STARS: CURRENT DEVELOPMENT STATUS

T. Kosuge, Y. Nagatani, KEK, Tsukuba, Japan

Abstract

Simple Transmission and Retrieval System (STARS) is a simple and useful software for small-scale control systems running on various operating systems.

STARS is used by various systems at the KEK Photon Factory (e.g., the beamline control, experimental hall access control, and key handling systems), and the development of STARS (e.g., development for many kinds of STARS clients and for interconnection of Web2c and STARS) is ongoing. We describe the current development status of STARS.

STARS OVERVIEW

Simple Transmission and Retrieval System (STARS) [1] consists of client programs (STARS clients) and a server (STARS server) program. Figure 1 shows some STARS configuration examples. Each STARS client is connected to the STARS server via a TCP/IP socket and communicates using text-based messages. Every STARS client has its own node name, which is unique in the system; a message with a destination node name sent to the STARS server by a client is delivered to the corresponding STARS client by the STARS server. STARS uses this simple message transfer mechanism to provide control system functionality.

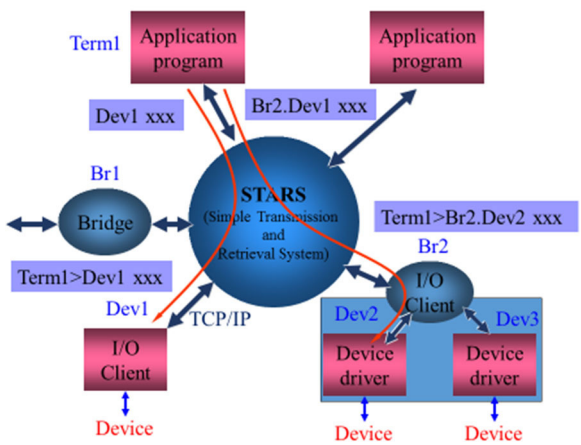

Figure 1: Layout example of STARS server and clients.

Multi-platform

The STARS server-side application is written in Perl and can run on various operating systems (e.g., Windows, Macintosh, and Linux). Development of a control system using STARS consists primarily in writing STARS client programs. The developer can choose his or her favorite operating system or programing language, if they support TCP/IP Socket and the handling of text string functions.

Simple Certification

The STARS server contains a simple certification procedure performed at STARS client connection time. STARS avoids client misconnection through three function steps, as follows:

- Host name certification
- Node name and keyword certification
- Node name and host name certification (optional)

Interface Libraries

STARS interface libraries (for Perl, .NET, Java, C, and ActiveX) assist in STARS client development. Developers need not be skilled in TCP/IP Socket or in the Node name and keyword certification procedure to use a STARS interface library.

INSTALLATION STATUS

STARS is used as a common beamline control system at the Photon Factory for introducing various systems. Table 1 lists the recent installation status of STARS at KEK.

Table 1: STARS Installation Status (as of September 2014).

Category	Beamline or Control System
PF-2.5GeV Ring X-ray	BL-1A, BL-3A, BL-4B2, BL-5A, BL-6A, BL-6C, BL-7C, BL-8A, BL-8B, BL-9A, BL-9C, BL-10A, BL-10C, BL-12C, BL-14A, BL-15A, BL-17A, BL-18B
PF-2.5GeV Ring VUV and Soft X-ray	BL-2A, BL-2B, BL-11A, BL-11B, BL-13A, BL-16A, BL-19B, BL-20A
PF-AR	NW-1A, NE-3A, NW-2A, NW-10A, NW-12A, NW-14A
Slow Positron Facility	SPF-A, SPF-B
Other Systems	Beamline Interlock Central Control System, Experimental Hall Access Control System, Key Handling System, Front-End Monitoring System, Radiation Monitoring System

CLIENT DEVELOPMENT

STARS contains three types of client programs (User, I/O, and Others). Users can add control system functions by adding STARS client programs without system stoppage.

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A user client is a user interface program that includes a GUI. We have developed several types of common GUI, such as stepping motor, monochrometer, and mirror control panels.

An I/O client behaves in the manner of a device driver in STARS. We support commonly used hardware at the Photon Factory beamlines. If a user requires the use of new hardware, we discuss the general character of the hardware and begin development. The typically supported hardware is listed in Table 2.

Other types of client (e.g., a syslogger or breaker) work as background processes providing many functionality.

Table 2: Typically Supported Hardware at the Photon Factory.

Type	Product
Stepping Motor Controller	Tsuji PM16C series, Tsuji PM4C series, Tsuji NPM2C-01, Tsuji UPM2C-01, Kozu SC-200
Digital Multi Meter	KEITHLEY 2701 series
Pico Ammeter	KEITHLEY 6485, KEITHLEY 6487
Encoder	HEIDENHAIN ND261, Tsuji ER2C series, Tsuji ER4C series
Counter	ORTEC 974, Tsuji CT08 series, Tsuji NCT08 series

RECENT CHALLENGES

Web2c

Web2c [2] is a very powerful tool kit developed by DESY that provides web-based GUI functions. Currently, a test version of a Web2c/STARS interface has been developed, and we have succeeded in connecting Web2c and STARS. Figure 2 shows a Web2c GUI panel with STARS on Windows 8.1, and Fig. 3 shows the GUI on Android. We obtained satisfactory results in this test. Development of a Web2c/STARS interface is ongoing.

