

Sun Mainframe Rehosting Software

Leveraging Mainframe Assets on Sun
April 2003



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Chapter 1

Executive Summary

Enterprises seek competitive advantage in many forms. Businesses that rely on information technology (IT) often achieve greater competitive advantage by closely aligning IT and business objectives. In today's economic environment, with business placing more emphasis on total cost of ownership (TCO) and return on investment (ROI), IT organizations must find ways to decrease costs while maintaining functionality, meeting service level agreements, and minimizing risk.

For many companies, the business logic and customized procedures that have evolved in their core applications over time play a central role in sustaining a competitive advantage in the market. However, an enterprise whose technology assets reside largely on mainframe platforms may have few ways to reduce costs and increase value in key IT areas. Moving legacy applications to platforms with lower TCO is one way to reduce overall expenditures and increase IT value, and is an approach that many organizations are now taking.

Sun Mainframe Rehosting software extends the benefits of an open environment to legacy applications. Rehosting mainframe applications on the Sun platform provides a low risk, high value alternative to leaving applications on a proprietary mainframe or redeveloping applications in new languages. Rehosting is low risk because business rules and procedures remain largely unchanged, unlike a redevelopment project or off-the-shelf package implementation. Together with scalable Sun Fire™ servers and the Solaris™ Operating System (Solaris OS), Sun Mainframe Rehosting software reuses

existing investments in mainframe applications and data, redefining TCO across the enterprise and resulting in substantial cost savings.

Sun provides a scalable and stable environment for rehosted mainframe applications. Today, Sun Mainframe Rehosting software is deployed in over 950 customer sites worldwide. A variety of third-party tools and applications can be used with Sun's rehosting software and Sun Services offers a full range of options to manage, mentor and complete rehosting projects according to customer needs. Sun's unique approach leverages existing skillsets, application code and administrative tools - benefiting the bottom line today and better preparing the enterprise to sustain competitive advantage in the future.

Chapter 2

Software Overview

Increasingly greater numbers of organizations are moving mainframe applications to open platforms to optimize data center efficiency, reduce IT expenditures, and improve shareholder value. Sun Mainframe Rehosting software maximizes the value of legacy assets without sacrificing business agility by providing a robust, secure environment for administering, developing, and deploying traditional mainframe applications natively on the Solaris OS.

Sun™ Mainframe Transaction Processing (Sun MTP) and Sun™ Mainframe Batch Manager (Sun MBM) software provide an environment for running CICS and batch applications on Sun servers. Figure 2-1 on the following page illustrates how Sun MTP and Sun MBM enable applications to be deployed on Sun.

Sun MTP and Sun MBM support CICS and batch JCL environments running COBOL, PL/I, C, C++, and Java™ technology-based programs. Data stored in VSAM files and DB2 databases can also be rehosted and a wide range of popular clients and interoperability capabilities are provided on Sun.

By preserving existing applications, administration frameworks, and skillsets, core IT investments can now be extended to a more cost-effective platform without risky rewriting efforts. Together, Sun MTP and Sun MBM provide a complete solution for supporting today's business-critical applications, and integrating with tomorrow's technology and enterprise models.

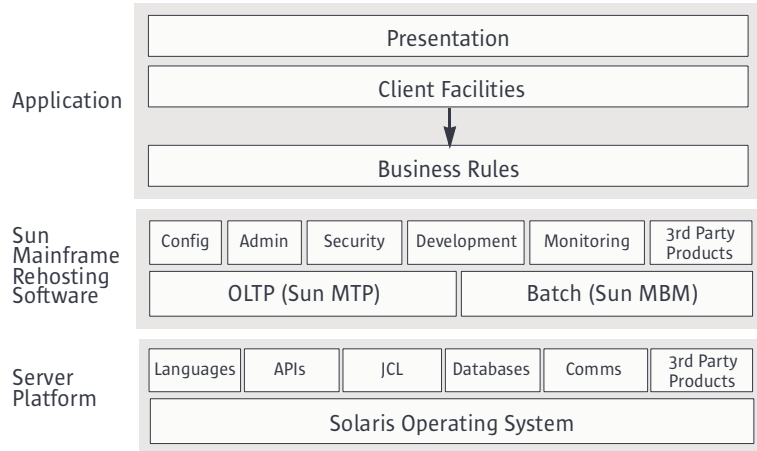


Figure 2-1: Sun MTP and Sun MBM Environment

Sun Mainframe Transaction Processing Software

Sun Mainframe Transaction Processing (Sun MTP) software is a native, fully-functional implementation of CICS on the Solaris OS. As with other advanced transaction processing systems, Sun MTP manages application resources such as programs, files, queues, transactions, screens, and terminals, providing a robust execution environment for business applications. The software includes support for a variety of client devices, including IBM 3270 SNA, TN3270, and WebSphere MQ clients. ECI, EPI, and Java technology-based clients, as well as IBM's CICS Client and Universal Client products are also supported.

Sun MTP 8.0 is the latest version of Sun Mainframe Transaction Processing software. This release has a number of new features designed to enhance security, availability, interoperability, and manageability, including:

- Sun Mainframe Security Facility (Sun MSF), which provides role-based access control and eases migration of applications using RACF security rules
- A high availability (HA) agent for Sun™ Cluster 3.0 Software to support failover
- Support for very large VSAM files
- Remote administration via the Java technology-based Sun Mainframe Administration Tool (Sun MAT)

