HAEC NEWS

Newsletter Issue 2

Collaborative Research Center, HAEC - Highly Adaptive Energy-Efficient Computing (SFB 912)

NEWS

WELCOME TO OUR SECOND EDITION

It is my pleasure to welcome you to our second edition of our newsletter.

The year 2012 was an exciting year for TU Dresden. TU Dresden is now one of only 11 excellence universities in Germany. All the hard work has paid off. The foundations for this success had already been laid with the work of the Leading-Edge cluster Cool Silicon as well as of the Collaborative Research Center 'Highly Adaptive Energy-Efficient Computing'. The CRC complements the newly granted cluster of excellence „Center for Advancing Electronics Dresden" as research Path H and is therefore scientifically linked to cfAED, even though we are organizationally independent.

In addition, the first year of the CRC HAEC has passed and we are proud of the achievements of the first year. I´m looking forward to our second year and hope that we can achieve our common goals.

In this edition of HAEC News I would like to introduce our new HAEC-Logo. The decision for the logo took a while, but I think it was well worth the wait.

Last but not least I thank the team of sub-project B04 for the first contribution to the newsletter about their project Energy-Aware Resource Management.

I hope you enjoy reading the news and look forward to your future contributions.

Gerhard P. Fettweis
CRC 912 Coordinator

HAEC – B04:
Energy-Aware Resource Management
M. Völp, M. Hähnel, H. Härtig

HAEC – B04 aims at incorporating energy characteristics and resource management at the operating-system level. Our general approach is to model workloads' energy behavior in a utilitarian fashion. That is, we seek to characterize what benefits users of the system may obtain from a certain operation, what resources these operations need and how executing these operations translates to the system's power consumption. In this context, resources can be both hardware resources such as network interface cards (NICs) and software resources such as the network drivers or streaming services that other software components need.

Figure 1 illustrates our approach. Applications execute on behalf of users. Depending on the situations, some applications may be more important than others and some premium users may be more important for the system for example because they have paid for extra service. Each application generates a certain utility (that is, benefit) for the user and requires a certain amount of resources for doing so. For instance, displaying a high resolution video typically generates a higher utility than a low resolution video where decoding artifacts from suboptimal decoding become visible. However, the high-resolution display also requires more resources for the post-processing steps and a higher network bandwidth for streaming the video to the device. Resource demands may also depend on external factors such as environmental
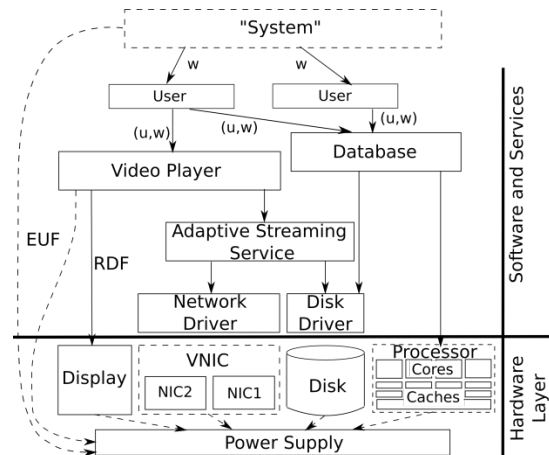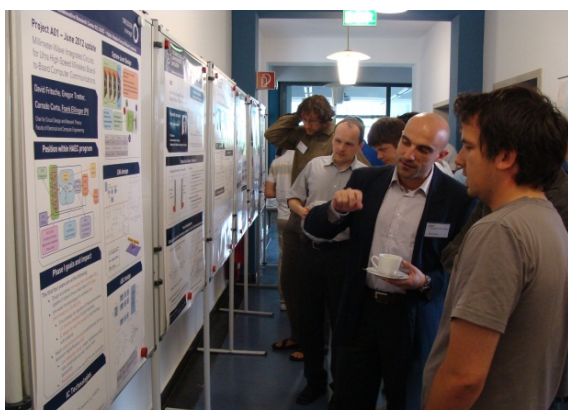

Fig. 1. Energy demands in the HAEC Hardware/Software stack

lighting. Different illuminations require different brightness settings to produce the same user-perceived quality. B04's goal is to characterize all system components in terms of these resource demands (RDFs). Combined with hardware-level energy profiles we can then translate the resource demand functions into a characterization of how much utility a given setup generates and the energy it consumes (EUFs) and use this characterization to optimally adjust system power consumption to the benefits it provides towards its users.

So far, we have improved the precision of the CPU-internal energy measurement equipment to determine the power consumed in short code paths. We characterized display, CPU and video player power in terms of energy / utility and found operation modes to dominate power consumption. Our energy-aware bonding interface exploits heterogeneity in the server's redundant network links to adjust link power to the servers' current bandwidth demands. Next steps include extending bonding to the HAEC optical and wireless interconnects and EUF-based resource scheduling.

