

Time	A1	B1	Cafeteria
Wednesday, June 1			
08:30-09:00	Registration		
09:00-09:20	Opening		
09:30-10:50	S1: Development & Testing 1	W1: Geekstone	
11:00-12:00	K1: Keynote Session 1	S2: Next Generation TV & Video 1	
12:15-13:00	K2: Keynote Session 2		
13:00-14:00			Lunch break
14:15-15:45	Computer Engineering Open Day		
16:00-16:30			Coffee break
16:30-17:15	K3: Keynote Session 3		
17:30-18:30	S3: Smart Homes & Things	S4: Development & Testing 2	
18:45-20:00	Social event - cocktail		
20:00-21:00	Conference dinner		
21:00-23:00	Conference party		

Thursday, June 2

10:00-11:00	S5: Hardware & Software	S6: Next Generation TV & Video 2	
11:15-12:00	K5: Keynote Session 5	K6: Keynote Session 6	
12:15-13:00	K7: Keynote Session 7	W2: STARTSoPI FOCUS	
13:00-14:00			Lunch break
14:00-14:45	K8: Keynote Session 8		
15:00-16:30	S7: Cloud Computing	W3: European Training Academy	
16:30-16:50			Coffee break
16:50-17:50	K9: Keynote Session 9		W4: Hackathon
18:00-18:30	Best paper awards, Closing		

Wednesday, June 1

Wednesday, June 1, 08:30 - 09:00

Registration

Rooms: A1, B1

Wednesday, June 1, 09:00 - 09:20

Opening

Welcome notes

Nikola Teslic, CEO RT-RK

Boris Dumnic, Vice-Chair, IEEE S&M Section

Room: A1

Wednesday, June 1, 09:30 - 10:50

S1: Development & Testing 1

Room: A1

Chairs: Momcilo Krunic (RT-RK Institute for Computer Based Systems, Serbia), Djordje Saric (RT-RK Institute for Computer Based Systems, Serbia)

09:30 **Data flow in automated testing of the complex automotive electronic control units**

Velibor Ilic (RT-RK Institute for Computer Based Systems, Novi Sad, Serbia); Srđan Popić (University of Novi Sad & RT-RK Institute, Bosnia and Herzegovina); Milan Kovačić (RT-RK Institute for Computer Based Systems, Bosnia and Herzegovina)

Process of development complex electronic control units (ECUs) is usually complex and requires several iterations (releases). After each iteration, it is necessary to perform detailed testing and verification of all components in a testing

environment that is as similar as possible to the real system. For this kind of testing it is recommended to use the automated testing environment that generates detailed reports about each segment of tested ECU. This paper describes techniques for secure and automated data flow in process of electronic control units testing.

09:50 *MDA approach in designing real-time embedded systems*

Alen Suljkanović (Typhoon HIL, Serbia)

Real-time embedded systems require efficient and maintainable source code. Most real-time systems are written in C programming language, which satisfies these needs. Though efficient, developing real-time systems from the scratch by using only C has serious impact on the productivity. To increase the productivity, the level of abstraction must be raised. This paper shows how real-time embedded systems can be developed by using models. Models are designed and validated inside the Typhoon HIL's1 Schematic Editor by using predefined components from the library. Thus created models are used as the specification for the process of code generation.

10:10 *Bandwidth Utilization in Deterministic Networks*

Miladin Sandić (Faculty of Technical Sciences, Bosnia and Herzegovina); Nikola Teslic (University of Novi Sad, Serbia); Ivan Velikic (RT-RK, Serbia)

In this paper we analyzed how a frame size type, period and number of virtual links affect bandwidth utilization in deterministic networks. This analysis is important for services which combine avionics applications and consumer electronics, such as In-flight entertainment. We analyzed one topology of TTEthernet deterministic network, and influence of the TT, RC, and synchronization traffic classes to total bandwidth utilization.

10:30 *Protection of Android Applications from Decompilation Using Class Encryption and Native Code*

Stefan Ilić (RT-RK Institute for Computer Based Systems, Bosnia and Herzegovina); Slavica Đukić (Faculty of Electrical Engineering Banja Luka, Bosnia and Herzegovina)

In this paper we analyzed how different methods of protection, namely class encryption and usage of native code, affect decompilation of Android applications. This is important in consumer electronics as it can be used to stop repackaging and spreading of maliciously modified applications. We analyzed two different methods of protection, their benefits and flaws.

