TopKapi Newsletter

#15 – November 2006

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Interoperability

Unlike what had (nearly) become a habit at the end of the year, this newsletter does not announce a new version of TOPKAPI.

In addition to deploying version 4 and new mid-term developments in their early stages, work has mainly been focused on interoperability: easy interoperation of different software packages used has always been our top priority.

Similarly to development implemented in 2005 for coupling with Unity, the software workshop for Schneider Electric's controllers, our work focused on data exchange with other applications: support of the DXF format for interfacing with Autocad and many graphic tools, OPC server function, new protocols. These developments are available in version 4.0, in the form of additional modules if required, to be discovered below.

Moving ahead in this area, AREAL has decided to fully extend its commitment in the OPC Foundation supporting **OPC UA**, the new OPC standard (www.opcfoundation.org) currently in the finalisation stage.

OPC Unified Architecture should offer a single communication media to the different applications of the company using the production means.

Unlike first OPC releases, based on the Microsoft-specific COM-DCOM technology, and to a certain extent limited in a distributed environment, OPC UA will be less dependent on hardware platforms and provide more open communication between applications. OPC UA calls upon new 'web-services' oriented technologies, using SOAP (Simple Object Access Protocol) and XML as basic elements, and enabling the selection of transport protocol in regards with speed, reliability and network issues (HTTP, SMTP, DCOM, etc.)

Many editors have already announced their acceptance of this new standard, which should hopefully accelerate the move towards greater ease of implementation of software, a major concern in all our development efforts.

Progress we make in this area will be reported within 6 months to a year. In the meantime, please send us your requirements and questions, your input is valued.

Events

To discover the latest updates in **TOPKAPI**, please visit us during the next few exhibitions...

Pollutec 2006 – Capitale environnement
November 28 - Dec. 1st, 2006
LYON Eurexpo
AREAL booth: AD125 - Hall 6

SCS Automation & Control Paris 2006 – systèmes - composants - solutions
December 5 - 8, 2006
PARIS Nord - VILLEPINTE
AREAL booth: M16 - Hall 5A

News

Light versions: lower pricing

To extend use in small applications, the price of versions with a limited amount of variables has dropped sharply: call us.

DXF interface

DXF (Data eXchange Format) is the format most commonly used for graphic data exchange between applications. Generalised through Autocad, it is used by most CAD software packages, or tools such as Adobe Illustrator CS.

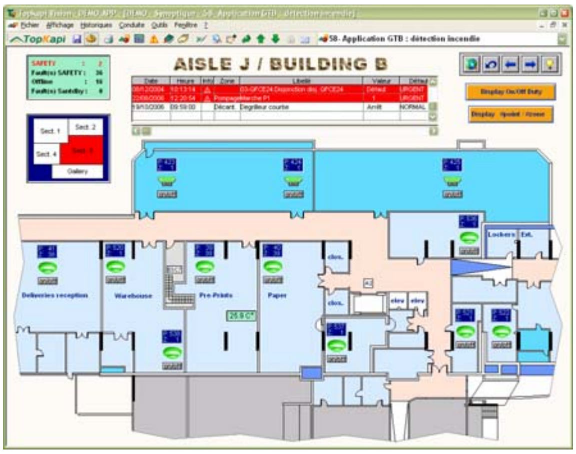
You can now import these files into TOPKAPI synoptic charts to provide a representation identical to that in your other tools. The use of layers allows filtering the drawing elements to be included or removed from supervision synoptics, but also to organize them to allow selective viewing during operation.

The notion of block is used to identify functional components; you choose to incorporate these blocks as standard drawing objects or associate them with library elements. In this case, their properties and animations are inherited from the object in the TOPKAPI library. TOPKAPI generally uses the name of the block as an identifier, providing a direct link between the animation links and the database.

For example, including and animating **electric diagrams** of the installations is effortless.

