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SPEC Research℠ Group Newsletter

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ICPE 2016 WILL BE HELD IN DELFT, THE NETHERLANDS

Alexandru Iosup, the General Chair of the next ACM/SPEC International Conference on Performance Engineering (ICPE 2016), invites interesting high-quality submissions. The conference will take place in March 2016.

Read more on page 3

NEW WORKING GROUPS

SPEC Research has two new working groups, namely Big Data working group and DevOps Performance working group. The chairs of the new working groups invite new members and are happy to present their groups.

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SUCCESSFUL CONFERENCE IN DUBLIN

Over 130 participants took part in the 5th ACM/SPEC International Conference on Performance Engineering in Dublin. The committee accepted 29 high-quality papers and 26 posters and tutorials.

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NADAV AMIT WINS THE DISTINGUISHED DISSERTATION AWARD

Among eleven high-quality dissertations that have been submitted to compete in the SPEC Distinguished Dissertation Award, the committee awarded Nadav Amit for his work on contemporary operating system virtualization techniques. The authors of two other dissertations have been distinguished with honorably mentions.

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SPEC RESEARCH WORKING GROUPS

Cloud Working Group

Chair:
Alexandru Iosup, TU Delft, The Netherlands
Vice-Chair:
Erich Nahum, IBM TJ Watson Research Center, USA
Secretary:
Aleksandar Milenkoski, University of Würzburg, Germany
Release Manager:
Nikolas Herbst, University of Würzburg, Germany

http://research.spec.org/working-groups/rg-cloud-working-group.html

IDS Benchmarking Working Group

Chair:
Marco Vieira, University of Coimbra, Portugal
Vice-Chair:
Alberto Avritzer, Siemens Corporate Research, USA
Secretary:
Aleksandar Milenkoski, University of Würzburg, Germany
Release Manager:
Aleksandar Milenkoski, University of Würzburg, Germany

http://research.spec.org/working-groups/ids-benchmarking-working-group.html

Big Data Working Group

Chair:
Tilmann Rabl, Bankmark UG, Germany
Vice-Chair:
Chaitanya Baru, San Diego Supercomputer Center, USA
Secretary:
Meikel Poess, Oracle Corporation, USA
Release Manager:
Not selected yet

http://research.spec.org/working-groups/big-data-working-group.html

DevOps Performance Working Group

Chair:
André van Hoorn, University of Stuttgart, Germany
Vice-Chair:
Andreas Brunnert, fortiss GmbH
Secretary:
Felix Willnecker, fortiss GmbH
Release Manager:
Nils Ehmke, Kiel University

http://research.spec.org/working-groups/devops-performance-working-group.html

WELCOME TO THE SPEC RESEARCH GROUP NEWSLETTER

We are delighted to present to you the 4th issue of the SPEC Research Group Newsletter. This regular publication provides information on latest developments, news and announcements relevant to the benchmarking and quantitative system evaluation communities. Our newsletter is part of our mission to foster the exchange of knowledge and experiences between industry and academia in the field of quantitative system evaluation and analysis.

The past ten months have been very intense and exciting for the SPEC RG. To the major activities and milestones reached, we include: launching two new working groups: Big Data and DevOps Performance, intensive collaboration between academia and industry within the Cloud and IDS Benchmarking working groups, successfull organization of ICPE 2014 in Dublin and preparation of the ICPE 2015 in Austin, TX, and awarding Nadav Amit with the Distinguished Dissertation Award.

We have been actively working on preparation, planning and organization of the ICPE 2015 conference. We hope that the vivid exchange of ideas during the upcoming ICPE 2015 will be a great motivation for the next year of scientific and engineering work.

This issue of the Newsletter is the last issue of the first volume. We hope that you will enjoy reading it. We welcome and encourage your contributions for articles and suggestions for future coverage.

