Embedded Operating System Projects

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Schmiedgen, Jan,Rhinow, Holger,Köppen, Eva

Embedded Operating System Projects Hentschel:

Embedded Operating System Projects Hentschel, Uwe,Richter, Daniel,Polze, Andreas,2014 In today s life embedded systems are ubiquitous But they differ from traditional desktop systems in many aspects these include predictable timing behavior real time the management of scarce resources memory network reliable communication protocols energy management special purpose user interfaces headless operation system configuration programming languages to support software hardware co design and modeling techniques Within this technical report authors present results from the lecture Operating Systems for Embedded Computing that has been offered by the Operating Systems and Middleware group at HPI in Winter term 2013 14 Focus of the lecture and accompanying projects was on principles of real time computing Students had the chance to gather practical experience with a number of different OSes and applications and present experiences with near hardware programming Projects address the entire spectrum from bare metal programming to harnessing a real time OS to exercising the full software hardware co design cycle Three outstanding projects are at the heart of this technical report Project 1 focuses on the development of a bare metal operating system for LEGO Mindstorms EV3 While still a toy it comes with a powerful ARM processor 64 MB of main memory standard interfaces such as Bluetooth and network protocol stacks EV3 runs a version of 1 1 Introduction Linux Sources are available from Lego s web site However many devices and their driver software are proprietary and not well documented Developing a new bare metal OS for the EV3 requires an understanding of the EV3 boot process Since no standard input output devices are available initial debugging steps are tedious After managing these initial steps the project was able to adapt device drivers for a few Lego devices to an extent that a demonstrator the Segway application could be successfully run on the new OS Project 2 looks at the EV3 from a different angle The EV3 is running a pretty decent version of Linux in principle the RT_PREEMPT patch can turn any Linux system into a real time OS by modifying the behavior of a number of synchronization constructs at the heart of the OS Priority inversion is a problem that is solved by protocols such as priority inheritance or priority ceiling Real time OSes implement at least one of the protocols The central idea of the project was the comparison of non real time and real time variants of Linux on the EV3 hardware A task set that showed effects of priority inversion on standard EV3 Linux would operate flawlessly on the Linux version with the RT_PREEMPT patch applied If only patching Lego s version of Linux was that easy Project 3 takes the notion of real time computing more seriously The application scenario was centered around our Carrera Digital 132 racetrack Obtaining position information from the track controlling individual cars detecting and modifying the Carrera Digital protocol required design and implementation of custom controller hardware What to implement in hardware firmware and what to implement in application software this was the central question addressed by the project Embedded Operating System Projects Andreas Grapentin,Kirstin Heidler,Dimitri Korsch,Rakesh Kumar Sah,Nicco Kunzmann,Johannes Henning,Toni Mattis,Patrick Rein,Eric Seckler,Björn Groneberg,Florian Zimmermann,2013

Proceedings of the Second HPI Cloud Symposium "Operating the Cloud" 2014 Bosse, Sascha ,Elsaid, Mohamed Esam, Feinbube, Frank ,Müller, Hendrik ,2015-12-23 Every year the Hasso Plattner Institute HPI invites guests from industry and academia to a collaborative scientific workshop on the topic Operating the Cloud Our goal is to provide a forum for the exchange of knowledge and experience between industry and academia Hence HPI s Future SOC Lab is the adequate environment to host this event which is also supported by BITKOM On the occasion of this workshop we called for submissions of research papers and practitioners reports Operating the Cloud aims to be a platform for productive discussions of innovative ideas visions and upcoming technologies in the field of cloud operation and administration In this workshop proceedings the results of the second HPI cloud symposium Operating the Cloud 2014 are published We thank the authors for exciting presentations and insights into their current work and research Moreover we look forward to more interesting submissions for the upcoming symposium in 2015 Inductive invariant checking with partial negative application conditions Dyck, Johannes,Giese, Holger,2016-04-13 Graph transformation systems are a powerful formal model to capture model transformations or systems with infinite state space among others However this expressive power comes at the cost of rather limited automated analysis capabilities The general case of unbounded many initial graphs or infinite state spaces is only supported by approaches with rather limited scalability or expressiveness In this report we improve an existing approach for the automated verification of inductive invariants for graph transformation systems By employing partial negative application conditions to represent and check many alternative conditions in a more compact manner we can check examples with rules and constraints of substantially higher complexity We also substantially extend the expressive power by supporting more complex negative application conditions and provide higher accuracy by employing advanced implication checks The improvements are evaluated and compared with another applicable tool by considering three case studies