W1: Geekstone

Room: B1

Chair: Milena Milosevic (RT-RK Computer Based Systems LLC, Serbia)

Wednesday, June 1, 11:00 - 11:45

K1: Keynote Session 1

Room: A1

Chair: Dmitry Vavilov (T-Systems RUS, Russia)

11:00 *Perspectives of sensing in agriculture*

Vesna Crnojević-Bengin (Faculty of Technical Sciences, University of Novi Sad, Serbia)

Agriculture today faces a great challenge of providing enough food and water for the ever-growing population. Advanced ICT technologies have the potential to make a huge impact - new paradigms such as "Internet of Things" and "Big Data" will, when deployed effectively, work towards achieving crucial long-term objectives of agriculture such as efficient farm management and resource efficiency, and traceability and supply chain efficiency. In particular, multidisciplinary and synergic efforts of various research efforts in new materials, micro and nanoelectronics and wireless communications have resulted in new devices such as ultra-compact sensors for in-situ and proximal detection of various physical or chemical parameters important in agriculture. In this talk, some of the most recent results in microfluidic devices, laser micromachining for MEMS and other state-of-the-art technologies will be presented together with their applications in sensors for agriculture.

Wednesday, June 1, 11:00 - 12:00

S2: Next Generation TV & Video 1

Video Quality Assessment

Room: B1

Chairs: Ilija Basicovic (University of Novi Sad, Serbia), Kousik Ramasubramaniam Sankar (CISCO Video Technologies, India)

11:00 *Satellite Transponder Broadcasting Plans for Quasi Perfect Perceptual Video Quality*

Ioan Tache (University Politehnica Bucuresti, Romania)

This paper determines, through real time experimental measurements with real video content performed on satellite television (TV) channels broadcasted in Europe, which are the satellite broadcasting plans that offer the best viewer Perceptual Video Quality (PVQ). For the satellite television providers, there is always a tradeoff between the efficiency use of the transponder bandwidth, in terms of the number and type of the television channels, and the video quality. The author introduces the concept of Quasi Perfect Perceptual Video Quality (QPPVQ) in order to establish a quality reference for the TV channels broadcasted by a satellite transponder. The tests were performed using a general application designed for this purpose by the author that can measure and monitor in real time the viewer PVQ simultaneously on all the TV channels broadcasted by a transponder in order to specify the influences on the PVQ score of the transponder broadcasting plan.

11:20 *Pixel-based Statistical Analysis of Packet Loss Artifact Features*

Ivan Glavota (Faculty of Electrical Engineering, Croatia); Mario Vranjes (Faculty of Electrical Engineering); Marijan Herceg (Faculty of Electrical Engineering, Croatia); Ratko Grbić (University of Osijek, Faculty of Electrical Engineering, Croatia)

Due to high requirements on network capacity during network transmission, video signals have to be compressed. Compression process and network transmission introduce different compression artifacts and packet loss (PL) artifacts in video signals, respectively. These artifacts degrade visual quality of video signal and thus video quality has to be continuously measured and monitored in order to assure the target quality of service. Regarding PL artifacts, decoder's post-processing algorithm tries to mitigate or completely remove the visual impairments caused by the PL. Consequently, depending on error concealment method, different types of PL artifacts may be formed. In this paper we made a categorization of PL artifacts. The pixel-based statistical analysis of each PL artifact type is performed. The results show that the interesting statistical features can be extracted for the particular PL type, which can be further exploited in PL artifact detection algorithms and video quality evaluation algorithms.

11:40 *Picture Quality Meter - no-reference video artifact detection tool*

Ivan Bošnjaković (University of Osijek, Faculty of Electrical Engineering, Croatia); Ratko Grbić (University of Osijek, Faculty of Electrical Engineering, Croatia); Dejan Stefanović (RT-RK, Serbia); Vukota Peković (RT-RK d.o.o., Serbia)

The demand for a wide range of video and multimedia applications is growing extremely fast recent years. In such a diverse usage of digital video, there is a need for reliable video quality assessment by different parties involved in video content delivering to the end users. While video quality assessment methods are gaining quite considerable attention in scientific research, practical tools for video quality assessment are still rare. This article presents Picture Quality Meter, an application for real-time no-reference video artifact detection that can be used in different scenarios like video equipment testing, network monitoring, video hardware/software development and scientific research. The application has some unique features allowing user customization in terms of used no-reference methods, giving the user deeper insight into the obtained results and easier usage when dealing with in field video equipment testing.