Sun Mainframe Batch Manager Software

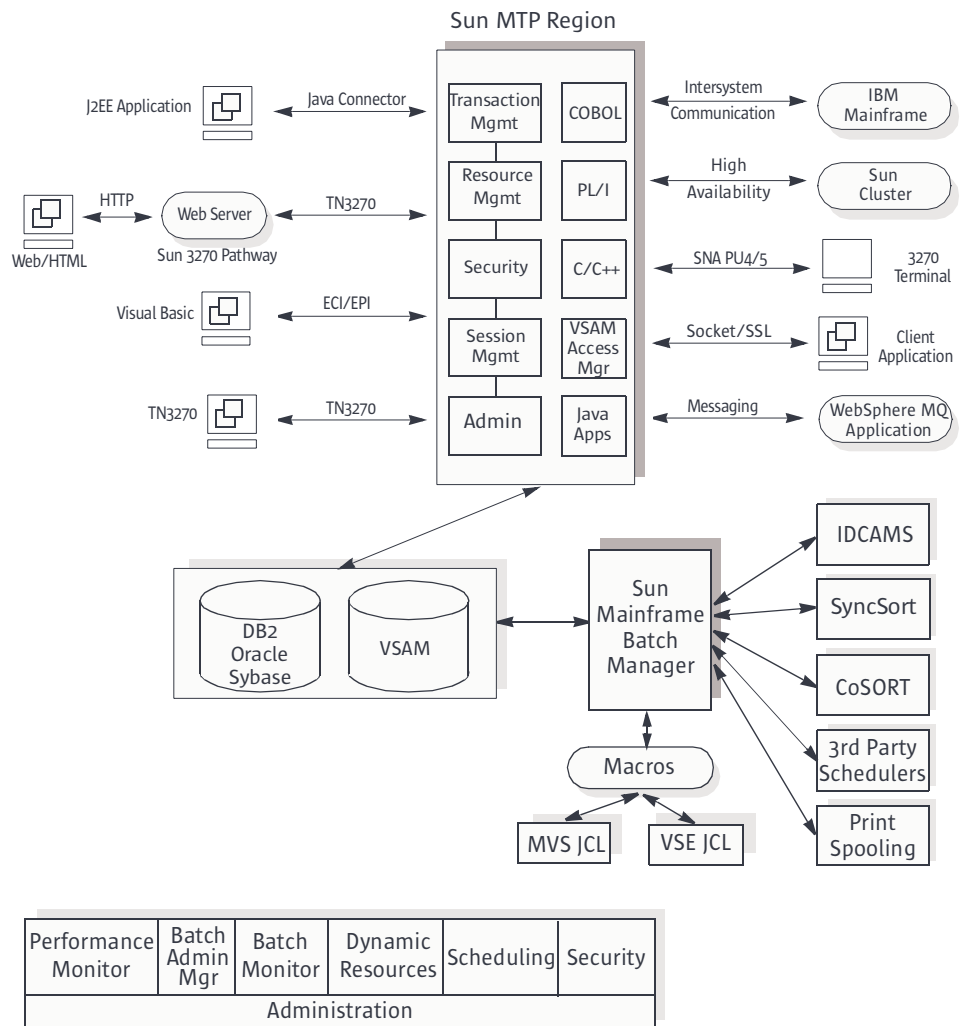
Sun Mainframe Batch Manager (Sun MBM) software provides a complete environment for the administration, execution, and management of batch workloads on Sun servers. Concepts such as job step level management, workload classes, and priorities, as well as file types such as COBOL, VSAM, and Generational Data Groups (GDGs), are supported. Sun MBM includes facilities for migrating z/OS, OS/390, and VSE JCL job streams to Sun. Additionally, since Sun MBM was designed to integrate with defacto standards, investment in existing system management utilities such as schedulers is often preserved.

Sun MBM 10.0 is the latest release of Sun MBM software. This version has a number of enhancements focused on improving manageability and ease of use, including a robust GUI interface for operator, developer, and administrator tasks. Additionally, remote job submission is now available from both PCs and mainframes.

Rehosting Environment

Sun Mainframe Rehosting software provides a comprehensive environment for the deployment of mainframe applications. Figure 2-2 depicts the primary components of Sun Mainframe Rehosting environments.

Figure 2-2: Sun Mainframe Rehosting Software Operating Environment



Organization of This Document

The remainder of this document describes the central elements of Sun MTP and Sun MBM illustrated above, including:

- Sun's CICS offering - Sun Mainframe Transaction Processing software (Chapter Three)

- Sun's batch environment - Sun Mainframe Batch Manager software (Chapter Four)
- Third Party Tools (Chapter Five)

Chapter Six details the extensive and flexible migration services that Sun can provide to customers who want to rehost their legacy assets to the Solaris platform. A brief conclusion is included as Chapter Seven.

Chapter 3

Sun Mainframe Transaction Processing Software

Sun Mainframe Transaction Processing (Sun MTP) software is a fully-functional, reliable transaction processing system which allows CICS applications to be run on cost-effective Sun servers with little or no change to program code. Sun MTP provides an enterprise OLTP environment, ensuring consistent, fast, and reliable application processing. Some of the core features of Sun MTP include:

- A scalable, native implementation of CICS on the Solaris OS
- Support for a wide range of application, client, and presentation options, including TN3270, and SNA 3270 clients and devices
- VSAM files services for KSDS, ESDS, and RRDS data sets
- Extensive interoperability with existing mainframe CICS regions and existing legacy infrastructure
- A graphical, real-time performance monitoring facility and options for logging detailed accounting records

Sun MTP Architecture

Sun MTP software is a logically-threaded system which provides a robust environment for CICS transaction processing. Sun MTP offers an extensive level of CICS compatibility, using much of the same terminology and interfaces as mainframe CICS, including

support for EXEC CICS commands. CICS table orientation is maintained with Sun MTP, making administrative tasks familiar to IT staff.

Sun MTP uses a *region* construct for managing execution environments. Multiple regions may be used to maintain environments with different application types and resource requirements. Region configuration includes the Sun MTP system tables, definitions of required data sources including VSAM files or relational databases (RDBMSs), language requirements, and security requirements, to name just a few.

After a Sun MTP region is started, a number of different processes may be running depending on the region configuration. In addition to the main server, these processes provide services such as:

- Transaction management
- Communications management
- Intersystem communication
- Client support (TN3270, etc.)
- Remote Administration
- Printing
- Recovery

As CICS applications are scheduled for execution, programs are loaded into the transaction server space and Sun MTP service routines are called to perform CICS work. All services that can be handled locally are completed locally. Should the program require RDBMS access or shipping work to another Sun MTP region, the transaction servers do so through the appropriate communication servers. A response code is returned to the application program when a service is completed. For asynchronous service requests, applications receive a response code immediately.

