StorageTek
Expert Performance Reporter

Introduction to ExPR

Version 6.1

Part Number: 312631901
August 2011
Revision AC

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StorageTek Expert Performance Reporter, Introduction to ExPR

Part Number 312631901

Revision History

EC Number	Date	Revision	Description
132453	May, 2006	A	This document applies to ExPR Release 6.1.
	June 2010	AB	Rebranding.
	August 2011	AC	Updated support URLs and added a notification that the ExPR PC Component is now in sustain support only and will not have further engineering changes. The ExPR PC Component was effectively replaced by the ExPR Web-based GUI in ExPR Release 6.1.

Contents

Preface

This book provides a general overview of Oracle's StorageTek Expert Performance Reporter software. ExPR features and processes are described here. The audience for this book includes MVS system programmers and administrators who will configure and use the ExPR MVS component, operations personnel, performance and capacity planning analysts, and support personnel.

Related Documentation

The following list contains the names and order numbers of publications that provide additional information about ExPR.

Function	Title	Part Number
Administrator	ExPR Installation, Configuration and Administration Guide	312632001
User	ExPR Mainframe User's Guide	312632101
User	ExPR Client User's Guide	312632201
Administrator	ExPR Messages Guide	312632301
Administrator	ExPR MONTAPE/MONREPT Guide	312632401

The ExPR documentation is available online at:

http://docs.sun.com/app/docs/prod/stortek.expr

Documentation, Support and Training

Function	URL
Web Site	**http://www.oracle.com**
Documentation	http://www.oracle.com/technetwork/indexes/documentation
Downloads	**http://www.oracle.com/technetwork/indexes/downloads**
Support	**http://www.oracle.com/us/sun**
Training	**http://www.oracle.com/global/us/education/sun_select_country**
Online Account	**https://reg.sun.com/register**

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Chapter 1: What's New in this Release

Overview

This chapter describes the new features and functions that are introduced in this release of ExPR.

ExPR Release 6.1 Summary

ExPR 6.1 modifications include the following:

HSC 6.0 Support for Cross-Host Dismounting of Volumes

HSC 6.0 introduced the ability to dismount real LSM drives/volumes when a sharing HSC host went down. However, the HSC SMF records for these dismounts would not be processed by ExPR as the dismounting host isn't the same host that originally mounted the volume. ExPR now internally checks its control block structures for all hosts to locate an unmatched dismount before rejecting the record. This ensures that statistics are maintained correctly.

HSC 6.0 Support for 16+ LSMs and SL8500

ExPR previously allowed up to 16 LSMs within a single ACS, in line with the historical HSC and hardware structures. The introduction of the new SL8500 library and HSC 6.0 support of same now allows for up to 24 LSMs within an SL8500. ExPR has been modified to remove any limits and checking of maximum LSM numbers. This will effectively allow for up to 256 LSMs per ACS in the future.

NCS 6.0 SMC/HSC without CSC Clients and Library Station Support

ExPR already supports CSC client MVS systems that do not have access to an HSC/VTCS address-space or CDS file. ExPR has been modified to automatically use the same special internal routines in the new HSC-SMC-SMC scenario without CSC or Library Station.

NCS 6.1 Near Continuous Operation (NCO) Support

NCS 6.1 will allow NCO by supporting the dynamic/on-the-fly addition and removal of hardware (including ACS/LSM/VTSS/drives/panels/etc.). During initialization, ExPR extracts the customer hardware configuration. NCO support dynamically rebuilds its view of the hardware when a change is made. Without NCO support, it would be necessary to restart ExPR to detect any changes to the hardware configuration.

VTSS Clustering and Bi-Directional Clustering Support

ExPR has been modified to extract data from the VTCS SMF records associated with clustering. This information is available via the real-time monitors and historical trending reports. Collected metrics include number of VTV's replicated and number waiting to be replicated, queue time to replicate a VTV, and the amount of data transmitted for replication. The VTCS SMF subtypes associated with VTSS clustering are the primary input to this new feature. You must ensure that these are switched on and collected by the SMF housekeeping processes.

MONTAPE Operator Command Displays Record Counters

A new operator command has been added to MONTAPE to display the record collection counters. This makes it easy to determine if MONTAPE is collecting data.

Database Backup during Reorganization Process

The ExPR reorganization and auto-delete processes dynamically invoke the IBM IDCAMS VSAM management utility to clone the existing VSAM files and then copy data using from/to date key ranges. The new VSAM clusters are internally 'tidy' in VSAM terms and old data is removed, thereby preventing the endless growth of the datasets. The original database cluster is now dynamically saved before the reorganization and deletion process runs (additional control statements are passed to the invoked IDCAMS utility to REPRO the ExPR database to a sequential file), providing a backup/checkpoint and the possibility to create a rolling GDG of database archives.

