

# Directory-enabled Lights-Out Management

white paper



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## Abstract

Over the last few years, many enterprise customers have adopted directory services for managing their information technology (IT) resources deployed across the IT environment. A directory service is an effective way to address security issues and reduce management costs in the IT environment.

This white paper illustrates the commitment HP has in the directory services arena by enabling directory service support on all of its industry-leading remote management products. This paper discusses the benefits of managing user authentication and authorization for the management processors in existing directory-enabled IT environments. This integration with directory services improves efficiency by allowing IT managers to configure and maintain their iLO, RILOE, and RILOE II user accounts in a central, scalable database.

Readers should have a familiarity with directories and their organization as well as a general understanding of existing HP remote management products. Acronyms are used for the remote management products discussed in this white paper, such as:

- Integrated Lights-Out (iLO)
- Remote Insight Lights-Out Edition (RILOE)
- Remote Insight Lights-Out Edition II (RILOE II)

When this white paper refers to all three remote management products, they are called management processors (MPs).

## Remote management products

HP continues to set the standard for platform manageability by providing built-in capabilities and industry-leading remote management tools. By using the following HP products, IT personnel can effectively manage their assets and reduce total cost of ownership.

- iLO Standard provides essential Lights-Out management features as standard components of the ProLiant server and is upgradeable to the Integrated Lights-Out Advanced feature. For directory service support, IT personnel must upgrade to iLO Advanced.
- iLO Advanced offers advanced virtual administration features for ultimate control of servers in dynamic data center and remote locations. Version 1.40 of the iLO firmware contains support for directory services, in addition to Graphical Remote Console and Virtual Media.
- RILOE provides cost-effective remote server management in corporate data centers and remote sites. Version 2.50 of the RILOE firmware contains support for directory services.
- RILOE II provides significantly faster graphical remote console performance, a larger local user database, and new Virtual Media features. Version 1.10 of the RILOE II firmware contains directory service support for user authentication and authorization.

Visit the HP Lights-Out Management website at [www.hp.com/servers/lights-out](http://www.hp.com/servers/lights-out) for more information on these products.

## Business needs

The complexities of network environments drive companies to implement directory services to manage users and resources across multiple operating systems, mission-critical applications, networks, web services, intranet services, and extranet services. In today's IT environments, the number of directory-based applications is rapidly increasing.

Businesses that succeed in today's market require greater capabilities than those of conventional networks. Uptime is the key to a customer's business strategy. With limited IT staff and resources, attended ('in-front-of-the-server') operations are expensive, time-consuming, and inflexible. This dilemma intensifies as IT groups increase the number of deployed systems. IT managers demand solutions that can be easily installed and deployed, commonly managed, able to run in a 24x7 environment, scale to meet their growing business needs, and protect confidential data.

## Customer environment

For customers with distributed remote sites and space-constrained data centers, the HP Lights-Out products address numerous challenges IT administrators are facing today. Some of the common concerns and/or requirements are:

- Limited IT staff with increasing number of deployed servers
- Increasing number of massively distributed (global) deployments
- Servers physically located at different locations while IT groups are centralized (customer preference is to diagnose-before-dispatch).
- Standard configuration/deployment/management required across all servers
- Scalability for configuration and maintenance is important to improve the overall efficiency of IT operations
- Access and authorization to IT resources via directory services improves security
- Response time is key to server issues
- Return on investment (ROI) with purchasing rack-based monitors, keyboards, plus CD-ROM and diskette drives in every server
- Cabling issues due to increasing server density
- Increase security for servers and data centers located remotely
- Increase uptime and decrease downtime on servers

## Benefits

Directory-enabled environments provide the solutions large and small businesses are demanding. By integrating directory support into the Lights-Out management products, HP can help improve the scalability for configuration and maintenance and dramatically improve the overall efficiency of IT operations. With these products installed, IT managers can increase the Return on Invested Capital (ROIC) by:

- Ease of management (one place to manage users and devices)
  - Using a common user database
  - Using previously established local accounts (users and groups)
  - Using a familiar interface - Microsoft's Active Directory Users and Computers and Novell's ConsoleOne
- Leveraging existing infrastructure and investment in the directory service

- Improving security
  - Providing stronger authentication and auditing of user restrictions - including time and Internet Protocol (IP) address restrictions
  - Using a central network identity
  - Instantly updating user access changes across all enabled devices
  - Encrypting communication with devices by using Security Sockets Layer (SSL)
- Increasing scalability and expandability

Businesses want to grow without interruption. The directory-enabled support is available as a software upgrade to existing Lights-Out management products. No hardware changes or upgrades are required to add directory support. This upgrade allows IT managers to achieve the benefits listed here without interruption and there is no change in the way businesses run today.