Application Types

Sun MTP supports a number of different application languages and utilities. Support for COBOL and PL/I applications is provided through Micro Focus Server Express and Liant Software Open PL/I. C, C++, Java, and other application types are also supported by Sun MTP, as detailed in the following list:

- Animator debugging code
- BMS mapset executables and source
- C code with EXEC CICS commands
- C native code and header files
- COBOL native and intermediate code
- IBM OS/VS COBOL code
- IBM COBOL/2
- Java source and compiled programs
- Liant Open PL/I code
- Liant Open PL/I code with EXEC CICS commands

- Liant Open PL/I database programs
- Input to the COBOL compiler
- Printer output
- Transient Data extrapartition job stream destinations
- Native and ASCII Sun MTP table formats
- ASCII format VSAM catalog
- VSAM KSDS, ESDS and RRDS files

Client Interfaces

In addition to supporting a wide range of application types, Sun MTP provides multiple client and presentation options, allowing mainframe applications to be rehosted with minimal or no change to the user interface and therefore little or no disruption to end users. Sun MTP applications support a variety of client devices, including desktop workstations, web browsers, telephones, ATMs, voice recognition units, kiosks, smart-cards, and other Internet-enabled appliances. Sun MTP's scalable communication servers can handle over 50,000 simultaneous clients in a single region. Supported client types include:

- TN3270 and TN3270E emulator clients for 3270 applications and terminals, and 3278 printers
- SNA3270 terminals
- ECI and EPI clients
- TCP/IP socket clients
- WebSphere MQ clients
- Secure Sockets Layer (SSL) clients
- Java clients
- IBM's CICS Client and Universal Client products

Relative Record (RRDS) files are limited only to the maximum size supported by the operating system, while Entry Sequential (ESDS) files have a maximum size of 4GB. Keyed Sequential (KSDS) files may have up to eight segments including the primary segment, with each segment's size limited to the maximum file size supported by the operating system. In the Solaris™ 9 Operating System, files may be up to 1TB in size, and a KSDS file may be a maximum of 8TB.

File and Database Management

Sun MTP supports all three major mainframe VSAM file types as well as popular relational database management systems. By supplying its own VSAM file services, Sun MTP allows mainframe CICS applications using VSAM to be rehosted smoothly. Sun MTP software provides features and utilities to enable easy manipulation and management of VSAM files. Sun MTP's File Manager can be used for creating and managing VSAM files, as well as managing the VSAM catalog for each Sun MTP region. Sun MTP also has utilities that provide such functions as allocating or deallocating VSAM datasets while a region is running, reserving a dataset for batch, changing the recovery attributes, building VSAM files from sequential files, rebuilding index files and alternate index files, and merging multiple sequential files into a single VSAM file.

Sun MTP provides VSAM file and journal caching facilities to defer physical file writes and thereby improve application throughput by reducing or eliminating application processing time spent waiting for I/O to complete. The underlying Solaris OS file system cache schedules the physical writes based on its cache flush rules.

To ensure data integrity, Sun MTP software allows for recovery of VSAM files, temporary storage queues, transient data queues, and asynchronous transaction starts. Two types of recovery processing are provided: recovery after a transaction abort and recovery after a system crash. In case of a transaction abort, all records updated by the failed transaction are backed out. Updates to temporary storage for recoverable queues are rolled back, as well as updates to transient data and recoverable asynchronous *START* requests. Transactions executed by other applications are not affected by the back-out process. In case of a system crash, when the Sun MTP region is restarted the Recovery Server backs out updates by any transactions that were incomplete at the time of the crash, and recovers any recoverable resources including temporary storage queues and ATI transactions.

Sun MTP works with popular relational database management systems supported on the Solaris platform, including DB2, Oracle®, and Sybase. Precompilers for specific application languages are provided by the database vendor. Sun MTP leverages RDBMS software to maintain data integrity of databases. When an application accesses multiple databases, care must be taken with how the application handles changes in order to keep the databases synchronized.

Intersystem Communication

Sun MTP provides several facilities to share resources and data between Sun MTP regions and IBM CICS systems. To Sun MTP, an IBM CICS mainframe system appears as a remote region through Intersystem Communication (ISC). These facilities are described below.

- *Transaction routing* allows terminals connected to one system to run transactions on another Sun MTP region or IBM CICS system.
- *Function shipping* allows an application to access or update resources owned by another region, enabling multiple systems to distribute and share resources. The resources can be VSAM files, transient data or auxiliary temporary storage. Sun MTP provides translation between ASCII and EBCDIC if needed.
- *Asynchronous processing* distributes processing between systems by allowing a Sun MTP or CICS transaction to start a transaction on a remote system and to pass data to it. Access to local resources is not blocked while a remote request is being processed.
- *Distributed Program Link (DPL)* enables a program on one Sun MTP or CICS region to synchronously link to a program on another region. For example, DPL enables a Sun MTP region to link to a mainframe program that can access BDAM, DB2 files, and IMS, DL/1, and SQL databases.
- *Distributed Transaction Processing (DTP)* allows a transaction on one region to start and converse with another transaction. The other transaction can be running on any system that supports LU6.2 protocol. DTP provides synchronous communication.

Sun MTP's Debug Facility provides debugging of outbound transactions, excluding transaction routing. With transaction routing, debugging must take place on the system where the transaction will execute.

Security

Sun MTP allows security configurations to be tailored to meet a variety of needs based on customer requirements. Basic user sign-on validation is provided. Sun MTP Secure, Sun Mainframe Security Facility (Sun MSF), or customizable user exits can be used to provide resource level access control, comprehensive administration, audit facilities, or to meet customized security requirements.

