

Selected Case Studies

Deribit, an exchange platform for on-line trading on complex instruments.....	2
The EduSimulations Project.....	3
Business Forecast.....	4
Verivox.....	5
The project “Recruitment Without a CV”	6
The OnWave.fm Software.....	7
Demeter – a product for the energy industry, consumers and producers.....	8
Orion – hardware and software for a street lights management system.....	10
CabinPlanner – on-line design and quotation for beam houses.....	11
FrontOffice – an on-line platform for cross-selling customized business gifts.....	12
Terminus – a ticketing tracking and accounting system for a company supplying repair and maintenance services.....	13
PocketBus – software for bus carriers and coach operators.....	14
PenForwarder – a data capturing, acquisition and retransmission device for digital pens.....	16

Deribit, an exchange platform for on-line trading on complex instruments

The client and his dream:

A private investor, entrepreneur, experienced and creative financial broker. Our client's dream (and objective) was to launch an internet exchange platform for derivatives which work on/with Bitcoin. He chose us to create it from scratch.

Our main problem (and priority) was to design and implement a modern, secure, high-performance system which had to be stable on standard servers offered by hosting companies and manageable by a small team (or even a single person).

The solution:

With our client, we designed and implemented a modern platform built for high frequency trading, which allows up to eight thousand orders per second (on a single server) with real-time risk management.

The platform supports two kinds of financial instruments – options and futures. It allows the client to collect commissions from users. These can be defined separately for each instrument and separately for market “makers” and “takers”. It also supports charging additional fees.

The platform consists of a responsive web interface (multiple language versions, two-factor authorization, widgets and charts showing real-time market and wallet data, a help system), simple administration tools (hot wallet and risk management, statistics about the system and user management) and a kernel performing actual transactions.

The platform's kernel implements a Limit Order book-matching engine, real-time risk management with auto-liquidation functionality, integration with the global Bitcoin Network, as well as hot and cold wallets to improve security of the users' funds.

We also implemented APIs for external IT tools.

The technology (2014-2015):

We selected a modern server from a popular hosting company and configured it with triple-mirroring hard drives, a BTRFS file system (which supports hot snapshots) and SSL certificates.

For optimum performance, stability and security we selected the Erlang stack (Cowboy, N2O, Mnesia), AngularJS and web-sockets technologies for the client-server architecture of the software.

To implement advanced kernel features, we created deterministic wallets extension and security enhancements to the Bitcoin-Core open-source software.

Software status and possible business cases:

The source code is the property of our client.

The service is not available publicly yet. Please contact us if you want to be informed of the online launch.

We are ready to participate in your projects in the financial area.

Should you be interested in licensing this particular technology/project, or in acquiring exclusive property rights, we will be glad to put you in touch with the respective IPR (Intellectual Property Rights) owner(s).

The EduSimulations Project

The client and the problem:

The WSB Schools of Banking conducted a project (financed by Polish National Centre for Research and Development) involving innovative methodologies and software for postgraduate online study programs. The client chose us as a partner responsible for solving all technical R&D issues in the project and for overall implementation of the software.

The solution:

With the client, we designed and implemented a complex Internet platform with social networking, simulation and publishing mechanisms. The content published on the platform is divided into “Games” (including the cooperative multiplayer type) with customizable recruiting, scoring and passing schemes. The software has been designed for three group of users (besides the administrators) – students, teachers and administrative staff. Teachers (or authors of educational content) can create and customize new games using built-in content editors, and then test and publish them on the platform with just a few mouse clicks. We made it possible to embed in these games content created using other educational tools. The platform allows designing simulations in which students, to earn points, need to make good decisions in certain contexts which involve specific persons, events, and objectives. Students can subscribe, play games, acquire the skills associated with them, and as they progress, they build their “virtual CVs” inside the platform. Facebook and LinkedIn-like social features allow students and teachers to communicate, and share their content and knowledge.

We delivered the software with separate user guides for all three groups of users.

The technology (2013-2014):

The platform was implemented as a client-server web application – for server-side JVM environment (using the Grails framework) and HTML5 client-side front-end. All functions are available via popular web browsers. The web user interface employs web-sockets to improve interactivity in social networking and general client-server communication.