In the field of Building Management, the DXF interface facilitates the use of **building drawings** produced under Autocad or other software packages, but also automatic implantation of **active components**, such as temperature measurement, regulation equipment, fire detectors, etc.

Applications related with Geographical Information Systems (GIS) take advantage of this function, for example when including **drawings, maps, cadastral and utility views**, with the associated equipment:



- water and sewerage network with valves, pumping stations, storage tanks, leak detection devices
- power networks with protection and cut-off devices
- urban signalling networks, public lighting
- hydrological networks with measurement and alert stations, etc.

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OPC Server

In the past, TOPKAPI could not be an OPC server, but only an OPC client. The OPC client function meets most needs, by allowing information to be acquired on multiple devices through this standard protocol, which is TOPKAPI's main function. However, like TOPKAPI, many software packages are purely OPC clients (others supervisors, CAMM tools, reporting tools, specialized applications, etc.), and had to use methods other than OPC to exchange data with TOPKAPI.

By becoming an OPC server, TOPKAPI can more easily become a data provider for these devices. Here are a few examples:

- Using TOPKAPI in a new application within a system including other OPC clients
- Performing data acquisition for any OPC client system without the communication capacity or drivers required
- Using TOPKAPI's modem communication and remote management features to use it as a remote management front end for an installation based on another supervisor without the same communication capabilities.
- Connecting an existing TOPKAPI station to a central supervision station of another manufacturer, acting as central supervisor

TOPKAPI's OPC server functions are compliant with the OPC DA (Data Access) V2 standard: instant reading and writing of variables in the TOPKAPI database (field equipment variables and internal variables).

SMS protocols

The use of SMS messages for data acquisition is spreading. New equipment is added to the list of equipment complying with TOPKAPI.

After Sofrel (Cellbox), Perax (P16XT), Wit (Twiny), we have added dataloggers by Technolog (Cello), Radcom/Hydreka (Multilog) and Primayer (Xilog). By the time you will be reading these lines, Aquamaster equipment by ABB (Flow rate and pressure measurement) and Sepem by Sewerin (leak pre-localisation) will also have been validated.

Geolocalisation

Localising an operator or a vehicle has become an easy task thanks to the widespread use of GPS systems. Various systems are being tested with TOPKAPI: they will be used to monitor a fleet of vehicles, trace operator interventions, ensure safety for standby agents, etc.

Information is transmitted by GSM in the form of SMS messages, or by GPRS, periodically, upon event or request from the central station.

Tips

TOPKAPI's interoperability does not rely only on the development of new tools facilitating user tasks; it also results from accurate knowledge of its current possibilities. We hope the following examples will help some of you to maximise the use of TOPKAPI.

Developing a WEB Application

We have repeated so often that there is nothing (or actually so little) to be done to produce a genuine copy of your TOPKAPI application onto the web, that many of you have deducted that using the TOPKAPI web server can only provide you with an identical copy of what is on the operating station. This is an unfortunate misunderstanding; not only is the web site generated by TOPKAPI's web server made of open and modifiable ASP code, but it also offers access to all the basic functions used to implement it.

Under the hood of the WEBSERV, the power of the engine is waiting to be used for your most specific needs. You can read and write basic supervision database information, retrieve a table of values, open a list of events and alarms to be filtered and formatted, display an animated graphic view in a page frame, etc.

For example, when using the Intranet as access to integrated management software (ERP), MES, scheduling, recipes, etc., the user interface and workflow interfaces can be easily deployed, creating the link with supervision. Call TOPKAPI's technical support to be guided in terms of feasibility and performance, and be provided appropriate examples.