Wednesday, June 1, 12:15 - 13:00

K2: Keynote Session 2

Room: A1

Chair: Nikola Teslic (University of Novi Sad, Serbia)

12:15 *The Time-Triggered Architecture*

Hermann Kopetz (Technical University of Vienna, Austria)

The Time-Triggered Architecture (TTA) provides a computing infrastructure for the design and implementation of dependable distributed embedded systems that is widely deployed in industry, e.g., in the Boeing 787 aircraft or the NASA Orion Spacecraft. A large real-time application is decomposed into nearly autonomous clusters and nodes, and a fault-tolerant global time base of known precision is generated at every node. In the TTA, this global time is used to precisely specify the interfaces among the nodes, to simplify the communication and agreement protocols, to perform prompt error detection, and to guarantee the timeliness of real-time applications. The TTA supports a two-phased design methodology, architecture design, and component design. During the architecture design phase, the interactions among the distributed components and the interfaces of the components are fully specified in the value domain and in the temporal domain. In the succeeding component implementation phase, the components are built, taking these interface specifications as constraints. This two-phased design methodology is a prerequisite for the composability of applications implemented in the TTA and for the reuse of prevalidated components within the TTA. This talk presents the architecture model of the TTA, explains the design rationale, discusses the time-triggered communication protocols TTP/C and TT-Ethernet, and illustrates how transparent fault tolerance can be implemented in the TTA.

Wednesday, June 1, 13:00 - 14:00

Lunch break

Room: Cafeteria

Wednesday, June 1, 14:15 - 15:45

Computer Engineering Open Day

Room: A1

Chair: Miroslav Popovic (University of Novi Sad, Serbia)

Wednesday, June 1, 16:00 - 16:30

Coffee break

Room: Cafeteria

Wednesday, June 1, 16:30 - 17:15

K3: Keynote Session 3

Room: A1

16:30 Audio Displays - New Dimensions in Sound Reproduction

Mark Bocko (University of Rochester, USA)

Recent developments in planar loudspeaker technology point the way to a new generation of planar audio displays in which both the spatial location and extent of audio sources, as well as the directionality of the radiated sonic field, can be controlled to a high degree of precision. Integrating such "audio displays" with visual displays will create more immersive interfaces for experiencing media, teleconferencing and other applications.

Wednesday, June 1, 17:30 - 18:30

S3: Smart Homes & Things

Room: A1

Chairs: Istvan Papp (University of Novi Sad, Serbia), Boris Radin (Faculty of Technical Sciences, University of Novi Sad, Serbia)

17:30 User Behavior Prediction in the "Offline" Smart Home Solutions

Dmitry Vavilov (T-Systems RUS, Russia); Valery Milykh (Quarta Technologies, Russia); Ivan Platonov (St.-Petersburg State Polytechnical University, Russia); Alexander Anisimov (St-Petersburg State University, Russia)

Smart Home products spread is relatively low due to fears of the personal data security. "Offline" (disconnected) solutions protect privacy but have some disadvantages. Suggested methodology for analysis of the householder's behavior and simulation of his activities provides improvement of the user needs predictions. In this paper the results of primal tests of this approach are considered.

17:50 Provided security measures of enabling technologies in Internet of Things (IoT): A survey

Minela Grabovica (University of Sarajevo, Bosnia and Herzegovina); Drazen Pezer (Faculty of Electrical Engineering, Bosnia and Herzegovina); Srđan Popić (University of Novi Sad & RT-RK Institute, Bosnia and Herzegovina); Vladimir Knezevic (University of Banja Luka, Bosnia and Herzegovina)

Internet of Things (IoT) involves creating network of everyday items embedded with electronics, software and network connectivity. In this way, users are empowered with possibility to communicate with devices, in order to control them or retrieve necessary information. Data security in IoT is one of substantial issues. This paper explores security protocols provided by communication technologies used in IoT such as: RFID, Bluetooth, Wireless network and ZigBee. Also, it presents issues which can arise in practical appliance. Finally, we give overview, summary and comparison of advantages of described technologies.

