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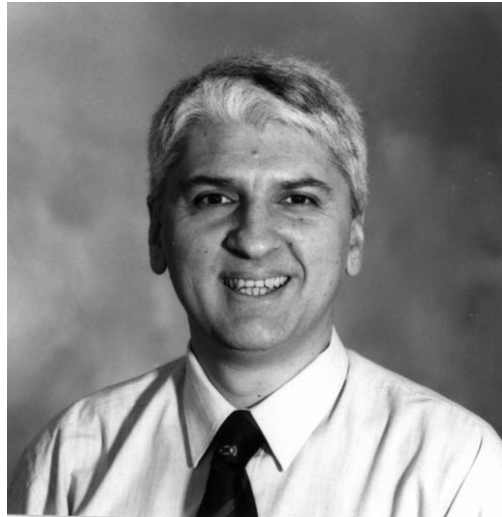
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MSc Electrical Engineering
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Professional background

2006
Founder ProSoftwarica

1998 – 2006
Zuehlke Engineering AG
Software Engineering Consultant,
Architect, Coach and Trainer

1995 – 1998
Metromec Software AG
Software Engineer,
Project Leader

1989 – 1995
Sulzer Chemtech AG
Software Engineer, EDP Analyst

1986 – 1989
Aerospace Institute Belgrade
Software Engineer / Analyst

1984 – 1986
Research and Development Institute
Belgrade
System Engineer, Acquisition and Control

1984
University of Belgrade
MSc Electrical Engineering

Major areas of expertise

- ✓ Management of Complexity, Abstraction, Separation of Concerns, Decomposition, Model Driven Development, Software Product Lines
- ✓ Requirements Engineering, Use Case & Feature Modelling,
- ✓ Architectural definition and evaluation
- ✓ Software Development Processes
- ✓ Design of distributed Enterprise, Embedded and Real-Time systems
- ✓ Design Patterns, Refactoring Technique
- ✓ Object-oriented Software Metrics
- ✓ Middleware: Corba, Connexis, Tao, Ace, Zen, JacORB, IDL
- ✓ Natural Language Processing: GATE
- ✓ Tools: Topcased, Papyrus, Eclipse, oAW, MetaEdit+, IBM Rational, Rhapsody, Enterprise Architect, MagicDraw, Poseidon, Together, Visual Studio
- ✓ Platforms: VMS, Unix, Windows, Linux, Jbed, VxWorks, PERC, VenturCom, embedded NT, DCS-RTOS(Yokogawa)
- ✓ Languages: UML2, xUML, QVT, ATL, XSLT, Mofscript, AOP, Xpand, Xtend, Check, Java, Javascript, C/C++, Ada, Delphi, APT Graphcet, Modula2, Pascal, Basic, DCL, TPU, Fortran, Assembler
- ✓ Web technology & Portal architecture: Glassfish, WebSphere, WebLogic
- ✓ Application integration & web services
- ✓ Database management systems: Hibernate, OO2RDB mapping, Oracle, Informix, SQL Server, MySQL, HSQL

Project examples

A new generation of Road Construction Machinery

The stakeholder, a large manufacturer of road construction machinery is preparing to develop a new generation of systems. The mandate starts with a vision elaboration detailing the current and future needs of the vehicle embedded systems functionality. Further, an extension of the existing big picture is provided with a control center capable of topology and supply chain information acquisition and processing. The control center is furnished with functionality ranging from on-line data acquisition to automatic task dispatching. Early warning messaging capabilities are defined for critical real-time tasks enabling the responsible on-site engineer to react timely to unexpected events such as supply latency.

A new reference architecture is elicited for a variety of controlled vehicles aiming to reduce complexity by reusing concepts and related components e.g. variability management allows controlled variation of the functionality of the envisaged vehicle product line. Additionally, an assessment of existing real-time embedded systems is carried out to define software quality of existing components. The assessment also answers questions such as which software parts are reusable and which components need to be reworked to be incorporated into the new reference architecture.

Delivered benefit to the client:

A working prototype of the reference architecture is built demonstrating concepts and advantages. The elaborated concepts, reference architecture and assessment results, provide a framework for project sizing i.e. elaboration of the project realisation plan, resource and budgeting needs.