Samuel Kounev (University of Würzburg), Kai Sachs (SAP AG), Piotr Rygielski (University of Würzburg)

SPEC RESEARCH GROUP MISSION STATEMENT

The SPEC Research Group (RG) is one of the four groups of the Standard Performance Evaluation Corporation (SPEC). Its mission is to promote innovative research in the area of quantitative system evaluation and analysis by serving as a platform for collaborative research efforts fostering the interaction between industry and academia in the field.

The scope of the group includes computer benchmarking, performance evaluation, and experimental system analysis considering both classical performance metrics such as response time, throughput, scalability and efficiency, as well as other non-functional system properties included under the term dependability, e.g., availability, reliability, and security. The conducted research efforts span the design of metrics for system evaluation as well as the development of methodologies, techniques and tools for measurement, load testing, profiling, workload characterization, dependability and efficiency evaluation of computing systems.

Samuel Kounev (University of Würzburg)

SPEC ANNOUNCEMENTS

ICPE 2016 in Delft, the Netherlands

January 27,.2015

We preliminarily announce that ICPE 2016 will take place on 12–18 of March, 2016 in Delft, the Netherlands. The deadline for submissions is September 18, 2015 (for abstracts: September 11, 2015). Alexandru Iosup from TU Delft will be the General Chair. Program Chairs are Lieven Eeckhout (University of Ghent, Belgium) and Steffen Becker (TU Chemnitz, Germany). We await your submissions!

Piotr Rygielski (University of Würzburg) , Alexandru Iosup(TU Delft)

Samuel Kounev gives Keynote at QEST 2014

January 20, 2015

The keynote was presented by Samuel Kounev on September 10th as part of the programme of FLORENCE 2014–a joint scientific event of QEST'14, SAFECOMP'14, FORMATS'14, EPEW'14, and FMICS'14. The talk entitled: "Quantitative Evaluation of Service Dependability in Shared Execution Environments" is available online.

http://se.informatik.uni-wuerzburg.de/news/single/artikel/keynote-pr-1/

Piotr Rygielski (University of Würzburg)

Alexandu Iosup Awarded!

January 20, 2015

The chair of the Cloud Working Group–Alexandru Iosup (TU Delft)–has been awarded at the SCALE challenge. "SCALE is a competition in which the participants demonstrate working solutions to real-world problems that rely on large scale computing. Competitors submit proposals in advance that outline the nature of the problem to be solved, the solution technique, and document the scale achieved in production." (www.ieeetcsc.org/awards/scale). The prize was handed out at the CCGrid 2014 conference. Congratulations!

Piotr Rygielski (University of Würzburg)

SPECapc for 3ds Max 2015

August 13, 2014

SPECapc has released SPECapc for 3ds Max™ 2015. The benchmark contains 48 tests for comprehensive measurement of modeling, interactive graphics, visual effects, CPU and GPU performance. It is currently available for download and purchase, and requires 64-bit Windows 7, 16GB of memory, and a working copy of 3ds Max 2015 with Service Pack 1 applied.

www.spec.org

SPEC GWPG's Benchmark Roadmap

August 14, 2014

SPEC's GWPG (Graphics and Workstation Performance Group) announced their benchmark roadmap for upcoming development, including a new strategy for SPECviewperf, upcoming workstation performance measurement initiatives, and plans for updated application benchmarks.

http://spec.org/gwpg/publish/siggraph2015_rel.html

www.spec.org

SPEC SFS®2014

November 04, 2014

SPEC announces the release of SPEC SFS®2014, SPEC's updated benchmark suite to measure performance of a storage configuration as it interacts with four new application-based workloads.

http://spec.org/sfs2014/

www.spec.org

Defect in SPECjbb®2013

December 9, 2014

A defect has been identified in the SPECjbb®2013 benchmark suite which impacts the comparability of results. Sales of the benchmark have been suspended and we are no longer accepting new submissions of SPECjbb2013 results for publication on the SPEC website. The Java subcommittee is working to revise the benchmark to correct this defect, add additional validation safeguards, and release a new version as soon as possible. Current licensees will receive a free copy of the new version when it becomes available.

http://spec.org/jbb2013/defectnotice.html

www.spec.org

SERT V1.1.0 Due to Release Shortly

January 24, 2015

SERT V1.1.0 is at the Release Candidate stage and will be released in the first half of 2015. This is a significant update, adding support for Oracle Solaris 11 running on SPARC64 and SPARC T4 as well as Intel x86. The user interface has been enhanced to simplify test configuration, automated range setting support has been added, and it has been further tuned to deliver successful test passes with a wider range of server configurations. Current licensees will be entitled to a free upgrade post-release.