This software-based enhancement of directory support adds to the already successful hardware-based iLO, RILOE, and RILOE II remote management products. In upcoming sections, we provide insight into how the remote management products interact with the directory, the directory model HP utilizes, user authentication and authorization, and the setup environment. However, first we briefly discuss high-level descriptions of the directory architecture and its organization.

## Directory architecture

The nature of directories provides multiple ways to view and manipulate the diverse resources of the enterprise. The next few sections describe the overall structural design of directories so you can understand the value of the HP remote management products and how they work in a directory-enabled enterprise.

### Overview

A directory is an extensible, distributed, and replicated database, which is hierarchical in structure that stores information about business resources as objects. Objects include shared resources such as servers, shared volumes, and printers; network user and computer accounts; as well as domains, applications, services, security policies, and just about everything else in your business. For example, directory services might store specific information about a user, such as the user's name, password, email address, phone number and so on.

Since the directory is stored and replicated on servers throughout the network, this creates a powerful infrastructure where dissimilar operating systems and applications can interoperate by leveraging the directory.

### Objects

Objects are the entities that make up a directory. An object is a distinct, named set of attributes that represent something concrete, such as a user, a printer, or an application. The attributes of each object describe the features of that object. For example, when an administrator creates a user they may define the attributes that describe the user, such as name, surname, address, phone number, etc. In the same way, when an administrator creates a device object, such as a management processor, the administrator will provide attribute information specific to that object.

## Schema

The *schema* is a description of the object classes (the various types of objects) and the attributes for those object classes. In other words, the schema is a set of rules that define the directory (in terms of tree structure), object types, object attributes, and relationships.

These rules are stored in a data dictionary that determines the types of data that can be created. The data dictionary defines object classes and attributes. The directory's initial set of object classes and attributes is called the base schema.

Even though the base schema is the initial starting point of object classes and attributes in the directory, it does not define all of the objects that can be stored within the directory. One powerful aspect of most enterprise-class directories is the ability to create new object classes and attributes by extending the schema. Thus, applications can create objects to represent any device, such as a RILOE II card, within the enterprise directory by defining that device in terms of object classes and attributes within the schema.

## Extending the schema

Schema extensions are a necessary and important part of many directory-enabled applications in the market today. In most directory services, the base schema is insufficient to store critical application data. Directory-enabled applications use schema extensions to expand the definition of the base schema so that the directory service can accommodate the new data the application would like to store.

The Schema Installer, bundled with the directory-enabled remote management installation software, will extend the base schema of the directory service. These schema extensions are necessary to enable role-based management and store information about each remote management processor.

For your convenience and pre-implementation review purposes, HP provides a complete listing of the directory schema extensions that will be made to your directory in the HP Directory Services Schema Information Booklet.

## Role-based management

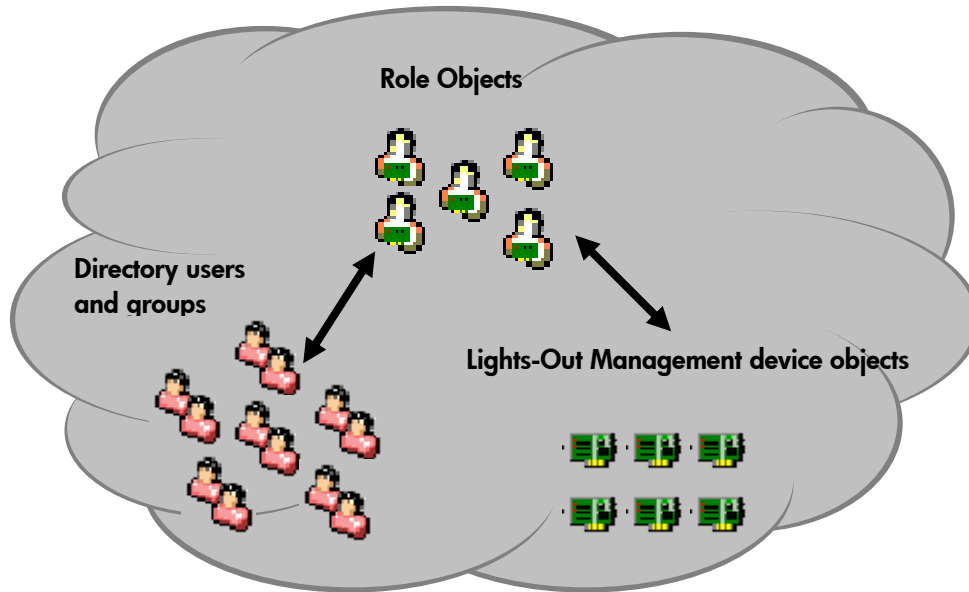
HP directory-enabled management products use Lightweight Directory Access Protocol (LDAP) standards-based directory servers for authentication and authorization. A simple yet powerful and flexible role-based authorization model determines users' rights.