EXPRFORM Parameter Removed

The EXPRFORM parameter (part of the ExPR TAPECAT feature) was used in early versions of ExPR to signal to the external TMS interface routines that ExPR was the invoking program. This parameter is no longer required and has been removed. This is an internal change and has no effect on the customer reports or options.

Schedule TAPECAT UPDATE Process within Started Task

The ExPR TAPECAT UPDATE process is a separate process that reads the supported tape catalog and updates the ExPR database with statistics on volumes and datasets within the complete mainframe environment (ACS/LSMs, VSM/VTSS, and manual tapes). This process was previously a standalone batch process that had to be scheduled to enable sharing of the ExPR database with the ExPR started task. ExPR has been modified to allow the TAPECAT UPDATE function to execute within the ExPR started task, thereby eliminating manual effort and scheduling. The times of the day when the TAPECAT UPDATE function should be executed are specified in the TAPECAT options of the Host Configurator. There is also a new ExPR console command to allow 'on-demand' scheduling of TAPECAT UPDATE. This feature is called the Integrated Tape Catalog Update (ITCU).

VSAM File Sizing Calculator Tool

Part of the customization and setup of ExPR requires calculating the size of the main ExPR database and the PGMIDATA SMF collection files. A simple Excel spreadsheet

has been devised to calculate the size of these VSAM datasets. This tool is included on the ExPR distribution CD.

Web-Based Host Configurator

The PC Host Configurator application has been replaced by a web-based browser application, under the System-Wide tab in the ExPR Web GUI. Inputs to the new configurator are identical to those previously entered into the PC Host Configurator. The new application generates the same output to the mainframe as previously generated by the PC Host Configurator.

Note: The ExPR PC Component is now in sustain support only and will not have further engineering changes. The ExPR PC Component was effectively replaced by the ExPR Web-based GUI in ExPR Release 6.1.

Web-Based TAPECAT GUI

The PC TAPECAT GUI application has been replaced by a web-based browser application, under the System-Wide tab in the ExPR Web GUI. Inputs to the new TAPECAT GUI are identical to those previously entered into the PC TAPECAT GUI. The new application generates the same output as previously generated by the PC TAPECAT GUI.

Note: The ExPR PC Component is now in sustain support only and will not have further engineering changes. The ExPR PC Component was effectively replaced by the ExPR Web-based GUI in ExPR Release 6.1.

Delete Definitions in Host Configurator

The new web-based Host Configurator contains a new option to delete description/model number definitions for any ACS/LSM/VTSS that has been de-installed. If these definitions are not deleted, ExPR will continue to internally define control block structures for the non-existent hardware.

Multiple E-mail Alerts for Exceptions

The ExPR Rules Manager in the ExPR Web GUI defines rules that specify an exception threshold value that when broken, displays messages on graphs and play specific sounds. A user can now define multiple E-mail addresses for a rule, and ExPR Web GUI will send E-mails to these addresses when the rule is broken.

Exception Rules Manager Signals an Alert

The ExPR Web GUI will now notify the host mainframe through TCP\IP when it detects that a rule has been broken.

VSM RTM Dynamically Reflects HAMT/LAMT Changes

The ExPR VSM real-time monitor shows the disk buffer utilization of each VTSS along with the HAMT and LAMT settings. However, any dynamic change to HAMT/LAMT was not previously detected by ExPR until the next start-up of the started task. ExPR has been modified to dynamically pick-up the latest HAMT/LAMT values instead of waiting until the next start-up. Changes to HAMT/LAMT are shown on the Space Usage graph in VSM.

Reduction in CPU Usage during Parameter Processing

ExPR internal block structure modifications have resulted in reduced CPU usage during parameter processing and initialization, by as much as 90%. Larger configurations previously incurred high amounts of CPU usage during these processes.

Support for New Tape Devices and Media

ExPR now supports the new Titanium/T10000 tape drive and its associated 120Gb and 500Gb cartridges. ExPR also recognizes the various types of LTO and SDLT drives, and their associated cartridges in a shared MVS/open environment. However, due to the lack of tape catalog entries, ExPR cannot give a detailed analysis of the data stored on LTO/SDLT media via its TAPECAT functions.

ExPR Monitor Service

The optionally-installed ExPR Monitor Service is an integral part of the ExPR suite of products that provides automatic notification of scheduled ExPR reporting events as defined by the customer. Event notification can include E-mail and MVS console reported messages.

Chapter 2: Product Overview

Overview

This chapter describes what ExPR does and how it works.

What ExPR Does

Expert Performance Reporter (ExPR) is a software solution for tape environments. It provides real-time and historical information on manual tape systems and specifically on StorageTek Nearline and VSM tape systems.

ExPR Components

ExPR components are listed below. Communication between the mainframe component and the ExPR GUI is provided by a TCP/IP connection.