Sun MTP Security

Basic Sun MTP security consists of validating user sign-on to a region, security of executables, shell scripts, and databases, in addition to transaction-level security. Sun MTP provides control of user names, password length, password lifetime, and password failure limits. User names and passwords may be assigned to printers and 3270 devices to allow access beyond what is permitted by the default security level.

Solaris OS security features are used to secure shell scripts, executables, and database files. Owner, group, and user permissions can be configured to ensure that each user has only the appropriate level of access to each file.

Sun MTP Secure

Each Sun MTP region can be integrated with an external security manager (ESM), which allows security controls to be assigned to each resource accessed by a transaction or batch job. Sun MTP Secure provides an interface between a region and an ESM. Use of an ESM enables Sun MTP to provide security features beyond user sign-on authentication and transaction-level security. Through the use of a security repository, which can be an LDAP directory or an RDBMS, the full complement of region resources can be secured.

Sun Mainframe Security Facility

Sun Mainframe Security Facility (Sun MSF) provides the administration and runtime services of an ESM for Sun MTP. Sun MSF uses a Role-based Access Control (RBAC) security model. In this model, permissions to resources are associated with roles, and users (or *principals*) are assigned to appropriate roles. A role may also be defined as a "parent" role, creating a hierarchy of relationships between roles. Parent roles have their own permissions in addition to the access granted to any "child" or subsidiary roles.

Sun MSF's model is inclusive in that all resources must be defined in the security repository, and permissions must be granted in order for any user or role to access them. If a resource is not defined, it cannot be used. Resources with common access

requirements may be grouped into *resource domains*. Roles granted access to a resource domain have access to all resources in that domain.

Sun MSF is composed of the following items:

- A *Security Repository*, implemented as a third-party RDBMS which contains the definitions of Principals, Roles, Resources Domains, and Resources
- An *Administration Tool Set*, used to initialize and maintain the security repository
- A *Security Server*, which manages interactions for authentication and authorization between Sun MTP regions and the security repository
- *Sun MSF runtime support*, a set of services that allows the security server and administration tools to communicate with the security repository
- *Sun MSF interfaces to the Security Server*, used by Sun MTP region transaction servers to communicate with the Security Server
- A *Security Log Server*, which collects audit messages generated by Sun MSF runtime services, and writes them to a Security Audit Log file

These components and their interactions are shown graphically in Figure 3-1 below. The Transaction Server communicates via TCP/IP sockets with the Security Server to validate access requests. The Security Server verifies or denies access based on the security configuration in the Security Repository. The Administration Tools are used to create and maintain the security configuration in the Security Repository.

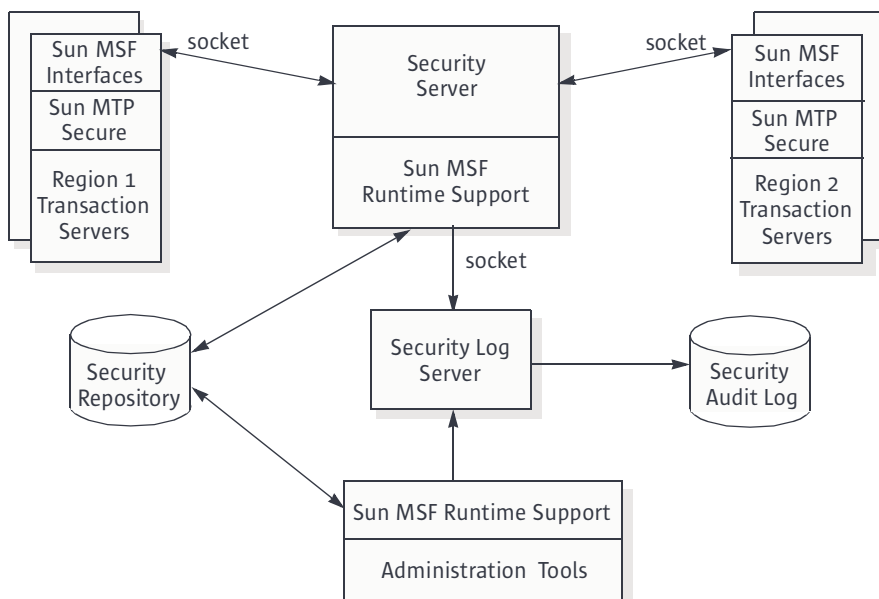


Figure 3-1: Mainframe Security Facility Components

Sun MSF defines three types of security system users. The *Super Administrator* can create and destroy the security repository, and creates the *Security Administrator*. The *Security Administrator* creates and maintains the *Principals*, as well as the Roles, Resource Domains, Resources, and their associated permissions. Sun MTP users are defined as Principals in the security system, but do not have administrative access to Sun MSF.

Sun MTP with Sun MSF distinguishes between users who have administrative permissions within Sun MSF, and administrative permissions within Sun MTP. A given user may not be permitted to run any of the Sun MSF tools, but may at the same time be a Sun MTP region administrator with the ability to start, stop, and manage one or more Sun MTP regions. This differentiation provides a more secure environment since each user is given only the needed capabilities and no more. With some care and planning in defining the Roles and Resource Domains, Sun MTP with Sun MSF provides a very flexible yet secure environment.

Administration Framework

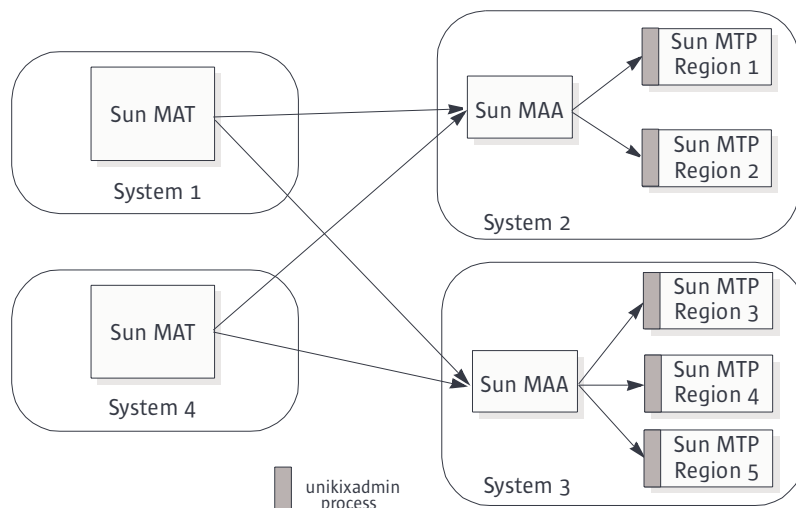
The major components of Sun MTP administration are the GUI-based Sun Mainframe Administration Tool (Sun MAT), Sun Mainframe Administration Agent (Sun MAA), and the `unikixadmin` process.