Administrators create roles that associate existing users and groups with managed targets like iLO, RILOE, and RILOE II. A role grants its members specific rights to all of its managed targets. Roles can manage multiple targets, and users can be members of multiple roles; each role granting those users additional rights to all the targets the role manages. Roles can also be limited with the Domain Name System or Service (DNS) name, IP address, or time restrictions, only granting rights to users that satisfy the restrictions. Complex rights relationships not possible in the non-directory case can be expressed with just a few roles; more common rights relationships can be expressed with a single role object. Administrators can use role objects to create rights relationships that reflect the responsibilities of persons in the organization with a minimum number of role objects.

Using role-based management also decreases ongoing maintenance efforts. When an administrator adds a new user or managed target like iLO, RILOE, and RILOE II, they can simply add it to the appropriate roles. Managing rights is also easy. Changing the rights assigned by a single role affects all the users and managed targets associated with that role, without the need to update any of the managed targets or users. All directory user rights management happens in the directory, eliminating the need to browse to and update every device when a user's rights change. Changes take effect as soon as they are made in the directory. There is no need to reboot devices or wait until users log out.

Directory-enabled features of HP management products allow a single administrator to manage complex rights relationships easily between tens of thousands of users and devices. Figure 1 shows an example of a directory service interacting with role and device objects along with directory users and groups.

**Figure 1:** Elements of a directory service



- Role Objects define rights granted to a particular set of users by associating Users/Groups with Lights-Out device objects.
- Directory Users & Groups define the existing or newly created users and groups in a directory service. These are the user accounts with which customers use to login to the directory service. The same account can be used for network, e-mail and Lights-Out management access. The standard tools provided with your directory service manage User and Group objects.
- Lights-Out Management (LOM) Device Objects are device objects that should exist for every Lights-Out management processor on the network. Associating a LOM device object to a LOM role object enables the Users/Groups associated with the LOM role object to manage that Lights-Out management processor

## Enhancing directory value

- Directory-enabled remote management, a key element to a successful adaptive infrastructure, offers IT administrators the ability to establish and maintain required levels of availability and security throughout the infrastructure. By using HP remote management products, administrators can easily and efficiently ensure their servers are always available giving their business a competitive edge. Directory-enabled remote management increases the efficiency of IT administrators and allows them to do more with fewer resources.
- Envision an enterprise in which there are hundreds of directory-enabled devices like iLO, RILOE, and RILOE II. By combining the directory-enabled devices with an adaptive infrastructure and using virtual presence technology with automated tools, IT managers can improve their efficiency by

easily updating and maintaining the user information on multiple remote management option devices via directory services.

- For more information on HP's Adaptive Infrastructure strategy, visit the HP website at [www.hp.com/servers/ai](http://www.hp.com/servers/ai).

## Remote management processors using directory support

Today iLO, RILOE, and RILOE II are the first products of their kind to provide directory services integration from the HP Insight Management suite of products. Using either Microsoft Active Directory or Novell eDirectory, IT administrators can authenticate user access and authorize user privileges to any management processor (iLO, RILOE, and/or RILOE II) deployed throughout the IT environment.

