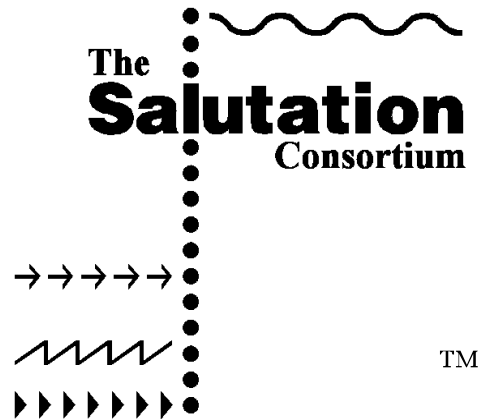


Salutation Information Management Service Structure and Product Component Review



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A system-level solution for managing information interworking is envisioned. This solution is called Salutation Information Management Services. It is an assemblage of various Salutation enabled components and support modules which, together build a service and resource management facility for information storage, retrieval, distribution and visualization in a ubiquitous network. **This paper describes the individual product opportunities that exist to build such a solution.**

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Overview

A system-level solution for managing information interworking is envisioned. This solution is called Salutation Information Management Services. It is an assemblage of various Salutation enabled components and support modules, which together, build a service and resource management facility for information storage, retrieval, distribution and visualization in a ubiquitous network.

As depicted in Figure 1, Salutation Information Management Services is an integration of other products and components that form an end-to-end information acquisition, management and distribution solution. The products and services offered:

- Provide a Server/Manager extensions of Existing Desktop clients
- Provide application isolation from network specific formats and protocols through APIs

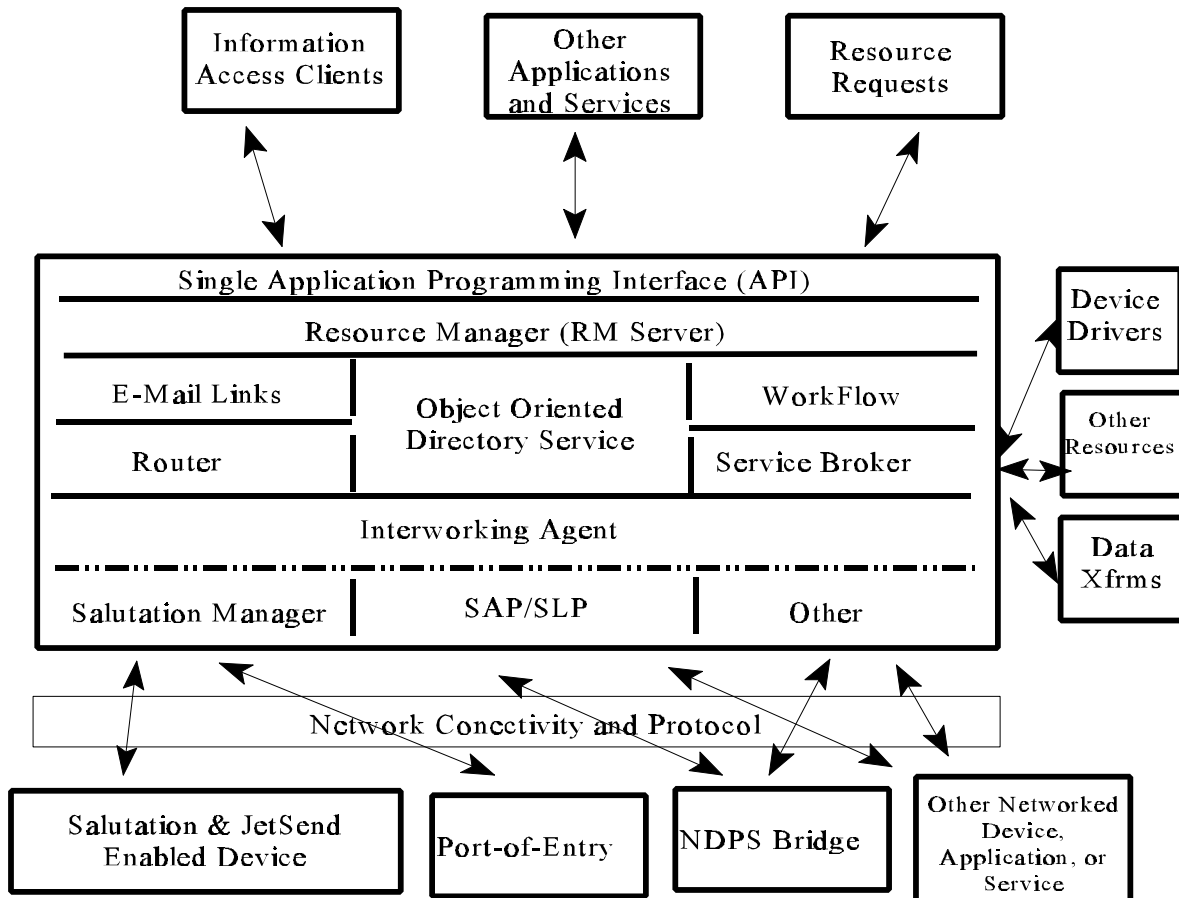


Figure 1: Components of Salutation Information Management Service

- Support functionality provided through NDS, NT or other directory services
- Manage resources required to support heterogeneous interoperation.
- Provide groupware and process routing encoding
- Provide linkage to image processing and workflow services
- Provide open snap-in interface for third party applications and resources

