AN ON-LINE PERFORMANCE TRACKING SYSTEM USING MXG® AND SAS®

Rodney L. Reish, General Electric Co.

ABSTRACT

An on-line performance tracking system has been developed at General Electric - Plastics Business Group using MXG® and SAS®. This system depicts important performance and capacity statistics for batch, IDMS/R [1], network, system and TSO processing. The system features a top-down reporting approach, both short-term and long-term performance and capacity graphs and hardcopy options. A demonstration of this system will be presented. Also, an overview of the collection process necessary to support this on-line performance tracking system and ideas for future enhancements will be discussed.

INTRODUCTION

General Electric - Plastics Business Group embarked on the task to acquire or develop an online performance tracking system in May of 1986. The goal of this tracking system was to provide performance and capacity information from the MVS environment to all levels of information service personnel. This task was carried out in light of the following four requirements: 1. Only one person was and could be assigned to performance analysis and capacity planning functions; 2. The system had to read BST's Real Time Evaluation (RTE) [2] records produced by IDMS/R; 3. The system had to display data in a way that reflected the components of the business, and; 4. The system had to be justifiably cost-effective. After careful review, the development of an on-line performance tracking system using MXG and SAS was the only solution found that met these four requirements.

An on-line performance tracking system was developed at GE - Plastics Business Group using MXG, SAS, SAS/AF®, SAS/FSP® and SAS/GRAPH®. SAS provided the base language necessary to develop on-line and batch programs as well as provide support for MXG and the rest of the SAS products. SAS/AF was used to develop on-line menus so that information service personnel could interactively select reports, graphs, data and hardcopies. SAS/FSP was used to display data, e.g., IDMS/R application abends, so that information service personnel could read and search through data online. SAS/GRAPH was used to develop procedures to allow information personnel to view graphs online and to produce hardcopies of graphs. MXG not only provided code necessary to read the SMF, RMF and RTE data but also provided the framework from which the collection process code was developed.

The SAS code for the on-line performance tracking system was written from scratch. Since at the time of development no starter code existed. Even though this performance tracking system was written from scratch, it took only one person part-time, i.e., approximately five hours per week, for six months to write the code necessary to support all the performance areas except network. It took a college student full time for two months to complete the network performance area. However, the college student also had to learn SAS during this two month period. Today however, skeleton SAS/AF starting code can be acquired from the SAS Institute at no charge [3]. Such an acquisition should expedite the development phase considerably.

The on-line PERformance Tracking System was given the acronym PERTRKS. PERTRKS will be used henceforth when referring to the online performance tracking system.

THE COLLECTION PROCESS

The collection process follows the philosophy outlined by Merrill [4] in that daily and weekly runs build corresponding SAS performance data bases (PDB). Five additional datasets besides those created by the MXG module BUILDDB are added to the daily PDB. On the weekly run twenty-two datasets are updated and seven graphic catalogs are created. These weekly datasets and graphic catalogs are housed in three separate DASD files. One file houses graphic catalogs. Another file houses only network data. The last file houses all weekly batch, IDMS/R, system and TSO processing data. As a consequence of this collection process any day within the last seven and any week since the date of collection can be selected online. The one exception to this is that only last week's network exception data, i.e., subsets of the NPM type 30 records, are kept. For further details concerning daily and weekly MXG runs see Merrill [4].

The SAS procedure UNIVARIATE is the primary procedure used to produce descriptive statistics from the process distributions of interest. These statistics are then saved to the daily and weekly files. As a consequence of saving only the condensed data of interest the three DASD files mentioned above take less than fifteen cylinders of space on a 3380 device. This space requirement corresponds to nearly a full year of collection. The seven daily PDB's, the MXG SPIN file, the two PERTRKS code's files and the three weekly files as a full compliment, today take less than four hundred cylinders of space on a 3380 device. The weekly MXG
The five additional datasets that are created daily house different condensed forms of the RTE data created from the production IDMS/R region. Condensation of the voluminous IDMS/R transaction data to different forms that the user wants to see reduces online processing and response time. Four of these forms or datasets contain different levels of summarization detail of the transaction data. The other dataset contains the daily events that occurred in the production IDMS/R region.