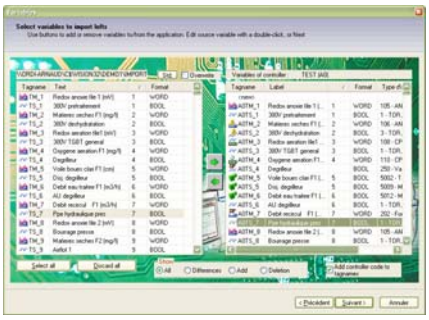
Customizing autosetting

Many of you appreciate the effectiveness of TOPKAPI's autosetting, based on its SOFTLINK wizard: with a few mouse clicks, you log into the controller's file and enter the data you require in supervision.

But do you know you can implement TOPKAPI autosetting mechanisms on your own, at a low cost? To do this, generate a CSV import file (tabulated ASCII) with your own data in TOPKAPI's standard format (see "Format of a Standard Import File" in the online help).

In Version 4, you can create your own database objects and their associated graphic representation in TOPKAPI.

In a standard import file, define the list of objects to create in TOPKAPI, their type (predefined or created by yourself), the parameters of each object (tagnames, labels, processing parameters) which may contain even their position in graphic synoptics.



Typically, if you have an equipment table or database, generating a file which can be used by TOPKAPI will be easy, using a basic query.

Finally, it will not be a basic initial import operation, as throughout the project's development, you will benefit from functions for managing differences integrated to the SOFTLINK wizard. Just "replay" the wizard to show modifications which occurred during your project, allowing you to integrate them to supervision.

To implement your own autosetting mechanisms, call us, so we can explain how to proceed.

Performing your own data acquisition

You are acquiring data using a very specific means and you wish to integrate this data to your TOPKAPI application? No need to call AREAL to do that. Using the TVision Active-X, you can interface you own executable programmes with TOPKAPI.

For example, you can retrieve data supplied by web sites in real time, then integrate it to your supervision application: this was implemented to use data supplied by weather forecast sites (outdoor temperatures, rainfall…).

To perform this type of application, call us, we can supply examples of source code of programmes designed to open a web page, analyze its content, retrieve the information required, and send it to TOPKAPI.

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Achievements

Thank you to the Métrologie unit of the Communauté Urbaine de Lille, as well as to Damien AMPE (Amber Technologies), Laurent PONCELET (SEFO) and Sergio LABBE FREDES (Aguas Andinas) for their contribution to writing this section.

SEFO

Integrated approach to automation and supervisory software

SEFO, i.e. the 'Société des Eaux de Fin d'Oise' (www.sefo-eau.com), is an independent water utility, based in Andresy (France). To automate the thermal water plant in Enghien Les Bains, it chose, together with the company GOAVEC (www.goavec.fr), to associate the TOPKAPI supervisor with Schneider Electric controllers thanks to the state of the art integration between TOPKAPI and Unity, the programming workshop of Schneider Electric controllers (see www.areal.fr/Doc/Unity-Pro-E.htm).

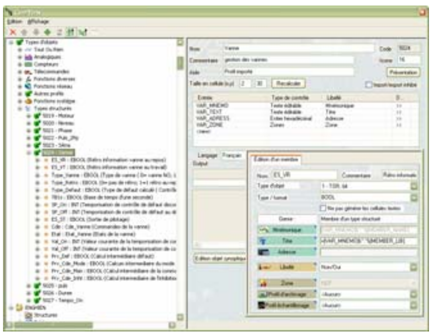
This project is one of the first using this coupling, and here is a report on the operation, shaped with Laurent PONCELET, in charge of the project within SEFO.

The system comprises:

- a Premium controller for the treatment plant
- three Twido controllers associated with each of the water wells
- an optic fibre Ethernet network connecting the controllers and the SCADA software, under Modbus IP protocol
- an OPC server, the OFS server by Schneider Electric
- a TOPKAPI server station with Text To Speech Remote Alarm Notification and Summaries options
- a permanent client station, and an Open Client station (free connection from any computer)

The OFS server was used instead of TOPKAPI's Modbus IP protocol, as this allows the programmer to work in Unity with "non located" variables (no physical address to be allocated to each variable).