The Single API Structure presented to Information Access Clients, Applications, Services and Resource Requests is an extension to the Salutation APIs. The base Salutation APIs provide the discovery, availability and service requests for the Salutation Information Management Service. Additional APIs are needed to support accounting, specific transport requirements and enhanced functionality.

The Directory Service modules enhances end user productivity by providing pre- and post-information distribution processing, and profile resource allocation management. This includes:

- Client Profiles:
 - Who, what, when, where preferences for sender and recipient of information
 - distribution list by subject, priority class, security class, department, etc.
- Application Profiles:
 - Application type, supported file types, output preferences, archival associations, HCSS types, security
- Resource profiles:
 - Resource type, supported data types, APIs and protocols, status summary
- Distribution methods
 - Rules/workflow profiles, print on demand characteristics, scheduling, security

Opportunities also exist for device, PC, workstation and network enablers for Salutation technologies. These products may be developed in traditional and Java environments.

Summary of Salutation-Based Product Opportunities

Products exploiting the Salutation technologies and contributing to the Information Management Services are depicted in Figure 2 and are summarized below.

- ◆ **Interworking Enablers** — *providing portable or proprietary, embeddable implementations of the Salutation Architecture for OEM device manufacturers, network infrastructure providers and workstation environments.* Two untapped opportunities exists; providing a Java based implementation and defining/providing

a minimum, 'server-only' or 'Lite' implementation.

- ◆ **Network Enablers** — *providing discovery and network management facilities for Salutation enabled devices, applications, and services through existing network management facilities or new independent management facilities.* A significant opportunity exists in managing dynamic networks enabled by Internet and Intranet infrastructures. Software products such as Port-of-Entry, Salutation Network Enablers, directory bridges, and routers may be developed for this segment. An additional opportunity exists in providing native integration of Salutation into the Window NT Active Directory and Novell's Directory Service (NDS).
- ◆ **Resource Managers** — *manage networked resources by providing automated customization facilities to associate system services with network enabled devices, applications and services.* Salutation provides capability discovery technology. There are currently no initiatives for using the information discovered. Brokering transform services is a primary opportunity in this segment. Designing open architected interfaces at this level provides third parties the ability to snap-in unique resources.
- ◆ **Applications** — *providing automated modification of end user and application interactions based on the capabilities of available equipment, services and inter-networking characteristics.* An opportunity exists to enhance existing applications with Salutation Technologies, however a greater opportunity exists to create new application spaces which exploit these Technologies.

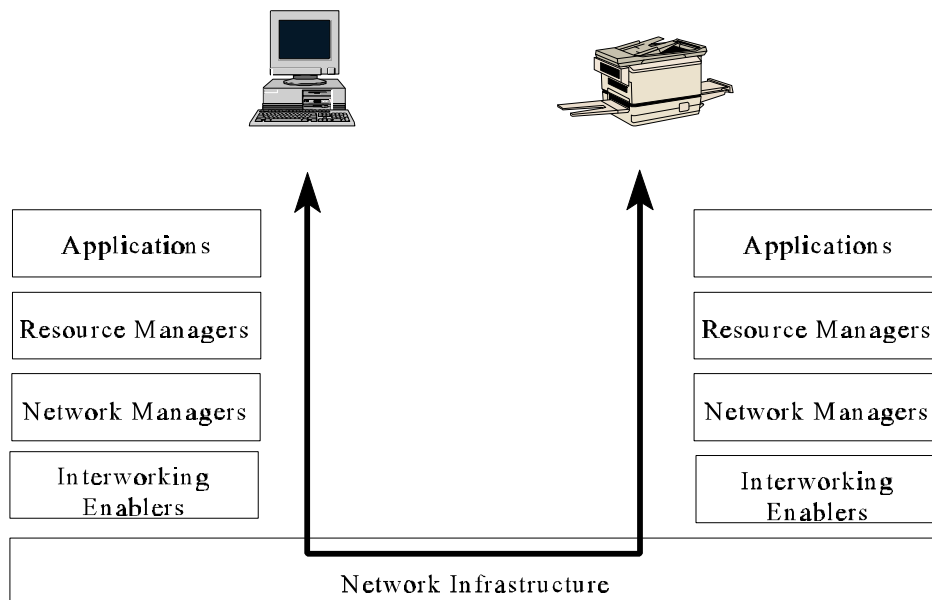


Figure 2: Areas of Opportunity

Detailed Product Description

Opportunities exist for a family of related products and components addressing needs in four areas.