- ExPR MVS (or ExPR MSP) is the mainframe component, which resides on one or more host systems, builds and maintains a database of historical performance data that it collects from the Nearline and/or VSM systems, from the operating system, and optionally from your site's tape management system. Tabular performance and exception reports are generated directly from this database for display in the mainframe environment. ExPR has a started task that maintains controls for TCP/IP communication, Online Monitors, HSC/VTCS PGMI data collection, and optional features such as DirectSMF updating.
- ExPR GUI is a web-based browser interface installed on an HTTP Server inside your network that can be used to display monitor applications and graphical reports over the network through a web browser. This GUI is also used to perform ExPR configuration administrative tasks.
- ExPR Monitor Service is an optionally-installed open system service that provides automatic notification of scheduled ExPR reporting events as defined by the customer. Event notification can include E-mail and MVS console reported messages. The supported platforms where the service can be installed are Windows, Solaris (sparc) and Linux (intel).

How ExPR is Packaged

ExPR software packaging is an SMP/E installation tape or CD for the mainframe.

Execution Environment

Item	Description
Hardware	• An MVS host system, or an MSP host system, on which to install the ExPR Server. • A PC, Unix or Linux workstation running a supported browser for the ExPR GUI.
Operating System	• MVS (all releases supported by HSC) and the MVS HTTP Server, or MSP (all releases supported by HSC) and the MSP HTTP Server. • Windows 2000/XP/2003 or 98/Me/NT4 running a supported browser (Microsoft Internet Explorer 6.0 or higher with SP2 installed, Firefox, or Mozilla 1.4 or higher). **Note:** ExPR has been fully tested and certified against Windows 2000 and XP. It should still operate under Windows 98/Me/NT4, but this has not been subjected to a formal test process. • Sun Solaris 8 or higher running a supported browser of Firefox or Mozilla 1.4 or higher, or Red Hat 8 Linux or higher running a supported browser of Firefox or Mozilla 1.4 or higher. **Note:** It is expected that any other OS running Firefox or Mozilla 1.4 or higher should function as a client but this has not been subjected to a formal test process.
Supporting Software	• MVS operating system (Version 5 or higher, OS/390 any release, z/OS any release) • StorageTek Host Software Component (HSC), Release 2.1 or higher • StorageTek Virtual Tape Control Software (VTCS 2.0.0 or higher) if using VSM/VTSS, VTCS 5.0 or higher is required for the ExPR GUI. • SORT product (DF-SORT, SyncSort, or compatible) • SMF/RMF (all releases) • TCP/IP (IBM Version 3.1 or higher, or CA-TCPAccess 5.2 or higher) • SMP/E, Release 8 or higher • Optionally, tape management system (TMS) software, either CA-1 (Release 5.0 or higher), CA-TLMS (Release 5.4 or higher), DF/SMSrmm (Release 1.4 or higher), BMC Control-T (Release 5.0.0 or higher), or ASG-Zara (Release 1.3 or higher). • For the ExPR GUI component, Java Runtime Environment 1.4 or higher (download free at www.java.com). • For the ExPR GUI component, a supported browser: (1) Microsoft Internet Explorer 6.0 or higher with SP2 installed (download free at www.microsoft.com), (2) Firefox (download free at www.mozilla.com), or (3) Mozilla 1.4 or higher (download free at www.mozilla.org).

Item	Description

Embedded Products	ExPR GUI:
	• Tigra Menu javascript (SoftComplex www.softcomplex.com)
	• Binding, Forms, Validation libraries (Jgoodies Karsten Lentzsch http;//www.dev.java.net) *
	• Jcalendar library (Kai Toedter http://www.toedter.com/en/jcalendar) *
	• JDesktop Network Components (Swing Labs http://swinglabs.dev.java.net) *
	• Jfreechart, Jfreecommon libraries (JFree software projects http://www.jfree.org) *
	• Shani Xml parser (Quentin Anciaux http://sourceforge.net/projects/shanidom) *
	* *Open Source project*

Note: Unless specifically stated, references to MVS apply equally to MSP.

Overview of External Interfaces

Interface	Description
Started Task	The ExPR started task is a continually running task within the MVS system. It controls the Real-Time monitor, the TCP/IP client server connection, the HSC/VTCS PGMI, the DirectSMF data collection and database update, the primary and secondary host identification, and the TAPECAT GUI interface.
HSC	The Host Software Component library management software enables StorageTek's automated tape libraries to operate in an MVS environment. The software manages the interface between the operating system and each automated cartridge system for MVS and VM tape environments.
VTCS	The Virtual Tape Control Software enables you to use 100 percent of your mainframe tape cartridge capacity. Virtualization means fewer actual tape drives to manage and fewer cartridge mounts.
MVS HTTP Server	The MVS HTTP Server provides Hypertext Transfer Protocol facilities for servicing MVS based World Wide Web applications without the need to run Open Edition/Unix System services on the mainframe.
Proprietary Tape Management Systems	The ExPR TAPECAT function interfaces with five OEM proprietary Tape Management Systems (TMS). These are – CA-1, CA-TLMS, Control-T, DF/SMSrmm and ASG-Zara. These are read-only interfaces to extract information about tape volumes and datasets.