18:10 MIKME - Advanced Wireless Microphone

Iva Salom (Institute Mihailo Pupin, Serbia); Nikola Nenadić (Founder & CEO PygmyTITAN d. o. o., Serbia); Goran Ferenc (RT-RK BG Office, Serbia); Vukašin Ristić (Institute Mihailo Pupin, Serbia); Lazar Berbakov, Željko Stojković, Vladimir Čelebić and Miloš Milutinović (Institute Mihailo Pupin, Serbia); Stefan Trailović (Software Developer, Serbia)

MIKME is an advanced battery powered standalone wireless high-quality audio recording device aimed to instantly capture inspiration of the musicians and creative people, avoiding complicated studio preparation procedures. MIKME meets several requirements in a single device. First of all, it contains high-quality condenser capsule providing studio grade signal quality. Additionally, the device has built-in internal memory providing recording, playback, record-on-top and AAC encoding functions, as well as sharing files via USB interface. It provides real-time wireless streaming to iPhone and Android based devices via Bluetooth interface, using a designed application to edit, mix and share recorded tracks. There is a variety of devices on the market that has some of the above mentioned functionalities separately, but MIKME presents an original solution that includes them all.

S4: Development & Testing 2

Room: B1

Chairs: Miodrag Djukic (Faculty of Technical Sciences, Serbia), Vukota Pekovic (RT-RK d.o.o., Serbia)

17:30 Implementation of Frames Scheduling in Mixed-Critical Networks

Miladin Sandić (Faculty of Technical Sciences, Bosnia and Herzegovina); Ivan Velikić (RT-RK, Serbia)

In this paper an implementation of critical traffic frames scheduling in mixed-critical networks is shown. Additionally, conditions which must be satisfied for avoidance of link overload and frames collision are explained. Free space on scheduling time-scale can be exploited for standard Ethernet traffic in systems which combine critical and low-priority traffic, for example, In-flight entertainment or In-car Internet.

17:50 An Eclipse Plugin for Memory Map Visualization

Stefan Stanivuk and Momcilo Kronic (RT-RK Institute for Computer Based Systems, Serbia); Jelena Kovacevic (University of Novi Sad, Serbia)

This paper describes one solution of Eclipse Plugin used for embedded platform memory map visualization and editing. The solution solves the problem of inefficient representation of used memory in firmware applications during debugging session. This plugin obtains information from memory map, a file generated after process of application building, and graphically displays it in a clear manner where each symbol defined in firmware application is graphically outlined by its name, processor core, memory name, section name, address and size. Also, values of presented symbols can be easily edited. This software tool is implemented using Java programming language with SWT (Standard Widget Toolkit) and JFace toolkit used for GUI (Graphical User Interface) widgets implementation.

18:10 Function-level Performance Estimation for Heterogeneous MPSoC Platforms

Danko Ivošević, Nikolina Frid and Vlado Sruk (University of Zagreb, Croatia)

Main challenge of System-level design is fast and accurate performance estimation on heterogeneous MPSoC platforms in early design stages. In this paper the authors present a design flow of a novel framework for automated early high-level software performance estimation based on source code analysis using elementary operation concept. Preliminary results demonstrate the ability to provide fast and efficient design space exploration with high accuracy of performance estimation.

Wednesday, June 1, 18:45 - 20:00

Social event - cocktail

Caffe-ship Zeppelin

Rooms: A1, B1, Cafeteria

Wednesday, June 1, 20:00 - 21:00

Conference dinner

Caffe-ship Zeppelin

Rooms: A1, B1, Cafeteria

Wednesday, June 1, 21:00 - 23:00

Conference party

Caffe-ship Zeppelin

Rooms: A1, B1, Cafeteria

Thursday, June 2

Thursday, June 2, 10:00 - 11:00

S5: Hardware & Software

Room: A1

Chairs: Nikola Djuric (Faculty of Technical Sciences, University of Novi Sad, Serbia), Velibor Mihic (RT-RK Computer Based Systems LLC, Serbia)

10:00 *Measurement firmware for pulse oximetry sensor*

Nemanja Gazivoda (University of Novi Sad, Serbia)

The aim of this paper is to give a brief review of a developed solution for measurement firmware used in pulse oximetry. The goal of this development was to prove the concept of designing a simple, cheap but reliable system for measuring blood oxygenation and pulse rate. The main goal has been achieved, and the results obtained by this measurement configuration are more than satisfactory.

