



WHITE PAPER

Rehosting Mainframe Workloads

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Chapter 1

Introduction

Enterprises seek competitive advantage in many forms. Businesses that rely on information technology (IT) and network computing for differentiation often enhance competitive advantage by closely aligning IT and business objectives. With today's 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 play a central role in sustaining competitive marketplace advantage. However, an enterprise with custom technology assets residing largely on mainframe platforms faces limited choice for reducing costs or increasing IT value. Many organizations are now taking the approach of moving legacy applications to open platforms with lower TCO and greater economies of scale so that they can reduce overall expenditures and open up new opportunities for increased IT value.

Mainframe Rehosting Solutions from Clarity Solutions, Inc. (Clarity) provide an alternative which safely extends the benefits of an open environment to custom legacy assets. Rehosting mainframe applications on distributed platforms such as HP-UX, IBM® AIX®, Oracle® Solaris™, Linux®, Linux on IBM® System z® servers, and Microsoft® Windows® provides a low risk, high value option as compared to leaving applications on a proprietary mainframe or redeveloping applications in new languages.

Clarity provides a scalable and stable environment for migrated mainframe workloads of any type. UniKix™ Mainframe Rehosting software from Clarity reuses existing investments in mainframe applications and data, redefining TCO across the enterprise and resulting in substantial cost savings. Today, more than 1,300 installations of Clarity's Mainframe Rehosting software suite are deployed at customer sites worldwide. A variety of third-party tools and applications can be used with Clarity's Mainframe Rehosting software, and the company offers a full range of options to manage, mentor, and complete rehosting projects according to a customer's individual needs. Clarity's unique approach leverages existing skill sets, application code, and administrative tools, benefiting the bottom line today and better preparing the enterprise to sustain competitive advantage in the future.

Organization of this document

The remainder of this document describes the available options to mainframe customers and the central elements of Clarity's offering for rehosting mainframe applications and data.

Specific chapters include:

- Available alternatives for mainframe customers (Chapter Two)
- Clarity's alternative to IBM® CICS® application servers for open systems — UniKix™ Transaction Processing Environment (TPE) software (Chapter Three)
- Clarity's batch environment for open systems — UniKix™ Batch Processing Environment (BPE) software (Chapter Four)

- Modernization solutions for mainframe or mainframe rehosting environments (Chapter Five)
- Third-party Infrastructure Solutions (Chapter Six)
- Clerity Services - Transforming Technology into Business Results (Chapter Seven)
- Conclusion (Chapter Eight)

Chapter 2

Mainframe Alternatives

Greater numbers of organizations are moving mainframe applications to open system platforms to optimize data center efficiency, reduce IT expenditures, and improve shareholder value. Some businesses choose to replace or redevelop legacy applications rather than rehost them. Every situation is unique and the goals and IT strategy of an institution can play a big part in deciding which approach is best. Some common reasons for moving off of the mainframe include:

- Reducing total cost of ownership — annual hardware and software costs, as well as maintenance support can be dramatically reduced, often by 50% or more.
- Enabling affordable future capacity — rather than pay for an expensive mainframe upgrade, it can make sense to move to a lower cost platform that offers more competitive economies of scale and better value for incremental growth.
- Decreasing dependency on mainframe technologies — with predictions of shortages of mainframe talent and the improved productivity in modern application development environments, many organizations have a plan to reduce or eliminate their dependency on mainframe programs and technologies.
- Improving integration with other applications — while many solutions exist for integrating mainframe applications and data into modern software architectures, it is often easier to perform the integration on an open platform that utilizes relational database and the latest technology.

Deploying packaged applications

A business may choose to replace aging mainframe applications with packaged software solutions if a packaged solution exists that encompasses most of the functionality of the legacy application. Enterprise business systems such as SAP, Siebel, and Oracle E-Business Suite provide the flexibility to significantly customize an application in an effort to accommodate diverse business processes and diverse feature requirements. It is often the case, however, that business processes must be drastically changed in order to be accommodated by a packaged solution. While deploying a customized packaged application is generally more cost-effective than redeveloping the application, it is often a significant undertaking.

Rewriting mainframe applications

Depending on the size and complexity of a legacy application, redevelopment on a lower cost platform may make sense. However, it is not always a practical option. Large applications can sometimes take several years to rewrite and there may be limited in-house expertise of the legacy programs making it difficult to re-implement business logic. A redevelopment project generally involves designing a completely new system that utilizes a modern Web services architecture to implement the business logic of the legacy mainframe application.

Service-Oriented Architecture (SOA) enablement

For organizations with a need to quickly provide new functionality, reusing mainframe assets through

a service oriented architecture (SOA) approach may prove to be an appropriate alternative. In such cases, technology such as Clarity™ Web Connect can be applied to rapidly transform inflexible 'green screen' applications into modern, user-friendly Web applications while leaving underlying business logic and data processes unchanged. Multi-step, multi-operation composite business services can also be assembled and deployed from 3270-based transactions from UniKix, mainframe-based IBM CICS and IBM® IMS™ application servers, in addition to COMMAREA-based applications and native data Web services with Clarity™ Service Builder.

Rehosting mainframe applications

Often, the most efficient and cost-effective way to get mainframe assets to a lower cost platform is to rehost them to an environment that enables existing legacy programs to run with minimal change. Clarity's UniKix mainframe rehosting technology preserves existing applications, administration frameworks, and skill sets so that the life of mainframe IT investments can be extended without risky redevelopment efforts upfront. UniKix Mainframe Rehosting software from Clarity 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 open systems environments.

UniKix Mainframe Rehosting software overview

UniKix Mainframe Rehosting software from Clarity provides an alternative environment for running IBM CICS transactions and batch applications natively on distributed platforms. Clarity also offer solutions for migrating IBM IMS TM, IMDS, Natural, and related application environments to open systems.

The primary components of Clarity's UniKix Mainframe Rehosting software suite are:

- *UniKix Transaction Processing Environment (TPE) software*
UniKix TPE software is a native, fully-functional alternative to IBM CICS environments for open systems. As with other advanced transaction processing systems, UniKix TPE software 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, IBM® WebSphere®, ECI, EPI, and Java™ technology-based clients. IBM CICS Client and Universal Client products are also supported.
- *UniKix Batch Processing Environment (BPE) software*
UniKix BPE software provides a complete environment for the administration, execution, and management of batch workloads on open systems servers. Concepts such as job step level management, workload classes, and priorities, as well as file types such as COBOL, VSAM, concatenated datasets, and Generational Data Groups (GDGs) are supported. UniKix BPE software includes facilities for migrating IBM® z/OS® environment and IBM® z/VSE® environment JCL job streams. Because UniKix BPE software was designed to integrate with defacto standards, investment in existing system management utilities such as schedulers is often preserved.

