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Intended Audience

This document presents an overview of the current SWIFT messaging environment together with the challenges faced by users as they formulate their strategy to address both the business and technical issues involved. It outlines an innovative approach to the problems and is intended to be read by business managers, SWIFT administrators and systems architects. A working knowledge of SWIFTNet processes and terminology is assumed. More detailed information on specific topics can be obtained by contacting Intercope through any of the addresses on the final page of the document.

Management Summary

This document provides an overview of Intercope's SWIFT Messaging Solution, Back Office Exchange for SWIFTNet (BOX).

BOX provides all the necessary components for implementing a SWIFT messaging solution.

BOX provides all the necessary components for implementing a SWIFT messaging solution and, in particular for IBM MERVA customers, it provides a replacement for the growing array of disparate products required to address functions previously provided by MERVA. BOX provides a complete end-to-end SWIFT messaging solution based on state-of-the-art technology with the capability of running on a wide range of hardware infrastructures. BOX addresses the complex business needs of today's financial institutions including their requirements for high performance, high throughput, high levels of availability and significant cost savings.

Intercope has been designing, developing and delivering secure messaging solutions for the banking industry for over 25 years. Today's systems have evolved from telex based solutions, through facsimile processing, to highly sophisticated SWIFT messaging, which are integral to the modern banking world, and are indispensable for international trading.

Intercope's BOX for SWIFTNet was designed to address all MERVA functionality.

Intercope has been at the forefront of SWIFT messaging for the past 7 years, having worked closely with both SWIFT and IBM to provide key software components and complete SWIFT messaging solutions. SWIFT processing standards have changed rapidly over this time to meet challenging new business requirements and Intercope has actively participated in bringing new solutions to the marketplace to address these changes. Examples of this involvement include the first independent vendor SWIFT-certified Relationship Management Application (RMA) for SWIFTNet Phase II delivered in 2005.

Introduction

The Challenge

IBM's MERVA (Message Entry and Routing with Interfaces to Various Applications), originally developed in the 1980s, evolved into a de facto standard for SWIFT FIN. MERVA covered all relevant aspects of SWIFT message handling in one unique solution including the network layer via X.25, the security layer via bilateral key exchange (BKE), and the application layer via a large set of functions and customization options.

Major financial institutions face a fragmented set of technologies to address their SWIFT business needs.

SWIFTNet phase 1 mandated MERVA customers to complement MERVA with a new application to support the new IP-based network and protocols instead of X.25. SWIFTNet phase 2 mandated the replacement of the former BKE mechanisms by a Relationship Management Application (RMA) which required a third system to handle all aspects of the SWIFT traffic. Additional complexity and costs arose in many cases due to the prerequisites of these solutions requiring several additional middleware components.

However, even with the above software mix customers have been forced to adopt additional software and to add functions themselves as application functions previously provided by MERVA were either not provided or only provided to a limited degree. Some of the most prominent examples include:

- Complex organizational structures modelled via MERVA queues
- Hundreds of queue definitions, with thousands not uncommon in large organizations
- Elaborate analysis / routing mechanisms to determine the recipients of messages
- Customer specific special processing for transactions interacting in various ways with MERVA using batch processing, API calls, and options such as the event driven launching of external applications or message validation services
- Printing services, manual data entry, authorization and correction

Thus, major financial institutions face the prospect of having to introduce a fragmented set of technologies to address their SWIFT business needs. This has major implications from both an operations, business risk and cost perspective.

BOX for SWIFTNet

BOX for SWIFTNet as a replacement for existing SWIFT solutions including MERVA.

Intercope's BOX for SWIFTNet was designed to address all MERVA functionality, such as back office integration, a user interface, manual message processing functions, and routing and printing services. BOX was built on Intercope's existing MessagePlus/Open (MPO), implementing SWIFT specific functions utilising the latest technology standards. Both the message handling and most system functions (such as the configuration of journals, user profile data and routing algorithms) are based on definitions using XML syntax and, as a result, can be exported and imported in this format.

A single integrated product storing all relevant data objects in one database providing active-active cluster configurations.

Minimizing MERVA migration risks and cost through exploitation of state-of-the-art technology.

Intercope developed an XML based message set for all FIN messages which is used for FIN message processing and validation as well as for automatically generating and updating screens of the graphical user interface. This technology allows Intercope to easily and efficiently implement the annual SWIFT changes.

With the advent of SWIFTNet Phase 2, Intercope incorporated an RMA component as part of the product and was the first vendor to receive SWIFT certification for this application. Intercope, working with existing customers, added functionality to BOX for SWIFTNet including the processing of the newer XML based message types that SWIFT were starting to introduce.

BOX for SWIFTNet has now been successfully adopted by a number of major financial institutions throughout the world. This has allowed these institutions to move forward confidently with MERVA migration projects and at the same time reduce the processing costs involved in running their SWIFT messaging systems.

Intercope worked closely with customers after the first two successful phases of BOX development before making the decision to develop BOX for SWIFTNet further as a total replacement for existing SWIFT solutions including MERVA. Today BOX for SWIFTNet includes both FIN CBT functions and InterAct and FileAct services, allowing direct connection to SWIFTNet via SAG without requiring an additional SWIFT connectivity solution. This allows MERVA customers to migrate to a single integrated product storing all relevant data objects in one unique database and providing high availability based on active-active cluster configurations. This solution addresses all current and future SWIFT requirements whilst at the same time streamlining operations and significantly reducing hardware and software costs.