10:20 *Intermodulation Distortion of Class D Audio Amplifier using Pulse Density Modulation*

Svjetlana Kovacevic, Tatjana Pesic-Brdjanin and Jovan Galic (Faculty of Electrical Engineering in Banja Luka, Bosnia and Herzegovina)

In this paper, an analysis of intermodulation distortion of class D audio amplifier is presented. Class D audio amplifier uses MOSFETs in switching mode is designed. The amplifier system contains a modulator and an output low-pass filter. Both modulation techniques, pulse width modulation and pulse density modulation, are used to drive class D amplifier stage. The influence of switching frequency on total second- and third-order intermodulation distortion products is examined. It is shown that for pulse density modulation, total intermodulation distortion remains within the permissible range of values.

10:40 *Energy-saving smart starter for fluorescent lighting applications*

Boris Radin and Sasa Vukosavljev (Faculty of Technical Sciences, University of Novi Sad, Serbia)

Design ideas and principles of operation of advanced microcontroller-based electronic starters for fluorescent lighting are presented. Some of these devices remained as working prototypes, while others were produced in volumes reaching 100k pcs.

S6: Next Generation TV & Video 2

Room: B1

Chairs: Goran Dimić (University of Belgrade & Institut Mihajlo Pupin, Serbia), Snjezana Rimac-Drlje (University of Osijek, Croatia)

10:00 *Rebooting the TV-centric gaming concept for modern multiscreen Over-The-Top service*

Marija Punt (University of Belgrade, School of Electrical Engineering, Serbia)

The TV-centric gaming concept creates an environment where people can play games with each other in the living room gathered around the TV screen. Games are controlled through mobile devices, using them not only as controllers, but also as personal screens for each player. The TV-centric gaming concept was hard to commercially deploy due to a

lack of a common programming platform on the customer premise equipment. However, recent developments in TV operating systems may allow for rebooting the TV-centric gaming approach. This paper presents a proposal of integrating the TV-centric concept with a modern Internet TV based ecosystem, and a potential business case which regards Over-The-Top services as a means of deploying the concept in practice.

10:20 *Proposal of application format for hybrid digital TV developed for cost effective STBs*

Dražen Grbić, Jelena Vlaovic, Mario Vranješ and Tonći Bartulović (J. J. Strossmayer University of Osijek & Faculty of Electrical Engineering, Croatia)

Contemporary devices for playing video and audio signal from DVB bitstreams use complex hardware structure due to high requirements specified by standards like HbbTV and MHEG. The main focus of this paper is the proposal of a software that runs on Set-top boxes (STBs). Instructions and attributes for STBs are contained in Extensible Markup Language (XML) therefore XML Schema Definition (XSD) is used for defining and validating XML file to operate on appropriate device without lagging. Cost effective devices in developing countries usually don't have hardware specifications that are high enough for complex video rendering and Graphic User Interface (GUI) thus in this paper the proposed XML and XSD are made to be suitable for low budget Set-top Boxes. Therefore, in this paper the authors analyze the definition of XML, XSD, the parsing and the validation of the code and the capabilities of such software for media interpretation.

10:40 *Embedding Interstitial Interactivity Meta-data in Video*

Kousik Ramasubramaniam Sankar and Ganesankumar Annamalai (CISCO Video Technologies, India)

State-of-the-art broadcast/transmission standards such as ATSC/DVB/ISDB are based on MPEG as the underlying compression standard. Various services like recommendations, advanced search etc enhance the experience of viewing the video content by maintaining a database of tags pertaining to each video. In a typical database search, there is no timestamp associated with the record item to the video content timestamp. This prohibits the progress of the next generation content-based interactivity mechanisms. This paper presents a mechanism to define and efficiently utilize the meta-data for content-based interactivity without any heavy-duty processing on the video encoding / decoding pipeline. For production house content as well as user generated content, the meta-data can be inserted into the stream. The main advantage of this approach is the portability across various platforms and decoder implementations. The overheads on the bit-stream, processing and memory due to such a change are also depicted.