For Laurent PONCELET, an object-oriented approach in automation and supervision is a major technological leap, and he no longer believes he could implement new major projects without these benefits. Let's see what this means in concrete terms.



In the Premium controller, 11 types of structured data items have been defined (here we mention only variables used in supervision): motor, valve, phase control, etc. The most complex include embedded structures (for example command and status variables for a valve) to facilitate management.

The controller programme includes declaration of instances of each type, 102 valves, 50 phase commands, 17 motors, etc.

When the link between Unity and TOPKAPI opens, the latter integrates automatically to the supervision application the types of structured data and instances of variables, whether structured or elementary. Modifying types in TOPKAPI is not required, but an editor allows extending them with processes performed by the supervisor.

The practical analysis of the supervision database shows the following elements:

- the application comprises 8876 elementary variables
- it contains 288 structured objects retrieved directly from the controller program for a total 8231 elementary variables
- the remainder, i.e. 645 elementary variables, was generated by the link with Unity (except a dozen internal variables specific to supervision)
- All 11 of structured data types represent, including the embedded sub-structures, a total 227 elementary variables.

When summarising the setting operations, using a classical method, we would have to:

- Instantiate about 8876 elementary variables in the controller
- Recreate – or in the best case import with more or less easy operations on files – these 8876 variables into supervision, and adapt the process performed by supervision for each of them
- Check each of the 8876 variables individually

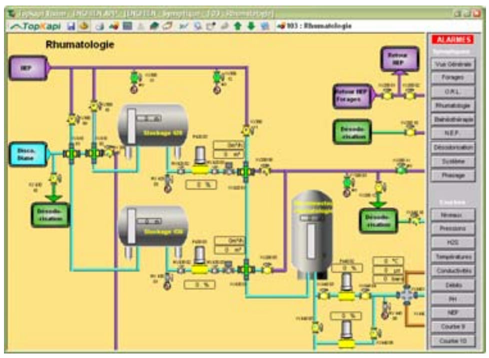
With Unity and its link to TOPKAPI, the work required consists in:

- Creating the structures in Unity (227 elementary variables)
- Instantiating 933 variables in the controller (645 elementary variables and 288 structured objects)
- Integrating information with supervision (direct link by wizard, without data handling)
- Adapting the processes of the 645 single variables and 227 elementary variables of structured objects
- Checking individually the 645 variables and 288 structured objects; for a structured object, just check one single instance in detail, then only one of the single elementary variables of each object.

The summary of the operation is:

- Using classical methods, the 8876 variables must be instantiated and checked
- Using the TOPKAPI-Unity coupling, instantiate and check 645 elementary variables, 227 elementary variables of the object types and 288 structured objects, i.e. 1160 basic components.

Finally, processing the database means processing a total 1160 basic elements, instead of 8876.



Forgive us for omitting details, rationalisation constraints or inheritance benefits in object-oriented design, but the figures speak for themselves, and show clearly the benefits provided by this approach.

Hours, even days, of copying/pasting and handling of sterile data are saved, as well as proof checking to eliminate human error.

In addition, the definition of typical objects can be reused from one project to another, without being frozen, as these objects may change during the project without damaging the work already done: the initial organisation effort provides instant return on investment, but is also a capital offering extensive profit over time.

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AGUAS ANDINAS (Santiago-Chile)

A Great company with a Great Control Center

By Sergio Labbe Fredes, Jefe de la Unidad de Ingeniería del Telecontrol

Aguas Andinas is the largest water utility in Chile, one of the largest in South America.

The company provides drinkable water, sewage collection and water treatment services to a population of 5.3 million users, from Santiago central to all neighboring suburbs (for more details, see www.aguasandinas.cl).

Most of the assets are spread across the concession's 175.000 Acres and are interlinked through a network more than 15.000 Miles long, all of which can be remotely monitored and controlled from the Operations Control Centre (OCC).