Success Factors

Intercope has a 25 year track record of successfully developing banking applications to handle inter-bank messaging with all the security implications this involves. Intercope's development processes are based on a detailed understanding of financial institutions requirements, a commitment to the marketplace which is unparalleled and a delivery record which is unsurpassed. Intercope's success is firmly based on the factors summarized below:

- Technology providing a comprehensive set of functions and protocol implementations to support all traditional and new SWIFT interfaces, functions and services such as FIN, FileAct, InterAct and RMA.
- Technology with the capability to replace and optimize the business logic implemented in MERVA.
- Technology capable of keeping or migrating existing applications interacting with MERVA without necessarily requiring changes in those applications.
- A supplier with deep MERVA knowledge and experience and a product strategy focused on depicting MERVA objects, processing logic, security and confidentiality mechanisms within a single integrated product environment.

- Proven ability to handle high volume messaging rates using a variety of hardware and software platforms to fit with customer's IT strategies.

The remainder of this document describes how and why the challenges faced by organizations wanting to move their MERVA installations to a new strategic platform can be met using Intercope's BOX software components and services. By using Intercope's technology and resources, organizations can minimize MERVA migration risks and cost, and at the same time retain the rich MERVA functionality whilst exploiting state of the art technology.

BOX for SWIFTNet Overview

A complete SWIFT Message Processing System which facilitates the exchange of information between back office applications and SWIFTNet.

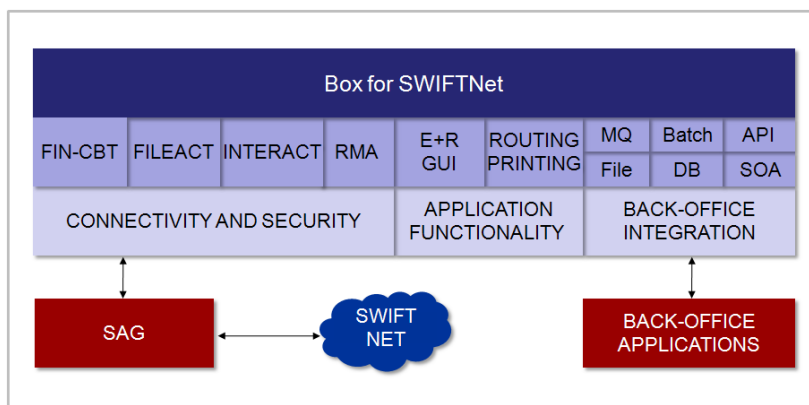
INTERCOPE BOX for SWIFTNet (BOX) is a complete SWIFT Message Processing System which facilitates the exchange of information between back office applications and SWIFTNet, including a SWIFT certified RMA component and all the necessary -- often sophisticated -- functionality for manual SWIFT message handling. Naturally BOX is updated annually to incorporate the mandatory SWIFT changes, and updates are delivered in August of each year to allow customers adequate time for testing before the required implementation date.

BOX provides all the components required to completely replace MERVA, or any similar application, with a single unified solution:

- SWIFTNet connectivity for FIN, InterAct and FileAct services
- RMA for SWIFTNet security
- A variety of back office integration options including MQ and emulations of both MERVA batch and API interfaces
- Comprehensive application functionality for MERVA-like routing, Message Entry and Repair for ISO 7775, 15022, and 20022 messages as well as a powerful GUI for online message enquiries and system administration

All required functions from the lower communication protocol stacks up to sophisticated application functionality and integration options.

The diagram below illustrates the scope of the solution.



BOX for SWIFTNet offers customers the ability to plan their migration from MERVA safe in the knowledge they can utilize a single integrated application environment from a knowledgeable vendor with a trusted track record. This is particularly significant because of the importance of SWIFT messaging to all banks and the complexity of the individual implementations. No bank can afford to allow their SWIFT based processes to become vulnerable to enforced change and BOX for SWIFTNet allows MERVA customers to plan a migration in line with a timescale that meets both their business and their technology needs.

Message Concept

Generic message processing kernel.

BOX is based on the generic message processing kernel of MessagePlus/Open, which was designed to handle any type of content independent of specific formats or encodings. Hence a broad message processing concept has been applied which extends beyond the scope of most traditional messaging solutions.

All versions of a message.

In BOX different versions of the content are stored as part of a message e.g. when message conversion or enrichment takes place providing the ability to compare different versions e.g. for auditing purposes.

Message history, Acks and Naks as part of the original message.

The complete history and audit log are part of a message showing exactly which processing steps occurred for a message and the messages relating to other messages such as SWIFT Acks and Naks or MT 10, 11, 15 and 19 are "attached" to the original message.

All information in one place.