We adopted and implemented the newest, widely accepted standard for communication between platform and educational content – the Experience API (also known as the TinCan API). We created a customized efficient learning record storage (LRS), linked with the platform's scoring and reporting procedures.

We designed and implemented a custom simulation engine which supports both single- and multi-player (cooperative) scenarios, and a dedicated simulation editor which uses a mini formal/script language for describing more complex simulation events.

Among many other things, the system supports electronic signatures (which can be used by students to sign their results and solutions), as well as uploading, embedding and converting video files and pdf's (used in the games and in social networking channels).

Software status and possible business cases:

The software has been tested by several universities and has passed through evaluation stages at the National Centre for Research and Development.

The source code should be publicly available soon, although we do not yet know the details of the final license agreement.

Should you be interested in licensing this particular technology/project, or in acquiring exclusive property rights, we will be happy to put you in touch with the respective IPR owners.

We offer our services in customizing (and extending) the software for particular needs and university environments.

Business Forecast

The clients and their problem:

Our clients, Polish entrepreneurs with a scientific/academic background, offer statistical forecasting services to companies. They had a problem with statistical tools being overly complex, which made them effectively impossible to offer to corporate clients. We were called upon to implement user-friendly software for statistical forecasting and reporting.

The solution:

We implemented a web-based SaaS (software-as-a-service) system designed for individual, independent statisticians and managers/analysts from small and medium-sized companies. Carefully chosen functionality and user interface solutions allowed our clients to offer most of their services online, broaden their client base, cut costs and focus organically on more demanding cases.

All users (individual or organizational) can manage their own data series and generate various statistical forecasts. Data series and generated forecasts can be shared between users in the same organization, which can itself be divided into “departments” with different access rights. The system supports popular data formats and remote data sources pulled automatically or manually. The software generates pdf reports and provides full coverage of basic client services such as online payments, invoices, a division into three levels of service (plans).

The software's back end is designed as a scalable and customizable computational cloud, ready for any number of clients and extensions (plugins with additional statistical methods and modules).

The technology (2014):

The Business Forecast software has two major parts: a client-server web application for managing the user interface and an independent, scalable computational back end.

The user interface is based on HTML5 and is designed for popular desktop web browsers and tablets. We used an ExtJS Java Script library for achieving instant stability and universality of the interface. This way we could focus on the most important issue – shaping the overall user experience with our clients.

Because of the clients' preference and experience, the computational back end was based on Gretl – an open source statistical program our clients used for their own work. We built a scalable environment on top of this software and, with various optimizations, we linked it with the functions available in the user interface.

Software status and possible business cases:

The source code is the property of our client.

The service is not available publicly yet. It should be online in late 2015. Please contact us if you are interested in licensing this particular technology and services or acquiring the property rights exclusively. We will be happy to put you in touch with the respective IPR holders.

You can also count on us to design and implement mathematics-related software for you.

Verivox

The clients and their problem:

A German media holding – a leader in the segment of comparison services related to household expenditures. After several years of continuous growth, the company's information portal, being the main POS for the customer, reached the peak of what its technology could support. We were hired to redesign the database and streamline data access in the CMS part of the system, and later to build new/extended versions of the CMS and customer-related tools.

The solutions:

We redesigned the database in such a way that it worked tens of times faster, while still being able to support the old version of the site. Then we provided software development services to help our client build from scratch a new content management system to take over the responsibility of the old sites. Beside preserving content and serving millions of visits per day, the new system's main features included:

- multi-domain and multi-language content management, including licenses and copyrights management for text and graphics on different markets;
- deep integration with the ordering process and customer-related tools, such as private user profiles, affiliation programs, or up-selling processes;
- a widgets framework allowing visual construction of landing pages by collecting pieces of data-driven software presenting news, graphics, analytic data and selling tools;
- web-services offering APIs for external partners;
- collectors of external content (news, information and cross-selling offers);
- custom auto-linking and auto-tagging algorithms.

The technology (201*):

We've been working remotely on an internal Verivox development and maintenance system. We have been part of our client's development team since 2008, working deep within a large base of MVC code extended by IoC and unobtrusive coding paradigms, automated tests, QA processes, continuous integration and a farm of servers used as the deployment platform.

