White Paper - Livre Blanc

Developing Information Systems

management applications

with LoriotPro

You have at your disposal, a heterogeneous computer environment and you wish to automate the management and monitoring of your resources using your console. Your solution is **LoriotPro Extended Edition**. The LoriotPro software is an **SNMP manager**, a major element of the SNMP architecture, which is the Internet standard for managing computer networks available on all professional equipment and systems.

Unfortunately, the adoption of this standard by all software publishers and network equipment manufacturers is not without some constraints. The wide varieties of software and hardware equipment in the information system engender the incapacity to put into place solutions that are identical as well as systematic. It is often necessary to adapt to the specific element which is to be managed or monitored in order to succeed.

LoriotPro Extended Edition responds perfectly to this problematic of adapting the tool to meet the diversity of problems relating to managing networks and systems, from the simplest to the most complex. All this is thanks to the flexibility and extensibility provided by the complete integration of the LUA script programming language.

 LoriotPro is a complete solution for developing applications dedicated to the management and monitoring of information systems, which are powered under a Windows graphical environment.

LoriotPro uses the bases of the **open source LUA** language which it completes with hundreds of functionalities dedicated to; monitoring using SNMP protocol, mapping and symbolic representations using Active Views, the correlation of events and alarms, generating performance or asset audits, network discovery and systems analysis, etc.

Dozens of ready-to-use examples are provided making it possible for you to automate monitoring tasks that are otherwise complex, unique, fastidious or recurrent.

An important document of more than 1300 pages written in both English and French dedicated to « scripting », accompanied by several different examples, provides all the elements for understanding the implementation and usage of LUA in LoriotPro. We have taken the initiative of doing the utmost to enable you to approach the realization and exploitation of your applications with the ultimate peace of mind.

Objectives and integration of LUA programs within LoriotPro

Collection and treatment of multiple SNMP variables: It is often necessary to collect several SNMP variables from one or several systems to establish, after correlation and with certitude, the functioning state or availability of a service. The LUA functions available within LoriotPro enable you to conduct all the mathematical manipulations of these variables and more specifically the 64 bits counters available in SNMP. These counters are now frequently used for measuring traffic on high-speed (Gigabytes) network interfaces. It is also possible to collect information derived from databases or files in order to carry out mixed operations using data from different sources.

Executing a script upon reception of an SNMP Trap: This is an extremely powerful capacity in the LoriotPro environment. The devices and software of your information system have the capacity to send **malfunction alarms** (SNMP Traps) to LoriotPro. The SNMP Traps notify you of changes in the status of your systems and they are often critical. As an example, we will cite the most common one, « Link Down», which informs you of the loss of a connection on a network interface. LoriotPro's collect and filter system intercepts the Traps and adds the script program identified by the filter into a queue. In the case of the « link down » Trap, the script can for example, realize complimentary verifications on the faulty equipment; verify the real status of the network interface, attempt reactivation and notify the administrator in case of a failure.

Collection of event and filter counters: Access to event and filter counters accomplished by script routines offers correlation capabilities that are both flexible and powerful. The cascading of a series of event counters could be used to determine the root cause of a malfunction on the information system. Let's take for example, a messaging system. Messages are no longer being delivered and the final users solicit the help desk. The correlation of an important number of indicators will help to determine the origin of the problem by placing thresholds and alarms on the following indicators: the number of messages in the queue, their size, the load capacity of the processor and the server, access disc performance, quality of the servers connection to the network, internet connection, and the availability of remote stations. An anomaly on any one of these elements may rapidly lead to a saturation of the message sending queue. Simultaneously monitoring all these elements using a unique script permits efficient interception of the degradation of the service. However, this monitoring should be carried out with discernment, an overloaded processor is not critical if it is temporary. For this purpose, the event counters may be evaluated in the scripts in such a way as to determine the frequency and duration of an anomaly so as to not take into account, trivial anomalies.

Generating alarms or notifications by sending Syslog or SNMP Trap events: LoriotPro integrates itself perfectly into any distributed network management system using products from different brands. The malfunctions, detected by LoriotPro can trigger the sending of messages respecting SYSLOG or SNMP Trap standards using an LUA intermediary. The events which are proprietary to the LoriotPro solution may only be sent to another LoriotPro management platform in a hierarchical or meshed structure.