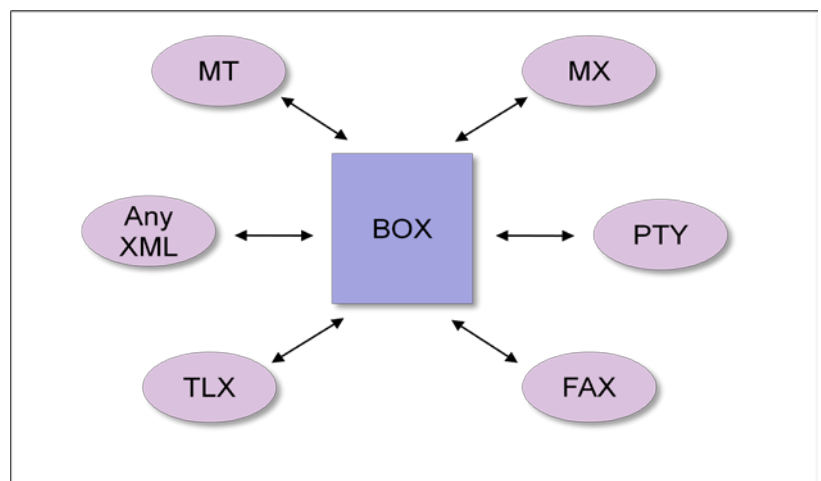
In sum this concept enables a user or application to access all relevant aspects of a message as a single object avoiding the necessity to look up information in different places or to reconcile information from different sources.

Broad scope of message formats.

The currently supported message formats include:

- SWIFT MT-messages
 - SWIFT Format
 - MERVA
 - MERVA FIN-Bridge (RFH2)
 - WBI-FN (RFH2)
 - SAA Format
- SWIFT MX-messages (ISO20022)
- MERVA Telex (TLX)
- Any XML
- Other proprietary formats (PTY)
 - Any structured format
 - Semi-structured formats
- Images / FAX
- Email
- SMS

Message conversion.



BOX contains generic and specific conversion services to transfer messages from any to any of these formats including

- Conversion of MT to MX messages and vice versa according to SWIFT rules
- Generic conversion services for XML structured messages
- Tools facilitating the conversion of proprietary formats
- Transparent integration of OCR (Optical character Recognitions) and ICR (Intelligent Character Recognition) tools to automate the processing of images and conversion of facsimiles into one of the SWIFT message formats

It should be noted that support for some of the formats mentioned in this paragraph and the corresponding communication channels may require a complementary instance of MessagePlus/Open.

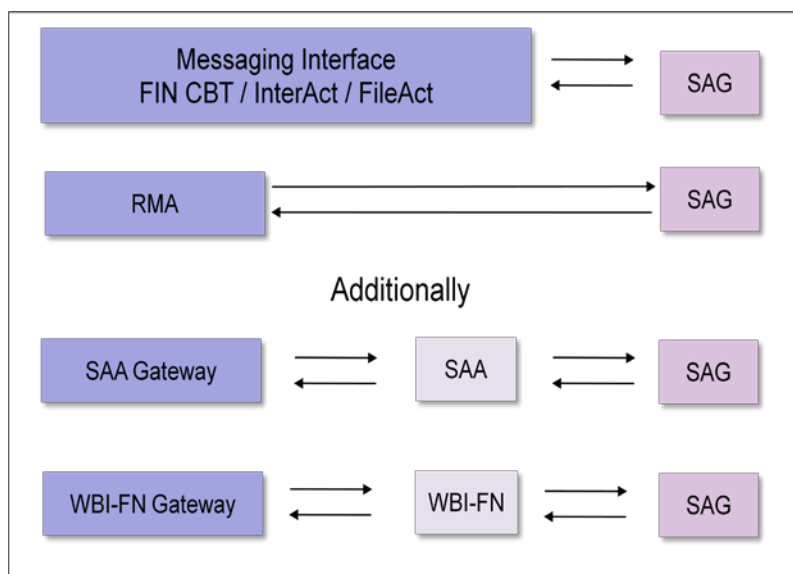
SWIFTNet Connectivity

BOX connects to SWIFTNet via a SWIFT Alliance Gateway (SAG) providing the following messaging interfaces

- FIN CBT
- FileAct Store and Forward
- FileAct Real-time
- InterAct Store & Forward
- InterAct Real-time

FIN CBT FileAct and InterAct.

In addition, for FileAct, the Remote File Handler provided by SWIFT is supported, thus avoiding the necessity to store confidential data outside of the DMZ. Furthermore with SWIFTNet 7 the existing RMA functionality will be enhanced to include InterAct and FileAct.



BOX offers a complete SWIFT solution including all required functions from the lower communication protocol stacks up to sophisticated application functionality and integration options. All

Configurations where different LTs are served by different types of FIN CBT.

SWIFT services for FIN, FileAct and Interact are supported by one “Single Window Interface” accessing FIN and other SWIFTNet services through a single network. The status and complete history of all messages is stored in a single database avoiding the need to perform laborious searches in several data sources followed by reconciliation between these data sources. For real-time monitoring of the communication layer and traceability of all messages sent and received (FIN, GPA, InterAct) the following tools are included in the product:

- Real-time session layer channel monitor
- Message audit log

For those users who wish to retain connectivity to 3rd party CBTs, (e.g. IBM WBI-FN or SWIFT Alliance Access), it is possible to set up configurations where different LTs are served by different types of FIN CBTs.

Application Functionality

Supported Messages

Traditional FIN message types (MT) as well as the newer, XML-based MX messages.