Technologies: RUP, UML2, C, C++, Windows, Microcontroller platform based on interrupt processing and small memory footprints.

Requirements Engineering for a new generation of Self Service Point of Sale - Billettautomaten

A large Swiss railway transport company prepares to develop a new generation of "Billettautomaten" in cooperation with one of 5 competing hardware and software suppliers. The supplier of choice is to be evaluated based on the carefully elicited set of requirements and evaluation criteria. The task is to engineer the necessary system requirements, both functional and non-functional, and describe them for a several potential hardware and software suppliers. A hardware abstraction layer is also identified with a number of interfaces satisfying the necessary requirements. After internal approval obtained after a series of informal and formal reviews, written documents are sent out to the competing suppliers. The received feedback is analysed, questions answered and guidance provided until all details concerning the requirements and the hardware abstraction layer have been clarified. The final evaluation of returned documentation identified clearly the preferred suppliers for the project.

Technologies: RUP, Requirements Engineering, UML2, Windows and Linux (Debian).

A new generation of security control systems

A Swiss market leader has decided to make the step towards developing a new generation of security control systems. Previous development was carried out using a waterfall life cycle, procedural programming languages and was dominated by scarce documentation and the single head of knowledge syndrome. A paradigm change is necessary in order to reap the benefits of innovative technologies. A software development process is introduced based on the iterative,

incremental, use case driven and architecture-centric principles. Training courses in OOA/D, UML and modelling Tools guide the developers into new ways of thinking. Requirements capturing results in over 200 identified use cases. Architectural analysis identifies a framework for a product line i.e. common infrastructure for all future systems. The elaboration phase is used to implement critical parts of the required framework. At the end of the elaboration phase a cluster of 5 to 12 CPUs was deployed and necessary metrics were collected. The results provide a basis for a proof of concept of the elaborated architecture.

Delivered benefit to the client:

The elaborated framework together with quality training and on-the-job-coaching enables the client team to autonomously face the construction phase. Identified risks related to the paradigm change and the project itself have been either eliminated or effectively mitigated. The result is that the client team is enabled to the stage where domain know-how and diligence are required to lead the project into a success.

We deliver the prerequisites to make the project a success with full functionality, on time and within budget.

Technologies: RUP, Requirements Engineering, RequisitePro, UML2, Rational Rose Real-Time, C++, Windows, Eclipse and embedded Linux.

An automatic, black box test system

A well-known medical device manufacturer needs to shorten the automatic black box testing cycle and increase test coverage in spite of a growing number of interacting devices comprising the system under test. An evaluation of pervasive, commercial testing tools reveals that not one of them satisfies the set requirements. Therefore, a custom 5-layer architectural solution is defined to

bridge the elicited market gap. The automatic tests are script driven, whereby each command is executed in 2 phases. In the first phase, one device is navigated to specific behaviour e.g. to generate configuration updates, that result in ripple effects propagating to several other devices. In the second phase, each participating device is navigated to and verified for compliance against a test specification. Test data is acquired directly from cameras observing LCD displays, tactile and other sensors. Since the system availability is specified to 5*24 hours, the system enables script testing and debugging in the absence of target devices as well.

Technologies: RUP, UML, Rational Rose Real-Time, Java, Windows.

Project and Architecture Coaching

The client is in a position to expand the production of his electronic card payment devices and enter new markets that were previously unimaginable. In order to achieve this target 2 software packages are to be developed i.e. the existing software needs to be made EMV compliant before EP2 functionality can be implemented. Both functional blocks pose a development challenge for the client's development team, 12 developers, which is heavily burdened by maintenance and product release activities. Main activities are project definition, RUP coaching, architectural coaching during framework development, team coaching in OO analysis and design as well as conducting reviews.