Sun MAT's GUI-based interface provides a flexible and usable tool for remotely managing and monitoring Sun MTP regions. Because Sun MAT is a Java application based on Swing components, it may be run on any system in the network where Java™ 2 Platform, Standard Edition 1.4 technology is installed.

Sun MAA provides the interface between Sun MAT and the regions being administered. In order to use Sun MAT, Sun MAA must be running on each system that hosts one or more Sun MTP regions. A `unikixadmin` process runs in each region where remote administration is used and handles administration requests sent via Sun MAA.

In a simple environment, Sun MAT, Sun MAA, and the Sun MTP region may all be running on a single system. A more complex environment might look something like that shown in Figure 3-2.

Figure 3-2: Multiple Region/Multiple System Environment



In this example, Sun MAT is running on two different systems and communicating with Sun MAA on two more systems. One instance of Sun MAA handles all Sun MAT

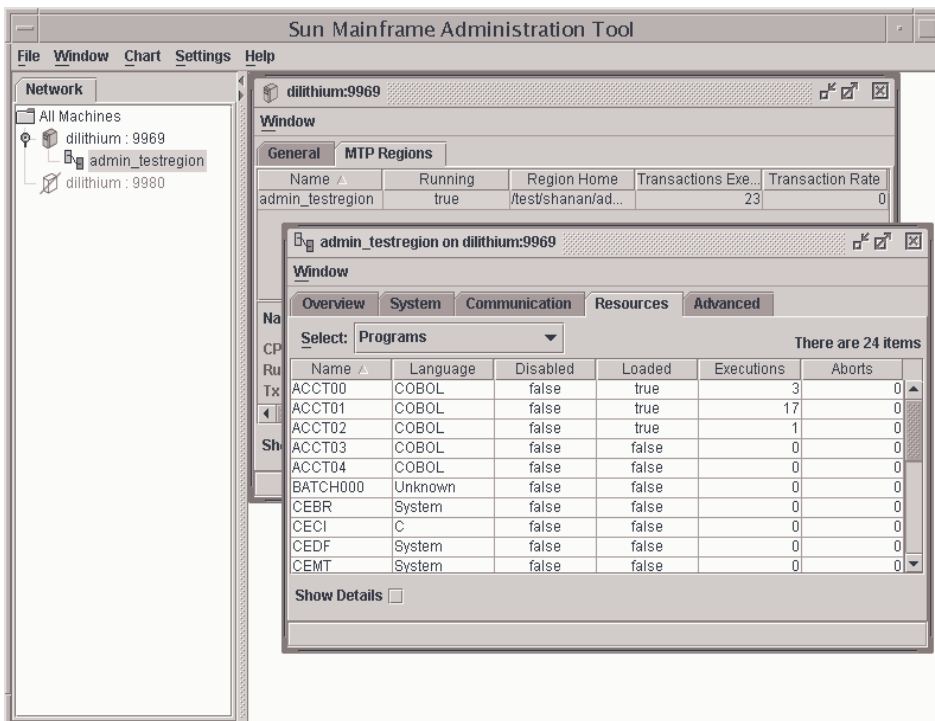
requests for all regions on the system where Sun MAA is running and sends those requests on to the `unikixadmin` process for the appropriate Sun MTP region.

The Sun MAT GUI provides a hierarchical display of the systems and the Sun MTP regions running on them. The graphical display provides easy access to an overview screen as well as system, resource, and communication information, organized under “tabs”:

- *Overview* tab: general information about the region, such as the region name, start date, version, and status
- *System* tab: performance and other system-level information specific to a region, including transaction rates, number of users, active processes, recovery data points, batch settings, allowed program languages, and configuration limits
- *Communications* tab: information about the region’s communications servers, including which communication servers are configured, the total kernel processor (CPU) time used by this server, and the maximum number of concurrent inbound ISC requests that will be accepted by the region
- *Resources* tab: information about the resources configured for the region, such as programs, maps, and transactions
- *Advanced* tab: information primarily used by service personnel for system diagnosis

Figure 3-3 shows the Sun MAT Graphical User Interface.

Figure 3-3: Sun MAT Graphical User Interface



Performance Monitoring

Prior to Sun MTP version 8.0, performance monitoring was done by Sun MTP Scan, a graphical performance monitoring tool that provided functionality similar to that of

Candle Corporation's OMEGAMON on the mainframe. With Sun MTP 8.0 and forward, the same functionality that was delivered by Sun MTP Scan has been incorporated into the Sun Mainframe Administration Tool. Sun MAT contains a comprehensive monitoring tool that can be used to enhance the efficiency and performance of Sun MTP. Sun MAT allows thorough analysis of transaction execution, VSAM datasets, temporary and transient data queues, interprocess communication, and terminal status. Information is displayed in real time to determine system status, processing rates, and to identify potential bottlenecks and configuration enhancements.

Accounting

Sun MTP generates RMF-like records in accounting journal files. Data can be collected on a per user or per transaction basis. Sun MTP provides a high degree of control over what accounting records are written and to which accounting journal file. Sun MTP's accounting can be configured, for example, to write accounting records for different transaction types to different accounting journals. Sun MTP's administration tools also provide a means to specify the size of each accounting journal file, as well as an alternate file.