BOX supports traditional FIN message types (MT) as well as the newer, XML-based MX messages. All messages can be routed according to configurable rules, printed and displayed via the structured screens of the graphical user interface as well as being manually created, verified, corrected and authorized. Comprehensive message validation, including semantics for complex cross field validation, is also provided.

SWIFT changes are incorporated annually into a release normally made available for customers at the end of August.

With the increasing usage of XML based ISO 20022 (MX) messages, financial organizations face the problem that their back office applications are not (yet) capable of processing these new formats but are bound to the MT representation of a message. Intercope addresses this problem by offering conversion services from MX to MT message formats and vice versa. These services will subsequently be provided for all message types requested by customers for which a valid SWIFT conversion specification exists. The first services being provided are for the funds application for the message types 502, 509, and 515.

User Profile Management

Sophisticated User Profile Management (UPM) modelling the most complex organizational structures.

BOX includes a sophisticated User Profile Management (UPM) facility with up to 8 hierarchical levels capable of modelling even the most complex organizational structures. This provides a powerful new capability which eliminates a great deal of complexity found in current SWIFT messaging systems.

At the highest levels of the UPM completely independent organizations can be defined utilising their own virtual BOX instance which will not interfere with the configurations or message processing of other organizations sharing the same physical BOX system. This architecture makes BOX a favoured platform for service providers managing the SWIFT traffic of several financial institutions

and Intercope currently has several large customers doing this today.

Within an organization access rights for SWIFT message handling can be defined with high granularity including approval limits based on message amount values in local and foreign currencies. These attributes can be defined for large organizational units, departments or individual users whereby definitions on higher organizational levels are inherited down the hierarchy. Typical “roles” are used to define different access profiles and then associated with organizational units or individuals.

While the user authorization to enable or disable system functions is handled directly by BOX, the user authentication can optionally be performed by generic single sign-on systems and the user data can be synchronized with external directories.

The BOX UPM provides a very powerful tool for SWIFT messaging authorization, and especially for any MERVA migration. Analysis of actual customer MERVA installations revealed that very often hundreds of MERVA queues were used with the only objective being to control message access. As part of the migration to BOX this highly complex queue structure can be replaced by a simple, coherent and transparent definition of organizational units and message ownership.

Routing

Over time many MERVA systems have grown to include complex routing rules for different FIN message types based on criteria such as:

- The application generating the SWIFT input messages
- Manually generated SWIFT Input messages
- Routing of ACKs
- Routing of NAKs
- Routing of FIN MT 10, 11, 15 and 19

A performance optimized workflow engine handling all the routing options found in MERVA systems.

The BOX routing component has been designed by a team of MERVA experts following a thorough study of MERVA routing facilities and their use in live customer installations. The result is a performance optimized workflow engine capable of handling all the routing options found in MERVA systems. All fields of a message can be analyzed including header information, user defined fields and information generated by BOX. As a result of this analysis multiple routing destinations can be assigned including specific back office applications, printers, and queues for manual intervention.

A browser based user interface is provided to help define the routing rules.

Printing

In today's world of digitized data storage the printing of messages might appear to be obsolete and unnecessary. However, MERVA users make extensive use of the automatic and manual printing functions and Intercope's studies revealed this to be a high priority requirement for any replacement solution. As a result all the printing options of MERVA have been taken into consideration during BOX development. In particular network printers can be defined as one of the various routing destinations and manual printing functions are

All the printing options of MERVA.

available for most functions supported by the graphical user interfaces.

Message Entry and Repair

SWIFT message processing, in general, is automated to a very high degree. Typically more than 99% of all messages are generated and processed by applications. However, manual message entry and related functions, such as message validation, and authorization and repair are absolutely critical for financial organizations as they are often used in problem or contingency situations. BOX offers the most comprehensive functionality available in the industry in this area including:

- An intuitive graphical user interface for message entry including immediate syntax checking on a field level
- Complete online message validation for FIN messages including cross field validation
- Configurable authorization rules and cycles (“4 eye” or “6 eye” principle for specific messages and amounts)
- An intuitive graphical user interface for message correction

A modern, user friendly, web-based GUI.

MERVA users who have migrated to BOX have been delighted to find all the functionality previously available via the 3270 green screens, but now provided through a modern, user friendly, web-based GUI. Several levels of context sensitive online help are provided together with error checking including field related access to SWIFT user handbooks.

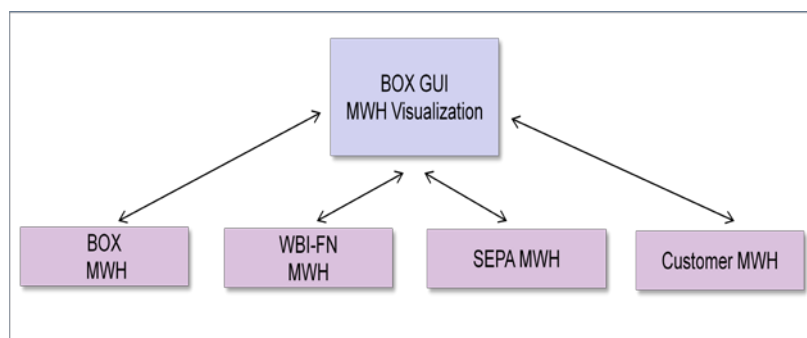
Message Warehouse

BOX includes a performance optimized Message Warehouse. This is separate from the database tables used for core processing and is primarily used to provide fast and flexible access to the messages handled by BOX. However, due to the modular architecture the Message Warehouse can also be deployed to provide access to messages from external data stores. Examples of such implementations include:

- WBI-FN Message Warehouse
- Message Warehouse for SEPA related messages
- Customer specific implementations

Performance optimized Message Warehouse component which fast end-user response times.