How ExPR Works

Figure 1 illustrates how ExPR is distributed on your MVS systems and how the systems interact.

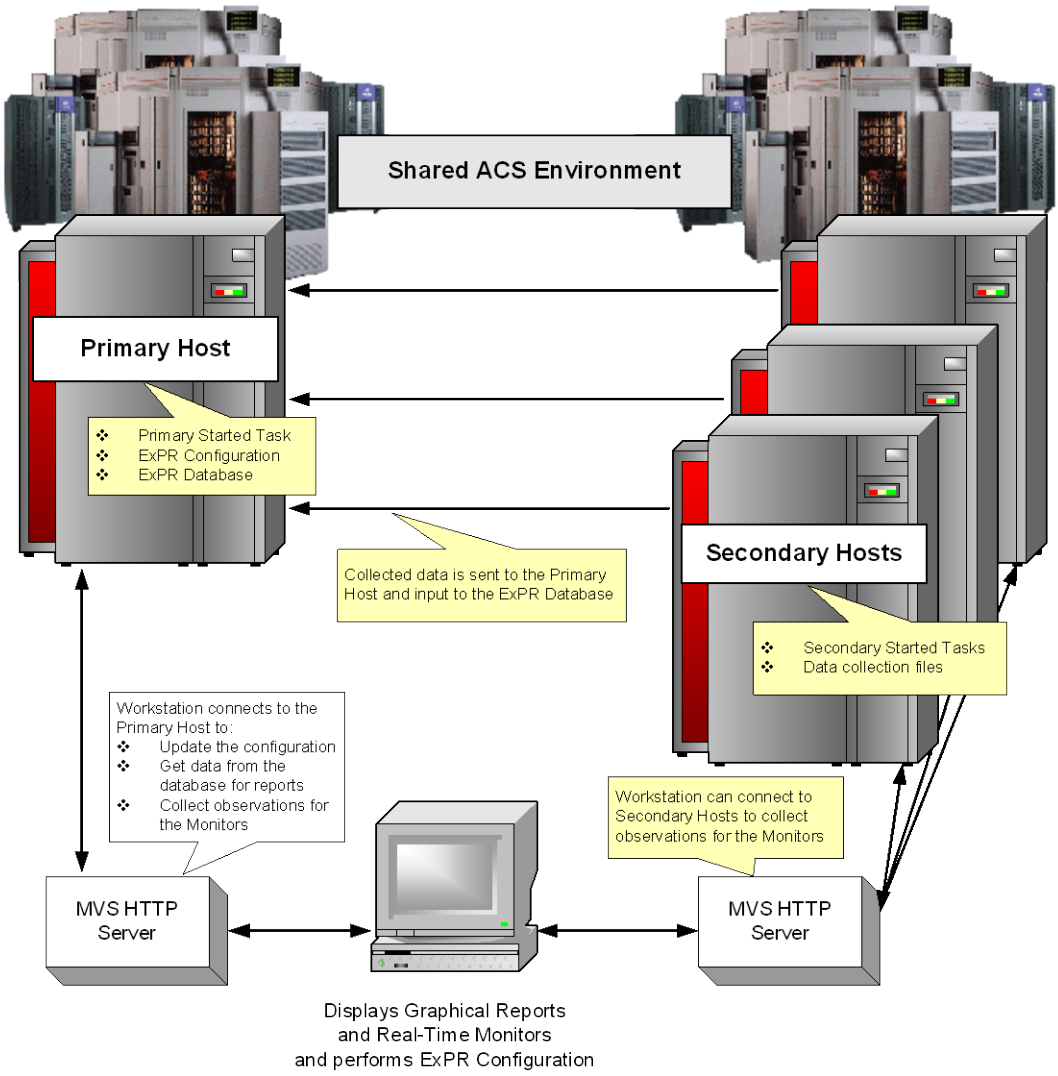


Figure 1: ExPR Functional Diagram

ExPR Data Flow

ExPR MVS collects information relating to Nearline, VSM, tape catalog, and manual tape drive performance and inputs it to an ExPR database on the host system. This process is controlled by user-specified parameters. Data from multiple MVS systems can be input to the database as individual records for each system or as a consolidated view representing user-selected systems, or both. Additionally, ExPR automatically creates and dynamically maintains an "ALL Hosts" consolidated view.