Interworking Enablers

To support Salutation, OEM manufactures, Real Time Operating Systems (RTOS) providers and network suppliers have two options, build Salutation support themselves or buy from a qualified supplier. Opportunities exist in the following areas.

SLM Lite

SLM Lite provides a 'Server-only' implementation for the Salutation Manager for embedded systems. Server-only functions in a Salutation implementation provides basic response to Salutation capability requests, availability requests and service requests. This product is intended for the OEM device manufacturer. More specifically, it is targeted at low end or entry-level OEM devices such as low cost networked printers, copiers, mopiers, and fax machines. It may also apply to desktop-attached MFP devices which also have an embedded modem. Finally it may apply to mid -and high-range networked devices which are seen as *passive* in the network (never requests or searches for capability information).

SLM Lite will be designed for embeddability. This means that it is implemented in a portable programming language, supports standards such as the Portable Operating System Extensions (POSE) made popular by Novell's NEST, and is sensitive to space restrictions.

The SLM Lite product may be offered to OEM developers, (RTOS) developers and Network Interface Card (NIC) providers, as well as Novell's NEST developers. It will be used as a base for other product offerings

SLM Heavy

SLM Heavy provides a full function Salutation Manager. Full function means both client and server functionality at both the Salutation Protocol and API levels. This product is intended for the OEM device manufacturer. More specifically, it is targeted at the high end OEM devices where dynamic configurations require modification of Salutation Functional Unit (FU) content. The SLM Heavy product is also targeted at products which are seen as *active* in the

network (may requests or perform searches for capability information as well as respond to received requests). This product is a direct replacement for the IBM SLM in the embedded space. It may be substituted for IBM SLM in PC and Workstation space should business plans justify the porting activity required.

SLM Heavy can be designed for embeddability. This means that it is implemented in a portable programming language, supports standards such as the POSE Operating System interface made popular by Novell's NEST, and is sensitive to space restrictions.

The SLM Heavy product may be offered to OEM developers, Real Time Operating System (RTOS) developers and Network Interface Card (NIC) providers, as well as Novell's NEST and Lotus Domino developers. It will be used as a base for other product offerings

SLM Java

SLM Java provides several levels of Salutation Manager functionality — from lite to heavy. Its distinction is the Java virtual machine environment design point.

- SLM Java Lite will have function consistent with SLM Lite
- SLM Java Heavy will have function consistent with SLM Heavy.

The SLM Java product may be offered to OEM developers, PC manufactures, Real Time Operating System (RTOS) developers and Network Interface Card (NIC) providers, as well as Novell's NetWare and Lotus Domino developers. It will be used as a base for other product offerings.

Network Enablers

The information provided by the Salutation capability discovery must be integrated into existing network management facilities to ensure widest possible acceptance and broadest market penetration. The opportunities for product offerings are:

Port-of-Entry

Port-of-Entry provides a bridge between current desktop environments and the Salutation network.

This product provides Salutation functionality via a SLM base. A User Interface (UI) is added to enable manual registration of devices attached to the desktop. The UI

provides a simple 'tab' or wizard settings approach to selecting the FU types and the detailed capability definitions representing each FU. The Port-of-Entry will convert these inputs to the BER-encoded Salutation FU definition and registers these FU with the SLM base. The product will automate the FU generation process as much as possible, using local DMI, Registry and active Directory services. This product may also provide remote FU definition and registration, thus supporting network administrator access and control.

The Port-of-Entry product may be offered to PC manufacturers, ISVs and System Integrators. A market also exists for legacy device manufactures wishing to provide Salutation enablement through a local PC.

SLM Network Enabler

SLM Network Enabler provides a full featured SLM operating in various network environments. For example, a Salutation Manager NetWare Loadable Module (NLM) will be provided. This function provides NetWare application and service developers access to the SLM API set, and therefore the functionality provided by Salutation.

The SLM Network Enabler can include a User Interface applet, similar to that provided by the Port-of-Entry product. This applet will be included to provide demonstration capability, as well as manual control of Salutation FU registry. The SLM Network Enabler will include an automated registration applet, enabling registration of SNMP and DMI compliant FUs in the SLM. It will also include automatic synchronization of SLM Network Enablers that may be encountered in a distributed network.