Manipulating graphical objects of the Active View: The LoriotPro Active Views grant total liberty to choose the representation of the elements to be monitored on your information system. The dynamic aspect of the objects and their characteristics (clipart, color, text, position etc.), may be controlled by your own scripting programs. Thanks to

this extraordinary box of tools, you can realize dynamic visualizations of the devices, automatic construction of network maps and visuals of the system, maps of the geographical locations of vehicles etc. The graphic contents of the Active View can be created dynamically at the launching of the Active View using an LUA script. This functionality is ideal for representing the network equipment interface or network maps when there are frequent modifications. The collection of the internal constitution (templates, used slots, interface types, functional status) of the equipment using SNMP allows you to build visuals with real and pertinent information. It is also viable to use variables derived from databases or configuration files to perform this type of activity.

Customizing the discovery process of the network and the analysis of resources using your own routines. For example, you could identify an installed application, the disks available, the versions of software and equipment and the type of network interfaces. The systems and devices that have been discovered can be added to the directory that is integrated to LoriotPro and the parameters of how to configure them can be assigned. As such, within the following minute, LoriotPro can start to monitor availability, its main role, as well as collecting statistics on response times in order to later on, generate reports on the quality of service according to the established contracts (SLA).

Realizing performance audits on status and targeted parks in relation to the type of equipment or system to be audited. Audit scripts can be attached to different systems and equipment of your information system in order to conduct an audit on performance status or of the IT assets. The audits are executed either manually by the administrator or automatically at pre-programmed intervals.

 For example, the performance audits could serve the purpose of analyzing your entire server infrastructure in order to verify the disks units, their status, the loading and usage capacity. In case thresholds have been breached, LoriotPro alerts can be sent to the administrator by e-mail, SMS or other « scriptable » methods. Performance audits could also be used to monitor the environment, for example, we could verify the charge load of UPS batteries, the room temperature of the computer rooms, the levels of ink in the printers, etc.

The **status or IT infrastructure audits** could also serve to perform an inventory of the resources of your information system and to identify all them in order to generate **reports in WEB format**. The audits are very pertinent because they are performed upon demand and as such have the most recent and updated information derived from information **collected in real-time** by SNMP when the report is generated. Thanks to the audits you can for example, have the status of both the software and hardware versions of an Ethernet switch infrastructure, get a list of the software installed on your Windows workstations, know the number of users connected on an application, etc.

Developing your virtual MIB objects. The virtual MIB objects provide all the LoriotPro plug-in templates with a direct access to LUA script routines. Access is provided through the intermediary of the MIB objects declared in the LUTEUS proprietary MIB. With the virtual MIB objects, the LoriotPro templates view the script as a classic SNMP object to be collected, making it feasible to create graphs for operations correlating several values, for instance.

Generating usage trend graphs. The monitoring of information systems relies on the availability of graphs showing the load and usage of the resources of this system. These

graphs make it possible to know the variations and evolutions during both short periods of a few minutes and on long periods of several months or years. LoriotPro uses RRD graphs (Round Robin Database) with a configuration user interface which is entirely graphic. The source data for generating graphs can be resulting values from executing LUA scripts. This functionality permits you to generate graphs with multiple curves even on the most complex performance indicators.

Generating service quality reports. LoriotPro possesses a tool for generating service quality reports (SLA Report Centre) with a graphic interface. If however, you prefer to be more flexible in generating your own reports, functions for calculation, performance and availability existing in the LUA script are at your disposal. These functions allow you to for example, display in %, the availability of a server for the last 24 hours in an Active View graph

Characteristics of the LUA language

The environment for developing scripts, integrated in LoriotPro enables you to rapidly write powerful applications dedicated to monitoring and auditing the resources of your information system. A few days of training or practice are required in order to fully master the entire product. Once the concept has been acquired, the development of programs can be accomplished in record time due to the potency of the available functions as well as the level of synthesis of the LUA programming language.

LUA is an interpreted programming language (scripts), it has been embedded into LoriotPro since version 4 for the « Extended Edition ». The LUA programming language exists since 1993 and is the object of a huge number of important communications. It is actually on the verge of becoming an undeniable standard on the market of script languages due to its strength and robustness. It is well known by the big names in the industry. A visit to the http://www.lua.org/ web site will provide you all the information concerning LUA and its implementation. Like all programming languages, the LUA language naturally possesses many functions necessary for developing generic applications. The native functionalities were extended within LoriotPro by adding functions that are specific to the management and monitoring of information systems. Over 200 functions were implemented to cover the following needs:

- Exchange with the SNMP devices of the information system. Reading or writing (GET, SET) of unique variables, or complete tables in modes supported by SNMPv1, V2c, V3. Moreover, some functions that are particular to the Multi VLAN switch environments have recently been added to supplement the usual SNMP requests.

- Managing the LoriotPro directory, accessing directory objects, reading or writing their attributes. Creating objects in the directory and creating the polling process attached to the hosts.

- Graphic management of the Active View objects. Modification of their images, colors, size and position, all this in relation to the returned values of the LUA script.