Klaus-Dieter Lange (Hewlett-Packard)

PTDaemon V1.7.1 Due to Release with SERT V1.1.0

January 24, 2015

An updated release of PTDaemon, V1.7.1, is currently in Beta and is scheduled to release with SERT V1.1.0. This release will add support for additional power analyzers, and enables DC power measurement with many of those analyzers. Full details may be found on the SPECpower Device List page on the SPEC website.

Sanjay Sharma (Intel)

Chauffeur Worklet Development Kit V1.0.4 Released

January 24, 2015

The Chauffeur Worklet Development Kit was initially released in 2014 as a platform to support energy efficiency benchmark development. Chauffeur is an integral part of the SERT and ships with PTDaemon, so enabling any developer to execute single or multiple workloads with SPEC-accepted power analyzers and temperature sensors. The Chauffeur WDK may be purchased via the Order page on the SPEC website.

Mike Tricker (Microsoft)

NEW WORKING GROUP: BIG DATA

November 19, 2014

Without any doubt the world has been in the midst of an extraordinary information explosion over the past decade, punctuated by the rapid growth in the use of the Internet and in the number of connected devices worldwide. The data growth phenomenon is global in nature, with Asia rapidly emerging as a major user base contributing to both consumption as well as generation of data. Indeed, the rate at which data and information are being generated is faster than at any point throughout history. With the penetration of data-driven computing, web and mobile technologies, and enterprise computing, the emerging markets have the potential for further adding to this already rapid growth in data. Data from all sources—from enterprise applications to machine-generated data—continue to grow exponentially, requiring the development of innovative techniques for data management, data processing, and analytics.

Realizing the lack of methodologies and tools to measure the performance of these new data processing tools, Chaitan Baru, Tilmann Rabl, Milind Bhandarkar, Meikel Poess and Raghu Nambiar founded the Big Data Benchmark Community (BDBC) in 2012. In order to congregate the big data community, both academia and industry, they organized the WBDB workshop series. It was kicked off in May 2012 in San Jose, CA and followed up with three workshops in India, China and Germany. Between meetings, bi-weekly conference calls were held to present big data solutions and ideas for benchmarking them.

Many ideas, born in the Big Data Benchmark Community have been solidified, such as the first end-to-end big data benchmark, BigBench 1.0, BigData Top100, accompanied by many papers in well known conferences, such as SIGMOD and TPCTC.

In April 2014 the Big Data Benchmark Community (BDBC) joined the SPEC RG and formed a working group to continue its work in the more formal setting of SPEC. The mission of the Big Data Working Group is to facilitate research and to engage industry leaders for defining and developing performance methodologies of big data applications. The group currently focuses on positioning big data applications in relation to traditional large database applications, DW, OLAP, etc., devising clear goals as to what aspects of a big data system are important to measure, developing sound rules and metrics to measure the performance of big data systems. developing tools aiding in creating sample big data systems, fostering collaboration between benchmarking efforts and filling gaps in current big data benchmarking.

Tilmann Rabl (Bankmark UG)

NEW WORKING GROUP: DEVOPS PERFORMANCE

November 04, 2014

The newly formed working group is concerned with combining application performance management (APM) and software performance engineering (SPE) activities for business-critical application systems. The need for a better SPE/APM integration is driven by an increased interrelation of development and operation teams in corporate environments due to DevOps concepts. SPE proposes to start performance evaluations by transforming software design models into performance models. These performance models need to be parameterized with estimates of resource demands to derive meaningful predictions. APM tools enable the collection of fine-grained monitoring information of a running system. This monitoring information has the potential to significantly increase the accuracy of the performance model predictions during the complete life-cycle of a software system.

