



SAS® Fraud Management 3.2

Universal SAS® Connector on IBM mainframe running z/OS

Highlights:

- Scalability is achieved as Universal SAS® Connector resources and scenario workload increased.
- Sustained 2,145 transactions per second (TPS) and observed peaks of 2,600 TPS with just four Universal SAS Connectors and 64 driver programs.

This SAS Fraud Management performance testing uses real-world fraud detection situations. While these testing scenarios vary based on configurable settings within the application, they allow customers to optimize the desired performance from the product within their environment.

The scenario was written by SAS Research and Development to provide feedback to software development, establish sizing guidelines and help build reference material for customers.

Scenario

A test program was used to simulate a corporation's authorization system that sends transactions to the Universal SAS Connector. To prove scalability the test was repeated using one, two, three and four Customer Information Control System (CICS) regions. Each CICS region runs an instance of the Universal SAS Connector.

All tests were performed in a single LPAR. No other activity was running in the background during the execution of the test scenario.

Data

A preloaded DB2 version 9 database with 30 million cards, 30 million accounts, 80 million customers, 30MM card user variables and 30MM account user variables were used in the test. Two more user variable tables are updated while processing transactions. DB2 tables were compressed and defined with 10 partitions each. After the tables were loaded, REORGS and RUNSTATS were executed to get the best performance while testing.

The test transaction mix was 50 percent authorizations, 32 percent master records and 18 percent posting distributed in 64 VSAM files, each file holding 70,000 transactions.

A test model and a set of user variable rules were defined to mimic utilization of a typical production environment's model and rules.

Test execution

The following tests were run:

Test	Universal SAS® Connector	Drivers
1	1	2
2	1	4
3	1	8
4	1	16
5	2	32
6	3	48
7	4	64

*Each of these tests used a test pumper driver using TCP/IP.

Testing started with a small transactions per second (TPS) using only two drivers in one CICS region. TPS was increased by adding additional drivers, four and eight, then the maximum number of drivers for a region (16). We continued increasing TPS by running with 16 drivers in additional CICS regions: two, three and four regions. Each pumper driver program reads transactions from a Virtual Storage Access Method (VSAM) file in sequential order and sends them to the Universal SAS Connector and waits for a response before reading and sending the next transaction.

System architecture

An IBM mainframe z196 710



LPAR with four CPUs
 IBM System Storage DS8800 High Performance Disk Storage System
 CICS TS 4.1
 DB2 V9
 Base SAS® 9.2
 Universal SAS® Connector 3.2
 SAS® OnDemand Scoring Engine 3.2

Test data gathering

Using z/OS workload management (WLM), we ran the SAS OnDemand Scoring Engine controller as a subsystem work manager and set up reporting classes to measure the workload. After the various test scenarios, we created Resource Management Facility (RMF) reports to show the CPU utilization of SAS Fraud Management as well as the utilization of each component: DB2, Universal SAS Connector (CICS), and SAS OnDemand Scoring Engine. We isolated the resources used by the pumper drivers, and the results only show the resources used by SAS Fraud Management.

The tests were run on a standalone LPAR configured with four dedicated central processors. The tests were scheduled when no other work was running on the system. With our CPU utilization numbers, we were able to derive a MIPS value using leading expert Cheryl Watson's MIPS chart. Tests were conducted on a 2817 (710) model M32. However, we must treat it as a model 714 to account for the four ZIIPs added and used on this LPAR. This gives us an average RNI workload of 924 MIPS/CP and a total MIPS for the LPAR of 3,695.

The System Management Facilities were set to gather data every two minutes to get an accurate reading, as all tests lasted no longer than one hour. We ran standard RMF reports for these days and times and picked one of the intervals to create the graphics.

Test results

CPU utilization and TPS remained mostly constant during test execution. Figure 1 shows CPU utilization during the various tests.

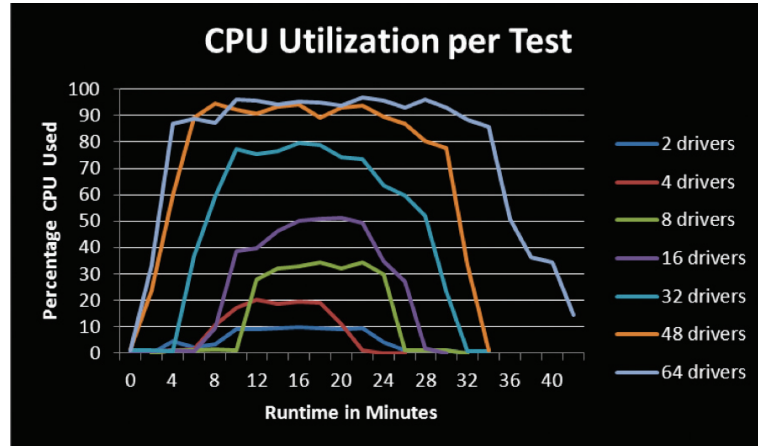


Figure 1: CPU utilization with different numbers of workload drivers.

Test results show as CICS and or Universal SAS Connector and driver programs were added to the test scenario, the TPS scaled to reach the system maximum. The system is rated at 3,695 MIPS. Tests were able to scale the solution from 215 TPS using one region and only two pumper drivers up to 2,145 TPS. At this point the scenarios reached the maximum capacity of the LPAR, close to 100 percent CPU utilization or 3,260 MIPS for the USC application. In order to scale TPS higher, more system resources would need to be added (i.e., CPUs). The low TPS increase from three to four regions is due to CPU contention in the LPAR (more CPUs needed).

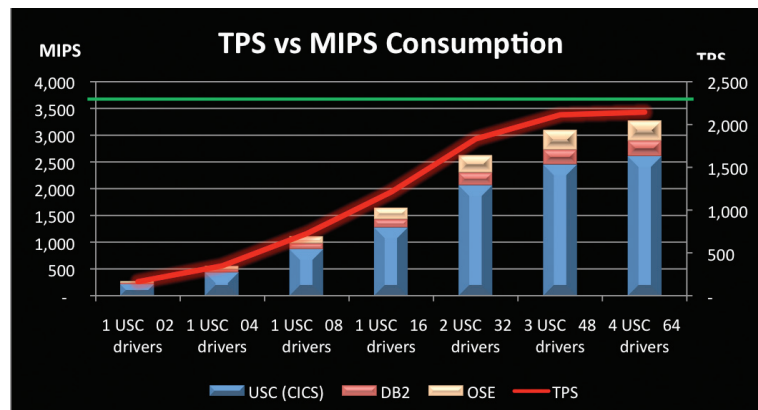


Figure 2: TPS Plotted against MIPS Utilization



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