The first of three files updated weekly contain sixteen datasets. These datasets contain statistics about the following information: 1. channel activity; 2-3. system measurements by hour and by week, e.g., CPU utilization and UIC count; 4. DASD space utilization; 5. DASD activity and response; 6. job queue time; 7. jobs which violate standard run times; 8. local and remote printer activity; 9-10. production IDMS/R transactions by major application and by task code; 11-12. update batch processing against the production IDMS/R region by major application and job name; 13-14. quality and test IDMS/R transactions, and; 15-16. update batch processing against the quality and test IDMS/R regions.

The second of the three files updated weekly contain six datasets. Each of these datasets contains statistics about the following network information: 1-2. NCP and line utilization by hour and by week; 3. last week's NCP errors and utilization exceptions; 4. last week's line utilization exceptions; 5. last week's line error exceptions; and 6. last week's PU error exceptions.

The last of the three files updated weekly contain the graphic catalogs for each of five performance areas: batch, IDMS/R, network, system and TSO. Each performance area has a graphic catalog depicting their performance data. In addition, the network and system areas each has a graphic catalog depicting their capacity data.

**THE PERTRKS DEMONSTRATION**

This demonstration is a sequential presentation of menus, selections, reports and graphs that can be obtained using PERTRKS. Since covering all possible PERTRKS selections would be too lengthy, only a representative sample of the selections will be presented. The demonstration starts with the primary master menu which users obtain by typing @PERTRKS under the TSO ready state or under the ISPF TSO command processor. The sequence followed in this presentation is given at the top of each menu after the SELECT OPTION ==>.
PRODUCTION QUEUE TIME BY JOBCLASS
Prime Shift Job Analysis by Rad Ratch

COLUMNS

**THE PRODUCTION QUEUE TIME REPORT**

**Production Queue Time by Jobclass**

**Description**

- Production Queue Time by Jobclass
- Production Queue Time by Transaction

**Note:**

- This report is generated by the system on demand.
- It provides a detailed analysis of production queue time by jobclass.
- The data is based on the performance statistics of the jobclasses over a specified period.

**Columns:**

- Jobclass
- Time
- Number of Jobs
- Queue Time
- Estimated Queue Time
- Exceeded Queue Time
- Percentage Exceeded

**Instructions:**

- Enter the jobclass name or a range of jobclass names to generate the report.
- Use the columns to filter and sort the data as needed.
- The report is updated daily and can be viewed online or printed for offline analysis.

**Technical Details:**

- The report is generated using the current performance statistics and system metrics.
- It includes a summary of the queue time statistics for each jobclass.
- The data is analyzed to identify patterns and trends over time.

**Contact:**

- For any questions or feedback, please contact the system administrator.

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**Table Columns:**

<table>
<thead>
<tr>
<th>Jobclass</th>
<th>Time (Mins)</th>
<th>Number of Jobs</th>
<th>Queue Time (Mins)</th>
<th>Estimated Queue Time (Mins)</th>
<th>Exceeded Queue Time (Mins)</th>
<th>Percentage Exceeded</th>
</tr>
</thead>
<tbody>
<tr>
<td>JOB01</td>
<td>30</td>
<td>50</td>
<td>20</td>
<td>30</td>
<td>10</td>
<td>33.33%</td>
</tr>
<tr>
<td>JOB02</td>
<td>40</td>
<td>60</td>
<td>30</td>
<td>40</td>
<td>20</td>
<td>50.00%</td>
</tr>
<tr>
<td>JOB03</td>
<td>50</td>
<td>70</td>
<td>40</td>
<td>50</td>
<td>30</td>
<td>60.00%</td>
</tr>
</tbody>
</table>

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**Summary:**

- The report highlights the performance of jobclasses and identifies areas for improvement.
- It is a valuable tool for managing production queue time and optimizing system performance.

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**Further Information:**

- The system administrators can provide additional insights and recommendations based on the data.
- Regularly reviewing the report helps in making informed decisions about system optimizations.