The SLM Network Enabler product may be offered to ISVs and System Integrators, as well as Novell's NetWare developers. It can be used as a base for other product offerings.

SLM Bridges

SLM Bridges provide a bridge between SLM products and popular directory services. For example, this product provides a bidirectional link between the Salutation Manager and an instance of the Novell's Directory Service (NDS) directory. The bridge will provide capabilities exchange and availability requests through an available Salutation Manager. The results of these queries will be posted in NDS using the available NDS API set. Conversely, NDS objects may be registered with the Salutation Manager by extracting their definition from NDS and registering them with the Salutation manager. This product provides a method for

expanding NDS controlled networks to Salutation enabled equipment.

As another example, The SLM Bridge may be coupled with Windows NT's Active Directory providing device, application and service discovery mechanisms to the NT base.

The SLM Bridges may be initially built on the SLM Network Enabler. Other versions of the product can be offered as NDS becomes prevalent on other network operating systems environments and the NT Active Directory rolls-out. Migration to a Java base will follow.

The SLM Bridge products may be offered to ISVs and System Integrators. Novell's NDS and Windows NT development teams are also potential distributors.

Resource Managers

Existing Salutation, NEST and other embedded technologies enable the discovery of capabilities of devices, applications, and services as they wander in and out of networks. An opportunity exists to develop middleware that finds and activates system services associated with found capabilities. This middleware will assure that services such as device specific drivers, data type transforms, inter-networking bridges, etc. are available for use. Additionally, as new services become available and are discovered by Salutation and the other technologies, they will be registered by the Service Broker for availability to other networked components. The Service Broker will seek out third-party resources which support the Service Broker's open snap-in interface.

Resource Manager

Resource Manager (RM) is the primary vehicle for providing this level of service. Two components make up this product; the Interworking Agent and the Service Broker.

Interworking Agent

Interworking Agent presents a single application interface for device, application and service discovery, message management and job control, independent of the underlying operating system, network protocol, or connectivity layer. The agent:

- Present a single API interface to applications accessing resources
- Discover capability of networked devices, application and services
- Access and utilize networked devices, applications and services
- Provide 'gateway' functionality between various interworking

- protocols
- Convert between network specific packets and standard agent format

The Interworking Agent provides Salutation API structure and drive Salutation, SNMP, IPP, and LDAP bases. Migration to a Java code base will follow.

The Interworking Agent may be offered to ISVs and System Integrators. Novell's NDS and Windows NT development team are also potential distributors.

Service Broker

***Service Broker* provides the ability to find, load and activate services that are necessary to communicate with devices applications and services.** These services include:

- Data format conversion routines
- Conversion of source graphics format to target graphics format
- Conversion of image data to coded text (OCR)
- Conversion of coded text to speech
- Conversion of coded text to image
- Combinations of above
- Device driver location, and download
- Routing
- Flow management

The Service Broker provides connectivity between supported devices. Migration to a Java base will follow.

The Service Broker product may be offered to ISVs and System Integrators. Novell's NDS and Window NT partner development team are also potential distributors.

SLM-NDPS Gateway

SLM-NDPS Gateway provides synergy between Novell's Network Distributed Print Support (NDPS) and Salutation enabled devices. This product provides Salutation enabled products the benefits of NDPS without the expense of embedding NDPS modules in their products.

The SLM-NDPS Gateway product may be offered to OEM device manufactures, ISVs and System Integrators. Novell's NEST and NDPS partner development teams

are also potential distributors.

Applications

When integrated with existing applications, Salutation technologies provide the ability to tailor inter-operation with other devices, application and services to support the highest common level of functionality, distribution and imaging. For example, the Resource Manager facilities can be enhanced to provide automated input/output/storage management for documents. This encompasses finding the highest possible match between the document processing requirements and system resources. Another example is modification of groupware products (i.e., Novell's GroupWise or Lotus' Organizer) to sense the characteristics of attached client environments and support accessing information managed by the groupware service via, fax, phone, copier, handheld, etc.

The application arena is not limited to enhancement of existing applications. Salutation provides opportunities for penetrating new markets. For example, providing access to handheld appliances from store controllers can provide retail stores with new marketing channels to their customers.

The key to success in this arena is to build on the Salutation APIs which provide existing applications the ability to touch down on proposed application services.

Road Map to Java

Getting to a Java-based product line can be accomplished with a step-wise approach. The first step is to develop a Java SLM. This provides a base for migrating the other Salutation-based products to Java platform. The timing for development of Java implementation should be consistent with the availability of Java prerequisites such as Java Virtual Machine implementations in target environments.

Conclusion

The value of a single API to an Information Management Service has been described. The use of Salutation as a base for this design is obvious. Opportunities to develop products that support Salutation exist at every level — from embeddable components, to legacy enablers, to information management services.