The main technology has been Microsoft .NET, which is why all of the software was written in C# and supported by Microsoft SQL Servers. The user interface is based on HTML5 and JavaScript – both used in simply defined design patterns & rules to make them work seamlessly on different devices and platforms, including PCs, tablets and mobile phones.

We have been working with external tools and systems ensuring the highest quality and efficiency of the code we wrote. We used Sonar to check against duplicated code and bad patterns, DotCover to find scenarios uncovered by automated tests, and GO! for continuous integration and tests in a production environment, among many other tools.

Software status and possible business cases:

Please refer to <http://verivox.de>

The project “Recruitment Without a CV”

The client and her problem:

Our client was a restaurant owner who had problems with effective recruitment of employees. She did not have enough time to analyze all incoming CVs and conduct interviews with all candidates. Thus she lost many opportunities to hire good waiters by selecting candidates for interviews based solely on their CVs and poorly defined (or indefinable) criteria.

The client decided to take a different approach and started thinking about beginning with interviews instead of collecting CVs. We were called upon to design and implement an Internet tool which would help her accomplish that.

Despite the project's tiny budget, we decided to take the job.

The solution:

Our solution was to use a mix of selected Internet video and social networking technologies.

First of all, we developed an online editor for advertisements which was the first tool for the employer. Our client, the restaurant's owner, could record her own video containing the first (and most important) questions for the potential candidates and embed it in an editable landing page of the job posting.

People interested in becoming the restaurant's employees answer the questions by entering the page and recording their own videos. Then our employer has a chance to continue the interview with selected people by recording further videos or by writing (we added simple forum functionality for each interview), or simply by inviting people to the restaurant for a face-to-face follow-up.

Our client and all of the candidates receive notifications about new recordings and posts which enables them to control the process and respond quickly.

The technology (2011):

To create the first version of the product we used the most popular Internet technology (PHP) and built a web page. Besides the forum functionality, we had to introduce three major components: an online video recorder which worked with webcams (we created our own Flash recorder), a storage and streaming system for video files (we configured different media servers for our needs but we stayed with Wowza Media Server) and a web-browser tester widget which showed the users if their browser was properly equipped and configured to record and upload video recordings.

Software status and possible business cases:

Our client successfully used the software in several enrollments and decided to give us full rights to the source code, so that we could offer the solution to other companies.

We extended the project to the SaaS form, but we do not offer this service on the market as yet.

We are ready to make arrangements related to selling this project with its full source code, customize it (for example by refreshing the technology), help to form an HR startup or make the software compatible with existing (HR?) tools.

Should you be interested in licensing this particular technology/project, or in acquiring exclusive property rights, we will gladly put you in touch with the IPR owner(s).

The OnWave.fm Software

The clients and their objective:

Entrepreneurs organizing kindergarten radio workshops for children – people with a passion for the radio – our clients wanted to start an internet radio station and run an easy-to-maintain website with some simple audio functions, as an addition to their core services. We were called upon to solve technological issues and implement the project.

The solution:

We built the website with an online audio recording widget (with a range of editing functions, such as selecting and cutting), simple embeddable audio players and a file manager for audio samples.

The first solutions we proposed turned out to be too complicated, so instead we decided to invest our own money to design and implement the OnWave.fm Software and offer our client a license.

OnWave.fm is an automated Internet radio studio and mixer. It allows the radio editor to set up a schedule consisting of (thematic) blocks, jingles, “live on-air entries” (ad-hoc and planned) and to manage and tag a large base of audio files. Such a schedule is automatically played by the OnWave.fm software: audio files for thematic blocks are automatically selected and mixed so that they fill the entire block (with the accuracy of up to 1 second), jingles (or ads) are automatically played (with the desired frequency, between songs), and live on-air entries are automatically mixed into the output stream with additional jingles at the beginning and end of each transmission. The software doesn't store audio files itself – it supports remote storages for original audio files (which may be important due to licensing issues).

The technology (2012):

We took the popular Wordpress platform as a basis for the website, and we selected and configured some useful plugins. We created a custom Flash-based audio recorder with support for .ogg files and simple editing functions.

For the OnWave.fm software, we decided to use as much as possible from existing audio streaming software and finally decided to base our solution on LiquidSoap and IceCast. We developed a custom scheduling algorithm based on the genetic programming approach, a custom mixer for live on-air streams, and network and tagging logic capable of managing remote file storages effectively.