- UniKix™ Secure software*

UniKix Secure software provides the administration and runtime services of an External Security Manager (ESM) for UniKix TPE software environments. With a comprehensive role-based access control security model, an inclusive permissions model, multiple user profile choices, and adaptable hierarchical relationship options, UniKix Secure software delivers the detailed security protection businesses require for applications central to daily operations.
- UniKix™ Manager software*

UniKix Manager software provides a graphical window into UniKix TPE software regions, allowing users to clearly view and monitor system events and performance. UniKix Manager software's easy-to-use interface provides centralized, real-time information for determining system status, processing rates, potential bottlenecks, and configuration enhancements that can aid in ensuring performance levels and user response times.

Figure 2-1 illustrates how UniKix mainframe rehosting software enables rehosted online IBM CICS transactions and batch applications to be deployed on open systems.

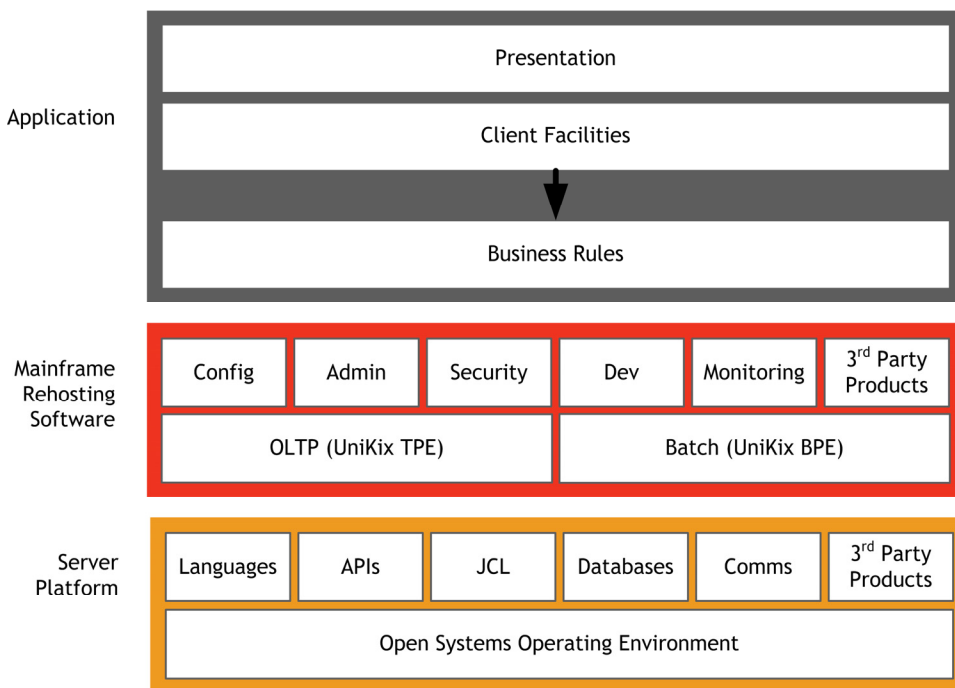


Figure 2-1. UniKix Mainframe Rehosting Software Environment

Migrating programs and JCL

The same COBOL, PL/I, JCL, batch, and IBM CICS applications that have served useful to a business for years can be rapidly moved to an open environment with minor code changes through mainframe rehosting. Clarity supports a number of different application languages and utilities including COBOL solutions from Micro Focus and Veryant, as well as PL/I. Most COBOL and PL/I programs can be migrated with only minor changes and a recompilation on an open systems operating environment. Applications written in C and C++ as well as Java can also be executed in this environment.

Programs written for IBM IMS Transaction Monitor (TM) environments, can be converted to an open environment using migration tools that help automate the process of replacing Data Language 1 (DL/1) calls with appropriate calls to a relational database using Sequential Query Language (SQL).

Clarity provides facilities for batch conversion of JCL using UniKix BPE software. JCL statements can be automatically translated into job and procedure scripts for the UniKix BPE environment. UniKix BPE JCL translators convert the mainframe JCL to script job equivalent programs. Any JCL references to datasets, libraries, and Generation Data Groups (GDGs) are then mapped to the new directories and filenames in the open systems platforms' OS file system where the migrated resources reside.

Migrating data

Data stored in VSAM files as well as IBM IMS databases (DB), IDMS, Adabas, and IBM® DB2® databases can be migrated to an open systems platform. In addition to supporting Oracle® database, IBM UDB, and Adabas, UniKix TPE software provides its own VSAM file services. Since IBM IMS DB is a hierarchical database, its database structure must be translated to a relational database environment before the data can actually be migrated. If done manually, this process can be time intensive and error prone. By leveraging automated tools, Clarity saves significant time and effort during migration projects and delivers database designs that are optimized for system performance.

Additional migration options

Clarity offers migration and modernization solutions for a range legacy environments in addition to IBM CICS applications. Some of the more common alternatives are described in more detail below.

- *IBM Information Management Systems (IMS)*
IBM IMS is common environment for high volume OLTP applications. It can include both IBM IMS TM and the IBM IMS DB hierarchical database. Programs written for IBM IMS environments can be converted to an open systems environment using migration tools that help automate the process of replacing Data Language 1 (DL/1) calls with appropriate calls to a relational database using Sequential Query Language (SQL). When migrating data from the IBM IMS hierarchical database, the database structure must be translated to a relational database environment before the data can actually be migrated. If done manually, this process can be time intensive and error prone. By using automated tools from Clarity, migration projects can save significant time and effort while resulting in a database design that is optimized for system performance.
- *Integrated Database Management System (IDMS)*
IDMS is a Computer Associates solution. It can be broken down into two main components, an IDMS database (IDMS/DB) and IDMS online transaction processing environment (IDMS/DC). Associated source and data components include ADS/O (4GL for IDMS), IBM CICS applications, COBOL, PL/I, VSAM, IBM DB2 data, and JCL. Under Clarity's approach, IDMS/DB is migrated to a relational database environment such as Oracle® database or Microsoft SQL Server. ADS/Online programs are migrated to native COBOL. IDMS/DC can be rehosted to an alternative IBM CICS framework such as UniKix TPE technology. As with both IBM CICS applications and IBM IMS transaction migrations, the corresponding IDMS batch/JCL programs can be migrated to a UniKix BPE software environment.
- *Adabas Natural*
Adabas is a high-performance database for large, mission-critical applications. Natural is the

application development programming environment (4GL) associated with Adabas. Both solutions are from Software AG.

There are two options available to Adabas Natural customers looking to migrate off of the mainframe. Customers can choose to continue using Natural and Adabas on an open systems platform or migrate Adabas to a relational database and migrate programs written in Natural to COBOL, the Java language, or C#. When transforming an Adabas Natural environment, the associated batch/JCL environment can be migrated to UniKix BPE software. UniKix BPE technology will also support the execution of Natural programs that access Adabas. There are tradeoffs to both approaches, and Clerity has experience with both options.

- *Ideal/Datacom*

CA Ideal™ for CA-Datacom® is an advanced application development system that addresses all aspects of program creation and maintenance. The CA-Datacom/DB Database is a high-performance RDBMS that provides the necessary functions for data definition, manipulation, and control. Associated source components of the CA Ideal and CA Datacom environment include COBOL, JCL, and possibly IBM CICS transactions. Clerity can automatically convert CA Ideal to COBOL and migrate CA Datacom to a RDBMS such as Oracle database or IBM® DB2® database. The associated batch environment (including JCL) can be rehosted using UniKix BPE software.

