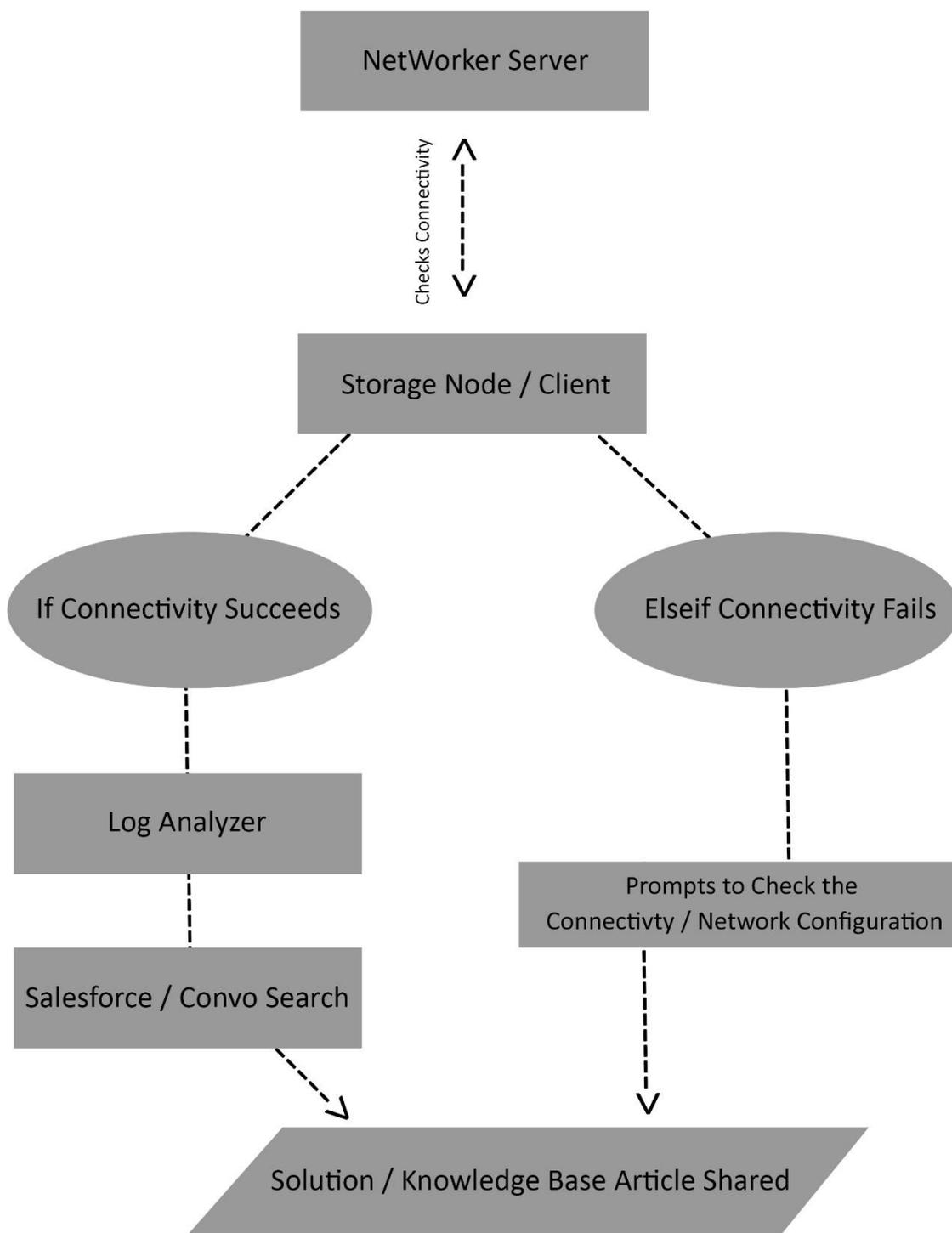


Figure 2.4.1

Figure 2.4.1 shows the Basic Troubleshooting working model which will first check for connectivity between NetWorker Server and the Storage Node/Client. If that passes, connection will be made to the Log Analyzer (covered in Module 2.5) by getting the error message from the Log Analysing part, the **Error Message** is being checked with Salesforce/Convo Search as the Application will be integrated directly to the Dell Technologies web portals. Once the Search is being performed, it will check if there is an existing knowledge base article or the Solution is applicable for the Error Message reported.

If that is a Solution already present with the AI/ML Integration with the Log Analyzer, NetWorker tries to Auto-Repair the issue (This requires a Data Analysis of previous Service Requests with the different methods of resolution). If no Solution is found, then the Analyzer shares a relevant Knowledge Base to help resolve the error.

