Legacy Integration with Yrrid's LOF Enterprise 3.1

by Robert P. Niedbalski and Shambhunath Borah, January 2004

The enterprise legacy system refuses to die. Mainframes are secure, easily managed, durable, fault tolerant, and run proven operating systems[1]. Legacy systems represent a major investment in specialized hardware and software that manages the information critical to large organizations. It is no wonder that most corporate data still resides on mainframes. Generally, legacy systems are applications that run on proprietary systems and use terminals as their primary I/O devices. The terminal or terminal emulator connects to the legacy system through TCP/IP.

Unfortunately, legacy systems require experienced users and can be awkward to use with other applications. What most organizations need is an efficient, low-risk way to make their legacy systems accessible to other applications and users, in two words: *legacy integration.*

Yrrid's Approach to Legacy Integration

LOF Enterprise 3.1 (LOF) is a set of development and deployment software tools for integrating legacy systems. They include LOFModeler for development, LOF Server[2] for deployment, and Cables.Web, a secure web-based terminal emulator. LOF Enterprise 3.1 supports the major legacy systems listed below.

Manufacturer	Environment	Terminal	Comm. Protocol
IBM	zSeries(Mainframe) iSeries/AS400 (Midrange)	3270 5250	TN3270 TN5250
Unisys	1100/2200 Series System 80 ClearPath HMP IX	UTS	UNISCOPE INT1 DCP UNISCOPE INT1 HLC
Tandem (HP)	NonStop	6530	TN6530
DEC (HP)	VMS Ultrix	VT-320/220/102/101/100/52	Telnet and serial ports
many	proprietary operating systems and variants of UNIX	VT-320/220/102/101/100/52 Wyse 60/50+ DG D215	Telnet and serial ports

The LOFModeler captures and stores the important functions of the legacy system in an LOF Model and exports these functions to front-end applications as a legacy Application Programming Interface (API)[3]. For example, a legacy API might export methods that allow another application to log into the legacy system, retrieve information for a specified customer, and update the customer's information. Applications that could use the legacy API include the following modern front-ends:

- Java (applications or applets)
- .NET (web applications or Windows GUI)
- Web services (XML or SOAP/WDSL applications)

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1. According to Bill Zeitler of IBM Enterprise Systems in:
   Foremski, Tom 'Big Iron' Retains Lustre. Financial Times. FTIT Survey. (April, 2, 2003), p.5.
2. LOF Server consists of seven server applications: Service Manager, Directory Server, Model Server, Emulation Server, LPT Server, LPT Forwarder, and Log Server.
3. Some products provide "direct-to-web" legacy integration. We contend this is the equivalent of a web-based terminal emulation and not legacy integration at all.

Leveraging Legacy Systems with LOF

With LOF you can integrate legacy systems into e-commerce/e-government projects to cut costs and increase efficiency.

Consider a legacy inventory and maintenance application. A user must access several screens from one or more legacy systems, enter various long part numbers by hand, and match information to paper batch reports from the mainframe. The work-flow is, in most cases, non-intuitive and definitely not user-friendly. A web application using LOF could rationalize data access and entry processes. The application could gather information from many disparate legacy systems and could replace the inconsistent commands and function keys of the legacy system user interface with intuitive, standardized web forms. In various entry fields, for example, the user could have drop-down lists of possible part numbers available, not only saving valuable time but also reducing chances of error.

Improving front-ends

Using LOF, you can create front-end applications that make data access and entry much more simple and intuitive than the original, separate legacy systems.

Portals, Web applications and EAI

Since most corporate data still resides on mainframes, legacy systems are a crucial piece of many web portal projects, web applications and Enterprise Application Integration applications (specifically those based on CRM and ERP systems). Often legacy integration seems impossible or is implemented in a clumsy, ad hoc manner. With LOF you can properly integrate these legacy systems and resolve many design problems, adding value to your new application.

Legacy rewrite risk mitigation

Rewriting a legacy system is not without risk. It is hard to duplicate all the business logic of the system, it can take longer than expected and there is no guarantee of success when the rewrite goes live. If your organization is committed to a rewrite of its legacy systems, you can mitigate the considerable risk of conversion by using LOF Enterprise 3.1 as a bridge between the old and the new. A common API, through which the LOF Model and the legacy rewrite will communicate with the new front-end application is written first. The API allows development of the LOF-based Models, the rewrite, and the front-end applications to proceed in parallel. Cables.Web (see next section for details) allows access to all functions of the legacy system until the LOF Model is completed. The LOF-based API's will be ready first and can be used to test and refine the front-end applications. As pieces of the rewrite become available, they can replace those of the legacy system in an incremental manner. This way, there will be no "Day of Reckoning" when the legacy replacement gets the weight of the world dropped on its shoulders.