Software status and possible business cases:

After several years our clients are still actively working with kindergartens and their website is working without any problems. We are hosting their internet radio infrastructure based on their license for the OnWave.fm software.

We are ready to arrange selling the OnWave.fm software with added development services – for example to build a SaaS on top of it, to add some mobile features for radio editors (“mobile live on-air sessions”) etc. We can also do some research and try to extend the software to support video streams.

Should you be interested in licensing this particular technology/project or acquiring the property rights exclusively, we will gladly put you in touch with the IPR owner(s).

Demeter – a product for the energy industry, consumers and producers

The customers and their needs:

Nowadays effective management of such utilities as electricity, gas, air or heat is one of the main factors in market competition. Whatever you are producing, storing or distributing, the cost of energy is a significant element of operational costs. The need for accurate, on-line data regarding costs, the supply process and distribution effectiveness is usually boosted by the need of having it compared with the production scale, resources & production planning, and market prices.

On the opposite side of the balance sheet, we have the cost of building such a system in various complexity-of-use cases. So far this barrier can be broken only by the big industry with specialized personnel on site. We can change it by providing Demeter, a deployable dedicated solution for large installations and a cost-effective metering agent working in the Software-as-a-Service model.

The solution:

The first version of Demeter has been available to customers since 2009. This system was destined for the big industry and supporting plant maintenance staff to supervise effective energy consumption. The system provides economical analysis of physical measurements, so apart from specialized technical staff, we also addressed the application to departments involved with controlling, accounting and production management. Our initial experiences were collected and used in creating Demeter 2 – a fully distributed, scalable, cost-effective system (up to half a million devices controlled from one metering point) working in almost every wired or wireless connection, covering such functionalities as data acquisition (on-line and archive), alerting (including complex prediction and trend analysis for forecasting alarms and running preventing procedures), charting & reporting with autonomous generation of periodical reports which might be sent to e-mail recipients or file servers, maps and GIS, an inventory and documentation repository for large-scale installations, synoptic tables and on-line process/state visualization, an interactive UI for adaptive data analysis, statistical analysis and forecasting, scheduling and chronological control of processes, tariffs and supply prices, usage planning and purchasing. Moreover, Demeter can be deployed upon integration with Terminus – a system to register/track/account for service and maintenance tasks (Demeter can report faults, planned maintenance tasks and optimization requests to Terminus; or another SCADA/MES/ERP system – e.g. Wonderware InTouch, SAP, energy/gas trade exchange, etc.

The technology (2009-2015):

A web-based system deployable on a server (both Linux and Windows platforms supported), built in MVC architecture. Featured with a fully functional browser application with a responsive UI design, a tray application for Windows-based PCs to notify about alerts and events registered in the system and a mobile application for Android-based smartphones to register, track, localize and overview devices working with the system.

Demeter 2 utilizes the top new software and hardware technologies including Java/Grails/Groovy, WebSockets, WebSockets Proxy, HTML5/JavaScript/CoffeeScript, OpenStreetMaps/GooleMaps, SSL, auto-discovery and auto-registration of devices, NFC or QR-codes, LUA scripting language, Z-Wave/WiFi/LTE, Linux embedded devices with a great deal of integrated measurement and control hardware.

Software status and possible business cases:

The system is used in over 40 locations (factories, hospitals, offices, power plants etc.) as a dedicated internal server and in dozens of small installations working with a shared server. Through ongoing support and development we respond to our customers' needs in three areas: adding drivers to new devices, adding features and custom applications, as well as optimization and extensions in core the functionality to make the system even more reliable and deployable in new areas. For instance: RF, PLC and Z-Wave drivers to build a mesh network of distributed wireless metering devices,

adopting the system to customer-specific requirements, including its use in prisons, schools or public places (so called: intelligent building), as well as monitoring frauds and malicious usage,

Should you be interested in licensing this particular technology & project or acquiring the property rights exclusively, we will be happy to put you in touch with the IPR owner(s).