- Conversions to support SNMP 64 bits values.

- Access to and control of event counters, event and SNMP Trap filters.

- Access to complementary LoriotPro templates (plug-ins) in order to ensure control or to exchange information.

- Access to availability and performance information (SLA) in order to generate customized service quality reports.

- Sending Event and SYSLOG messages or SNMP Traps to LoriotPro or other network management stations.

- Access to the LoriotPro graphic assistants, selecting SNMP objects or tables, selecting event numbers, directory objects, selection of text values.

- Access to WEB servers in http or https mode.

- Access LoriotPro tools (plug-in direct).

- Generating documents in html WEB format.

- Manipulating units of time or period, conversion of SNMP values, type sysuptime.

- Possibility of using external LUA public libraries (V5.1.x) allowing an unlimited access for your scripts to external libraries. Consult the following website http://luaforge.net/ to get an idea of the richness of the libraries that are available.

- Possibility of generating complementary libraries via the SDK that is provided.

Characteristics of the development environment

The LoriotPro graphic development environment (LSDE), offers all the functions necessary to write, modify, debug, and test LUA script programs.

The LSDE is executed from LoriotPro; it is LoriotPro and its functioning environment which guarantees access to all its resources such as the directory, Event Management, Active Views, etc. The multiple task environment of LoriotPro makes it possible to create and test your scripts on the platform in parallel to other monitoring templates.
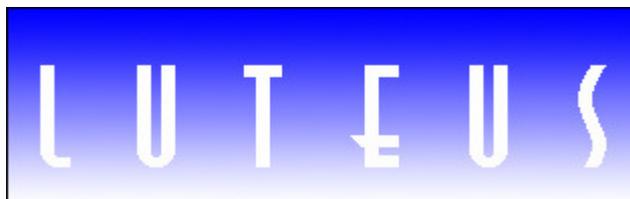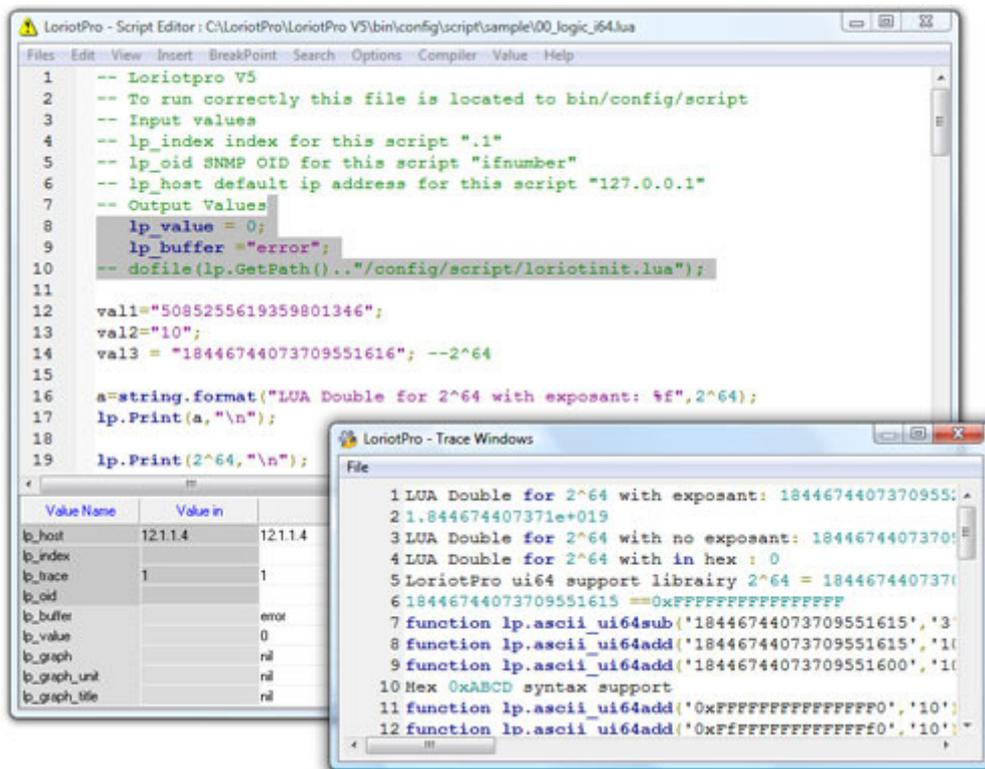
LUTEUS SARL
Bâtiment : « Le Sextant »
ZI de Moissy-Cramayel
462 rue Benjamin Delessert
BP 83
77554 Moissy-Cramayel
France

Site Web: www.loriotpro.com
E-mail: sales@loriotpro.com