Replacing the mainframe infrastructure

Realizing that mainframe solutions are usually surrounded by a well-established infrastructure that must be replicated in a rehosted environment, Clerity has made a considerable effort to ensure that UniKix Mainframe Rehosting software is complemented by a wide range of Clerity and third-party infrastructure tools that provide comparable functionality. Figure 2-2 depicts the primary components of Clerity's mainframe rehosting software and shows how the technology is typically integrated into a comprehensive environment for mainframe applications. Chapter 5, Third-Party Infrastructure Solutions, provides more information on the mainframe infrastructure solutions that complement Clerity Mainframe Rehosting software to satisfy the infrastructure requirements of such environments.

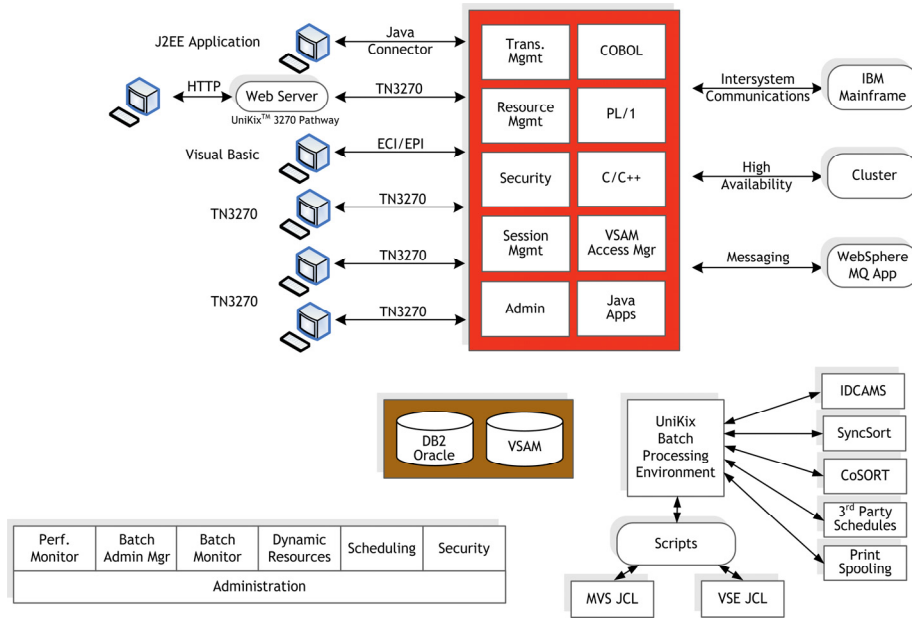


Figure 2-2. Mainframe Rehosting Infrastructure

Chapter 3

UniKix Transaction Processing Environment (TPE) Software

UniKix Transaction Processing Environment (TPE) software is a fully-functional transaction processing system which allows migrated IBM CICS applications to run on cost-effective open system platforms with little or no change to program code. UniKix TPE software provides an enterprise OLTP environment, ensuring consistent, fast, and reliable application processing. Core features of UniKix TPE software include:

- A scalable, mainframe-compatible OLTP environment on open systems
- Support for a wide range of application, client, and presentation options, including TN3270, SNA 3270 terminals, BMS, ECI and EPI, as well as TCP/IP sockets
- VSAM files services for KSDS, ESDS, and RRDS data sets
- Extensive interoperability with existing mainframe IBM CICS regions and existing legacy infrastructure components
- Robust transactional integrity, including commitment and recovery support, as well as user-level file locking, lock contention, and resolution
- A graphical, real-time performance monitoring facility and options for logging detailed accounting records

UniKix TPE software architecture

Central to UniKix TPE software is a powerful, logically-threaded engine that provides a robust environment for online transaction processing. Built on a highly scalable architecture designed to take full advantage of a shared pool of server processes, UniKix TPE performance improves linearly as additional processor cores are added to a deployment platform. Since UniKix TPE software utilizes multiple threads, there is no need to run numerous regions or replicate environments to support high volume workloads.

UniKix TPE software 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 UniKix TPE system tables, definitions of required data sources including VSAM files or relational databases, language requirements, and security requirements, to name just a few. After a UniKix TPE software 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

UniKix TPE software offers an extensive level of IBM CICS transaction compatibility, using much of the same terminology and interfaces as IBM CICS applications, including support for EXEC IBM CICS commands. As IBM CICS applications are scheduled for execution, programs are loaded into the transaction server space and UniKix TPE software service routines are called to perform transaction processing work. All services that can be handled locally are completed locally. Should a program require RDBMS access or shipping work to another UniKix TPE 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

UniKix TPE software provides immediate reuse advantages with the ability to move a large number of application languages and utilities from mainframe to open systems environments, generally with few or no program code changes.

UniKix TPE software supports both Micro Focus Server Express and vCOBOL™ Enterprise from Veryant. Most COBOL and PL/I programs can be migrated with only minor changes and a recompilation on an open systems platform. Applications written in the C language as well as Java can also be executed in the UniKix TPE software environment.

End-user interface options

UniKix TPE software 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.

UniKix TPE software 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. UniKix TPE software'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 sockets
- IBM® WebSphere® clients

- SOAP
- Java clients
- Secure Sockets Layer (SSL) clients

Data access and integrity

UniKix TPE software supports all three major mainframe VSAM file types as well as popular relational database management systems such as IBM DB2 (UDB), Microsoft SQL Server, Oracle, and Sybase. By supplying its own VSAM file services, UniKix TPE software allows mainframe IBM CICS applications using VSAM to be rehosted smoothly.

Once VSAM files have been rehosted, UniKix TPE software provides features and utilities that enable easy file manipulation and management. UniKix TPE software's File Manager can be used for creating and managing VSAM files, as well as managing the VSAM catalog for each UniKix TPE region. UniKix TPE technology also has utilities that provide such functions as allocating or de-allocating 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.

UniKix TPE software provides VSAM file and journal caching facilities to defer physical file writes and thereby improves application throughput by reducing or eliminating application processing time spent waiting for I/O to complete. The underlying operating system's file system cache schedules the physical writes based on its cache flush rules.

To ensure data integrity, UniKix TPE 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 a UniKix TPE 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.

All interactions with relational databases and VSAM files are controlled and synchronized using XA-compliant architecture. To ensure data integrity, full two-phase Commit and Rollback commands are supported and database recovery facilities are provided.

Intersystem Communication

UniKix TPE software provides several facilities to share resources and data between UniKix TPE software regions and IBM CICS systems. To UniKix TPE, 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 UniKix TPE software 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. UniKix TPE software provides translation between ASCII and EBCDIC if needed.
- Asynchronous processing distributes processing between systems by allowing a UniKix TPE software or IBM 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 UniKix TPE or IBM CICS region to synchronously link to a program on another region. For example, DPL enables a UniKix TPE region to link to a mainframe program that can access BDAM, IBM DB2 files, and IBM IMS DB, 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.
- UniKix TPE software'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

UniKix TPE software allows a wide range of security options. Basic user sign-on validation is provided through the administration of sign-on table entries, as well as through External Security Management (ESM) systems. Customizable user exits can also be used for individual resource-level access control and audit requirements. UniKix Secure is an extensible ESM available for UniKix TPE software environments which use a Role-based Access Control (RBAC) security model to handle regions and associated resources that includes support for LDAP. Through the definition of roles and resources, UniKix TPE software with UniKix Secure provides a flexible and secure environment for application resource control.