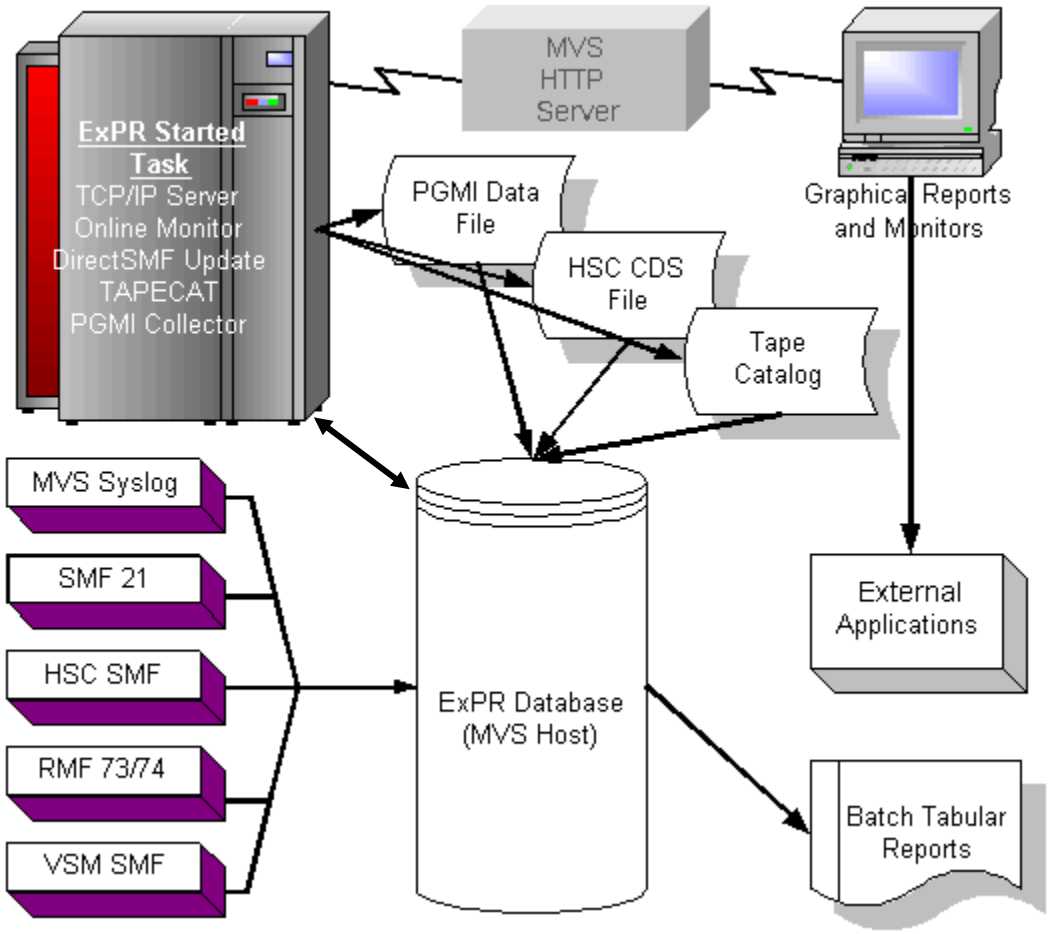


Figure 2: ExPR Data Flow

Figure 2 illustrates how information is collected from various sources (PGMI, tape catalog, SMF, RMF, MVS SYSLOG, etc.) and input to the ExPR database. Collected data can then be processed for batch tabular reports, displayed at a workstation via the HTTP Server or ported to a Microsoft Excel-compatible spreadsheet and other external applications.

Chapter 3: ExPR Features

Overview

This chapter describes the ExPR report types and reporting features.

ExPR Reporting Features and Formats

Reports can be generated to track the capacity, utilization, and performance of Nearline, VSM, and manual configurations ranging from a single LSM and/or VTSS to complex multi-LSM/VTSS environments utilizing mixed transport types and manually racked devices.

Four types of reports are available:

- Batch reports – traditional mainframe tabular hardcopy.
- Historical graphical reports – graphs that are built via the web-based browser feature based on ExPR database information
- Real-time monitor reports – graphs that are built via the web-based browser feature and frequently updated to monitor Nearline, VSM, or device-level status.
- TAPECAT GUI – tabular reports based on queries of your tape catalog displayed via the web-based browser feature.

Report Samples

Sample Batch Report

The sample below is a Mounts report showing details of LSM mounts and their timings. The report is displayed in tabular format.