OPERATIONS CONTROL CENTRE (OCC)

The OCC is running 24/7 and handles real-time information coming from all units, centralizing the decision making process and optimizing the management of all its "state of the art" IT tools.

As a result, with the help of technological tools, the best support is given to the requirements coming from Production, Transportation, Water Distribution, Recollection and treatment operational needs.

At the end of the day, customers' satisfaction and a quality and efficient service are there.

TOPKAPI SCADA PLATFORM

The Remote Monitoring at Aguas Andinas, includes:

- Redundant TOPKAPI V3.0 running on Windows 2000 Server.
- 8 "permanent" Clients, 10 "floating" Clients and 60 web-based Clients accessing the Intra/Extranet.
- The application holds more than 23.500 variables (and more to come...), collecting data from more than 450 field RTUs.
- Integration of heterogeneous devices/brands (RTU, PLC, various drivers) and multiple TOPKAPI options (Applicom, Modbus, Modbus/Dh, Client OPC, Client DDE).
- Transfer of historical data to a database management system - DBMS - (ORACLE), via ODBC and transfer.exe mechanisms.

The TOPKAPI architecture was set up by the internal staff (Remote Monitoring Systems Dpt), along with the collaboration of all operational units of the company.

Regarding the technical issues, it has been decided to call-in the experience, support and consultancy of the Agbar Group (mainly Adasa Sistemas), along with the specific and constant backing of Areal that has proceeded to specific adaptations (the Client DDE was tailor suited to Aguas Andinas needs) and applied many of the customer's suggestions & requirements to the next versions of the software.

With the modern communication means, the technical support provided by Areal had not to suffer from distance, its quality being mainly based on the direct relationship between the end user and the editor.

CAURALI

Sewerage at the Lille Métropole Communauté Urbaine (cities LMCU) under control

The urban community of Lille manages the sewerage for 85 cities, i.e. about 1.2 million inhabitants. It has just implemented a new generation centralised control system to supervise all its structures.

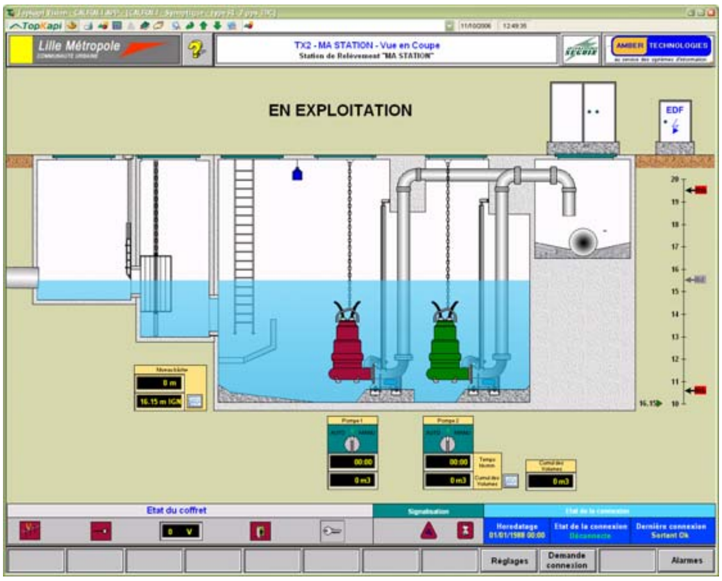
Before, the LMCU had a remote management system running under Unix, installed in 1994 (241 pumping stations) and a TOPKAPI system installed in 1999 (22 waste water treatment plants), which at the time was the first full hot redundant remote management system in France.

Within the framework of environment preservation and flood prevention, the LMCU wished to implement tools improving availability of sewerage systems and anticipating impacting events.