Thursday, June 2, 11:15 - 12:00

K5: Keynote Session 5

The network side of online games: trends, characteristics and issues

Dr. Mirko Suznjevic

Room: A1

Chair: Marija Punt (University of Belgrade, School of Electrical Engineering, Serbia)

11:15 *Cloud gaming in education: Evaluation of multiple game streams in a shared WLAN*

Mirko Suznjevic and Ivan Slivar (University of Zagreb, Croatia); Lea Skorin-Kapov (University of Zagreb, Faculty of Electrical Engineering and Computing, Croatia); Vanja Ilic (Faculty of Electrical Engineering and Computing, Croatia)

This paper presents a platform for using digital games in an educational scenario - teaching in classrooms. The platform is based on the cloud gaming concept - streaming a high definition video from a server to an end consumer. We shortly present the architecture of the solution and focus on the evaluation of the network performance inside schools. We study user perceived cloud gaming performance under the impact of multiple cloud gaming streams in a shared WLAN. An empirical user study was performed using the GamingAnywhere platform wherein participants were asked to report on perceived degradations of game play quality imposed by incrementally adding additional artificially generated cloud gaming streams to the same network. Results show that degradations are perceived (in the form of video jitter and higher latency) by most participants when four or more cloud gaming traffic flows share the same wireless access point.

K6: Keynote Session 6

Room: B1

Chair: Mario Vranješ (J. J. Strossmayer University of Osijek & Faculty of Electrical Engineering, Croatia)

11:15 *Emerging Technologies: Adding Dimensions to Lifelong Learning*

Constanta-Nicoleta Bodea and Radu Ioan Mogos (Bucharest University of Economic Studies, Romania); Maria-Iuliana Dascalu (University Politehnica of Bucharest, Romania); Alin Moldoveanu (Politehnica University of Bucharest, Romania); George Dragoi (University Politehnica of Bucharest, Romania); Martina Huemann and Matthijs Schilder (Vienna University of Economic and Business, Austria)

The current paper debates upon the adoption of a social learning platform to support the highly dynamic industry of consumer electronics' providers, acknowledging the role of emerging technologies on the delivery of efficient lifelong learning solutions. The discussion is based on a mixed research approach, in which structured interviews and online questionnaires were used and customized for various stakeholders of such a social learning platform within the Danube region: students, professors, representatives of career development centers of universities and private companies. Having a clear regional value, the conclusions can still easily be extended to the world-wide current context, in which individuals are constantly challenged to optimally function in a job, to stay attractive on the labour market and aligned with continuously changing trends of digital age.

Thursday, June 2, 12:15 - 13:00

K7: Keynote Session 7

Room: A1

Chair: Bojan Mrazovac (Faculty of Technical Sciences, University of Novi Sad & RT-RK Computer Based Systems LLC, Serbia)

12:15 Flexible sensors

Goran Stojanovic (University of Novi Sad, Serbia)

A wide range of applications of sensors realized on flexible (foil, paper, PET, Kapton, etc.) can be seen in major fields like automotive, consumer electronics, pharmaceutical and medical applications. This presentation will show and explain the following structures fabricated using ink-jet technology on flexible substrates: Capacitive Angular Sensor with Flexible Digitated Electrodes; Ink-jet printed resonant LC structure; Flexible transformers and inductors; Force sensing resistors, etc. Furthermore, this presentation will give main vision in attracting EU funds in Serbia.

W2: STARTSoPI FOCUS

Room: B1

Chair: Nenad Jovanovic (RT-RK Institute for Computer Based Systems, Serbia)

Thursday, June 2, 13:00 - 14:00

Lunch break

Room: Cafeteria

Thursday, June 2, 14:00 - 14:45

K8: Keynote Session 8

Room: A1

Chair: Nebojsa Pjevalica (University of Novi Sad, Serbia)

14:00 Advanced Low-Power High-Security Wireless Sensor Network Nodes

Zoran Stamenkovic (IHP, Germany)

Wireless sensor networks (WSN) consist of sensor nodes that may be randomly and densely deployed over some area. The sensor nodes can be of different type and sense the environmental (temperature, light, humidity, radiation, seismic vibrations, etc.) and medical (body temperature, heart pace, blood pressure, etc.) parameters. This presentation is expected to capture the current state in the field and specifically address the applications, architecture, and design of WSN nodes. Several hot topics will be considered including design for low power and high security.