Suppose a Client is failing with a Connectivity Issue. Once the Log Analyzer finds a Connectivity Error, the Solution for this would be available to check the ping, nslookup and some networking commands used as part of troubleshooting. If these commands fail, the application will share a knowledge article to troubleshoot with the Network Team with the Hosts being affected, i.e. connectivity fails between Client and Storage Node and vice-versa works fine (It should also share the Information to which Hosts it succeeds and which can be checked/fails)

Log Analysing Tool Built-in with NetWorker

Log analysis helps Engineers understand the issue, be it routine or complicated, a fundamental step in efficient troubleshooting. Often, improper log analysis unnecessarily prolongs the time to resolve an issue.

The Log Analyzer should be implemented on the Application level with an individual process running on the NetWorker Host (NetWorker Management Console). This process should automatically track Backups, Restores, and Replication Jobs that are being executed and if they fail, the Log Analyzer should analyse the logs for that specific client which failed. The error message is being analysed with the database and a relevant knowledge article will be shared. The customer might be given an option to say if that was Helpful or Not Helpful.

If it was Not Helpful, a case will be logged and the relevant errors and environmental details reports will be uploaded to the case automatically. If it was marked as Helpful, we make a note at the Backend that the Article was helpful and can be marked as Valid for that issue.

The process will enhance customer centricity and will be helpful for the Technical Engineer to route the Issue in the right way and flag with the resolution faster. It will also reduce time taken by the Customer to log an incident and saves time for the Technical Engineer to review the logs from scratch.

The Log Analyzer enables the Engineer to more quickly grasp the issue and its cause. The Engineer is not required to have deep knowledge to review the logs. The Log Analyzer will be trained with Artificial Intelligence and Machine Learning implanted to make it think like an Engineer

NetWorker has many different error messages for issues and sometimes it is difficult to understand the issue as logs might be confusing. Data of analysis from prior years is used to build the Training Model for the Log Analyzer. This requires a great amount of data in it to analyse the logs and arrive at the exact error causing the issue.

First, the Log Analyzer should be connected to an API with a database of Dell EMC Server which should be updated daily with different errors occurring on the Customer environment. This database will be key in helping to analyse the logs and quickly provide correct error messages when initiating Service Requests.

Figure 2.5.1 and 2.5.2 depict how the Log Analysis will be performed in the background, enhanced by Artificial Intelligence and Machine Learning. Integrating knowledge-based articles with an existing Database of Solutions and Error Messages provides that lead to positive results. which should result in the most accurate and in an Positive Res ult. solution