Orion – hardware and software for a street lights management system

The client and his problem:

A local technical university established a joint-venture project with Japanese corporation to R&D a new product related to intelligent street-light management. They wanted to design and prototype microcontrollers and suppliers allowing very precise and cost-effective scheduling of light scenes, with algorithms auto-adopting the system to weather conditions, lighting of objects in the neighborhood, traffic intensity, etc.

The consortium can provide scientists in electric and electronic engineering, but they need someone experienced in wide computer systems who can conduct research and test assumed models and then design and build a system capable of maintaining installations up to 500 000 lamps.

The solution:

Our engineers were involved in the overall system decomposition and design of all layers and distributed elements, including the communication methods and protocols. Further research was focused on completing platforms and modules to build such a distributed telemetry and control system. We decided to make a last-mile grid network using a combination of two mediums: PLC and RF to get the most reliable and still cost effective solution. The university was responsible for implementing the hardware and two lowest layers of the protocol stack. We implemented higher layers in the embedded data acquisition subsystem placed on an ARM-based Linux device. This device is equipped with hardware responsible for local environment monitoring and fault-tolerant mechanisms designed and prototyped by our engineers. It is a reliable distributed platform allowing us to fully control last-mile installations with dozens of street lamps. Thanks to the broadcast character of the medium we can also make one redundant controller for lamps orphaned by another controller.

In parallel we designed a central application for mass data collection from measurement devices and a data warehouse to provide a variety of analytics reports – starting from energy and maintenance costs, carbon fingerprint (CO2 emission impact) and inventory aspects, up to complex simulations of changing lamp types, energy providers, tariffs and schedules. On top of this data we built reports predicting faults and planning service actions.

Thanks to integrated GIS functionality, we can show the state of the system on a map and support gathering geo-location data with a mobile application for service personnel.

The technology (2013-2015):

The remote controllers: embedded Linux (Raspberry Pi), microprocessor measurement devices connected via I2C/SPI/USB buses. Multithread server software written in C++, controlled with a GUI designed in an HTML5 web application based on the Angular framework. The communication protocol: Web-socket-based bidirectional HTTP(S) connections. Web-proxy to make all remote controllers reachable from the Supervisory Centre. The supervisory center: a Java/Grails/Groovy server application with a responsive UI designed in HTML5 based on the Angular framework. Role-based access management. GIS data pulled from OpenStreetMaps and services provided by Google Maps.

The service app: an Android application for finding and tracking particular devices in the system, collecting full information, including GPS positioning and photo documentation.

Software status and possible business cases:

All copyrights including the source codes are transferred to the customer. We have supported the project maintainer in production, deployment and introduction of new features. Thanks to the testing and validation phases having been performed at the university's laboratories, a great deal of materials and observations were gathered for subsequent innovative improvements.

Should you be interested in licensing this particular technology, embedding this concept in your devices, or acquiring the property rights exclusively, we will be happy to put you in touch with respective IPR owner(s).

CabinPlanner – on-line design and quotation for beam houses

The client and his idea:

A private entrepreneur who owns a factory of beam houses had an idea to sell his products on the Internet. The classic on-line web shop was already in place, but the client found that most buyers wanted to customize the standard project to meet their own needs. Almost all orders had some changes requested by the customers. This engaged the architect and factory engineers who needed to recalculate the projects and reset the machines.

The goal was an on-line tool to self-design and plan a beam house with a drag & drop user interface. The tool should also calculate the construction and quote the price. The first attempt by an Indian software company was not promising – they could not convey the complexity of the projects and customer's wishes.

The solution:

We declared to make a mathematical model of a beam house and introduce constructional constraints into it. On top of this model we built a presentation layer for a 2D top view supporting drag & drop functionality for walls, doors and windows. This proof-of-concept worked perfectly, so the client decided to fund further development and we provided such features as:

- “on-change” validation if it's possible to make such a construction;
- “on-change” quotation of the full project;
- side views of the designed house;
- terraces, floors, rails and fences;
- lofts, second floor and roof manipulation;
- adding furniture for better visualization of sizes and spaces
- a 3D view with an active first-person-perspective camera allowing a walk around the inside and the outside.

The technology (2012-2015):

As the main features are implemented on the client's side, in a browser, the solution is written in CoffeeScript and precompiled to obfuscated JavaScript with support of Kinetics.js and Three.js libraries. The server side is based on a RubyOnRails framework served by Nginx. As the database solution we can use MySQL or even a flat file database like sqlite3.