This integration with directory services improves management efficiency by allowing IT personnel to configure and manage their remote management user accounts in a central, scalable database. HP provides an easy and reliable installation program that installs a management console snap-in and extends the customer's existing directory schema to enable directory support on iLO, RILOE, and RILOE II. Bundled with these installation programs, HP has created two new migration utilities that automate upgrading the firmware, configuring objects, and assigning rights to that object for all of the management processors in the directory. These utilities replace the manual process of building associations between Lights-Out Management objects in the directory

### Required software

Each management processor requires specific software for directory service support. The software, an HP Smart Component, contains the following pieces and is available for download from the HP website a [www.hp.com/servers/lights-out](http://www.hp.com/servers/lights-out):

- Schema Installer extends the schema.
- Management Snap-in Installer provides snap-ins to manage the remote MP device objects in an existing directory-enabled IT environment.
- Two Migration Utilities (HPQLOMIG.EXE and HPQLOMGC.EXE) allow users to deploy and/or upgrade the MPs in their enterprise.
  - HPQLOMIG offers a Graphical User Interface (GUI) where users can manage large amounts of management processors in a directory-enabled environment.
  - HPQLOMGC runs unattended with a command line interface and is used in conjunction with Insight Manager 7.

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#### **IMPORTANT**

You must download and install the HP Smart Component before you can use the directory-enabled features of the management processor.

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In addition to the software contained in the HP Smart Component, each management processor requires a minimum firmware version to support directory services. If any management processor requires upgrading, download the necessary version from the HP website at [www.hp.com/servers/lights-out](http://www.hp.com/servers/lights-out).

Table 1 includes the minimum firmware version required for directory support.

**Table 1:** Minimum Firmware Versions Needed for Directory Support

Management processor	Minimum firmware version	Date
iLO	1.40	July 2003
RILOE	2.50	June 2003
RILOE II	1.10	June 2003

## Implementing Lights-Out Management directory services support

Today, IT professionals can manage numerous management processors by running XML scripts. The scripts help upgrade the firmware and configure the management processors, but the steps taken to achieve this process are not streamlined. The HP migration utilities eliminate the need for an IT administrator to configure (manually) the directory service to have the appropriate objects and relationships for iLO, RILOE, and RILOE II.

Here are the steps necessary to directory-enable any management processors currently deployed.

### Planning

1. Download and review the HP Directory Services Schema Information Booklet and the Directory Services section of the User Guide for the iLO, RILOE or RILOE II products.

### Installation

2. Download the HP Smart Component containing the schema installer, the management snap-in installer, and the migration utilities.
3. Run the schema installer program once to extend the schema.
4. Run the management snap-in installer program and land the appropriate snap-in for your directory service on one or more management workstations.

### Firmware Setup

5. Flash the ROM on the management processor (iLO, RILOE, or RILOE II) with the directory-enabled firmware. Refer to Table 1 for the firmware version needed to provide directory support.
6. Set directory server settings and the distinguished name of the management processor objects on the Directory Settings page in the GUI of the iLO, RILOE, or RILOE II products.

### Management

7. Create a management device object and a role object by using the snap-in.
8. Assign rights to the role object, as necessary, and associate the role with the management device object.
9. Add users to the role object.

Using the current deployment method, IT managers must complete steps 4 through 8 manually. This time-consuming process does not scale well for configuring numerous management processors. The HP migration utilities (HPQLMIG.EXE and HPQLMGC.EXE) automate this process and are available in conjunction with the new firmware versions offering directory support (shown in Table 1). To download the HP Smart Component containing the management snap-in, the schema installer, and the migration utilities, go to the HP website at [www.hp.com/servers/lights-out](http://www.hp.com/servers/lights-out).



## New migration tools

HP offers two new software migration tools to assist you in enabling directory support on all of the remote management products (iLO/RILOE/RILOE II) in the IT environment. HP calls these utilities HPQLOMIG and HPQLOMGC.

HPQLOMIG.EXE, stands for HP Lights-Out Migration and comes with a graphical user interface (GUI) providing the user with a wizard approach to implementing or upgrading large amounts of management processors in the enterprise. The second utility, HPQLOMGC.EXE, is an abbreviation of HP Lights-Out Migration Command and offers a command line approach; therefore, it does not present a user interface and runs unattended. This utility works in conjunction with Insight Manager 7 Application Launch. Both utilities automate the process of directory enabling the ProLiant remote management products and, for security, use a SSL connection to communicate with the management processors in your IT environment.