Incremental deployment using Yrrid's Cables.Web

Legacy systems can be very large. It can take a long time to develop an LOF Model of the entire legacy application and the front-end application to access it. Cables.Web (Yrrid's secure, web-based terminal emulator, integrated into LOF Enterprise 3.1) allows a unique incremental approach to deployment. The Cables.Web terminal emulator *shares the same connection* to the legacy system that the front-end application uses. This allows you to create a partial LOF Model including the most important legacy system functions and immediately deploy it. The Cables.Web session gives a user *complete access* to any part of the legacy system that is not yet available from the new front-end application. The developer customizes the look and feel of the Cables.Web session to fit seamlessly into web applications. Cables.Web offers the following features:

- **Compact and accessible:** Zero installation client. Supports recent versions of Netscape and Internet Explorer.
- **Strong encryption:** Shares same encrypted connection the front-end application makes with the LOF server.
- **Configurable colors, keyboard mapping, and button panels:** Both developer and user can customize features of the Cables.Web session.
- **Automatic font scaling:** The size of the Cables.Web window and font automatically scales when the user resizes the web page.

Security

LOF supports the following encryption standards for communications between the front-end applications, their associated Cables.Web sessions and the LOF server:

- RSA (Public key/private key) 1024-, and 2048-bit
- DES 56-bit
- Triple DES (3DES) 112-bit
- Blowfish 128-, 192-, and 256-bit
- AES (Advanced Encryption Standard) 128-, 192-, and 256-bit
- CAST 128-bit

Developing with LOF

The developer can create LOF Models on the Microsoft Windows Win32 platform which includes Windows 2000 and Windows XP.

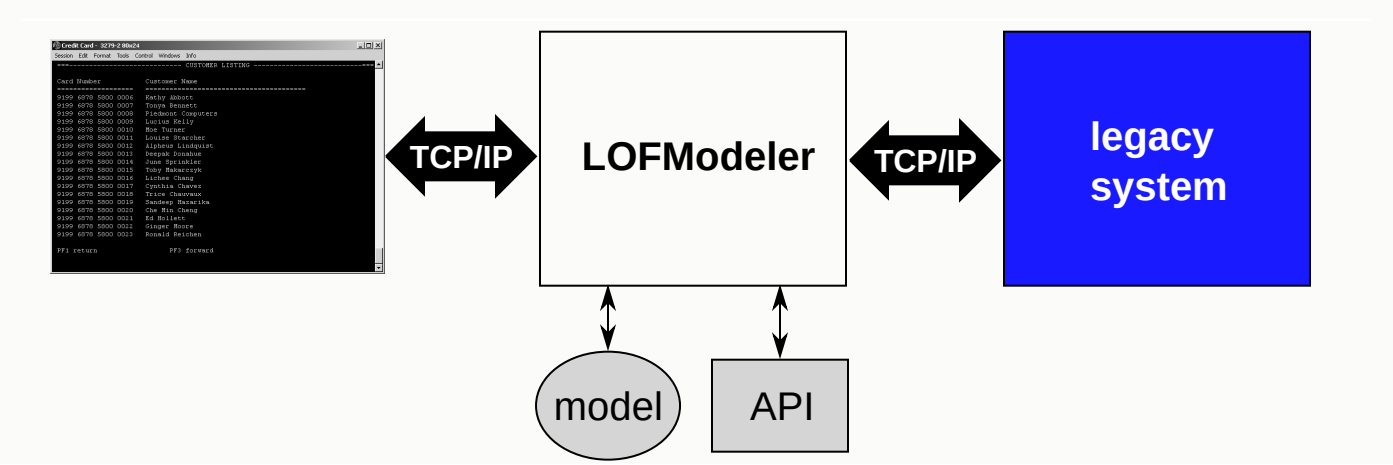
Using the LOFModeler tool, the developer creates a new model, connects to the legacy application, implements the API and supporting functions, and finally saves the LOF Model. The model encapsulates all terminal and legacy application specific behavior. Since the LOF Model decouples the legacy application from any front-end applications that use it, development on the LOF Model and front-end applications can proceed independently. When a new development environment or transport protocol emerges, a new release of LOF can support it, and you can generate new API's for your LOF Models without any changes to them.

You can specify in the LOF Model whether an LOF session will create its own named terminal connection to the mainframe or whether each LOF session will share mainframe connections from a pool of terminals.

LOF 3.1 introduces the named connection feature. With a single named connection to the mainframe, the user securely signs onto his or her own account. However this same user can use multiple web applications which call this named terminal connection to access the mainframe system. This is especially useful when large legacy applications are broken down into smaller web applications or web services which still require each user to securely sign on.

When a mainframe connection is shared among multiple users, the pooled terminal option allows more users to access the legacy system through the model than the legacy system physically supports.