Software status and possible business cases:

The software is available for registered customers only, mainly resellers and local representatives of the customer, because the factory could not keep up with the demand and the client was afraid of over-selling. Next year the project will become publicly available, as soon as we speed up the production with automated conversion of the designed project to set a of commands for the machine tool (CNC). For testing purposes you can use the developer's machine <https://dev.cabinplanner.eu>.

The idea, along with the source code and author's rights, belongs to the customer. We can use parts of this software in other projects as long as the project is not designed for our client's direct competitors. So, if you need a similar custom-made design on line (e.g. for windows planning, furniture design, garden planning, non-beam cabins and shelters or homes) we can not only prove our abilities, but also can use some experiences, tools, techniques and libraries in your project.

Should you be interested in licensing this particular technology/project or acquiring the property rights exclusively, we will gladly put you in touch with the respective Intellectual Property Rights owner(s).

FrontOffice – an on-line platform for cross-selling customized business gifts

The client and his obsession for perfection:

One of the biggest business gifts distributor in the country wanted to provide for his business partners a full stack of web applications for web selling/ordering, on-line customization and control of the decoration process. The client was disappointed with the quality of the on-line presentation of his offer on web sites created and controlled by his resellers. The client had also a set of side goals: to activate new agencies to work with him and to ensure better positioning of his offer in the Internet search engines.

The solution:

The system evolved from a multi-domain web catalogue to a full-featured platform for B2B trade. The partner can register a company, several workers and several domains (a domain is a full e-commerce solution web site with CMS, an on-line shop and some marketing and operational tools, including on-line payments, newsletters, Google Analysis, sales actions, bonus codes, individual pricing for end users, dedicated offer preparation in PDF form, stock booking, merchant credits, etc.). There is a list of products and services offered by suppliers. Each product can be taken to a domain with a different price, combined in a package with another product or service and offered under terms & conditions specific for that domain. It allows creating a domain for particular countries/languages with an offer and terms tailored for this market, creating multi-brand domains for the same offer or a narrowed-down one, and creating shop-in-shops for key customers, etc.

The partner can be a supplier as well. It is possible to add one's own products and services to the product list and offer them in domains mixed with the rest of the products. Moreover, one's own collection can be created and made available to another partner or to all participants of the platform. So the main collection can be extended by adding products and services provided by different suppliers, but the domain holder fully controls the offer of his domain. Orders are automatically split and passed on to the right suppliers. The end user observes the processing of the entire order and receives notifications/bills only from the originating domain, even if we allow blind shipment.

In this particular case, we add to the cart in the shop an on-line tool called “Design Studio” where the end user can upload his own graphics, add text, place the project on the product and choose the decoration method (e.g. printing, laser engraving, etc.) to customize the item ordered. A visualization document, including the measurements, pricing, and technical details is available as an attachment in the cart and is sent in an e-mail to the end user, the domain help-desk and the person responsible for the decoration service (as the service can be optionally outsourced to another partner).

The customization process is supported by the back end side as well, including negotiation/confirmation interactions with the end user when the designed project has defects or technological limitations.

The technology (year 2005-2015):

Starting from 2005, when the first versions of the web platform and back-end tools were deployed, every year we have developed new features or redesigned the platform to optimize the performance, modernize the technology, and make UI/UX improvements. The system is currently based on the RubyOnRails framework and MySQL database.

Software status and possible business cases:

We own and maintain the full know-how and technical part of this project. The project can be used as a basis for other applications or deployment areas. We can also deploy an as-is version for organizations with similar needs in terms of distribution, providing quickly deployable e-commerce sites, multi-domain web solutions and a grantable B2B platform for on-line trading.

We only have a gentleman's agreement not to offer the “Design Studio” to our client's direct competitors. But use of this technology on other products (e.g. printouts, dress customization, card design) is not restricted. Should you be interested in licensing this particular technology/project or acquiring the property rights exclusively, we can put you in touch with the respective IPR owner(s).

Terminus – a ticketing tracking and accounting system for a company supplying repair and maintenance services.