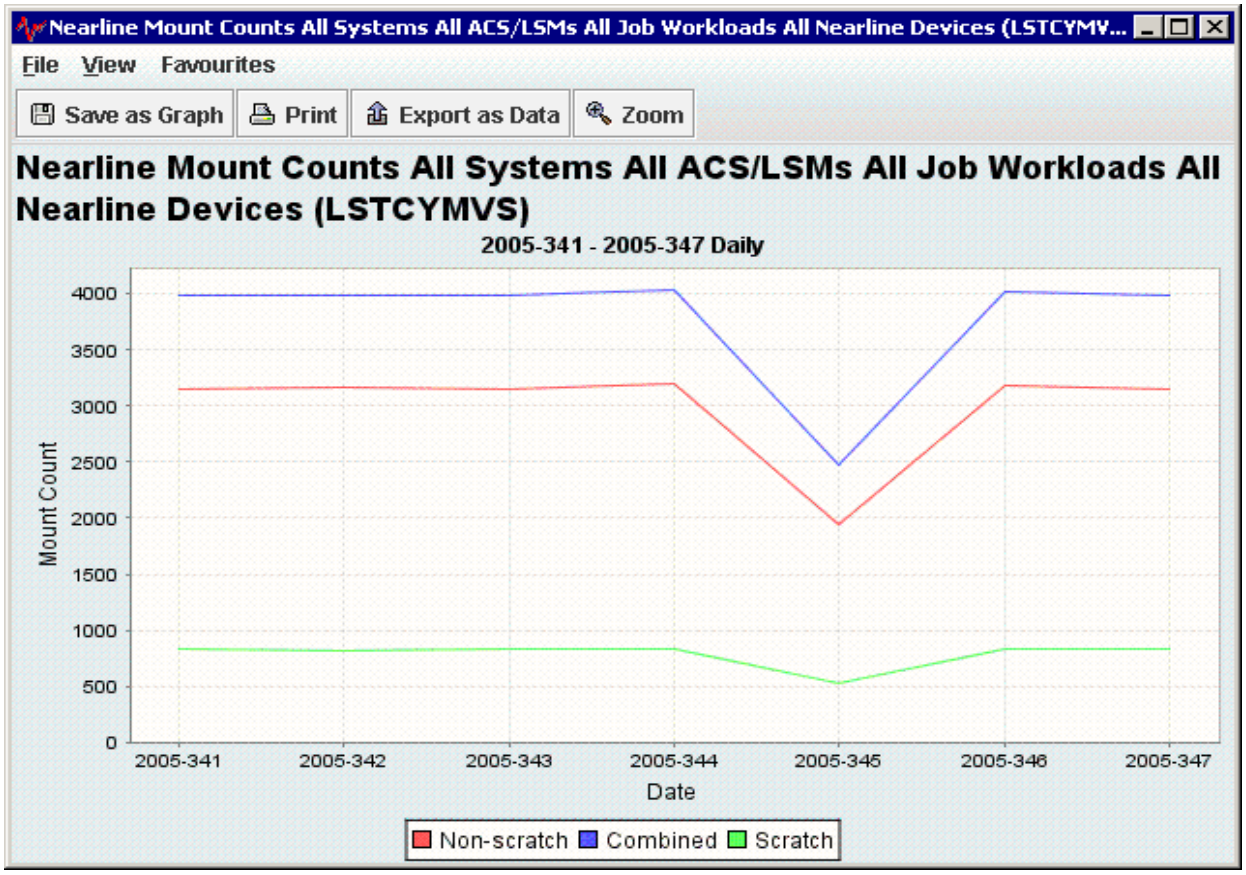
```
SAT, 07 JAN 2006       S T O R A G E T E K   E X P R              XYZ COMPANY                                    PAGE   11
 16:51:59    2005.223                                                                                  JOB:B30T005R    XPRREP021
-------------------------------------------------------------------------------------------------------------------------------
                                          MOUNTS-ACS  REPORT FOR SYSTEM IPO1          DATE RANGE: 2005210 TO 2005365
                                          ACS: 000 NEARLINE ACS 000
                                          LSM:     ALL LSM'S IN THIS ACS
-------------------------------------------------------------------------------------------------------------------------------
---PERIOD---           <-------------------------STATS FOR THIS ACS-------------------------> <---BYTES TRANSFERRED-->
 DATE  HOUR DEVICE-TYPE   LSM-MOUNTS                TOTAL-TIME   AVERAGE-TIME  MAXIMUM-TIME
            OR WORKLOAD  SCRTCH NONSCR              SCRTCH NONSCR SCRTCH NONSCR SCRTCH NONSCR    READ WRITTEN   TOTAL

2005223 00         ALL       0      0                   0      0      0      0      0      0      0K      0K      0K
        01         ALL       0      0                   0      0      0      0      0      0      0K      0K      0K
        02         ALL       0      0                   0      0      0      0      0      0      0K      0K      0K
        03         ALL       0      0                   0      0      0      0      0      0      0K      0K      0K
        04         ALL       0      0                   0      0      0      0      0      0      0K      0K      0K
        05         ALL       0      0                   0      0      0      0      0      0      0K      0K      0K
        06         ALL      40     22                 810    416     20     18     91     60   6746M     16G     22G
        07         ALL      38     20                 802    388     21     19     78     72     10G     29G     39G
        08         ALL      23     31                 463    313     20     10     80     54   5442M     33G     39G
        09         ALL      17     76                 369    898     21     11     61     72   7754M   6587M     14G
        10         ALL      17    108                 304   1468     17     13     48    126     12G   7304M     19G
        11         ALL      16    103                 457   2360     28     22    112    111     12G   5193M     17G
        12         ALL      13     75                 348   1515     26     20     41    102     23G   6125M     29G
        13         ALL      11     71                 352   1159     32     16     63     76     11G   5648M     16G
        14         ALL      10     66                 155   1008     15     15     46     80   2942M   1721M   4663M
        15         ALL      10     91                 204   1063     20     11     38     59   1351M   2440M   3791M
        16         ALL       8     85                 156   1073     19     12     36     72   3988M   1788M   5776M
        17         ALL       7     68                 143   1002     20     14     43     86   5977M   2067M   8044M
        18         ALL       8     46                 234    710     29     15     75     83  10063M   2244M     12G
        19         ALL      75      5                1348     83     17     16     81     37   3468M     18G     22G
        20         ALL      50     16                1089    336     21     21    101     91   5466M     22G     27G
        21         ALL      35     36                 933    792     26     22    106    115   7237M     14G     21G
        22         ALL      42     18                 890    365     21     20     70    108   6775M     15G     22G
        23         ALL      35     16                 657    276     18     17     42     68   5245M     16G     21G
DAILY TOTAL        ALL     455    953                9714  15225     21     15    112    126    138G    203G    341G
PERIOD             ALL     455    953                9714  15225     21     15    112    126    138G    203G    341G
END OF REPORT FOR THIS ACS  . RECORDS READ: 00996   TYPE 00/14/16: 00084
```

