

Experience at iSystems LLC

Evolution payroll software: Broker-based system of TCP/IP servers (request processors), with central management (Request Broker TCP/IP server), my guess on base of **kbmMW** solution (www.components4developers.com), with some alterations. Servers communicate by “datagrams” – binary presentation of Variants objects and collections of Variants.

web GUI server interacts with REST services on API web server (all of them of Microsoft stack), and via Delphi Connector DLL to Delphi Remote Relay server, with the help of Open SSL, and then to broker TCP server and then to Request Processor Server, all of Delphi; those servers can run as Windows Service or just as application; if necessary, start instance of Report Writer server to process group of reports; that instance would shut off after reports generated.

Database server: Firebird, linux-based, as free and not requiring dedicated administrator to minimize maintenance expenses; (open source version of Interbase); each client uses dedicated database; common layer exists as user context, permitting heterogeneous queries. All applications (including report engine) address database via User Context Layer - independent SQL engine having Firebird as back-end. Database included history of all transactions in audit tables.

Total code base about **10M** lines of code; **Accurev** used as version control system; custom build server to provide continuous integration for Delphi code, (on the same code base) and **JIRA – Bitbucket Git–Jenkins** as continuous integration system for .NET based GUI and REST API systems; Smartbear **CompleteTest** and **Selenium** as QA tools.

My primary responsibilities for several years included support of report generation and **Report Writer**; (report system exceed 3K of reports); **Report Developer** media imitates simplified Delphi environment (without Delphi IDE), permitting creation of report own components and their inheritance, and event handlers written in Pascal-like language. **Report Writer** includes Virtual Machine for compilation of event handlers and inherited code, and positioning system for rendering components on virtual paper; EMF and subset of HP Graphic Language used as internal graphic presentation, permitting detailing necessary for real printing of payroll checks; elaborate and low-level manipulation of printer settings included. Resolving of report problems required deep understanding of whole system, including payroll preparation, database audit, and details of PDF conversion and metafile rendering by print driver.

Main achievements:

- Identification of system problem with audit reports (query data from audit tables which are normally not available to users grow too fast with data interval size), and providing means to resolve it (removed N-squared dependence from history size, in context layer and on report level);
- Integration of Virtual Mail Room – system for distribution of reports to consumers – with user-side printing capabilities over Web API (so Service Bureau would be able to print checks and reports locally, having core system remotored, beyond firewall); included integration of PDF backgrounds and PDF generation fixes.
- Support of Web Service Swipeclock client
- Identification of system problem with Entity Framework objects in REST service (any LINQ request will retrieve full content of physical table by default)

Another big group of projects included conversion of 32-bit Delphi 7 code to Win-64 Delphi 10 Seattle.

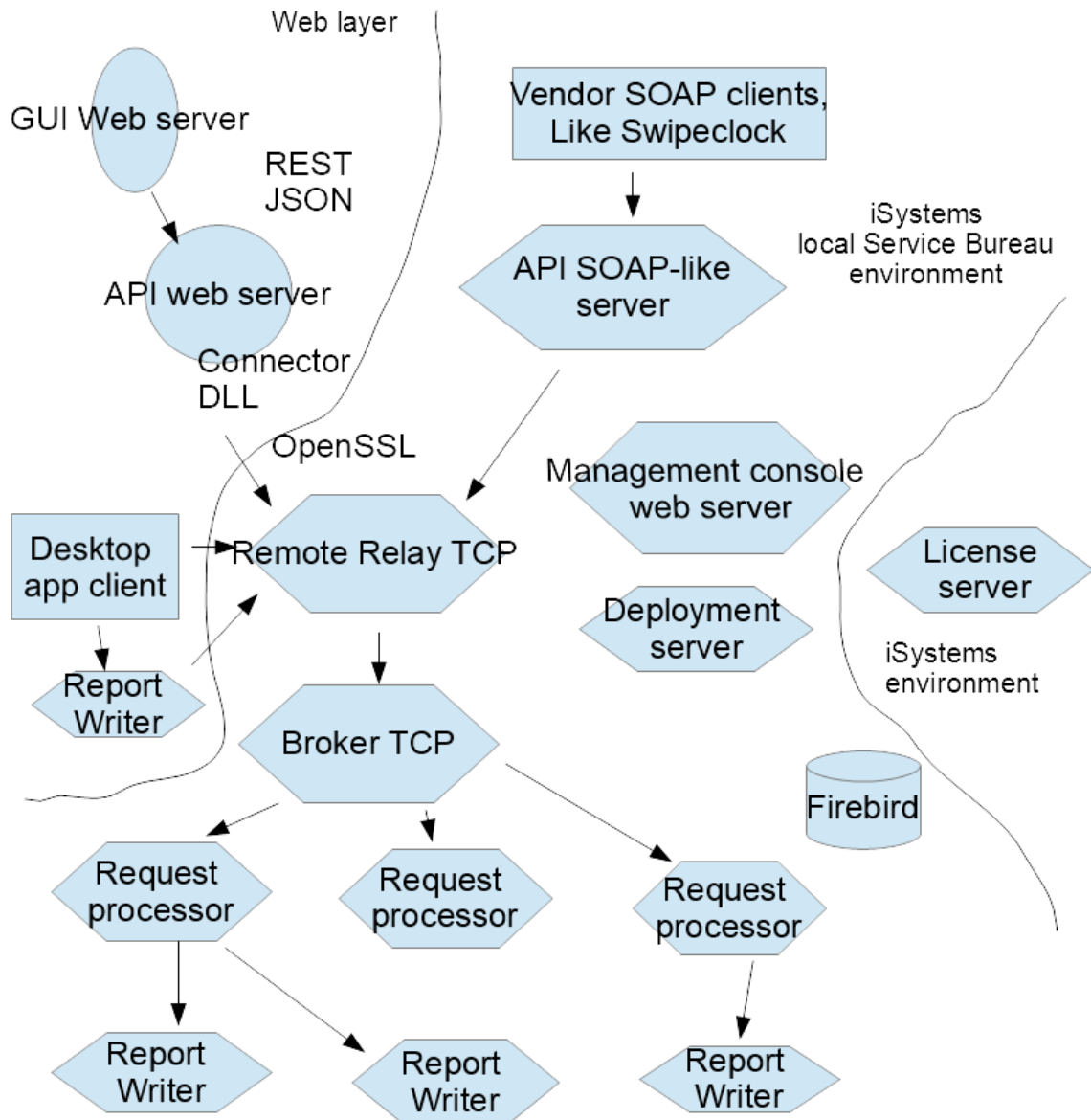
Some of problems I discovered and resolved:

- Ban on using of nested procedures in multi-threaded environment
- difference of Variant serialization (Delphi 10 added special descriptor for Variant Ansi string); important because all our server protocols based on serialization of Variants.

- problems with differing of parent component for kbmMemoryDataset
- problems with restoring **threadvar** variables on thread switches
- Distribution of inherited components by packages for IDE (some additional design-time registration limitations were discovered).

<http://www.evolutionhcm.com>

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Report Writer instances start by request of Request processor as necessary; each report generated in separate process