Can also be deployed for external data stores.



Message Inquiry

The BOX Web Client includes a customizable graphical user

Flexible search mechanisms.

interface to allow searching for specific messages under various filter criteria including “Quick Search”, “Standard Search” and “Advanced Search” modes. With the help of these tools, frequently occurring queries can be easily initiated with just a few clicks, while complex analyses can be carried out using combinations of logical operators including AND, OR, NOT, EQUAL, and GREATER THAN criteria similar to those used in SQL statements.

Configurable screen layout.

The results of a search are presented in configurable columns showing the most important information at a glance on the first page, whilst more specific data can be obtained by opening an individual message.

Visualization in several formats.

The message content can be visualized in several formats including a graphical presentation, Wire Format and XML, and all information displayed can be printed. In addition the GUI can be customized for accessing external data repositories based on individual customers choices.

All options and functions of MERVA queues.

Queues

Queues are a key concept of MERVA and are used for a variety of purposes. BOX includes a concept called the “application queue”. Typically messages routed to these queues require some form of manual intervention such as an authorization or correction, or they are waiting for a system event such as the receipt of a SWIFT ACK or NAK. The messages in these queues can be accessed via the BOX GUI under various selection criteria and a predefined set of actions can be performed by authorized users.

Although BOX comes “out of the box” with a predefined set of standard application queues, the general concept of application queues is universal and any type of application queue can be defined to address customer specific requirements.

In practice no physical queues actually exist, since application queues are implemented as views on the message database. This mechanism avoids any physical movement or copying of messages and allows an organization to easily define additional application queues corresponding to customer specific requirements. In addition application queues can incorporate certain specific attributes of MERVA queues such as being started and stopped or launching external applications. The elimination of physical queues saves on computing resources, gives rise to performance benefits, and enables higher levels of message throughput from the same hardware configuration

Queues in MERVA are also used extensively to restrict message access to specific user groups. In BOX message access is controlled by the UPM settings. This leads to a major simplification in the definition of routing rules as well as to performance enhancements because no routing or copying of messages has to be executed for this purpose. In addition the significant administration task of designing, defining and maintaining these queues is eliminated.

In summary BOX includes all relevant options and functions of MERVA queues and more, based on a powerful User Profile Management, a universal concept of application queues and views on the message database.

Message Enrichment

User Data is a feature of MERVA allowing external applications or processing steps in MERVA itself to include user or application specific data in a message. This data is not only stored in the MERVA message, but can also be used for routing purposes in MERVA.

Support of user data.

This requirement has been considered in the BOX design and BOX provides similar functionality. The information can be provided through application interfaces such as MQ or via the MERVA API emulation. User data can be displayed in BOX Journals and Application Queues. The data can be filtered and searched for by standard BOX search and filter functions and can be analyzed for routing decisions.

In addition to the configuration options of the graphical user interface it is also possible to customize screens using X-HTML syntax. This is particularly helpful for visualizing customer specific user data and offers a high degree of flexibility for implementing customer specific requirements such as those previously available with MERVA MCBs.

Duplicate Checking

Duplicate messages are detected and passed to an error queue.

Duplication Checking is a specific configurable part of the workflow and is not related to any PDE / PDM handling. If this feature is active, BOX stores all relevant parameters of every message such as amount, TRN, sender, and recipient. Every new message is checked against this database. If the message is found to be a duplicate it is passed to the corresponding error queue.

Options can be defined as to which message types are to be checked, which parameters are to be extracted, and which time period for which messages are to be checked_

Interfaces to Third Party Software

OFAC filtering and other applications.

It may be essential that messages are passed to external applications at a specific stage of message processing. A typical example is the requirement to apply an OFAC (Office of Foreign Assets Control) filter on specific message types. Depending on the results of this check some special handling of the messages may be required.

Based on a modular plug-in architecture such functionality provided by third party software can be integrated transparently into the BOX message processing workflow as outlined below.