A production site that has many users and applications running on multiple systems in a network environment may require a more sophisticated accounting facility. In such cases, Sun MTP allows the integration of a third-party accounting package for processing of accounting data.

Modernizing Mainframe Applications

With ever increasing numbers of new applications being developed and deployed, along with the continued growth of the Internet, there is a growing need for Web-based applications to be able to interact with existing mainframe applications and data. Sun Mainframe Rehosting software provides a variety of ways to modernize legacy environments without lengthy rewriting or major enterprise change.

With Sun™ 3270 Pathway software, new Java technology-based applications can be rapidly developed which interact with existing Sun MTP and mainframe CICS applications. Sun 3270 Pathway software leverages the universal 3270 interface already present in the majority of mainframe transaction processing environments to provide access to almost any back-end mainframe application. Using Sun 3270 Pathway software, developers can connect to a 3270 end system, run an application, and extract data from the end system. The data can then be used in an application written in the Java programming language.

On the client side, multiple back-end applications on multiple hosts can be accessed concurrently and presented in a single user interface. Traditional 3270 green screens can be replaced with easy-to-use GUI interfaces to improve end user experiences and productivity. Sun 3270 Pathway software also enables Java IDEs (Integrated

Development Environments) and Java technology-based application servers, such as the Sun™ ONE Application Server, to create new user interfaces for legacy applications.

On the application front, Sun has developed Sun MTP connector technology which allows applications written in the Java programming language to share data with rehosted legacy applications. Java application developers can use the Common Client Interface (CCI) defined in the Java™ 2 Platform, Enterprise Edition 1.3 specification to integrate existing Enterprise Information Systems (EIS) such as Sun MTP, with new Web-based applications. For those enterprises continuing CICS development but also embracing newer application development options, Java technology-based CICS applications can also be written and managed in a Sun MTP framework.

Chapter 4

Sun Mainframe Batch Manager Software

Sun Mainframe Batch Manager (Sun MBM) software provides a scalable environment for developing, scheduling, executing, and managing batch programs natively on the Solaris OS. Sun MBM allows an enterprise to rehost batch applications on a flexible, cost-effective platform while maintaining existing business logic and IT frameworks, preserving key application and skillset investments, and minimizing migration time and risk. Sun MBM uniquely brings mainframe batch concepts to open systems environments. Some of Sun MBM's primary features include:

- Retention of common batch JCL constructs such as job steps, classes, and priorities for z/OS, OS/390, and VSE job streams
- Support for a wide variety of file types, including Sun MTP VSAM, relational databases, Generational Data Groups (GDGs), concatenated datasets, and flat files
- Remote job submission from PCs, mainframes, and other UNIX® server platforms
- An interactive interface for operator, developer, and administrator tasks
- Integration capabilities with industry standard software and utilities to provide a full enterprise framework for executing batch workloads

Sun MBM Architecture

Sun MBM provides a complete batch job execution facility. The software is composed of independent processes that manage and schedule batch programs according to configuration parameters, such as start time and job priority. Sun MBM provides functionality to allow administrators to assign job attributes, change job attributes, and determine the current status of a job.

Specific job execution environments are defined in nodes and subsystems. Within a Sun MBM instance, one or more nodes can be created, and within each node up to eight subsystems can be defined. Multiple nodes can be created when separate environments are needed, for example to provide separate production and test environments. Figure 4-1 illustrates the Sun MBM architecture.

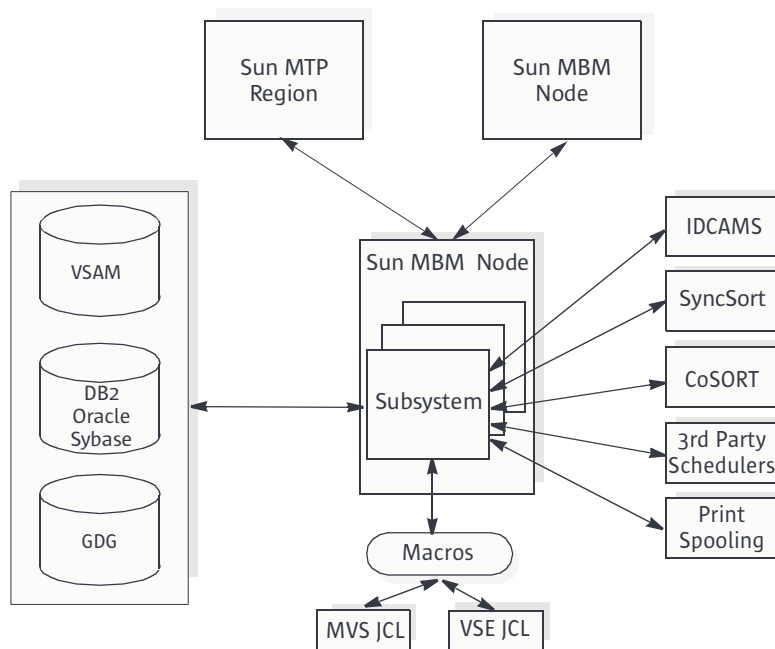


Figure 4-1: Sun MBM Architecture

Each node configuration includes parameters that affect all of the node's subsystems, such as the total number of batch jobs that may execute at one time or the amount of information to maintain in the history file. Subsystem configurations define specific execution variables, such as which languages batch programs are written in, the type of data files to be used, third-party packages and MVS or VSE compatibility.

Sun MBM supports COBOL, PL/I, C, and C++ programs, as well as applications written for the Java platform. Supported data types include sequential files, Sun MTP VSAM files, GDGs, concatenated data sets, and relational databases.

JCL on Sun

Concepts such as jobs, job steps, and common mainframe utilities such as IDCAMS and SORT are preserved in Sun MBM. Before mainframe MVS and VSE JCL statements may be

run in a Sun environment, they are first migrated using translation tools provided with Sun MBM.

At a high level, MVS and VSE translators read jobs and procedures located in predefined directories, convert the JCL to macro job scripts and save the scripts to a different set of predefined directories. The macro job scripts can then be executed in the Solaris OS.