Basic security

Basic UniKix TPE software security consists of validating user sign-on to a region, security of executables, shell scripts, and databases, in addition to transaction-level security. UniKix TPE software 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.

Platform-specific security features can also be 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.

Integration with External Security Managers

Each UniKix TPE region can be integrated with an ESM, which allows security controls to be assigned to each resource accessed by a transaction or batch job. UniKix Secure provides an interface between a

region and an ESM. Use of an ESM enables UniKix TPE software 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.

UniKix Secure software

UniKix Secure software provides the administration and runtime services of an ESM for UniKix TPE technology. UniKix Secure software 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.

The UniKix Secure software 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.

UniKix Secure software is composed of:

- A Security Repository, implemented as a third-party RDBMS or LDAP which contains the definitions of Principals, Roles, Resource 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 UniKix TPE software regions and the security repository
- UniKix Secure software runtime support, a set of services that allows the security server and administration tools to communicate with the security repository
- UniKix Secure technology interfaces to the Security Server, used by UniKix TPE region transaction servers to communicate with the Security Server
- A Security Log Server, which collects audit messages generated by UniKix Secure runtime services, and writes them to a Security Audit Log file

These components and their interactions are shown graphically in Figure 3-1. 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.

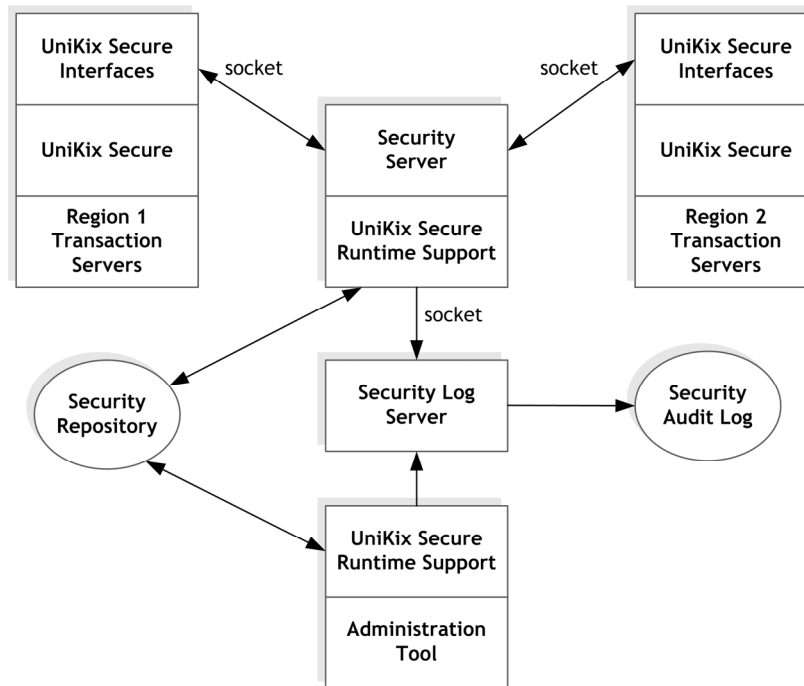


Figure 3-1. UniKix Secure Software Components

UniKix Secure technology 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. UniKix TPE software users are defined as Principals in the security system, but do not have administrative access to UniKix Secure software.

UniKix TPE software with UniKix Secure distinguishes between users who have administrative permissions within UniKix Secure software, and administrative permissions within UniKix TPE technology. A given user may not be permitted to run any of the UniKix Secure tools, but may at the same time be a UniKix TPE region administrator with the ability to start, stop, and manage one or more UniKix TPE 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, UniKix TPE software with UniKix Secure technology provides a very flexible yet secure environment.

Administration framework

The major components of UniKix TPE software administration are the GUI-based UniKix™ Manager software, UniKix™ Manager Agent (UniKix MA) technology, and the unikixadmin process.

UniKix Manager software's GUI-based interface provides a flexible and usable tool for remotely managing and monitoring UniKix TPE software regions. Because UniKix Manager 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.

UniKix MA software provides the interface between UniKix Manager software and the regions being administered. In order to use UniKix Manager technology, UniKix Manager Agent technology must be running on each system that hosts one or more UniKix TPE software regions. A unikixadmin process runs in each region where remote administration is used and handles administration requests sent via UniKix MA.

In a simple environment, UniKix Manager, UniKix Manager Agent, and the UniKix TPE software region may all be running on a single system. A more complex environment might look something like that shown in Figure 3-2.

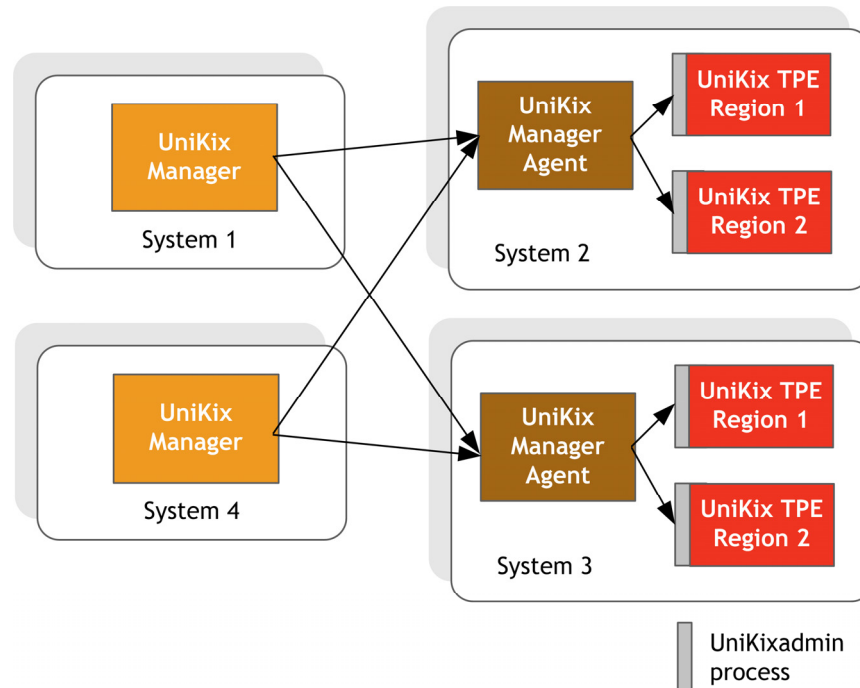


Figure 3-2. Multiple Regions, Multiple Systems UniKix Manager Software Environment

In this example, UniKix Manager software is running on two different systems and communicating with UniKix Manager Agent technology on two more systems. One instance of UniKix MA software handles all UniKix Manager software requests for all regions on the system where UniKix MA technology is running and sends those requests on to the unikixadmin process for the appropriate UniKix TPE software region.