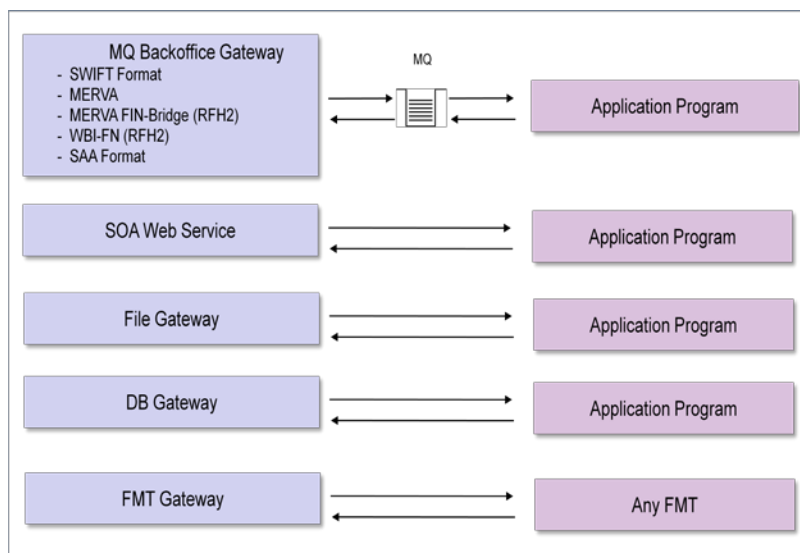
Transparently integrated into the BOX workflow.

- Applying BOX analysis functions the message requiring handling by an external application are determined
- The message is forwarded to the external application typically via MQ and put in a halt state in BOX
- A reply is received from the external application and stored in the application data of the original message
- The data provided by the external application can be viewed in the standard journals and queues using XHTML technology
- The data received from the external application is analyzed and

further routing decisions are based on the results from this analysis

- The process is controlled by the BOX application queue monitor: Should be no answer received from the external application within a configurable timeframe an alert an alert may be generated and the message forwarded to an exception queue

Back Office Integration



All facets of MQ based interfaces.

MQ

IBM WebSphere MQ (MQ) has evolved as a de facto standard for the transport layer of message exchange between back office applications and SWIFT message processing systems. BOX supports all facets of this interface such as:

- The SWIFT format
- MERVA
- MERVA FIN-Bridge (RFH2 header)
- WBI-FN (RFH2 header)
- SAA format

WSDL structured data.

SOA Web Service

The BOX message Web Service provides an option to use Web Services as a transport medium to exchange messages between BOX and back office applications. In addition to the message payload and SWIFT related header data various parameters can optionally be specified in WSDL (Web Services Description Language) structured data.

File based information exchange.

File Gateway

The file gateway provides an option to simply use files as a transport medium to exchange messages between BOX and back office applications. In addition to the message payload and SWIFT related header data various parameters can optionally be specified in XML structured data.

Configurable database tables.

Database Gateway

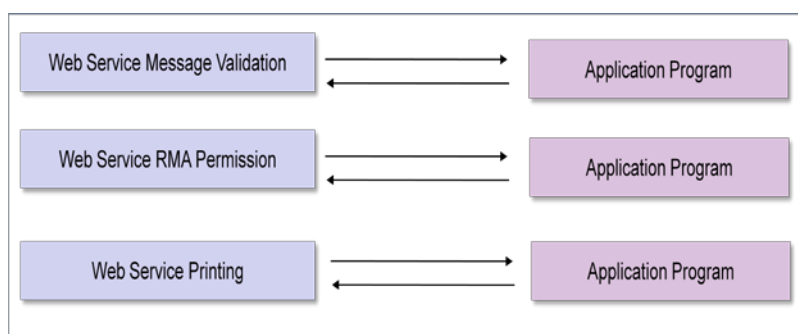
The database gateway provides an option to use database tables as a transport medium for the exchange of messages between BOX and back office applications. The layout of these tables is configurable in BOX and so can be adapted to the needs of specific applications.

No cost message transfer by FMT for intra-company messaging.

Financial Message Transfer

With MERVA it is possible to transfer SWIFT messages directly between MERVA systems thus avoiding the cost which would otherwise be incurred if the messages were sent through the SWIFT network. BOX fully supports this type of Financial Message Transfer (FMT) so that no transmission cost occurs when messages are transferred between several BOX systems, or BOX and any other application supporting the FMT format.

Complementary Web Services



Former MERVA BKE lookup and validation API through a SOA interface.

Best operations practice demands the detection of any potential problem with a message as early as possible to enable corrective action at an early stage in the message life cycle. For this purpose BOX offers two specific functions implemented as Web Services:

- The Validation Service allows an application to send a message to the service and to receive a reply indicating whether the message passed validation, or if not, which syntactical or semantic errors occurred
- The Authorization Service checks if an RMA authorization exists for a specific correspondent and specific message type and returns the result to the calling application.

With these Web Services BOX provides the same functions as the former MERVA BKE lookup and the MERVA validation API call, but through a modern, future-oriented interface fitting into the strategy of a Service Oriented Architecture (SOA).

In addition a Web Service is available to print messages in SWIFT format.

MERVA-specific batch input and output functions.

SDI / SDO

BOX offers features enabling a customer to continue using MERVA-specific batch input and output functions. This feature eases a migration from MERVA to BOX and provides an emulation of the

MERVA sequential dataset (SDS) programs DSLSDI and DSLSDO.

The functions provided in MERVA to import SWIFT FIN messages from a sequential MVS dataset and to export FIN messages into a sequential MVS dataset are supported. The format of the FIN messages should be SWIFT 2 wire format. Given this format no changes are required in the structure of these datasets or in the syntax required to load the MERVA programs DSLSDI and DSLSDO. Recovery and restart functions are provided and the tool has been designed and tested for high volume data throughput.