There are two primary steps involved in such translation. First, a Sun MBM translator runs a JCL stream and creates a File Map. This File Map contains a set of entries that relate the mainframe datasets, libraries, and GDGs to their equivalent files in the Sun MBM environment. The translators are run a second time to create from the JCL statements the macro job and procedure scripts, including job steps, which will be executed on the Solaris platform.

Administration Framework

Sun MBM offers a complete administration framework, as well as tools to support job creation and management, job accounting, and diagnostics.

Batch Administration Manager

Sun MBM provides tools for defining, configuring, and administering batch environments using a menu-driven program, the Batch Administration Manager (BAM). BAM allows an administrator to configure databases (VSAM, COBOL files, and RDBMS), define security, specify accounting criteria, create job classes, define the batch console, and specify many other attributes. Multiple Sun MBM configurations can be defined for different environments.

BAM contains a series of tree-structured menus that give easy access to the groups of functions shown in Table 4-1.

Table 4-1: Batch Administration Manager Menus

Menu	Functions
System Environments	System status; starting, and stopping Sun MBM; console management; job output redirection; date and time management; job accounting; inter-node communication management
Applications and Subsystems	Displaying subsystem information; creating, changing, or deleting subsystems; displaying or changing the default subsystem; importing subsystems
Security and Users	Control access to subsystems; control access to Sun MBM commands; list user work directories; create, change, or delete user work directories
Classes and Activities	Display job classes; create or delete job classes; set the number of activities in a class

Menu	Functions
Problem Determination	Error log management; tracing subsystems, processes, or messages; dump memory; verify disk space; create a snapshot; run a test
Software License Management	Creating, updating, or deleting license files; displaying license information

Job Editor

The job editor is a graphical tool for creating and maintaining Sun MBM jobs. The job editor allows the user to define steps, jobs, procedures, and projects. A project groups jobs and procedures, such as a project for jobs in production and a project for jobs being tested. An application program and its required resources are grouped and represented as a step. A sequence of steps may be grouped to form a job, or it may be used to form a procedure, which is then invoked by one or more job steps. Steps may be executed conditionally based on the success or failure of preceding steps.

Job Management

Sun MBM provides a full set of management functions for controlling job execution and managing system resources. Sun MBM's job management features enable a variety of functions, such as:

- List active batch jobs
- List status of jobs waiting to execute and waiting to be scheduled
- List status of executing jobs
- List current command and step for executing jobs
- Change job attributes
- Control jobs to enable job sequencing and synchronization
- Cancel a job
- Suspend and resume a job
- Create job accounting files for auditing jobs
- View statistics

Sun MBM controls job execution and manages system resources through job classes. Each job submitted for execution must specify a job class. Up to twenty-six job classes (named a - z) may be defined for each node. Each job class is configured with one or more segments of shared memory which are known in Sun MBM terminology as activities or threads. The number of activities assigned to a job class controls the number of jobs in that class that may execute on the node at the same time. If a job class has 5 activities and 30 jobs are submitted, only 5 jobs will execute. As jobs complete, the next highest priority job will be scheduled. Figure 4-2 shows some of the job management functions available in Sun MBM.

Figure 4-2: Job Management

Class	Active Threads	Available Threads	Total Threads	Pending Jobs
a	00	08	08	00
b	00	02	02	00
e	00	01	01	00
Total	00	11	11	00

node2: Job Classes
2002/07/12 09:26:01

Buttons: Pending Jobs, Active Jobs, Allocate Thread, Deallocate Thread, Refresh, Quit

Security and User Management

Security is managed through BAM's Security and Users menu and allows access to be specified by user or group. BAM provides separate access controls for:

- Starting and stopping Sun MBM nodes
- Managing Sun MBM nodes and subsystems
- Running jobs within subsystems
- Creating, changing, or deleting job classes and activities

A given user may be permitted to start nodes, but not to stop them, or to stop and start nodes, but not to change their configuration, and so on. BAM also allows the user's work directory to be created, changed, or deleted.

Problem Determination

Sun MBM provides tools to make it easier to locate the source of a problem. These tools include managing and displaying error logs, displaying shared memory, verifying disk space, and tracing functions.

Subsystem tracing displays the current configuration of a subsystem and the number of jobs running or already processed. *Process tracing* displays a list of processes for the node, including process name, process ID, host name, and any error messages. The *message tracing* functions include activating the message log, displaying message traces, and deactivating the log.

The "run test" function is used to verify correct installation of Sun MBM. The test creates a subsystem, runs jobs, and deletes the subsystem.

For more difficult problems, Sun MBM provides a *snapshot* function which can be sent to Sun or an authorized Sun service provider for diagnosis.

Job Accounting Facility

Sun MBM's job accounting facility is a set of tools for building accounting systems containing user-written programs or shell scripts. When a node is configured with job accounting active, each time a job terminates, one or more user-defined records are written to a job accounting file. User programs can then summarize the data in the accounting file. Job accounting may be activated or deactivated, the accounting configuration changed, and the job accounting record format may be modified. For complex situations, a third-party accounting package may be used with Sun MBM.

Chapter 5

Third-Party Tools

A wide range of software tools and utilities can be used with Sun Mainframe Transaction Processing and Sun Mainframe Batch Manager software to support a complete enterprise environment. Table 5-1 below shows a sampling of available third-party products. Additional listings can be found in Sun's iForceSM Partner Products Catalog.

Table 5-1: Third-Party Tools for Mainframe Rehosting Environments

Product Name	Company
<i>Compilers</i>	
Open PL/I	Liant Software
Server Express	Micro Focus
<i>SNA Connectivity</i>	
SNAP-IX (SNA Stack)	Data Connection
TPS SNA Primary (PU4/5 Stack)	TPS Systems, Inc.
<i>Sort Packages</i>	
CoSORT	IRI, Inc.
SyncSort	Syncsort Inc.