Technologies: RUP, UML, C++, Rhapsody, Black box and Unit Test Environment

Train yard design and control system

The train yard design and control system is realised as part of the new

railway automation project. The task is to provide a genuine test platform for automation control, whereby each part of hardware is simulated in its entirety. A simulation programming language is provided that enables each simulated component to exhibit behaviour as defined by the current command set e.g. generate faulty behaviour on predefined events. The simulator is a reusable system component relying on configuration e.g. infrastructural topology description rather than hard-coding. Quality attributes of the system are: usability, flexibility, reuse, remote, distributed, asynchronous and real-time. The project was staffed with 5 developers for a period over 12 months.

Environment: RUP, UML, Rational Rose Real-Time, Connexis, XML, Spirit Parser, VxWorks, Interrupt Handlers, Profibus, Windows.

Real-time Java evaluation

The task is to evaluate a new target platform that will provide better isolation from the underlying operating system, as well as satisfy real-time and performance constraints. The evaluation platform is Perc, NewMonics, a clean room Java VM implementation. Two test applications were written, a client and a server, communicating over TCP/IP that could be executed collocated or remote. Performance dependencies were analysed between interpreted, JIT, accelerated bytecode and AOT code. Control of the size of generated image was enabled by specifying methods to be AOT compiled using the Accelerator tool. The Romizer was used to "prune and shake" i.e. free the image from unused methods. Alternative performance tests concentrated on exploring the run-time features of the Perc VM. Variations in dynamic class loading and timing were tested. Finally, programmatic control of the garbage collector allowed fine-tuning of system performance where

and when it was actually needed. The project was complemented with a workshop that enabled know-how transfer to the client.

Technologies: VxWorks, NewMonics Perc VM, PowerPC based system.

Automation vision

A new generation of automation systems is to be developed. A vision document is elaborated exposing a set of emerging user needs by recognizing the opportunity of integrating various subsystems and providing efficient user access to the integral. A number of involved subsystems are identified and the degree of their interaction is systematically quantified. This knowledge is used to propose an overall system architecture that is to serve as reference for the integration and development of next generation systems with a projected life span of 10 to 15 years.

Technologies: RUP.

Virtual reception system

A prototype system is built with the task of automating the reception desk business process with a respective workflow. The use case model provides for the necessary understanding of the domain concepts. Consequently, a clear-cut architecture emerges, identifying contained, well-manageable components. Contracts are specified that the components have to honour, in order for the system to fulfil the set requirements. The chosen software infrastructure, on which the application is built, consists of JSP pages, a web server and a Model2 MVC framework. A user interface running within the familiar and widely available browser is provided. The workflow requires integration of external subsystems, namely badge dispenser, ISDN telephony and access control within the premises. Main activities include

project management, use case modelling, architecture definition, as well as team support during design, implementation, testing and deployment.

Technologies: RUP, UML, Together, Forte, Java, JavaScript, JSP pages, Model2 MVC framework Struts, Tomcat web server, C++, JNI, JTAPI, RS232, USB.

UML consulting

A PBX system is developed based on voice over IP technology. The project introduces new concepts to the team such as RUP, UML and object-orientation. The main tasks are UML training and coaching as well as architectural consulting.

Technologies: RUP, UML, Rational Rose.

Real-time consulting

A new generation of real-time control systems based on embeddedNT and VenturCom is designed to be used in three similar domains in the cement industry. Control and supervision are physically distributed via middleware. Control is realised using the VenturCom extension running on dedicated hardware. Supervision clients use the standard Windows NT platform.

Technologies: RUP, UML, embeddedNT, VenturCom, C++, COM.

Elevator system

Providing consulting to the IT-Department at a technical college. The project consists in offering assistance for the introduction of Java-based, real-time systems with an aim to promoting Java know-how among the students and eventually replacing the existing and out-dating Ada-based environments. For this purpose, a graduate project is carried out with a

small team of diploma students. An elevator system is specified, designed and implemented, providing a number of valuable scholarly examples and hands-on experience for the students.

Technologies: RUP, UML, Java, Jbed.

Reengineering of a photo-printing system

Project lead, architectural definition of the system, coaching and consulting a team of 12 developers. A large software system consisting of +500kLOC is reengineered in two phases. The project assessment phase provides an insight into the metrics and chronic architectural problems and the rework phase defines and implements the solutions. Proprietary, error-prone communication mechanisms are replaced by Corba-based solutions making use of asynchronous method invocation, naming service as well as the notification service based on the publish-subscribe mechanism. This provides a standard-based system eliminating fragility and promoting maintainability, reliability and robustness. Refactoring techniques provide reusable class trees, enhancing extensibility. Application of real-time techniques enables the machine to reach the specified performance.