For more information on these migration tools, see the HP Directory Migration Utility User Guide available on the HP website at [www.hp.com/servers/light-out](http://www.hp.com/servers/light-out).

## Operating system support

The HP directory-enabled remote management products currently support [Microsoft Active Directory](#) running on Windows® 2000 and Windows Server 2003 in addition to [Novell eDirectory](#) running on Windows® 2000, NetWare 6, or Red Hat Linux 7.2/7.3.

To extend the advantages of the HP remote management technology to Linux customers, HP is adding support in RILOE II cards (firmware version 1.10 and later) and iLO (firmware versions 1.40 and later) for Red Hat Linux and SuSE Linux client operating systems. Administrators can access RILOE II and iLO from a Mozilla or Netscape Navigator browser interface running on a Linux client operating system.

## Future direction

HP currently offers a robust suite of management products offering remote manageability of ProLiant servers.

HP plans to continue to improve the value proposition of ProLiant servers through Directory-Enabled Management. In the future, HP plans to add more directory-enabled features and products.

# Glossary

This glossary provides an alphabetical listing of products and new industry technology terms with detailed descriptions for each entry.

<b>class</b>	A data definition of an entity (object) that can be created in the directory service. For example, a user is a class.
<b>Domain Name System or Service (DNS)</b>	An Internet service that translates domain names into IP addresses. For example, the domain name www.example.com might translate to 198.105.232.4.
<b>directory</b>	A distributed and replicated database that represents an organization from a hierarchical viewpoint.
<b>distributed</b>	In terms of a directory, distributed means that the information contained within the directory is available from multiple directory service agents on the network.
<b>extensible</b>	The ability to customize (or extend) the directory's schema to fit your enterprise.
<b>HPQLOMGC.EXE</b>	The command line version of the HP software migration utility used to automate the process of directory enabling the ProLiant management processors in an IT environment.
<b>HPQLOMIG.EXE</b>	The graphical "wizard-like" version of the HP software migration utility used to automate the process of directory enabling the ProLiant management processors in an IT environment.
<b>Integrated Lights-Out (iLO)</b>	Consists of an intelligent processor and firmware providing standard and advanced levels of Lights-Out functionality. Basic system card management functions, diagnostics and essential functionality are provided as standard components of the server. Advanced functionality consists of a virtual graphical console, virtual media, and directory support.
<b>Lightweight Directory Access Protocol (LDAP)</b>	An industry-standard protocol for accessing X.500 standard directory services. LDAP is a standard derived from DAP (Directory Access Protocol).
<b>migration utilities</b>	Software migration tools, HPQLOMIG.EXE and HPQLOMGC.EXE, used to automate the process of directory enabling the ProLiant management processors in an IT environment.
<b>management processor</b>	A reference used in this document referring to all three remote : iLO, RILOE, and RILOE II.
<b>object</b>	An entity instantiated in the directory. Each object consists of properties and the values for the properties and is derived from a class.
<b>Remote Insight Lights-Out Edition (RILOE)</b>	A remote management tool that provides cost-effective remote server management in corporate data centers and remote sites.

**Remote Insight Lights-Out Edition (RILOE) II**

A remote management tool that allows browser access to ProLiant servers through a seamless, hardware-based, OS-independent graphical remote console.

**Security Sockets Layer (SSL)**

A protocol designed to provide encrypted communications on a network. SSL works by using a key-based cipher to encrypt data that is transferred over the SSL connection.

**schema**

The data definition of each entity within the directory. A schema is a set of rules that define the directory in terms of tree structure, object types, attributes, and relationships. These rules are stored in a data dictionary that determines the types of data that can be stored. The base schema is the initial starting point of object classes and attributes in the directory.

**tree**

A hierarchical structure of objects in the directory database. The tree includes container and leaf objects that represent resources and help to organize the tree.

## References

Some of the information on directory architecture found in this document was provided by the Microsoft TechNet website at [www.microsoft.com/technet](http://www.microsoft.com/technet).

## For more information

To learn more about the HP Insight Management Suite, visit [www.hp.com/servers/manage](http://www.hp.com/servers/manage).

To learn more about HP products, visit our website at [www.hp.com](http://www.hp.com).

## Call to Action

To help us better understand and meet your needs for ISS technology information, please send comments about this paper to: [TechCom@HP.com](mailto:TechCom@HP.com).

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