Product Name	Company
<i>Schedulers</i>	
CONTROL-M	BMC Software, Inc.
Unicenter AutoSys Job Management	Computer Associates
<i>Printing and Output Management</i>	
Columbus	Macro 4
UniQ	Macro 4
ViewDirect	Mobius Management Systems, Inc.
Vista Plus	Quest Software
<i>Business Intelligence/Report Generation</i>	
Advantage CA-Easytrieve	Computer Associates
BusinessObjects	Business Objects
Cognos BI Series 7	Cognos
FOCUS	Information Builders
<i>Monitoring and Performance Management</i>	
PATROL	BMC Software, Inc.
TeamQuest Alert	TeamQuest
Unicenter	Computer Associates
<i>Capacity Planning</i>	
PATROL - Perform & Predict	BMC Software, Inc.
TeamQuest Model	TeamQuest
Unicenter	Computer Associates
<i>Accounting and Chargeback</i>	
CIMS Resource Accounting	CIMS Lab Inc.
NetCountant	Apogee Networks, Inc.
SAS IT Resource Mgt/IT Charge Mgt	SAS
<i>Storage Backup</i>	
Brightstor CA-1	Computer Associates
LEGATO Networker	LEGATO
VERITAS Netbackup	VERITAS Software Corporation
<i>Tape Management</i>	
TMS/ix	LXI Corporation
<i>Development</i>	
PVCS	Merant
Server Express	Micro Focus

Chapter 6

Rehosting Services

Sun provides extensive and flexible migration services for customers wanting to leverage legacy assets on the Solaris platform. Sun Services tailors its offerings to meet both the business objectives and technical needs of a migration project. Sun Services consultants have expertise in mainframe online and batch environments, open systems, and application rehosting projects. More than 500,000,000 lines of COBOL code at over 950 installations have been migrated using Sun's proven rehosting services methodology.

Service Offerings

Sun Services offers services ranging from an initial assessment of feasibility to performing rehosting projects to mentoring and training a customer's staff.

Project Evaluation

The initial consultation uses the completed Application Summary Form as the basis to investigate the financial and technical feasibility of rehosting the application(s) under consideration. This form provides the information needed to begin to analyze the scope of a proposed project.

Sun's rehosting experts evaluate information on existing mainframe hardware and software, application, file and data types, and other areas. Based on this information, Sun presents initial technical and financial characteristics of a rehosted Sun application

environment to the customer. Upon determination that this evaluation fits the customer's direction, Sun will propose to move into a more detailed assessment phase.

Application Assessment (Audit)

Sun consultants perform a more extensive analysis of the application environment in the application assessment or audit phase. The source assessment includes an audit of application source components (programs, copybooks, include files, BMS maps, JCL, parameter libraries, and other relevant source modules).

If there is need for a more comprehensive solution beyond the application components themselves, Sun can also offer optional infrastructure and environmental assessments. These assessments investigate and characterize the support requirements of the current application framework, and result in recommendations on how to meet these requirements on the Sun platform.

Application Transition

Once a customer has decided to move to Sun there are several options provided by Sun Services to either perform or assist in the application transition to the Sun MTP and Sun MBM environments: Mainframe Application Rehosting Project and Mainframe Migration Technology Transfer Service.

A Mainframe Application Rehosting Project delivers end-to-end application rehosting. This could include migration of source code and JCL, data conversion, Sun hardware configuration and installation, as well as Sun MTP and Sun MBM installation and configuration.

Mainframe Migration Technology Transfer Service offers a combination of training, on the job consulting assistance on a migration project, and assisting in the transition from the mainframe to the Solaris OS.

Sun encourages customer participation on various project tasks to offset external consulting costs, to provide business logic knowledge, and to ready the customer for production cutover and ongoing operation of their business solution.

In addition to training provided by Sun rehosting experts throughout the migration service, Sun offers a broad range of learning solutions including courses in Sun MTP, Sun MBM, and Solaris system administration to help staff gain an in-depth understanding of their IT infrastructure. Classes can be tailored to business needs and delivered at a customer site or at a Sun training center. Many classes are also available online via the Internet, or on CD-ROM.

Sun Services experts have completed many successful rehosting projects. Information about some of these projects can be found on Sun's Web site. See Table 7-1 for a list of Web links.

Chapter 7

Conclusion

As business and technology needs evolve, IT departments will continue to be challenged to find ways to sustain and improve competitive advantage in the marketplace.

Rehosting mainframe applications on Sun provides a low risk, high value method of reducing IT costs without sacrificing functionality and service level agreements.

Sun recognizes that many companies have made significant investments in their core applications and data center procedures. Sun MTP and Sun MBM software preserves this investment and avoids the pitfalls inherent in rewriting applications or replacing them with third-party packages, while gaining the advantage of an open, scalable, and cost-effective platform.

Reliable, high-performance software and servers are required to meet the needs of Sun's mainframe rehosting customers. Continuous investment in servers, software environments and tools, and adherence to standards, ensures that Sun customers will always have access to superior products. Sun also pursues alliances with other industry leaders in a concerted effort to deliver new products and technologies that foster productivity, enhance quality, and reduce time-to-market.

For More Information

Table 7-1 identifies other sources of information on related Sun products and service offerings. Organizations can also contact a local Sun sales representative to learn how Sun can help build competitive advantage with mainframe rehosting.

Table 7-1: Web Links for Additional Information

Web Site URL	Description
www.sun.com/datacenter	Sun in the Data Center
www.sun.com/datacenter/mainframe/index.html	Sun Mainframe Rehosting
www.sun.com/solaris	Solaris Operating System
www.sun.com/servers	Sun Servers
www.sun.com/service	Sun Service Offerings
www.sun.com/iforce	Sun iForce Initiative
solutions.sun.com/catalog.html	Sun iForce Partner Product Catalog
www.sun.com/service/sunps/platform/migration.html	Sun Services Migration Services
www.sun.com/datacenter/mainframe/appform.html	Sun Services Mainframe Rehosting Application Summary Form
java.sun.com/j2ee/connector/	J2EE Connector Architecture

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