The client and his problem:

A very fast growing company aimed to support large industrial plant (paper mill or power plant) by delivering complex repair and maintenance services for factory installations (starting from construction and building, through machinery and hydraulics, up to automation and robotics). They had a problem with proper tracking of the workflow, efficient recording efforts spent on an order, warehouse management and the resource supply chain. Finally they wanted to calculate precisely the cost and gain of an order to introduce profit sharing for the staff involved in profitable tasks.

Initially all data was analyzed in several Excel spreadsheets. But the number of offers, orders and realizations was growing so fast, that customer became desperate to find a system for sharing data and responsibilities across the organization. They tried some off-the-shelf products, but finally decided to fund a custom project, because there were no products covering all needs.

The solution:

We started working with an analysis of the current state of the company, gathering information about formal and non-formal processes (including habits and practices of individual workers) and collecting all requirements into a web tool supporting Agile project developments. With the customer we defined sprints and minimal market functionality, to provide modules helpful in particular areas as soon as possible. We deployed the warehouse module with a host of customer-specific features, such as assigning goods to orders and realizations, the FIFO/LIFO method of clearing the warehouse, sub-warehouses and tracking of goods, dedicated warehouse types for materials, bulk goods and tools (the items that return to the warehouse, but are controlled for wear and depreciation).

Subsequently, we provided modules for work management (realizations), work accounting, tools use and release of materials/parts. Real calculation of the cost of implementation was the starting point for our tools to handle the pre-order work flow: preparing offers, collecting requests and questions, registering orders, splitting orders into realizations and assigning realizations to teams/gangs. Finally we provided tools for issuing invoices, calculation of profits and spreading bonuses according to profit sharing rules. Meanwhile we implemented some additional features which went against what tends to be available in more formal software packages but were nonetheless needed in the real-world operational environment of our client. For instance, we allowed the use of goods in production, which could not be released from the warehouse, because they weren't supplied.

The technology (2014):

The system was designed as a server solution accessible via PCs (web application), tablets (web & mobile application) and mobile phones (mobile application). The core functionality was built in the Java/Grails framework deployed on a Tomcat server. The user interface designed in HTML5/CSS3 with extensive usage of JavaScript can be supported by dedicated devices, e.g. a photo camera on a tablet or smartphone, an external bar code scanner or an RFID/NFC transceiver.

Software status and possible business cases:

We perform on-going support for this system. It is deployed for three companies owned by the entrepreneur who ordered the system and we are developing of features necessary to adapt the system for two new installations. All author's rights belong to us and we can convert this project to a ready-to-use on-line system offered to similar companies in the SaaS model.

Should you be interested in licensing this particular technology and project or in acquiring the property rights exclusively, we will gladly put you in touch with the respective IPR owner(s).

PocketBus – software for bus carriers and coach operators

The client and his objectives:

An owner of a medium-sized transportation company, operating several local lines and a fleet of buses for hire, wanted to make his organization more effective using new technologies. The process of selling period tickets, managing the buses and connections, assigning drivers and planning routes was very inefficient. The same opinion was shared by the company web site, designed many years ago, out of date, and wrongly displayed on mobile devices.

The client was very interested in developing a solution which could meet all his needs, and address his experiences and ideas. However the budget was rather limited, so we could not deliver the full project scope at once.

The solution:

The client's main concern was honest and reliable cooperation with a company that would respond to consecutive requests and be able to cover the entire scope of the project. The time horizon was set to 3 years and the introduction of new features was adapted to the budget. We started with a multi-language micro-CMS implementation (menus, articles, galleries, messages) and a web page supporting user registration and granting access based on user roles. It allows creating several roles for front actors and back actors and teaches the client's employees how to maintain the web page and share internal information without disclosing it to end users.

We quickly added to the back end web pages for managing the buses, lines and timetables. In the same phase we added some GIS information and visualization of routes, stops and buses on the road available on the front page (using OpenStreetView or GoogleMaps). In parallel the mobile application for drivers was developed and all information necessary for the web page – including the GPS positions of the stops, the inter-times between the stops, and photos of the stops – can be acquired “by the way”. The new web page with timetables and routes visualized on-line was ready for deployment.

In the process of continuous deployment we soon added such features as a connections finder, a database of buses with filters and booking options, sale of on-line period tickets (with PayPal and PayU integration), an internal calendar for employees integrating information about buses hired, drivers assigned, as well as holidays, absences, meetings and reminders.