The UniKix Manager software GUI provides a hierarchical display of the systems and the UniKix TPE software 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 as shown in Figure 3-3 and as detailed below:

- 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

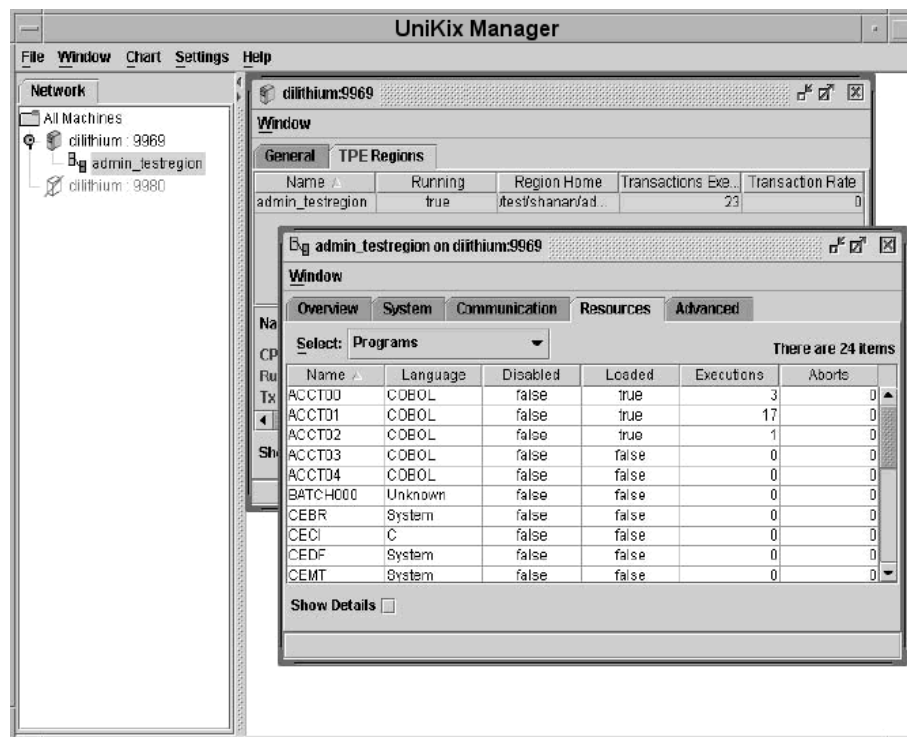


Figure 3-3. UniKix Manager Software Graphical User Interface

Performance monitoring

UniKix Manager software provides a graphical window into UniKix TPE regions, allowing users to clearly view and monitor system events. UniKix Manager software's easy-to-use interface provides centralized, real-time information for determining system status, processing rates, potential bottlenecks, and configuration enhancements that can aid in ensuring performance levels and user response times. UniKix Manager allows thorough analysis of transaction execution, VSAM datasets, temporary and transient data queues, inter-process communication, and terminal status.

Accounting

UniKix TPE software generates SMF-like records in accounting journal files. Data can be collected on a

per user or per transaction basis. UniKix TPE software provides a high degree of control over what accounting records are written and to which accounting journal file. UniKix TPE software's settings can be configured, for example, to write accounting records for different transaction types to different accounting journals. UniKix TPE software's administration tools also provide a means to specify the size of each accounting journal file, as well as an alternate file. UniKix TPE technology accounting data can also be processed by third-party accounting and capacity planning packages.

Chapter 4

UniKix Batch Processing Environment (UniKix BPE) Software

UniKix™ Batch Processing Environment (UniKix BPE) software provides a scalable environment for developing, scheduling, executing, and managing batch programs natively on open systems. UniKix BPE software allows an enterprise to rapidly rehost batch applications on a flexible, cost-effective platform while maintaining existing business logic and IT frameworks, preserving key application and skill set investments, and minimizing migration time and risk. UniKix BPE software uniquely brings mainframe batch concepts to open systems environments.

UniKix BPE software's primary features include:

- Retention of common batch JCL constructs such as job steps, classes, and priorities for IBM® z/OS® environments and IBM® z/VSE® job streams
- Support for a wide variety of file types, including UniKix TPE software 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
- Job execution reports and job monitoring

With UniKix BPE software, organizations can maintain job streams using the native IBM JCL itself, where JCL is then precompiled to native scripts. Alternatively, when it is convenient for a customer as opposed to at the pace of the migration, a customer can begin using the native scripts instead of the IBM JCL for a full transition to the new environment.

UniKix BPE software architecture

UniKix BPE software 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. UniKix BPE software 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 UniKix BPE software 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 UniKix BPE software architecture.

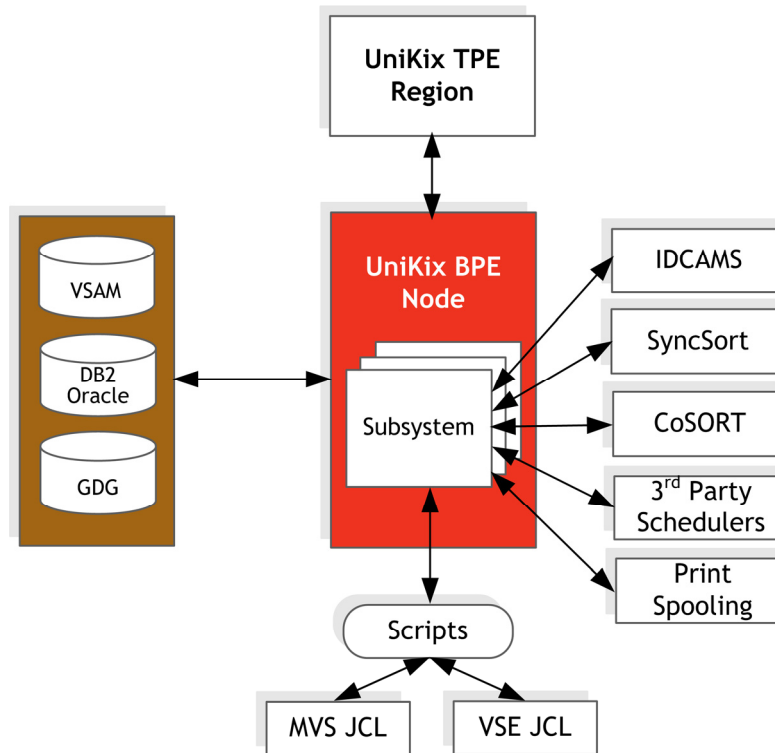


Figure 4-1. UniKix BPE Software Architecture

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.

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

JCL on open systems

Concepts such as jobs, job steps, and common mainframe utilities such as IDCAMS and SORT are preserved in UniKix BPE software. Before mainframe IBM z/OS environment and IBM z/VSE environment JCL statements may be run in an open systems environment, they are first migrated using translation tools provided with UniKix BPE technology.