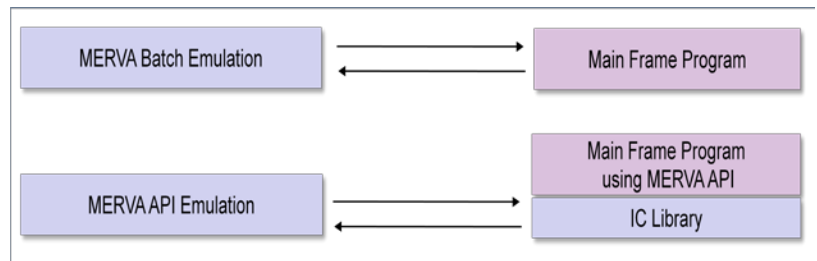
Although the modules emulating DSLSDI and DSLSDO must be installed and run on the mainframe, BOX software itself can run on any other supported operating system as the communication between the emulation and BOX is based on MQ interfaces as shown in the diagram below:

MERVA API

Emulation of the MERVA API.

To further ease migration from MERVA, BOX includes an emulation of the most important services provided by the IBM program DSLAPI including Queue Management Services, TOF (Tokenized Form) Services, and Message Format Services. This feature enables customers to keep existing applications that exploit the MERVA API without necessarily requiring changes and is offered following analysis of a customer's specific requirements.

As with the SDI/SDO feature the modules emulating DSLAPI must be installed and running on the mainframe, but the BOX software itself can run on any other supported operating system as the communication between the emulation and BOX is again based on MQ interfaces as shown in the following diagram:



Deployment and Operation

Export - Import Tools

BOX customers typically deploy the product in 3 instances:

- A development system
- A quality assurance (QA) system
- A production system

A new release or fix pack of BOX is normally installed and tested on the development system initially, then verified on the QA system, and finally deployed on the production system. To ease these deployment steps, BOX includes tools to migrate configuration data easily between systems. The data is exported in XML format. All relevant objects can be exported and imported including Workflow (routing) configuration, UPM configuration and Journal views.

Ease of deployment- all relevant objects can be exported and imported in XML format.

Monitoring and Alerting

Automated System Control

BOX has been explicitly designed for continuous operation 24 hours a day, 365 days a year. One aspect of this design is a comprehensive monitoring and alerting facility allowing easy monitoring and supervision of all aspects of the system. These tools also allow support personnel to take pre-emptive measures to guarantee optimal system performance.

A monitor module continuously receives live signals and statistical information from each individual component. Any exceptional event or problem including, for example, a failure of a communication link is forwarded to the monitor and an appropriate recovery action is automatically undertaken.

A comprehensive monitoring and alerting facility.

SNMP

For centralized system control and supervision BOX provides an SNMP interface. BOX has an SNMP subagent with a worldwide registered Management Information Base (MIB). These components are used to integrate BOX into standard System Management Applications such as IBM Tivoli Netview, HP Open View or others. BOX alerts are received as standard SNMP traps. A broad range of information can be accessed by reading SNMP variables and the system can be actively controlled by writing SNMP variables.

Queue Monitor

BOX provides a queue monitor that enables easy and comprehensive supervision of queues. The actual number of entries in a queue is displayed in different colours (traffic-light principle) with thresholds for colour setting and alerting configured individually for each queue. In addition alerts can be generated when the number of messages in a specific queue reaches a certain threshold, or whenever a message stays in a specific queue for longer than a configurable period of time.

Channel Monitor

The actual status and various data of the SWIFT communication can be monitored real-time for each Logical Terminal (LT) session with the „Session Layer Channel Monitor“.

Message Audit Log

The „Message Audit Log“ provides comprehensive information about all messages exchanged including FIN, GPA and InterAct messages searchable by various filter criteria.

Archiving

Typically BOX customers use dedicated archiving solutions for long-term archiving of financial messages processed by BOX. BOX provides an option to store messages in separate database tables when they are purged from the active database, and then keeps them online for a certain period of time, such as one year, without affecting the performance or size of the active database. This allows users to easily access these messages in the event of inquiries from the BOX web client using the extensive search criteria provided.

Keeping messages online without affecting the performance or size of the active database.

Technology

BOX consists of both Server and Client components

BOX Server

The server is a mandatory part of every BOX installation. It controls message processing and workflow and it includes a system monitor that generates alerts and allows integration with the customer's system management strategy via SNMP. The server is written in C and C++ and can be implemented on the following operating system platforms:

The BOX Server component supports multiple platforms.

- IBM zOS USS
- Linux for System z
- Linux for Intel
- IBM AIX
- Sun Solaris
- Microsoft Windows

BOX Web-Client

BOX provides a Web-Client written in JAVA and using Java Server Page technology (JSP). It can be used together with standard web browsers like Internet Explorer or Firefox. The Box Client is deployed in a web application server. Currently supported are:

The Box Client is deployed in a web application server.

- Apache Tomcat
- Oracle WebLogic
- IBM WebSphere Application Server

Database

BOX stores all relevant data in the tables of a Relational Database Management System (RDBMS), which is a prerequisite for every BOX installation. ODBC and JDBC standard interfaces are used with products from different vendors. Currently BOX databases can be implemented using IBM DB2 or Oracle Database.

All relevant data is stored in a Relational Database Management System.