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**Contact Us:**

- For any assistance or further clarification, contact the system administrators.
**VIRTUAL STORAGE ACTIVITY REPORT**

**FOR THE WEEK OF JANUARY 20, 1987**

<table>
<thead>
<tr>
<th>Task ID Number</th>
<th>(HIDECOD):</th>
<th>20672</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of Person</td>
<td>(HIDECOD):</td>
<td>Student</td>
</tr>
<tr>
<td>Time Start/End</td>
<td>(HIDECOD):</td>
<td>11:24:40</td>
</tr>
<tr>
<td>Task Description</td>
<td>(HIDECOD):</td>
<td>SORSELYT</td>
</tr>
<tr>
<td>Co-Dated Task No.</td>
<td>(HIDECOD):</td>
<td>106902</td>
</tr>
<tr>
<td>Terminal LU Name</td>
<td>(HIDECOD):</td>
<td>TP83257</td>
</tr>
<tr>
<td>ZPMS ID No.</td>
<td>(HIDECOD):</td>
<td>SP38203</td>
</tr>
<tr>
<td>ZPMS Access Code</td>
<td>(HIDECOD):</td>
<td>208113</td>
</tr>
<tr>
<td>Batch Source Code</td>
<td>(HIDECOD):</td>
<td>020203</td>
</tr>
</tbody>
</table>

**EDIT LOG DATA SET: XXXXXXX**

**EDIT LOG DATA SET: XXXXXXX**

![Graph](image-url)

**NOTE:**

* GP = 4th Percentile

Response Time in Seconds

Number of Transactions in Thousands

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**Table:**

<table>
<thead>
<tr>
<th>Task ID Number</th>
<th>Task Description</th>
<th>Co-Dated Task No.</th>
<th>Terminal LU Name</th>
<th>ZPMS Access Code</th>
<th>Batch Source Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>20672</td>
<td>Student</td>
<td>106902</td>
<td>TP83257</td>
<td>208113</td>
<td>020203</td>
</tr>
</tbody>
</table>

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**Legend:**

- **Mean Time:** Average response time
- **95th Percentile:** Time above which 95% of responses fall
- **99th Percentile:** Time above which 99% of responses fall

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**Graph:**

- X-axis: Load Level
- Y-axis: Response Time

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**Chart:**

- Chart 1: Relationship between load level and response time.
- Chart 2: Comparison of response times across different load levels.

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**Analysis:**

- Response time increases with load level.
- The 95th percentile is significantly higher than the mean time.
- The 99th percentile shows a sharp rise at higher load levels.

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**Summary:**

- The system can handle medium load levels efficiently.
- At high load levels, response times exceed acceptable limits.

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**Conclusion:**

- Further optimization is required to reduce response times.
- Priority should be given to improving system capacity at high load levels.

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**Recommendations:**

- Increase hardware resources to handle higher loads.
- Implement load balancing strategies.
- Optimize database access and query execution.
CPU SERVICE UNIT CAPACITY
Capacity Analysis by Rod Reish

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The second involves changes to PERTRKS to depict data collected by NetView, i.e., data collected in type 37 and 39 SMF records. This new data consists of network availability and response time statistics.

Several other future enhancements are also being considered. Future changes involving the collection and displaying of availability statistics for the system, IDMS regions, and network have been committed to. Other considerations being discussed involve the capturing and displaying of RMF Monitor III data, SYSLOG and LOGREC data.

SUMMARY

PERTRKS has provided information service personnel with on-line performance and capacity information in a fashion which reflects the components of the business. In addition PERTRKS has nearly eliminated customized report writing and has provided time to do true performance analysis and capacity planning work. Thanks to the flexibility of SAS code old reports, graphs, and data displays can be easily modified and new ones easily added.

REFERENCES


SAS, SAS/AF, SAS/FSP and SAS/GRAPH are registered trademarks of SAS Institute Inc., Cary, NC, USA.

CONTACT

Rodney L. Reish
General Electric Co.
Plastics Business Group
1 Plastics Ave.
Pittsfield, MA. 01201
(413) 448-6941