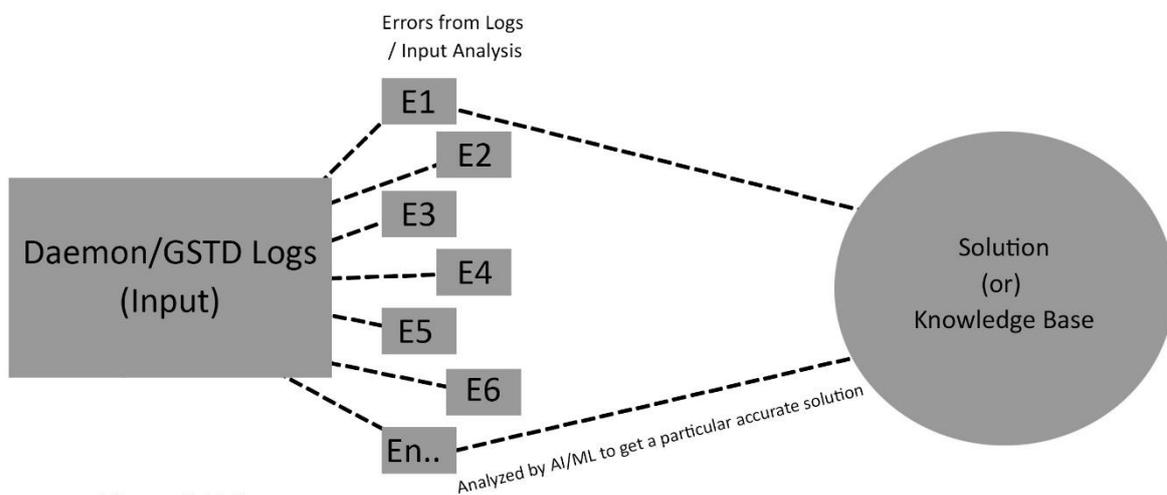


Figure 2.5.1

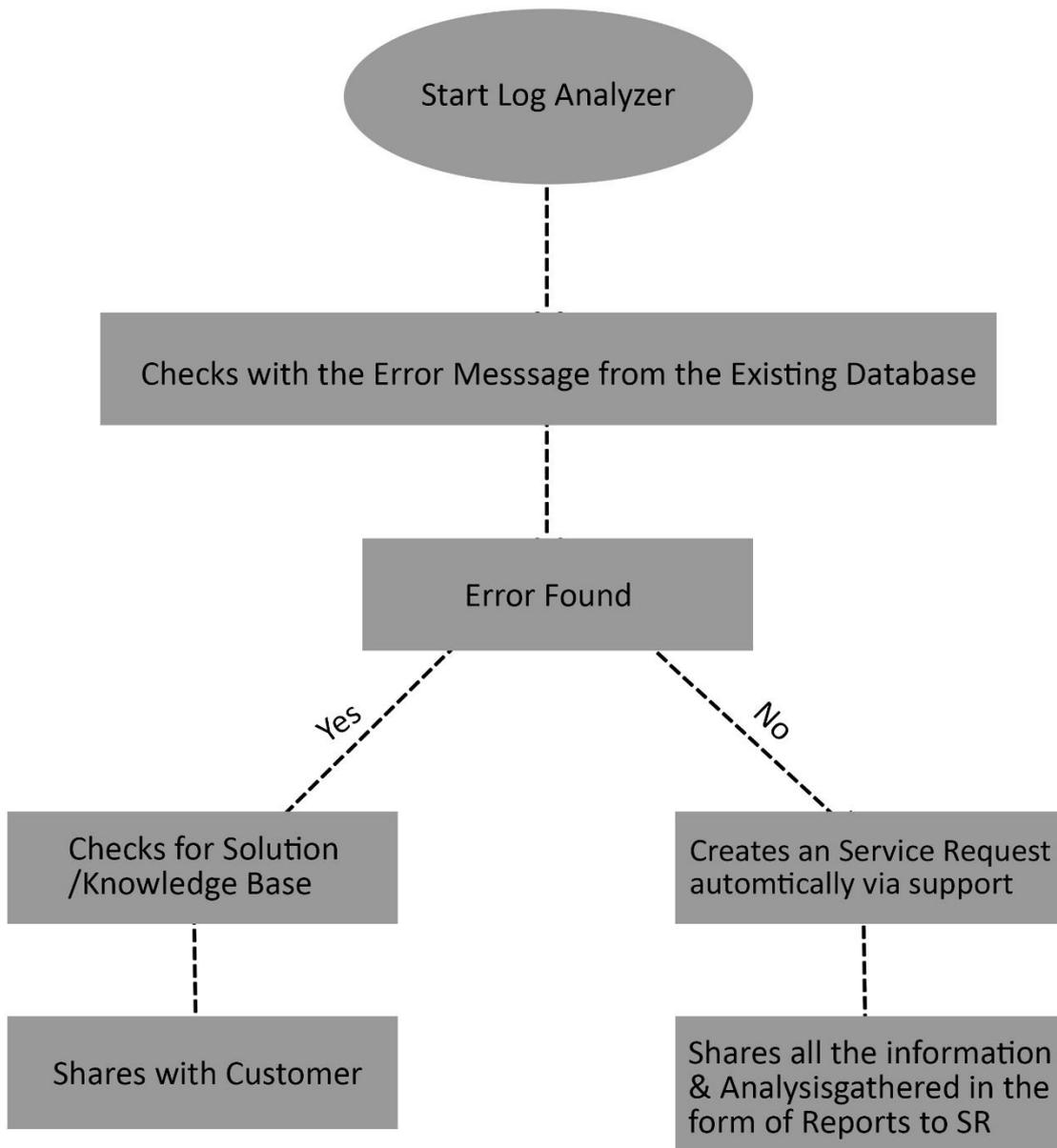


Figure 2.5.2

Performance Factor

How implementing maximizes efficiency

This Knowledge Sharing Article has focused on enhancing Customer flexibility and reducing resolution time by introducing the enhancements directly on the Application level.

Resolution time and manual intervention can be significantly reduced by taking minimizing the need for remote sessions and automating logs collection/analysis, environmental information collection, etc. This will create a 'WOW' experience for customers using the NetWorker Application. Reliance on Support teams will diminish as many simple issues will be resolved by the Customer instead of opening a Service Request for support.

Clearly, Enterprise customers never like to have Service Requests open for longer than necessary simply because of delays obtaining basic log collections. Implementing the following Performance Factor strategy with NetWorker will enhance the Customer experience by receiving quicker, smarter support.

<i>Performance Factors</i>	<i>Current NetWorker</i>	<i>After Enhancement</i>
Gathering Logs via *RS	No	Yes
Environmental Information via *RS	No	Yes
Rendering the Logs via *RS / *EL	No	Yes
Troubleshooting Basic via *RS	No	Yes
Log Analyzer via *RS	No	Yes

Table 3.1.1

Note: *RS – Remote Session | *EL – Engineer Lab

Conclusion

This article demonstrates how NetWorker can be improvised to gather environmental information, debug Logs, and leverage Log Analyzer to provide a phenomenal customer experience by integrating with Artificial Intelligence and Machine Learning. This results in increased customer satisfaction and more productive Technical Engineers moving forward.

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