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

There are two primary steps involved in such translation. First, a UniKix BPE 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 UniKix BPE software environment. The File

Map can be modified by the user to map files according to application requirements. The translators are run a second time to create from the JCL statements the job and procedure scripts, including job steps, which will be executed in the open systems environment.

Administration framework

UniKix BPE software offers a complete administration framework, as well as tools to support job creation and management, job accounting, and diagnostics.

Batch administration

UniKix BPE software provides tools for defining, configuring, and administering batch environments using a menu-driven program administration tool. UniKix BPE software 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 UniKix BPE software configurations can be defined for different environments.

UniKix BPE software's management console contains a series of tree-structured menus that give easy access to the groups of functions shown in Table 4-1.

Table 4-1. UniKix BPE Administration Menus

Menu	Functions
System Environments	System status; starting, and stopping UniKix BPE software; 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 UNIKIX BPE 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
Problem Determination	Error log management; tracing subsystems, processes, or messages; dump memory; verify disk space; create a snap shot; 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 UniKix BPE software jobs. The job editor allows the user to define steps, jobs, procedures, and projects. A project group's jobs and procedures, such as a project for jobs in production and a project for jobs being tested, can be defined. 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

UniKix BPE software provides a full set of management functions for controlling job execution and managing system resources. UniKix BPE technology'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

UniKix BPE software controls job execution and manages system resources through job classes. Each job submitted for execution must specify a job class. Up to 26 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 UniKix BPE 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 five activities and 30 jobs are submitted, only five jobs will execute. As jobs complete, the next highest priority job will be scheduled.

Security and user management

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

- Starting and stopping UniKix BPE software nodes
- Managing UniKix BPE technology 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. UniKix BPE software also allows the user's work directory to be created, changed, or deleted.

Problem determination

UniKix BPE software 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 UniKix BPE technology. The test creates a subsystem, runs jobs, and deletes the subsystem. For more difficult problems, UniKix BPE software provides a snapshot function which can be sent to Clarity or an authorized Clarity service provider for diagnosis.

Job accounting facility

UniKix BPE software'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. External third-party accounting or capacity planning packages may be used to process UniKix BPE software accounting data.

Chapter 5

Modernizing Mainframe Applications

Clarity provides a variety of solutions to modernize legacy environments on or off the mainframe. These options can be delivered without lengthy rewrite requirements or significant enterprise change as highlighted in the table below:

Table 5-1. Clarity's Modernization Portfolio

Solution Offering	Benefits
<i>Rehost, replatform</i>	<ul style="list-style-type: none"> - Reduce annual operating costs by 30 to 70 percent - Consolidate and modernize platforms, applications, and data
<i>Instant Web enablement</i>	<ul style="list-style-type: none"> - Enable universal, browser-based access - Eliminate the need for TN3270 emulators and simplify the IT environment - Perform basic GUI improvements
<i>User-interface modernization</i>	<ul style="list-style-type: none"> - Same benefits as Instant Web enablement listed above - Enhance end-user productivity
<i>Service Oriented Architecture enablement</i>	<ul style="list-style-type: none"> - React quicker to business change and market requirements - Shorten development and test cycles - Reuse application assets without disrupting ongoing operations

Rehost, replatform

Mainframe rehosting with Clarity can be an effective first step to modernize an organization's legacy assets. Through the process of rehosting, IT environments can be simplified by consolidating data sources to a strategic RDBMS or moving VSAM files to relational. Extraneous languages such as Assembler and 4GLs may also be transformed during the rehost process. Since rehosting significantly reduces annual operating costs, the savings gained through this process can be redirected to fund new BPM, ERP, SOA and other related modernization initiatives.

Instant Web enablement

The appearance of legacy applications can be immediately improved by leveraging technology such as Clarity™ Web Connect. Using Clarity Web Connect software, traditional "green screen" 3270 and 5250-

based programs residing on or off the mainframe can be rapidly transformed into updated, user friendly Web applications without changing program code.

Captured green screens can be further modernized by simply associating 3270 or 5250 data with graphical objects and interface controls. For example, a standard 3270 input field can be replaced with a Web-friendly input box or drop down list if desired. Because Clernity Web Connect uses an intuitive visual development, no special programming skills are required to build, deploy and call Web services from any captured screen.

User-interface modernization

If an organization's objective is to enhance end-user productivity, Clernity Web Connect can deliver far more dramatic and sophisticated changes to end-user interfaces than simple one-for-one mapping to the Web. Application workflows can be re-engineered by combining and collapsing redundant screens, eliminating fields and screens that are no longer relevant, and changing the tab order within an application screen itself. These changes can simplify the end-user's experience, reduce training requirements, and increase user satisfaction and productivity.

Clernity™ 3270 Pathway software provides another alternative that enables new Java technology-based applications can be rapidly developed which interact with existing UniKix TPE software and mainframe IBM CICS applications. Clernity 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 Clernity 3270 Pathway software, developers can connect to a 3270 end system, run an application, and extract data from the end system. Data can then be used in an application written in the Java programming language.

SOA enablement

Depending on the size and complexity of a mainframe environment, redevelopment or rehosting to a lower cost open systems platform may not be a practical short-term solution. To quickly provide new functionality, reusing mainframe assets in a service-oriented architecture may be the appropriate path forward. Clernity™ Service Builder software allows developers to quickly assemble and deploy multi-step, multi-operation composite business services either on or off the mainframe. 3270-based UniKix environments, as well as mainframe IBM CICS applications, IBM IMS transactions, COMMAREA and native Web services can be exploited in new application frameworks – no special understanding of SOAP, XML, or HTTP protocols required.

Chapter 6

Third-Party Infrastructure Solutions

Through years of experience migrating and modernizing mainframe workloads, Clarity has learned that these projects cannot focus on individual applications in isolation, but must also have a wide project scope that encompasses the entire application environment in order to be successful.

Mainframe applications are usually surrounded by well-established infrastructures and procedures integral to daily operations. No two mainframe installations are exactly alike and there is really no concept of a 'typical' configuration. Through experience, however, Clarity has encountered many common infrastructure solutions for mainframe environments and has helped customers identify requirements for equivalent levels of functionality in their rehosted environments. Table 6-1 lists many of the commonly required mainframe infrastructure solutions, organized by category:

Table 6-1. Common Requirements for Mainframe Infrastructure Solutions

Infrastructure Category and Product Name	Company
<i>Accounting and Chargeback</i> JARS MICS IT Resource Management IT Charge Management SMF	Computer Associates Computer Associates SAS SAS IBM
<i>Business Intelligence/Report Generation</i> Base SAS Easytrieve FOCUS IBM® QMF®	SAS Computer Associates Information Builders, Inc. IBM
<i>Capacity Planning</i> CMF IBM® RMF™ Sysview	IBM IBM Computer Associates
<i>Content Management</i> CMVC Endeavor Harvest Librarian Panvalet PVCS ViewDirect	IBM Computer Associates Computer Associates Computer Associates Computer Associates Serena Software Mobius