Thursday, June 2, 15:00 - 16:30

S7: Cloud Computing

Room: A1

Chairs: Dejan Stefanovic (RT-RK, Serbia), Milan Vidakovic (University of Novi Sad - Faculty of Technical Sciences, Serbia)

15:00 Open Compute-Equipment Design Specification as a Standard for Cloud Computing

Yahav Biran and George Collins (Colorado State University, USA)

As cloud-computing becomes the primary method to run information and communication services, IT related spending toward workload processing increased in 90% in the last three years. A substantial element of these spending dedicated for building a processing capabilities in from of a massive datacenter deployments across the globe. The compute hardware equipment is at the core of the datacenters. That equipment specification is presently dictated by name-brand proprietary vendors. In the case of specific needs that encompasses the vendors offering, the operators require to adjust their architecture to the various equipment vendors to run its service. This solution is suboptimal as specific needs might include the use of generic compute features in large scale that leave some of the system components totally unused or in low utilization limbo. We present a model that mimics the open source software paradigm and provides a metric for technical measurement of the hardware compute system design. It uses the openCompute community as an illustrative collaboration platform. It allows a continuous improvement in the equipment specifications process based on both customer and operator needs along with evolving vendor constraints. Finally, it employs Systems Engineering theory for mitigating certain risks, and uncertainty where no meaningful data are available.

15:20 Comparison of AngularJS framework testing tools

Nina Ljubica Fat (Institute RTRK, Serbia); Marijana Vujovic (RT-RK Institute for Computer-Based Systems, Serbia); Istvan Papp (University of Novi Sad, Serbia); Sebastian Novak (RT-RK Computer Based Systems LLC, Serbia)

AngularJS, the new Javascript framework, with wide usage across web browsers and great expression power, comes with a shortcoming - lack of compiler optimization. Consequently it is strongly recommended that every application written in JavaScript, regardless of the used framework, should include tests that validate both its behavior and performance. This paper presents and evaluates two popular web automation testing frameworks: Protractor and Karma. As an addition to the description of testing frameworks in this paper, we present the results of running tests on optimized and unoptimized web application used in real systems.

15:40 A UML-based approach to forward engineering of SQLite database

Zvezdan Spasic Pavkovic (RT-RK Institute, Bosnia and Herzegovina); Drazen Brdjanin (Faculty of Electrical Engineering University of Banja Luka, Bosnia and Herzegovina)

An approach to automated forward engineering of SQLite database is presented in this paper. The proposed approach is completely based on the standard UML notation, which is used for conceptual modeling and for representation of the target relational database schema, as well. Unlike the existing approaches using specialized notation (UML profiles) for representation of relational database schema, in this paper standard UML class diagram is used. Finally, the automatic generation of the target SQLite database is performed by using Acceleo transformation program. In this way, a simple and more efficient forward engineering of SQLite database is achieved. The proposed approach is illustrated by a simple model in forward engineering of SQLite database in an open source Eclipse-based tool chain.

16:00 *Introduction to a WebSocket Benchmarking Infrastructure*

Gábor Imre (Budapest University of Technology and Economics, Hungary); Róbert Sárosi (Erinnovations Ltd., Hungary); Gergely Mezei (Budapest University of Technology and Economics, Hungary)

The WebSocket protocol is a HTTP(S) based standard enabling full-duplex realtime communication between a web server and its clients, typically regular browser applications. The performance gain of this new standard is relevant compared to the classical XHR-based communication both on server and client side, but this topic has not been fully explored yet. In this paper we present a WebSocket benchmark infrastructure created for measuring server-side performance of the WebSocket protocol. This infrastructure enables black-box measurements independently of the server-side implementation. We also validate the presented infrastructure with 3 measurement scenarios using an industrially applied WebSocket implementation.

16:20

W3: European Training Academy

Room: B1

Chair: Milenko Beric (RT-RK Institute, Serbia)

Thursday, June 2, 16:30 - 16:50

Coffee break

Room: Cafeteria

Thursday, June 2, 16:50 - 17:50

K9: Keynote Session 9

Maker Culture Hackaton: IoT Platforms

Zoran Roncevic

Room: A1

Chair: Miroslav Popovic (University of Novi Sad, Serbia)

W4: Hackathon

Room: Cafeteria

Chair: Nenad Cetic (University of Novi Sad, Serbia)

Thursday, June 2, 18:00 - 18:30

Best paper awards, Closing

Room: A1