The DevOps Performance Working Group fosters and facilitates research in combining APM and SPE activities, e.g., by experience sharing, agreement on definitions, specification of metrics, and dissemination of novel methods, techniques, and tools for quantitative evaluation. Topics of Interest include, but are not limited to, performance and workload model extraction, data feedback between development (Dev) and operations (Ops), runtime performance management techniques, load testing, benchmarks for SPE and APM methods, techniques, and tools.

Since June, the group meets on a biweekly basis to discuss current activities and new project ideas. Its membership body currently includes representatives of fortiss GmbH, Kiel University, Karlsruhe Institute of Technology, NovaTec GmbH, University of Stuttgart, and University of Würzburg.

For more information about the DevOps Performance Working Group, (including mission, activities, meetings, and presentations) visit our web page. If you are interested in following the discussions or contributing actively, please get in touch with the working group chairs.

http://research.spec.org/working-groups/devops-performance-working-group/

André van Hoorn (University of Stuttgart),
Andreas Brunnert (fortiss GmbH)

REPORT: IDS BENCHMARKING WORKING GROUP

November 04, 2014

The SPEC RG IDS Benchmarking Working Group successfully concluded its agenda for 2014 and faces 2015 with a renewed commitment. In 2014, the Working Group further established its research agenda having several works published.

The SPEC RG IDS Benchmarking Working Group has completed a field study on vulnerabilities of hypercalls handlers. Hypercalls enable intrusions in hypervisors through their hypercall interfaces. In a paper published at ISSRE 2015 (The 25th IEEE International Symposium on Software Reliability Engineering) [1] we characterize the hypercall attack surface based on analyzing 35 vulnerabilities of hypercall handlers. We systematize and discuss the errors that caused the considered vulnerabilities, and activities for executing attacks triggering them. We also demonstrate attacks triggering the considered vulnerabilities and analyze their effects. Finally, we suggest an action plan for improving the security of hypercall interfaces.

In the technical report SPEC-RG-2014-001 published by the SPEC RG IDS Benchmarking Working Group [2], we provide in-depth technical information on publicly disclosed vulnerabilities of hypercall handlers. For each analyzed vulnerability, we provide background information essential for understanding the vulnerability, and information on the vulnerable hypercall handler and the error causing the vulnerability. We also show how the vulnerability can be triggered and discuss the state of the targeted hypervisor after the vulnerability has been triggered.

The SPEC RG IDS Benchmarking Working Group has published the first version of HInjector, a tool for injecting hypercall attacks. The injection of hypercall attacks is performed with respect to hypercall attack models, which we constructed by systematising activities for executing attacks triggering hypercall vulnerabilities. HInjector can be used for generating workloads that contain hypercall attacks for the purpose of evaluating intrusion detection systems. HInjector is publicly available online.

As future work, the Working Group plans on defining metrics that take into consideration on-demand resource provisioning in virtualized environments (e.g., CPU and memory hotplugging, memory ballooning).

[1] Aleksandar Milenkoski, Bryan D. Payne, Nuno Antunes, Marco Vieira, and Samuel Kounev. Experience Report: An Analysis of Hypercall Handler Vulnerabilities. In Proceedings of The 25th IEEE International Symposium on Software Reliability Engineering (ISSRE 2014)–Research Track, Naples, Italy, November 2014. IEEE, IEEE Computer Society, Washington DC, USA. November 2014, Acceptance Rate: 25%.