SOA Services

Today several BOX functions are readily available as SOA services. INTERCOPE is committed to providing further functions as SOA services as required based on customer demands as well as market, standards and industry developments.

INTERCOPE has achieved the highest status of SOA certified partner with IBM.

INTERCOPE has achieved the highest status of SOA certified partner with IBM. BOX SOA services, including those listed below, have already been demonstrated together with IBM SOA foundation products at international exhibitions including SIBOS:

- FIN Message Validation
- RMA Permission Check (data from IC-RMA)
- BIC Lookup

Availability and Performance

Running several instances of BOX simultaneously using the same database.

Active-active cluster configuration.

Architected and optimized to handle extremely high message volumes.

High Availability Architecture

As BOX is used by customers for financial message transfer it is normally seen as a mission critical application requiring a guaranteed availability of at least 99.9 percent. In order to meet this requirement BOX supports all major high availability architectures such as IBM's Parallel Sysplex technology and High Availability Cluster Multi-Processing (HACMP), SUN Solaris Cluster or Microsoft Cluster Server.

The high availability capabilities of BOX Intercope are further enhanced by the "Multi Instance Architecture". With this architecture it is possible to run several instances of BOX simultaneously using the same database. In a clustered architecture environment this allows BOX to run in an active-active configuration in two or more nodes.

Performance

BOX for SWIFTNet (BOX) has been architected and optimized to handle the extremely high message volumes encountered in SWIFT systems. Using actual customer queue definitions and workflows, benchmarks have shown a transaction rate of up to 30 transactions per second (complete processing of SWIFT output and input messages including ACK / NAK processing but excluding wait times due to limited bandwidth to SWIFT or SWIFT response times) under zOS, and more than 200 transactions per second under Linux for System z. In the case of the Linux environment there was also a significant reduction in computing resource consumption.

Summary

Major financial institutions employing MERVA for their SWIFT messaging are facing significant decisions on their strategic direction.

Major financial institutions employing MERVA for their SWIFT messaging are facing significant decisions on their strategic direction. SWIFT messaging solutions continue to change on an annual basis both in terms of the SWIFT mandated technology and evolving business requirements. On the other hand the MERVA systems are not keeping pace with these developments and MERVA users face the prospect of having to introduce a fragmented set of technologies to address their business needs. This evolving environment has implications from both an operations, business risk and cost perspective.

Intercope has been a provider of messaging systems for the banking world for over 25 years with an excellent track record of delivering reliable, cost effective, functionally rich messaging solutions. This track record has been built on the development of telex systems, facsimile systems and SWIFT messaging systems for the banking industry, all of which have provided highly reliable, scalable and secure solutions at an affordable cost.

Enabling customers to make a smooth migration from MERVA to new state-of-the-art technology.

Intercope designed BOX for SWIFTNet with the explicit objective of enabling customers to make a smooth migration from MERVA to new state-of-the-art technology while at the same time simplifying and reducing the administrative requirements for SWIFT messaging. Intercope's detailed investigation and analysis of complex MERVA installations formed the basis of the functional requirements for the BOX solution. Several new innovative concepts have been introduced, such as virtual queues, and a powerful User Profile Management capability. These innovations allow streamlined processing and simplified configuration, operation and maintenance. This design allows the user to eliminate hundreds of formerly required MERVA queues, whilst keeping and extending the rich functionality provided by MERVA.

As of today (March 2011) BOX is in production at 25 large customers around the world and several MERVA replacement projects are currently in process or have been already successfully terminated - typically using a step-by-step approach to provide a phased migration. Intercope is actively involved in these migration projects providing expert on-site consultancy through experienced MERVA and BOX consultants to define the optimal BOX configuration options to meet each customer's specific requirements.

Based on the flexibility of BOX many complex projects have been successfully managed.

Based on the flexibility of the BOX solution and the outstanding competence of Intercope staff in the areas of SWIFT and MERVA implementations, many complex projects have been successfully concluded. For example a very large service provider used BOX to unify a highly heterogeneous SWIFT infrastructure offering SWIFT services for 24 banks. In this case several instances of highly complex MERVA systems, SWIFT Alliance installations and proprietary applications were replaced by a single physical instance of BOX satisfying the broad scope of individual customer requirements from 9 countries. Outstanding performance with up to 60 transactions per second, moderate resource consumption, uninterrupted availability, the sophisticated multi-client functions of BOX, and an optimized human machine interface for user interaction are some of the key results of this success story.

All services in one unified solution.

BOX provides all SWIFT services in a unified application including all layers from the lower protocol stacks up to sophisticated application functionality and integration options. The complete solution does not require any specific prerequisites apart from a standard relational database system and Web Application Server thus easing the implementation process and reducing dependencies, complexity and cost. Additionally BOX for SWIFTNet is not bound to a specific operating system and so can be easily deployed in the strategic and most cost effective IT environment of the customer's choice. High availability and outstanding performance are achieved through a unique multi-instance architecture allowing several BOX instances to run simultaneously using a single database instance.

Cost savings - BOX for SWIFTNet is available at a very competitive price.

Finally BOX for SWIFTNet is available at a very competitive price thus enabling significant cost savings including reduction of software and hardware costs as well as minimizing operational and maintenance efforts and complexity.

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