Parts without a whole? Schmiedgen, Jan,Rhinow, Holger,Köppen, Eva,2016-02-03 This explorative study gives a descriptive overview of what organizations do and experience when they say they practice design thinking It looks at how the concept has been appropriated in organizations and also describes patterns of design thinking adoption The authors use a mixed method research design fed by two sources questionnaire data and semi structured personal expert interviews The study proceeds in six parts 1 design thinking s entry points into organizations 2 understandings of the descriptor 3 its fields of application and organizational localization 4 its perceived impact 5 reasons for its discontinuation or failure and 6 attempts to measure its success In conclusion the report challenges managers to be more conscious of their current design thinking practice The authors suggest a co evolution of the concept s introduction with innovation capability building and the respective changes in leadership approaches It is argued that this might help in unfolding design thinking s hidden potentials as well as preventing unintended side effects such as discontented teams or the dwindling authority of managers

Modeling collaborations in self-adaptive systems of systems Wätzoldt, Sebastian,Giese, Holger,2015-04-30 An

increasing demand on functionality and flexibility leads to an integration of beforehand isolated system solutions building a so called System of Systems SoS Furthermore the overall SoS should be adaptive to react on changing requirements and environmental conditions Due SoS are composed of different independent systems that may join or leave the overall SoS at arbitrary point in times the SoS structure varies during the systems lifetime and the overall SoS behavior emerges from the capabilities of the contained subsystems In such complex system ensembles new demands of understanding the interaction among subsystems the coupling of shared system knowledge and the influence of local adaptation strategies to the overall resulting system behavior arise In this report we formulate research questions with the focus of modeling interactions between system parts inside a SoS Furthermore we define our notion of important system types and terms by retrieving the current state of the art from literature Having a common understanding of SoS we discuss a set of typical SoS characteristics and derive general requirements for a collaboration modeling language Additionally we retrieve a broad spectrum of real scenarios and frameworks from literature and discuss how these scenarios cope with different characteristics of SoS Finally we discuss the state of the art for existing modeling languages that cope with collaborations for different system types such as SoS **Proceedings of the 9th Ph.D. retreat of the HPI Research School on service-oriented systems engineering** Meinel, Christoph,Plattner, Hasso,Döllner, Jürgen,Weske, Mathias,Polze, Andreas,Hirschfeld, Robert,Naumann, Felix,Giese, Holger,Baudisch, Patrick,Friedrich, Tobias,2017-03-23 Design and implementation of service oriented architectures impose numerous research questions from the elds of software engineering system analysis and modeling adaptability and application integration Service oriented Systems Engineering represents a symbiosis of best practices in object orientation component based development distributed computing and business process management It provides integration of business and IT concerns Service oriented Systems Engineering denotes a current research topic in the eld of IT Systems Engineering with high potential in academic research and industrial application The annual Ph D Retreat of the Research School provides all members the opportunity to present the current state of their research and to give an outline of prospective Ph D projects Due to the interdisciplinary structure of the Research School this technical report covers a wide range of research topics These include but are not limited to Human Computer Interaction and Computer Vision as Service Service oriented Geovisualization Systems Algorithm Engineering for Service oriented Systems Modeling and Veri cation of Self adaptive Service oriented Systems Tools and Methods for Software Engineering in Service oriented Systems Security Engineering of Service based IT Systems Service oriented Information Systems Evolutionary Transition of Enterprise Applications to Service Orientation Operating System Abstractions for Service oriented Computing and Services Speci cation Composition and Enactment Development of AUTOSAR standard documents at Carmeq GmbH Hebig, Regina,Giese, Holger,Batoulis, Kimon ,Langer, Philipp,Farahani, Armin Zamani,Yao, Gary,Wolowyk, Mychajlo,2016-01-11 This report documents the captured MDE history of Carmeq GmbH in context of the project Evolution of MDE Settings in Practice The