[2] Aleksandar Milenkoski, Marco Vieira, Bryan D. Payne, Nuno Antunes, and Samuel Kounev. Technical Information on Vulnerabilities of Hypercall Handlers. Technical Report SPEC-RG-2014-001 v.1.0, SPEC Research Group–IDS Benchmarking Working Group, Standard Performance Evaluation Corporation (SPEC), 7001 Heritage Village Plaza Suite 225, Gainesville, VA 20155, USA, August 2014.

http://research.spec.org/working-groups/ids-benchmarking-working-group.html

https://github.com/hinj/hinjector

Aleksandar Milenkoski (University of Würzburg), Marco Vieira (University of Coimbra), Nuno Antunes (University of Coimbra), Alberto Avritzer (Siemens Corporate Research, USA)

OVER 130 ATTENDEES AT ICPE 2014

April 1, 2014

Over 130 participants from industry and academia attended the 5th ACM/SPEC International Conference on Performance Engineering (ICPE 2014) in Dublin, Ireland. The technical program included 14 full research papers, 2 short papers, 7 industrial/experience papers, and 6 work-in-progress papers selected from 100 submissions over all tracks (paper acceptance rate 27%). The conference also featured 3 keynotes, 20 poster/demo presentations, and 6 tutorials. Many thanks to the conference chairs, John Murphy and Klaus-Dieter Lange, and their team who did an excellent job in organizing the conference!

As usual, best research paper and industry papers were awarded. Like last year, the best paper candidates were announced before in the program and presented their work in dedicated slots. For the first time, the presentation has been taken into account for the final decision: all participants attending the candidate talks were asked to evaluate the talks based on a questionnaire. The winners of the best papers are:

- Research papers: Peter Libič, Lubomír Bulej, Vojtěch Horky, Petr Tůma. “On the limits of modeling generational garbage collector performance.”
- Industry/experience papers: Jianbin Fang, Henk Sips, LiLun Zhang, Chuanfu Xu, Yonggang Che, Ana Lucia Varbanescu. “Test-driving Intel Xeon Phi.”

After their best student research paper award at ICPE 2012, SPEC RG steering committee member Petr Tůma and his team were recognized with an ICPE best award already for the second time–congratulations!

The conference co-located two workshops, International Workshop on Hot Topics in Cloud service Scalability (HotTopiCS 2014) and International Workshop on Large Scale Testing (LT 2014). For the HotTopiCS workshop, it was the second edition after the initial workshop co-located with ICPE 2013. For the

Face-to-face meeting of SPEC Research during ICPE 2014 in Dublin.

LT workshop, it was the third edition–but for the first time it was co-located with ICPE.

Also co-located with the conference were various SPEC meetings, welcoming interested participants outside SPEC. The SPEC meeting included the annual meetings of the SPEC RG and its–at that time–two working groups, Cloud and IDS.

André van Hoorn (University of Stuttgart)

WINNER OF THE SPEC DISTINGUISHED DISSERTATION AWARD 2014

January 12, 2015

The SPEC Distinguished Dissertation Award is an annual award that aims to recognize outstanding doctoral dissertations within the scope of the SPEC Research Group in terms of scientific originality, scientific significance, practical relevance, impact, and presentation. This year, the award committee considered 11 excellent thesis submissions from universities around the world–Auburn University, Brown University, Caltech, College of William and Mary, Ghent University, Indian Institute of Science, Technion, University of Illinois at Urbana-Champaign, University of Kiel, University of Pennsylvania and Virginia Tech.

The winning thesis of Nadav Amit, nominated by professor Dan Tsafrir, deals with technical issues encountered in contemporary operating system virtualization techniques. The committee particularly appreciates the deep insight and the immediate application potential, coupled with careful presentation. The award is to be handed over at the ICPE 2015 Conference in Austin, Texas.

In addition to selecting the winner, the committee decided to recognize two theses with honorable mentions. These are the theses of Zhenhua Liu, nominated by professor Adam Wierman of Caltech, for the contribution to sustainable data center management techniques, and Zhuoyao Zhang, nominated by professor Boon Thau Loo of University of Pennsylvania, for the work on performance of map reduce frameworks.

The award selection committee for 2014:

- Walter Binder, University of Lugano, Switzerland
- Andrew Bond, RedHat, USA
- Klaus-Dieter Lange, HP, USA
- Raffaela Mirandola, Politecnico di Milano, Italy
- Meikel Poess, Oracle, USA
- Sameer Shende, University of Oregon, USA
- Cloyce Spradling, Oracle, USA
- Petr Tuma, Charles University, Czech Republic
- Jan Vitek, Northeastern University and Purdue University, USA.