Finally we developed an analytics module to make statistic aggregates about bus utilization, driver workloads and profitability of resources and offers. Another side functionality added to the software was a tracking module to discover frauds and unintended usage of the fleet (overgenerous fuel consumption, extra routes or legs, delays etc.).

The technology (2014-2015):

The web application written in the RubyOnRails framework using MVC methodology with a GUI based on HTML5/CSS3, organized with the Angular framework. The RESTfull API for the system is utilized by Cordova/IONIC-based hybrid mobile applications designed for:

- the driver: track the course, update route information and check tickets (GPS, NFC, QR, camera and GSM)
- the cashier: register passengers, archive documents and print tickets (NFC, QR, camera)
- the passenger: check connections and manage ticket orders.

Software status and possible business cases:

We own the source code and the author's rights to all of the components used in this project. There is a plan to extend the project with multi-domain features and deploy it on a bigger server in SaaS model to offer this service to a wide range of transport companies.

The initiator of the project also has a number of ideas he wants to implement in the future, for instance single-fare tickets on a mobile app or via SMS codes, pre-paid and micro-payments, interoperation with sub-urban train connections, usage of the customers database for delivering advertisement content to the buses (flat panels, voice spots) according to traveler profiles.

Should you be interested in licensing this particular technology and project or acquiring the property rights exclusively, we will gladly put you in touch with the respective IPR owner(s).

PenForwarder – a data capturing, acquisition and retransmission device for digital pens

The client and his problem:

Sertal, the Swiss company specializing in digital paper solutions, is using digital pens – intelligent devices integrating a traditional pen with a scanner, able to record hand-written text on paper forms, store digital documents in a flash memory and transmit them to a USB docking station or Bluetooth receiver. The software responsible for catching files and retransmitting them to the central server was very unstable, as it was installed on Windows XP-based PCs.

The main problem was the area of deployment – dozens of locations, hundreds of kilometers apart – and supporting customers with restarting the PCs and reinstalling the software cost too much.

The customer dreamed of a simple box solution capable of taking over the responsibility of the software thus far installed on PCs. We still had to use USB docking stations, but the box needed to offer more stability, and in case of any trouble there should be a simple procedure to restart the box or replace it with another device delivered by mail.

The solution:

At first we found a reliable platform based on ARM processors, running a stable Linux distribution. Next we checked if the hardware would interoperate with the pen's docking station and if we were able to control a reliable connection with the pen. The customer did not provide the transmission protocol documentation, so we needed to capture some data sent to the formerly used PC software and recognize the stack and message flow in the communication. Then we recreated this algorithm on a Linux device to handle all transmission scenarios properly.

When we had the proof-of-concept fully tested, we also developed software for auto-diagnostic connections to pens, hot-plugging procedures for docking stations, finding an Internet connection and a route to the central server, web-proxies/firewalls/NAT passing techniques, auto-registration on the central server after powering on, remote management and firmware update from the central server, etc.

The final cut was completing a nice case, with a power supply and the design (PCB and manufacturing) of an extension board with 10 LED indicators signaling the current status of work.

The technology (2012):

Linux software programming and deep integration with the operating system. Modules written in C++ for kernel space and user space services, extensions for the USB handling stack in OS, a software watch-dog to keep all the services running. Shell programming for proper handling of the installation, configuration and automated update processes. PHP servlets to handle central management of all boxes.

Software status and possible business cases:

This solution is used in approximately 30 locations on more than 50 devices and we continue to support the customer with new features and new installations. The end users confirm the new solution is less troublesome and more reliable than the original software. It also dramatically reduced the cost of:

- deployment – personal installation of a PC with the software, vs. a ready-to-use box delivered by mail,
- support – there are only two procedures for the end user: turn the device on/off or send it back and wait for a new one, so the number of help-desk cases is also much lower than before,
- maintenance – the solution is so cheap that it is preferable to replace a broken device with a new one than repair it.

We are able to optimize all data processing on all platforms – starting from central servers up to embedded devices working continuously and consuming less than 5W of power, even if the technical details need to be discovered.

Should you be interested in licensing this particular technology/project or acquiring the property rights exclusively, we will gladly put you in touch with the respective IPR owner(s).