Late 2004, a call for tender was launched for a global supervision system covering all structures: 288 pumping stations, 29 treatment plants, 11 storage tanks, 5 valves, 27 flow measuring stations and 20 rain gauges, i.e. close to a total 400 structures. Early 2005, the project, named CAURALI ('Contrôle Automatisé du Réseau d'Assainissement Lillois', Automated control of the Lille sewerage network), was entrusted with a group comprising Automatismes Seguin (*www.automatismes-seguin.fr*) for the electricity and automation part, and Amber Technologies (*www.amber-tech.fr*) for the supervision and IT part.

For the Metrology Unit, in charge of the project within the Water and Sewerage Department of the Lille Urban Community, the overall design had to meet the requirements of information continuity and ease of operation.

The heart of the system (see diagram next page) is made of two couples of redundant servers; each server station processes a part of the application (distributed processing) and provides the associated server backups should the main servers fail. Two other redundant servers ensure autonomously data processing for a treatment plant.



All these servers feed raw data into a central database under Oracle: every day, the system generates the storage of about 4 million basic records, i.e. 70GB data per year. To manage such a volume of information in good conditions, a quarterly partitioning of the base was implemented. Please note that unicity of the data sent to this base is ensured by TOPKAPI redundancy, which handles the processes related with failure events.

The raw data is then reprocessed within the database by a consolidation application developed specifically by Amber Technologies, which consolidates calculations and generates reports.

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Communication with local controllers is performed mainly through the switched telephone network (Remote Terminal Units - RTUs: Napac, Perax, Sofrel). For the most sensitive sites, about thirty of them, a permanent real-time link with the central site was required; ADSL support is more economical than a leased line, but, except paying a very high price, it does not guarantee continuity of service.

This obstacle is worked around by TOPKAPI, which provides a backup for the ADSL link by a connection over the switched telephone network, without having to adapt the settings of basic variables.

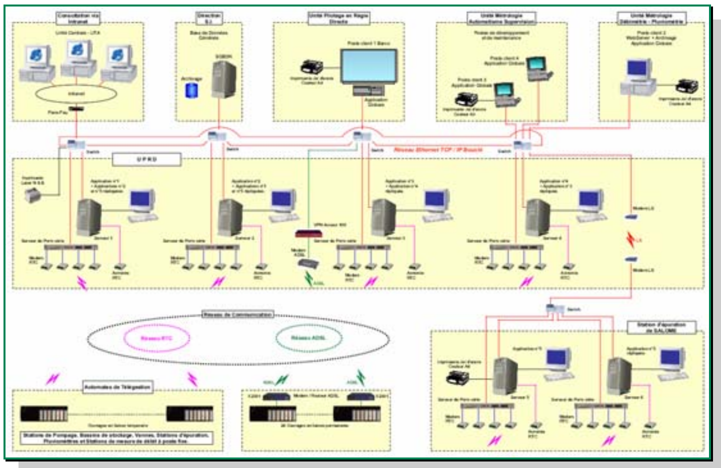
To operate the system, the user has:

- an operating station in the control room with a Barco overhead projector
- a fixed client station at the waste water treatment department, also acting as web server and archive processing station
- two remote-connectable mobile operating stations
- overall access, using a web browser from any computer in the Intranet, to supervision screens (viewing and controls according to access rights) and database consolidated reports
- standby management functions

A minor technical particularity which will probably be of interest for some of our readers, LMCU wanted to have a function of the memo type, to enter operating notes for each of the sites. This function was provided by Amber Technologies, who developed a small application: when the operator clicks a 'Post it' object in synoptics, a html window opens a form to display and edit a memo stored in an external database (accessible to all client stations). The presence of a memo is then reported to the users by means of an indicator (using the TVision Active-X for data exchange between the two applications).

For Damien AMPE, department manager at Amber Technologies, this type of implementation with an extensive architecture uses all the know-how of the company in terms of supervision, networks, and databases.

The use of a VPN network between Amber's premises near Paris and those of LMCU contributed to reducing costs of this major project, while allowing a large part of remote development and deployment.



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