Refer to the *ExPR Mainframe User's Guide* for information about the ExPR Batch reports.

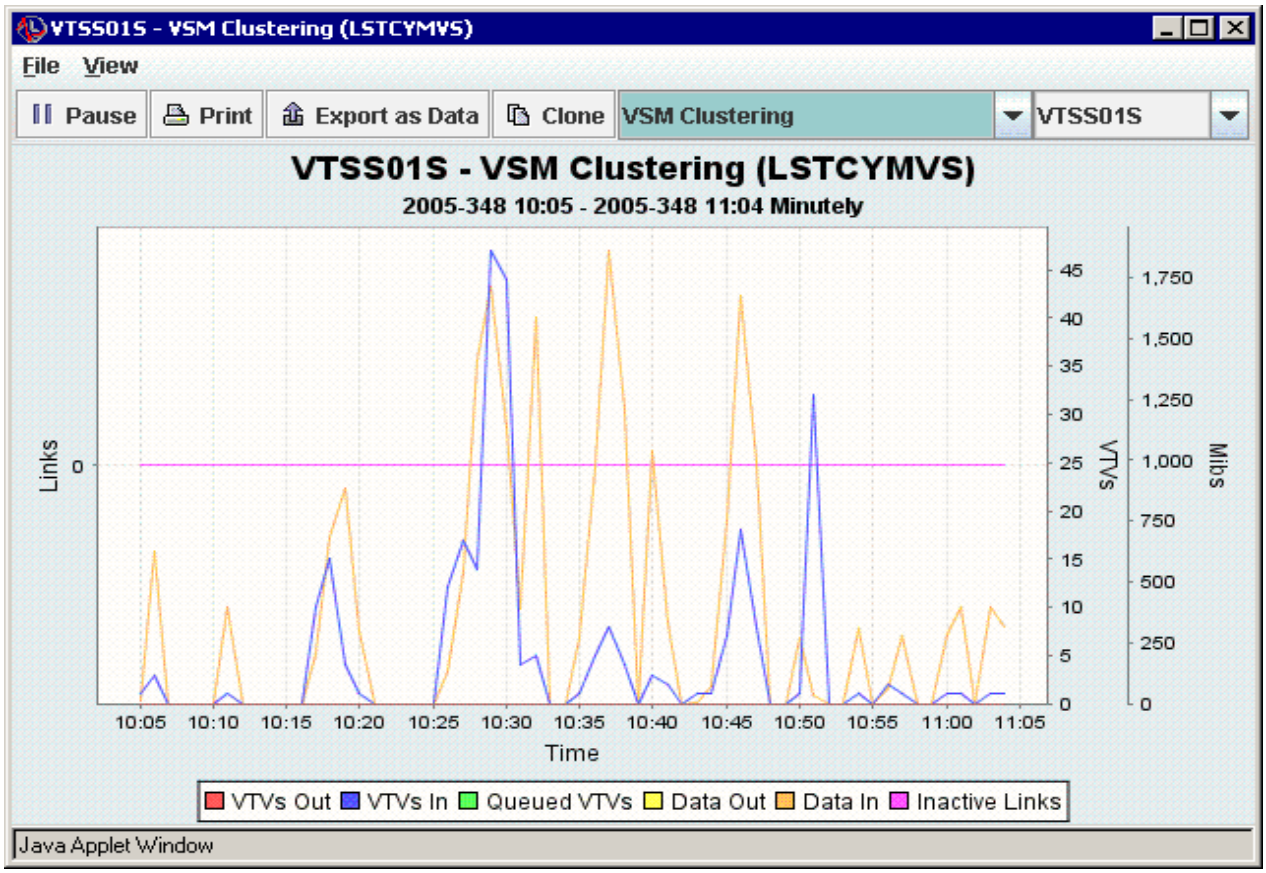
Sample Graphical Report

The sample below is a Mount Counts report showing historical daily mount activity, with separate scratch and non-scratch counts. Refer to the *ExPR Client User's Guide* for information about the ExPR Graphical reports.