The SPEC Distinguished Dissertation Award was established in 2011 to recognize outstanding dissertations within the scope of the SPEC Research Group in terms of scientific originality, scientific significance, practical relevance, impact, and quality of the presentation. The scope of SPEC's Research Group includes

Petr Tůma, (Charles University of Prague), research.spec.org

SPEC RG FACE-TO-FACE MEETING, DUBLIN 2014

April 1, 2014

Over 40 RG member representatives from industry and academia as well as additional interested ICPE participants attended this year's RG face-to-face meeting in Dublin, Ireland right after the conference's main program. For the fourth time, the RG's annual meeting was co-located with the ICPE conference. The meeting started with an introductory talk by the RG chair, Sam Kounev, who welcomed the attendees, gave an

Samuel Kounev (University of Würzburg) receives the SPEC Presidential Award from the SPEC President Walter Bays (right).

overview about the RG scope and activities, and briefly reviewed the achievements of the last year. The chairs of the Cloud and IDS Benchmarking working groups, Alex Iosup and Marco Vieira, introduced and reviewed their groups' activities. Moreover, Meikel Poess presented the current status on the new working group on big data to be announced soon. Eight technical talks by RG members completed the meeting and provided the basis for further vivid discussions:

- J Nelson Amaral: The Data Set Dimension: Supplementary Inputs for SPEC CPU Benchmarks to Enable Feedback-Directed Optimization Research
- Nikolas Herbst and Joakim von Kistowski: LIMBO–A Tool For Modeling Variable Load Intensities
- Nikolas Herbst and Andreas Weber: Towards a Resource Elasticity Benchmark for Cloud Environments
- Alexandru Iosup: Update on "Cloud Usage Patterns–A Formalism for Description of Cloud Usage Scenarios"
- Qais Noorshams: Storage Performance Analyzer (SPA)–A framework for performance evaluation of storage systems
- Nuno Antunes: Benchmarking of vulnerability detection tools for web services
- Aleksandar Milenkoski: On benchmarking intrusion detection systems in virtualized environments

In addition to the RG's annual meeting, both working groups held separate meetings on the next day with additional talks and discussions.

Aleksandar Milenkoski (University of Würzburg) receives the award.

Moreover, the SPEC Distinguished Dissertation Award was presented during the conference. The winner was Anshul Gandhi who received the prize from SPEC president Walter Bays and took the opportunity to present his work to the ICPE audience.

André van Hoorn (University of Stuttgart)

SPEC AWARDS 2014

April 1, 2014

During SPEC's 2014 Yearly Meeting in Dublin(Ireland), RG members Samuel Kounev, Alexandru Iosup, Aleksandar Milenkoski, and Petr Tuma were recognized by the SPEC President for their outstanding service to SPEC in 2014.

Samuel Kounev (University of Würzburg) was awarded with the SPEC 2014 Presidential Award for "Excellence in Research" recognizing long-lasting contributions to the field of performance evaluation and benchmarking of computing systems over the past decade.

The SPECtacular award was presented to Alexandru Iosup (TU Delft) for creation of the RG Cloud working group. Aleksandar Milenkoski (University of Würzburg) received an award for his "Technical Leadership" recognizing outstanding contributions and service to the

Participants of the SPEC dinner await the SPECtacular members to be awarded.

Petr Tůma, (Charles University of Prague) and Walter Bays.

Alexandru Iosup (TU Delft) receives the award and congratulations from SPEC President Walter Bays.

RG Cloud and RG IDS (Intrusion Detection Systems) Working Groups in 2013. In addition, Petr Tuma (Charles University of Prague) was recognized by SPEC President for his accomplishments as General Chair of ICPE 2013. Congratulations!

Piotr Rygielski (University of Würzburg), Walter Bays (Oracle), Klaus-Dieter Lange (HP, USA), Photographs: David Reiner (AMD)