LOF Development Architecture:

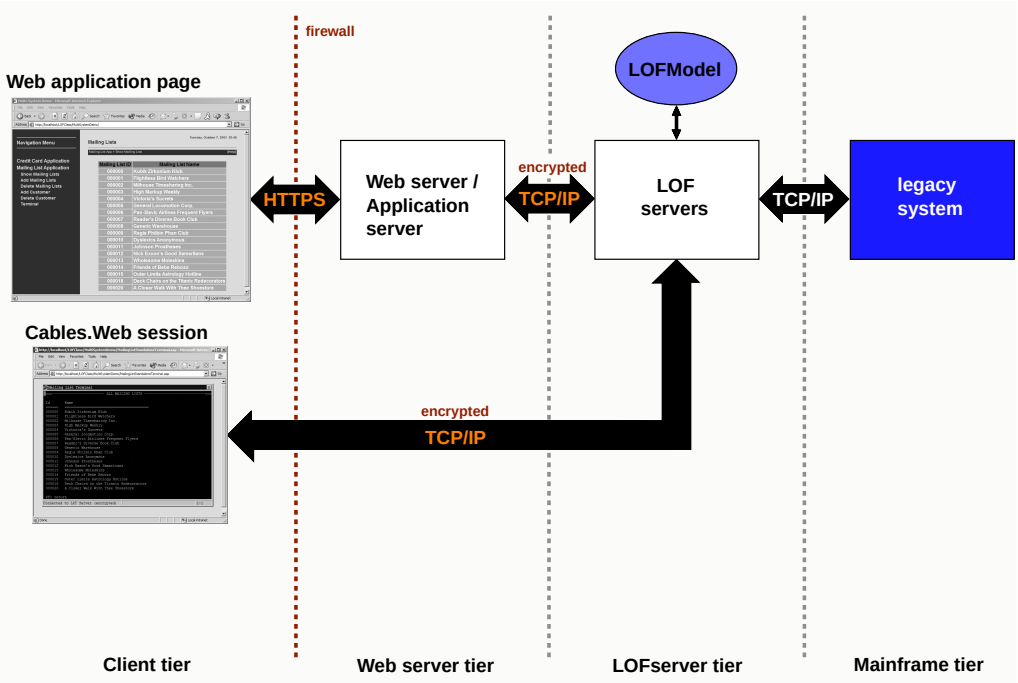


Deploying LOF

In a typical multi-tier deployment, the LOF servers form the tier between the legacy system and the web application. The LOF servers take requests from the web applications through the API provided by the LOF Model and send the appropriate request to the mainframe system. Responses from the mainframe are passed back to the web application.

LOF's highly scaleable architecture makes use of multiple servers and processes. The LOF Servers run in a peer-to-peer network administered by the LOF Directory Server. As the number of connections increase, the Directory Server balances the load and ensures that there is no single point of failure. Any errors that occur in communicating with the legacy system — situations where there is no response from the host (time-out), or the host session gets disconnected — are caught and passed back to the web application server. If errors due to an incomplete LOF Model occur — an unknown screen or unexpected screen occurs, or where there is no path to get to the desired screen — the legacy system is still accessible to the user through the Cables.Web session.

LOF Deployment Architecture:



LOF Deployment Server Platforms

You can deploy LOF Enterprise 3.1 on these platforms:

- Windows Win32 family
- Linux
- Solaris

Remote Administration

The LOF Service Manager can remotely administer the LOF Servers. The LOF Service Manager runs on the Windows Win 32 platform, but it can administer LOF Servers deployed on the Windows (Windows NT, Windows 2000/2003, Windows XP), Linux and Solaris platforms.

Advantages of LOF Enterprise 3.1

If you have a legacy system that you need to integrate with a modern front-end application, LOF 3.1 offers the following advantages:

- **Low cost**
  Since LOF is based on screen scraping, it requires no modification of legacy system code. Developing an LOF Model for your legacy system takes considerably less time than converting or rewriting it.
- **Modular**
  LOF is not your father's screen scraper[3]. The LOF Model encapsulates all legacy system and terminal behavior. If the legacy system changes, you only need to change the LOF Model. LOF Models generate interfaces for all major front-end technologies.
- **Low risk**
  Front-end applications can be deployed before they or the LOF Model are complete. The user, through a Cables.Web session, can always access the functions of the legacy system that are not implemented in the front-end application. You get all the advantages of legacy integration while your legacy systems run without interruption. Development of the LOF Model and of the front-end applications that use it can proceed incrementally and independently. You can, therefore, more easily estimate the requirements for developing each part of the project. If your organization absolutely must rewrite the legacy application, creating an LOF Model API can be the first step in a planned, low risk conversion.
- **Secure**
  LOF supports a wide range of built-in encryption standards between the front-end application and the LOF Server, and supports SSL between the web browser and the web application.
- **Highly available** and **Scaleable**
  An LOF application can be deployed on multiple LOF Servers running in a peer-to-peer network. The LOF Directory Server balances the load between the LOF servers and provides fault-tolerance.

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4. See Legacy Object Modeling Speeds Software Integration. Communications of the ACM. (December 1998) Vol. 41 No. 12, pp. 80-89.

Availability and further information from:

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