Sample Monitor Report

The sample below is a VSM Monitor showing VSM clustering details. The report rolls to the left across the window and is updated each minute. Refer to the *ExPR Client User's Guide* for information about ExPR monitor applications.



Report Granularity

ExPR provides mechanisms for isolating precise data in reports. Reports can include data for all or specific MVS systems, ACSs, LSMs, VTSSs, and device types. Information can be displayed in hourly and daily formats for batch tabular reports; in hourly, daily, weekly and optionally monthly formats for historical graphical reports; and in real-time through the Monitor applications on a per-minute basis.

Nearline Reporting

Nearline reporting provides information on the utilization of hardware, such as drive concurrency and robotics utilization, as well as workload data, including mount counts, data throughput and response times and finally contents profiling through the Tape Catalog feature. Reports cover detailed metrics such as mount response time breakdown and passthru analysis through to summary statistics in the Nearline Mount Analysis reports.

VSM Reporting

Some of the VSM reports are mirror images of the Nearline measurements. These include mounts rates and data throughput and the use of TAPECAT to profile the volumes under VSM control. However, ExPR also provides many statistics and measurements that relate specifically to the performance and operation of VSM, most notably disk buffer residency time, disk buffer utilization, and clustering. At a more detailed level, ExPR can provide information on the front-end and back-end data path loading.

Device Group Reporting

Device group reporting has many applications. Primarily it is intended to allow you to define your non-automated (or manual) transports in a manner that enables that environment to be reported as a whole. However, device groups can equally map a particular device type, a location or even a complex mix of transport types and attachments. ExPR also generates device groups automatically for each ACS and for the RTDs of each VTSS. With device groups, you can report mount counts, data throughput, see the drive concurrency, measure allocation/recovery time, and then do comparisons against other Device Groups or the Nearline or VSM environment.

Exception Reporting

ExPR exception processing monitors user-specified exception thresholds, which represent the point at which an event is considered to be an exception. Exception processing generates a report when thresholds have been exceeded, such as when the number of mounts or mount response time exceeds the specified value. Separate threshold values are maintained for Nearline and VSM. Exception reports are produced in tabular hardcopy format on the host and in exception windows on the ExPR GUI screens.

Tape Catalog Reporting

ExPR processes tape catalog data as an input source to the database update process. Database records are written that can be later reported against as mainframe tabular reports or as ExPR GUI graphical reports.

Tape catalog processing makes another level of tape management reporting available. Where other input sources look at how the various hardware components are performing and identify processing trends and potential bottlenecks, ExPR tape catalog processing can account for who is occupying the slots within each LSM or VTSS or the complete tape library, and also how efficiently the tape is being used.

One feature of TAPECAT is the sorted reports, where a single or multiple sort argument can be applied to the tape catalog to report fields such as how much tape has been used, how frequently the volume has been accessed, how many times it has been used, etc. Additionally, historical comparisons of the tape catalog's contents can be produced.

The Interactive Tape Catalog Update (ITCU) feature offers a complete replacement for batch TAPECAT processing and also an online facility to query the tape catalog and CDS contents. The ExPR Web GUI user can specify selection, filtering, and display criteria from more than 25 volume and dataset attribute fields.

Workload Group Reporting

Site-specified jobname and dataset workload groups provide mechanisms for logically mapping activity from specified jobnames or datasets into groups against which reports can be generated, increasing the ExPR reporting capability by further defining tape activities within your organization.

- Jobname workload groups map Nearline, VTSS, or device group activity from specified jobnames into logical groups, typically defining activities generated by specific departments or functions.

- Dataset workload groups, used in conjunction with ExPR tape catalog processing, logically map the contents of a Nearline library, VTSS, or device group based on dataset names, typically defining critical applications or system components.

Channel Path and Control Unit Reporting

ExPR reports provide information about channel path and control unit activity related to Nearline, VTSS, or device group configuration. Channel paths are mapped into logical groups that reflect how they are organized in the hardware IOCP/IOCDS configuration.

Allocation Recovery Reporting

The MVS SYSLOG is read to produce allocation recovery reports that provide per-system per-LSM/VTSS/device group reports of operator reply measurements, including the number of replies that allocated devices, the total time spent awaiting a reply, and the longest operator reply.

User API

The supplied ExPR Application Programming Interface (API) provides a mechanism for writing custom tabular reports against the ExPR mainframe database. These reports can be developed by your technical staff. See the *ExPR Installation, Configuration, and Administration Guide (ICAG)* for details.

MONTAPE

The MONTAPE/MONREPT SE Tool utility is distributed as a separately licensed feature of ExPR. See the *ExPR MONTAPE/MONREPT Utility Guide* for details.

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