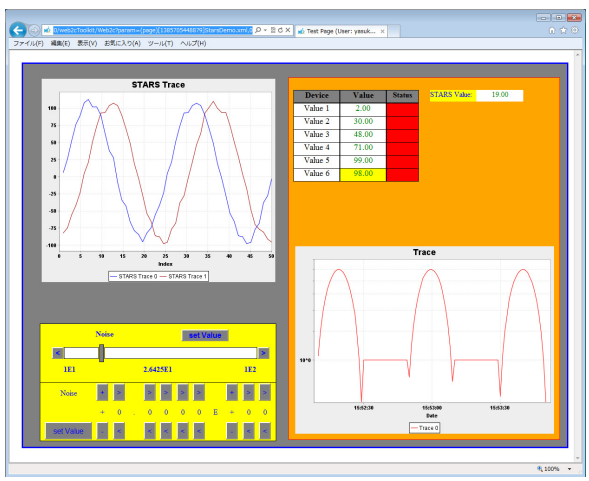

Figure 2: Snap shot of Web2c/STARS GUI panel on Windows 8.1.

Figure 3: Snap shot of Web2c/STARS GUI panel on Android.

STARS over RS232

Bridge clients are used for connecting a STARS server to other STARS servers (STARS bridge) or other protocols, such as TINE [3] (TINE bridge [4]). We have developed a new type of STARS bridge, the RS232 bridge, that works with RS232, connecting two STARS servers via RS232 with serial communication. STARS servers can communicate without a network using the RS232 bridge (Fig. 4). This performs efficiently in environments that do not have a network.

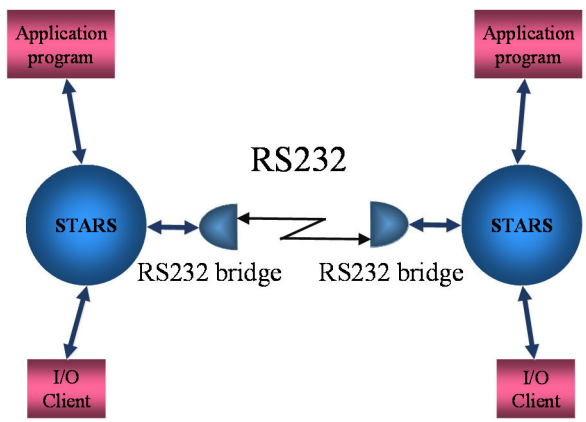

Figure 4: STARS RS232 bridge.

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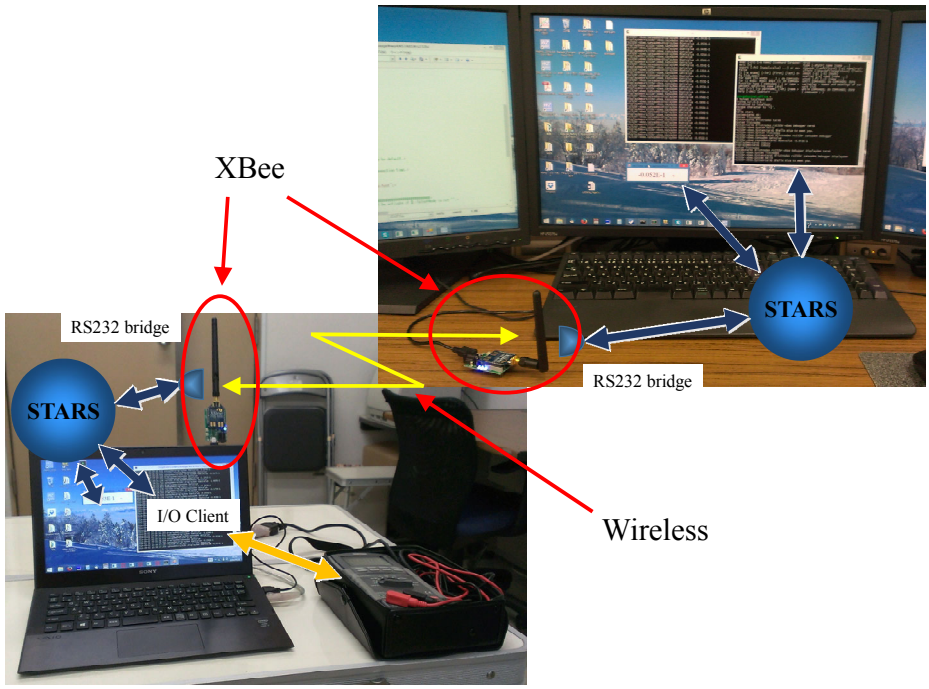

Figure 5: STARS RS232 bridge with XBee.

The RS232 bridge works well also with wireless modems (e.g., XBee), assisting development of control or data acquisition systems with slow wireless communication. Figure 5 shows a test bench of the RS232 bridge with XBee. We have succeeded in reading values of a digital multi meter from clients connected to another STARS server with wireless serial communication.

CONCLUSION

STARS is a simple and useful system installed in many kinds of system including beamline control systems. Development and updating of STARS (development clients and STARS functions) continues.

We have begun development of a STARS-Web2c practical application for our control system, and we are planning to develop a standalone wireless monitoring system with the RS232 bridge.

REFERENCES

[1] http://stars.kek.jp/

[2] http://adweb.desy.de/mcs/web2cToolkit/web2c_hom e.htm

[3] http://adweb.desy.de/mcs/tine/

[4] T. Kosuge, et al., The Interconnection of TINE and STARS, PCaPAC2006, Newport News, 2006.

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