<i>Development</i> Abend-AID Debug Tool File-AID ISPF Roscoe SDF XPEDITOR	Compuware IBM Compuware IBM IBM IBM Compuware
<i>Monitoring, Performance, and Systems Management</i> DADS/Plus IBM® OMEGAMON® II MAINVIEW MIC NetView NeuMICS PR (Visualizer) SYSVIEW/-E	Computer Associates IBM BMC Computer Associates IBM Computer Associates IBM Computer Associates
<i>Printing and Output Management</i> CONTROL-D DCF Deliver PSF Spool View VMCF VPS	BMC IBM Computer Associates IBM Computer Associates Computer Associates Levi, Ray & Shoup Levi, Ray & Shoup
<i>Schedulers</i> CA-7 CONTROL-M IBM Tivoli® Workload Scheduler Zeke	Computer Associates BMC IBM ASG
<i>Security</i> ACF2 Examine IBM® RACF® security Top Secret	Computer Associates Computer Associates IBM Computer Associates
<i>Sort Packages</i> DFSORT SyncSort Unicenter CA-Sort	IBM SyncSort Computer Associates
<i>Storage Backup</i> CONTROL-T DFSMS, DFSMSdftp, DFSMS/dss SAMS:Allocate SAMS:Vantage SMS Vantage Zara	BMC IBM Computer Associates Computer Associates IBM Computer Associates ASG

<i>Tape Management</i> Brightstor CA-1 DFSMSHsm, DFSMSrmm CONTROL-M/Tape MIA VTS	Computer Associates IBM BMC Computer Associates IBM
-------------------------------------------------------------------------------------------------	-----------------------------------------------------------------

Clarity Mainframe Rehosting Reference Architecture (MFRR)

Having all of the right software tools available for implementation is often not enough in the fast-pace of today's IT environments. In an effort to get up and running quickly, and to reduce the cost and risk of deploying new solutions, organizations often seek to leverage previously proven architectures and solutions. The Clarity Mainframe Rehosting Reference Architecture (MFRR) helps enterprises by simplifying the entire process of evaluation, selection, design, and deployment, thus enabling a less complex, lower risk path to success. The Clarity MFRR combines technology products from Clarity and best-in-class hardware and software providers to deliver an infrastructure that is tested and proven to meet specific business needs. Enterprises can tailor the final solution to meet their specific requirements. This methodology reduces costly integration services that are often required by other technology vendors.

Businesses that utilize the Clarity MFRR can rest assured that the up front work has been completed that will be required to architect a complete implementation. The Clarity MFRR includes a series of complementary elements which work together to simplify the entire process of designing and deploying new infrastructure implementations:

- A multi-tiered architecture
- Best-in-class hardware and software components
- Architecture, sizing, and implementation guides
- Support from Clarity service experts
- Proof-of-concept testing at a Clarity solution center

Accelerating deployment, reducing risk, and lowering TCO

The Clarity MFRR is based on the Capsil system life insurance solution from Transamerica Life Canada (TLC). It showcases Mainframe Rehosting software, a detailed systems management environment, open systems servers, and related third-party infrastructure products.

Clarity MFRR functionality

The Clarity MFRR is built upon several key criteria that Clarity considers essential to the design, deployment and maintenance of any successful IT implementation. Today's enterprise solutions must address the high standards that businesses have come to expect — standards which include enabling flexible functionality, high availability, scalable performance, and extensibility.

Mainframe application environments typically utilize a wide range of infrastructure tools and utilities. Therefore, the MFRR places considerable emphasis on demonstrating how these third-party tools and utilities can be deployed in a Mainframe Rehosting environment.

UniKix TPE software and UniKix BPE software can be utilized in conjunction with a large variety of third-party products to support a complete enterprise. Tables 6-2 and 6-3 present a list of Clarity and third-party solutions that were selected for the MFRRA. It must be noted that this is not a definitive list of supported solutions, merely a list of solutions selected for the MFRRA. Many of the functional areas in Tables 6-2 and 6-3 contain multiple product listings. These options illustrate the flexibility and choice available in Clarity's mainframe rehosting framework. Customers can choose the particular products within a functional area that meet their cost, functionality, vendor preference, and technical needs.

Table 6-2. Clarity Solutions in the MFRRA

Product Category and Product Name	Description
<i>Online Transaction Processing System</i> UniKix Transaction Processing Environment (TPE) software	IBM CICS alternative transaction processing environment for open systems
<i>Batch Processing System</i> UniKix Batch Processing Environment (BPE) software	Mainframe batch processing environment for open systems
<i>Performance Monitor</i> UniKix Manager software	Real-time monitoring for UniKix TPE software regions
<i>External Security Manager (ESM)</i> UniKix Secure software	Role-based Access Control (RBAC) model for UniKix TPE software regions
<i>TN3270 Terminal</i> UniKix™ Client	Java-based TN3270 client which can be used to connect to back-end UniKix TPE technology systems
<i>SOA enablement</i> Clarity Service Builder	Expose any 3270-based transaction as a Web service
<i>Web enablement</i> Clarity Web Connect	Web enable 3270 based transactions
<i>Development Tool</i> Clarity 3270 Pathway software	Create Java beans to extract and manipulate data from 3270-based systems

Table 6-3. Third-Party Solutions in the MFRRRA

Product Category and Product Name	Description
<i>Accounting/Chargeback</i> SAS IT Charge Management SAS IT Resource Management	SAS IT Charge Management provides an enterprise solution for tracking and managing IT costs SAS IT Resource Management allows a user to collect and report on log and/or accounting data for almost any data source
<i>Backup and Restore</i> VERITAS NetBackup	VERITAS NetBackup DataCenter provides total enterprise data protection from a central point of control
<i>C Compiler</i> IBM VisualAge C++ HP C++/ANSI C Sun Studio for Solaris	VisualAge C++, C++/ANSI C, or Sun Studio each provide a C Compiler environment, depending on operating system platform deployed
<i>Capacity Planning</i> TeamQuest Model	TeamQuest Model historically tracks, measures and reports on the performance availability and utilization of system active resources such as processors, channel paths, devices, and storage
<i>COBOL Compiler/Development environment</i> Veryant vCOBOL Enterprise Micro Focus Server Express COBOL	vCOBOL provides a complete COBOL development and deployment environment Micro Focus Server Express provides source code development, compilation, debugging and management capabilities
<i>Data Extraction/Report Writing</i> IBI FOCUS for Unix	FOCUS for Unix offers data extraction and manipulation capabilities, as well as the ability to generate custom business reports
<i>Editing environment</i> Workstation Group Uni-SPF	Uni-SPF provides a common mainframe based ISPF environment for open systems platforms
<i>File/Data Editing</i> DCR DataVantage Global	DataVantage Global provides File-AID equivalent functionality for UniKix TPE software VSAM files
<i>Job Scheduler</i> ORSYD Dollar Universe	Enterprise job scheduler