Technologies: RUP, UML, embeddedNT, VenturCom, C++, Sniff, tools for software metric analysis.

Framework for a new product line

Flow meters are devices that must interact with clients as well as provide real-time i.e. deterministic behaviour. The primal forces for the framework are to define the reference architecture and provide for extensibility, maintainability, reliability and performance of the product family. The framework should also reduce the development time for new devices. Enabling techniques include generation

of UML classes from a proprietary system description into Rational Rose using Rose scripts and ODBC. Code generation is employed to obtain C++ like code whereby the real implementation language is C. Inheritance, polymorphism and encapsulation are available by implementing the well known OOP concepts in C.

Technologies: RUP, UML, Rational Rose with Extensibility Interface, MSAccess, VC6.0, OO to C Mapping.

Reverse engineering and extension of an ICCP gateway

ICCP (Inter Control Centre Protocol) is a standardised protocol for the transmission of data in the energy producer/consumer sector. A gateway enables the data exchange between control centres using proprietary protocols. The device itself is a Windows NT-based PC, using a SQL server database to define bilateral communication capabilities. It is required to analyse the existing gateway software, to document and extend it, and provide means for arbitrary client applications to access the available ICCP data.

Technologies: Microsoft Developer Studio 5.0, Microsoft SQL Server 6.0, ICCP.

Fly-by-wire

Analysis, design and implementation of real-time software for data acquisition and flight control in the aerospace industry. The system architecture is based on a redundant, serial bus (1553b) with more than 20 autonomous, real-time subsystems such as radar, laser-tracker etc. The man-machine interface and process visualisation are distributed on several monitors i.e. 3 head-down displays and 1 head-up display. A flight simulator is developed enabling the superposition of the real world scenery

with computer generated images using vector graphics.

Technologies: ADA, C++, VMS, HP-Unix.

SCADA systems

Evaluation, configuration, analysis, design and implementation of real-time process control and visualisation systems for the control of chemical processes. A custom database is the source for flexible control of batch processing. More than 200 field devices i.e. pumps, valves, PID controllers etc. are processed within the 1 second real-time period. The redundancy of processor cards, controller hardware and networking, provides guarantees for a continuous operation in a hard environment.

Technologies: TI-APT Graphcet, DCS-RTOS Yokogawa and Unix.

Coordinate measurement machine software

The automotive industry relies heavily on precise measurements and early production qualification. Work parts are designed using standard CAD tools e.g. Autocad. These models are exported for manufacturing machines as well as CMM (IGES files). After work part production and CMM verification it is possible to quantify and qualify production errors with a qualification report. Dimensional Measurement Interface Standard is also used to ease system interoperability.

A single CM machine exhibits 6 degrees of freedom. Each machine may be fitted with a motorised probe head, augmenting the domain complexity. Clusters of up to 3 CM machines may be organised. Software features include teach-in program mode, program mirroring etc. Computer aided accuracy algorithms provide corrections for 21 machine and temperature errors as well as work

part errors. About 40 CMM hardware producers are integrated into the CMM software system including Renishaw, Zeiss, Stiefelmeyer, Brown&Sharpe, Wenzel, Pantec, Trimesures, Dea, Romer, Imetric, MetroNor.

Hands-on experience includes object oriented analysis and design, implementation and test for the complete coordinate machine measurement suite of applications as described above. Domain of client expertise includes such automaker companies as BMW, VW, Audi, Porsche and Peugeot.

Technologies: Windows NT, C++, Delphi, Modula2.

Probe head servo

Analysis, design and implementation of software for the PHS probe head. Algorithms for calibration, positioning and control of the probe head system allow for integration into existing 3 axis machine controllers.

Geometric evaluation using optical systems

Images of work parts are produced with at least 2 digital cameras. Evaluation of points of interest is done on the Sparc workstations followed by general geometric evaluation using the CMM software.