goal of the project is the elicitation of MDE approaches and their evolution *Efficient and scalable graph view maintenance for deductive graph databases based on generalized discrimination networks* Beyhl, Thomas,Giese, Holger,2016-01-12 Graph databases provide a natural way of storing and querying graph data In contrast to relational databases queries over graph databases enable to refer directly to the graph structure of such graph data For example graph pattern matching can be employed to formulate queries over graph data However as for relational databases running complex queries can be very time consuming and ruin the interactivity with the database One possible approach to deal with this performance issue is to employ database views that consist of pre computed answers to common and often stated queries But to ensure that database views yield consistent query results in comparison with the data from which they are derived these database views must be updated before queries make use of these database views Such a maintenance of database views must be performed efficiently otherwise the effort to create and maintain views may not pay off in comparison to processing the queries directly on the data from which the database views are derived At the time of writing graph databases do not support database views and are limited to graph indexes that index nodes and edges of the graph data for fast query evaluation but do not enable to maintain pre computed answers of complex queries over graph data Moreover the maintenance of database views in graph databases becomes even more challenging when negation and recursion have to be supported as in deductive relational databases In this technical report we present an approach for the efficient and scalable incremental graph view maintenance for deductive graph databases The main concept of our approach is a generalized discrimination network that enables to model nested graph conditions including negative application conditions and recursion which specify the content of graph views derived from graph data stored by graph databases The discrimination network enables to automatically derive generic maintenance rules using graph transformations for maintaining graph views in case the graph data from which the graph views are derived change We evaluate our approach in terms of a case study using multiple data sets derived from open source projects *Proceedings of the 8th Ph.D. retreat of the HPI research school on service-oriented systems engineering* Meinel, Chistoph,Plattner, Hasso,Polze, Andreas,2015 Design and Implementation of service oriented architectures imposes a huge number of research questions from the fields of software engineering system analysis and modeling adaptability and application integration Component orientation and web services are two approaches for design and realization of complex web based system Both approaches allow for dynamic application adaptation as well as integration of enterprise application Commonly used technologies such as J2EE and NET form de facto standards for the realization of complex distributed systems Evolution of component systems has lead to web services and service based architectures This has been manifested in a multitude of industry standards and initiatives such as XML WSDL UDDI SOAP etc All these achievements lead to a new and promising paradigm in IT systems engineering which proposes to design complex software solutions as collaboration of contractually defined software services Service Oriented Systems

Engineering represents a symbiosis of best practices in object orientation component based development distributed computing and business process management It provides integration of business and IT concerns The annual Ph D Retreat of the Research School provides each member the opportunity to present his her current state of their research and to give an outline of a prospective Ph D thesis Due to the interdisciplinary structure of the Research Scholl this technical report covers a wide range of research topics These include but are not limited to Self Adaptive Service Oriented Systems Operating System Support for Service Oriented Systems Architecture and Modeling of Service Oriented Systems Adaptive Process Management Services Composition and Workflow Planning Security Engineering of Service Based IT Systems Quantitative Analysis and Optimization of Service Oriented Systems Service Oriented Systems in 3D Computer Graphics sowie Service Oriented Geoinformatics Weak conformance between process models and synchronized object life cycles Meyer, Andreas,Weske, Mathias,2015-06-09 Process models specify behavioral execution constraints between activities as well as between activities and data objects A data object is characterized by its states and state transitions represented as object life cycle For process execution all behavioral execution constraints must be correct Correctness can be verified via soundness checking which currently only considers control flow information For data correctness conformance between a process model and its object life cycles is checked Current approaches abstract from dependencies between multiple data objects and require fully specified process models although in real world process repositories often underspecified models are found Coping with these issues we introduce the concept of synchronized object life cycles and we define a mapping of data constraints of a process model to Petri nets extending an existing mapping Further we apply the notion of weak conformance to process models to tell whether each time an activity needs to access a data object in a particular state it is guaranteed that the data object is in or can reach the expected state Then we introduce an algorithm for an integrated verification of control flow correctness and weak data conformance using soundness checking **Exploratory authoring of interactive content in a live environment** Otto, Philipp ,Pollak, Jaqueline ,Werner, Daniel ,Wolff, Felix ,Steinert, Bastian ,Thamsen, Lauritz ,Taeumel, Marcel ,Lincke, Jens ,Krahn, Robert ,Ingalls, Daniel H. H. ,Hirschfeld, Robert,2016-07-04 Bei der Erstellung von Visualisierungen gibt es im Wesentlichen zwei Ans tze Zum einen k nnen mit geringem Aufwand schnell Standarddiagramme erstellt werden Zum anderen gibt es die M glichkeit individuelle und interaktive Visualisierungen zu programmieren Dies ist jedoch mit einem deutlich h heren Aufwand verbunden Flower erm glicht eine schnelle Erstellung individueller und interaktiver Visualisierungen indem es den Entwicklungssprozess stark vereinfacht und die Nutzer bei den einzelnen Aktivit ten wie dem Import und der Aufbereitung von Daten deren Abbildung auf visuelle Elemente sowie der Integration von Interaktivit t direkt unterst tzt **The Cadillac of IT Systems that No One Could Drive** Cheryl Lyn Shelmadine,1999 *American Machinist, Metalworking Manufacturing* ,1964-07 **The Engineer** ,1873 **Aeronautical Engineering** ,1990 A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA

scientific and technical information system and announced in Scientific and technical aerospace reports STAR and International aerospace abstracts IAA **The Embedded Operating System Project** ,1985 Thomas Register of American Manufacturers ,2003 Vols for 1970 71 includes manufacturers catalogs *NASA SP.* ,1990 **Consultants and Consulting Organizations Directory** Thomson Gale,2002-11

The Enigmatic Realm of **Embedded Operating System Projects Hentschel**: Unleashing the Language is Inner Magic

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