<p><i>Operating System</i></p> <p>IBM AIX</p> <p>HP-UX</p> <p>Linux, Linux on IBM System z</p> <p>Solaris</p> <p>Windows</p>	<p>Underlying operating environment for delivering Mainframe Rehosting and related third-party solutions</p>
<p><i>Printing and Output Management</i></p> <p>Macro 4 Columbus OM</p> <p>Levi, Ray and Shoup, Inc. VPSX</p>	<p>Columbus OM provides an interface for managing print resources such as print spoolers, devices, and logs. It also provides management of documents to their final destination, providing status and feedback</p> <p>VPSX also provides an interface for managing print resources such as print spoolers, devices, and logs.</p>
<p><i>Relational Database</i></p> <p>IBM DB2/UDB</p> <p>Oracle</p> <p>Microsoft SQL Server</p>	<p>Available relational database environments</p>
<p><i>SLA Monitoring and Management</i></p> <p>TechSMART Emite</p>	<p>TechSMART Emite enables IT service measurement, visualization, reporting, and improvement of service</p>
<p><i>Sort Utility</i></p> <p>IRI CoSORT for Unix</p> <p>SyncSort for UNIX</p>	<p>CoSORT for Unix provides a variety of data sort related functions such as selecting, joining, grouping and extracting</p> <p>Alternative sort utility to CoSORT for Unix</p>
<p><i>System Event Management</i></p> <p>TeamQuest Alert</p>	<p>TeamQuest performance software provides measurement, performance analysis and reporting functionality. Data collected by TeamQuest can be analyzed using TeamQuest View, and reports can be published using TeamQuest on the Web</p>
<p><i>System/Performance Management</i></p> <p>BMC PATROL for Unix</p>	<p>PATROL for Unix provides the majority of the infrastructure monitoring for the MFFRA rehosted application</p>
<p><i>Version Control</i></p> <p>CVS (Concurrent Version System)</p>	<p>CVS provides an open source version control software with additional Java technology-based interface (JCVS)</p>

To support the rapid development and deployment of rehosting implementations, the Clarity MFFRA provides sizing, tuning, and benchmark information, as well as detailed systems management data. This information can be used prior to implementing a project to estimate CPU, memory, I/O, and disk requirements. Companies can also take advantage of MFFRA suggestions for fine-tuning UniKix TPE

software and UniKix BPE software as individual implementations progress. To further extend the life of rehosted applications, the Clernity MFRRRA also includes suggested guidelines for deploying Java technology and Web-based application components in conjunction with rehosting initiatives.

The Clernity MFRRRA serves as a recommended configuration that can be tailored to meet the specific requirements of any enterprise by leveraging the openness, scalability, and flexibility of the solution. For instance, systems may be configured redundantly for enhanced levels of availability. Businesses can replace solution components such as a database or sorting package with a different application that better suits their needs.

The Clernity MFRRRA substantiates open systems platforms as credible alternatives to the mainframe for core IBM CICS and batch applications as well as for related third-party infrastructure products. The MFRRRA also demonstrates the exceptional availability, performance, and scalability provided by Clernity solution offerings, critical characteristics for mainframe-based applications.

Chapter 7

Clerity Service Offerings

Clerity provides extensive and flexible migration services to leverage legacy assets on flexible, cost-effective open systems environments. Service offerings are tailored to meet the business objectives and technical needs of an organization. Clerity 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 more than 1,200 installations have been migrated using Clerity's proven rehosting services methodology.

Transforming technology into business results

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

Project evaluation

An initial consultation is typically done for customers considering mainframe rehosting to evaluate a project's feasibility in terms of both business and technical merit. Clerity rehosting experts evaluate information on existing mainframe hardware and software, application, file and data types, and other areas. Based on this information, Clerity appraises a customer's options for SOA enablement or transforming an application as well as rehosting it to the open systems. If initial technical and financial characteristics show that a rehosted application environment is a good fit for a customer, then Clerity will propose to move into a more detailed assessment phase.

Application source audit assessment ('Audit')

Clerity 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, Clerity 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 an open systems platform.

Application transition

Once a customer has decided to rehost there are several options provided by Clerity to either perform or assist in the application transition to the UniKix TPE software and UniKix BPE technology environments. The two primary service offerings for this phase are:

- *Mainframe Application Rehosting Project*

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

- *Mainframe Migration Technology Transfer Service*

The 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 target open systems environment.

Clerity 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 Clerity rehosting experts throughout the migration service, Clerity offers a broad range of learning solutions including courses in UniKix TPE software and UniKix BPE software to help staff gain an in-depth understanding of the target IT infrastructure. Classes can be tailored to business needs and delivered at the customer site or at a Clerity training center.

Clerity service experts have completed many successful rehosting projects. Information about some of these projects can be found on Clerity's Web site at <http://www.clerity.com/customers/>.

Clerity infrastructure services

In addition to the rehosting services described above, Clerity provides a continuum of expertise, technology, and global coverage to assess business needs, and implement and manage solutions to help organizations realize the full value of IT investments. For each customer engagement, Clerity can offer specific consulting, training, and pre-emptive support, providing the service offerings that meet business needs. Clerity gets solutions up and running quickly and efficiently, and provides the operational support and management capabilities that help maximize service levels while minimizing costs.

Lifecycle services that meet business needs

Every business has unique needs — needs that cannot be solved by technology alone. Companies need great people to help architect, implement, and manage complete solutions. Through professional consulting, training, and support services, Clerity helps businesses meet challenges head-on, and offer a total solution that can help achieve business needs. Deep technology expertise, broad service offerings, and global experience serving enterprises make Clerity the best choice for companies looking to reduce the time, cost, and risk of transforming businesses with technology.

Key aspects of Lifecycle Services include:

- *Expert Consultants*

From business concept through architectural design and deployment, Clerity's expert consultants can help create the innovative services that give companies sustained business advantages — maximizing return on investment while minimizing total cost of ownership.

- *Architecture Methodology*

Clerity's Architecture Methodology enables the development and delivery of services based on best practices. Clerity consultants work through the entire architectural stack using a service-driven approach to establish Quality of Service (QoS) standards across the enterprise. Clerity's Architecture Methodology offers proven results in driving operational and management efficiencies and improving service quality and availability.

Global support

Clerity extends its system support capabilities to span the globe, offering comprehensive proactive support solutions that best meet business needs. From traditional hardware and software support, to 24/7 access to online resources, to network delivered system management services, Clerity offers comprehensive support programs to meet unique business requirements — from proactive, mission-critical services to basic self maintenance support.

Chapter 8

Conclusion

As business and technology needs evolve, IT departments will continue to be challenged to find ways to sustain and improve competitive advantage. Rehosting mainframe applications provides a low risk, high value method of reducing IT costs without sacrificing functionality and service level agreements.

Clerity recognizes that many companies have significant investments in their core applications and data center procedures. UniKix TPE software and UniKix BPE 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. With UniKix Rehosting Solutions from Clerity, an organization can initially rehost its applications, and then use the cost savings generated to rewrite them over time if desired.

Reliable, high-performance software and servers are required to meet the needs of Clerity's mainframe rehosting customers. Continuous investment in servers, software environments and tools, and adherence to standards, ensures that Clerity customers will always have access to superior products. Clerity 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

For more information related to Clerity products and service offerings visit <http://www.clerity.com>. Organizations can also contact a local Clerity sales representative to learn how Clerity can help build competitive advantage with mainframe migration and modernization by emailing info@clerity.com.