Research Festival June 2012

During the second Research Festival in Dresden on 20 and 21 June, 2012, members of the HAEC-program came together to exchange the latest research results and to keep everybody abreast about the developments of the CRC 912. Prof. Fettweis, CRC - SFB 912 Coordinator, opened the festival providing a general overview of successful events such as the DATE and the TTM conferences, the planned childcare service and our financial status. Dr. Anni-Yasmin Turhan and Michael Jenning were elected as "Members of the CRC" (with the same rights as HAEC principal investigators). Afterwards, the A-Group presented an update of their research to the team. During poster sessions, the team had time to discuss their results with other team members - it was a lively exchange.

After lunch, team members were invited to a gender awareness training, which was organized by the admin team. The team was divided into 4 groups to discuss general gender problems and topics. Owing to the different groups and trainers, the feedback was quite diverse.

The second day was opened with a presentation by Dr. Achim Bonte from the Saxon State- and University library about open access and Qucosa. He gave the team a general idea about open access, the different business models, the pro and cons of open access and the service offered by the SLUB. Following the presentation, the B-group presented the latest results of their work to the team and had the chance to present and discuss their posters with the team as well. After lunch, team members met in small working groups to discuss the interfaces of their research. The Festival was completed with a General Assembly where members of the HAEC-program reflected again about the agenda points.

The next Research Festival will take place in July 2013. Further details will be announced as soon we have decided on a location.

-Sandra Helms-

Logo

The CRC HAEC has finally its own logo. I never thought that it takes so long to create (design) a logo or to pick a logo that just feels right for us. During this long process I did some "research" about logos. First of all, what exactly is a logo? The free dictionary says: "A logo is a graphic mark or emblem commonly used by commercial enterprises, organizations and even individuals to aid and promote instant public recognition. Logos are either purely graphic (symbols/icons) or are composed of the name of the organization (a logotype or wordmark)."

So I went looking for famous logos which we all see on a regular basis. Sometimes the idea for a logo comes easy like for example for the company Apple Inc. But what when an apple logo looks like a tomato, you just take a bite. This way you have it all, you make it distinguishable, easy recognizable and you even include a nerdy pun (bite/byte). Apple's slogan back then: "Byte into an Apple".

Amazon went a different way. Their logo does not have an obvious connection to the company name. The friendly logo with the smile. But did you know that the yellow arrow is not just a smiley. It also suggests that you can buy everything from A to Z on Amazon.

Priorities are different still for an age-old 3-letter-acronym tech industry giant. How do you purvey technological authority without alienating people? IBM's answer was to use a typewriter like serif font which was later made even lighter and more dynamic by adding the horizontal stripes and the color which earned the company its nickname: BIG BLUE.

How about our own logo? We asked the VOR-agency to design a logo that shows our goal, to demonstrate our results in a joint prototype - the HAEC Box and to see a connection to TU Dresden. If you look at the logo, you will see a box, surrounded by an octagon. The same octagon you will find in the TU Dresden logo, this should reflect the connection to the university, as well as the chosen colors of that matches the colors of the logos of Dresden concept and cfAED. Our new logo might not (yet!) be as widely known as the ones above, but we should be just as proud of it. It feels right for us and fits the CRC HAEC perfectly.
Our new HAEC logo rocks!

-Sandra Helms-

Childcare

At last, we finally received the approval for the flexible childcare service. We signed a contract with „Flexperten" (aka eq-Familienservice) in early October, 2012 which includes the following services: phone consultation about the different care options, short-term childcare, and childcare of sick children. Our employees will receive a phone number combined with a password to get in touch with an advisor. *Flexperten* guarantee that a call or email will be answered within 2 hours during weekdays in case an advisor is not available right away. For short-term childcare the parents can choose between a student, a qualified social education worker or a kindergarten teacher, who will come to the client´s house. According to their education,

the caregiver can charge between € 9-18 per hour. The care of a sick child can be covered by an examined or pediatric nurse should the employee be unable to stay at home owing to an important deadline or scheduled meeting. For detailed information regarding the costs, payment or other general questions, please get in touch with Dr. Nicolle Seifert or Sandra Helms. In addition, we would like to inform you that we will not further investigate the possibility to open our own day nursery as the demand for the care of infants in the Collaborative Research Centre is not as high as expected. We are proud to be the first DFG funded CRC at the TU Dresden, who will offer flexible childcare service to their employees.   *-Sandra Helms-*

And the Oscar goes to...........

The city of Dresden honors the commitment of scientists, business and convention organizers for the acquisition and organization of conferences and meetings in Dresden. This exclusive social event is organized by Dresden Marketing GmbH. The highlight of the event is the presentation of the 9th Dresden Congress Award. The "Oscar" of the Dresden convention industry has been awarded since 2004 and honors those who have held meaningful meetings and conventions in Dresden. A jury consisting of representatives of the city of Dresden, Dresden Chamber of Commerce, the business sector and the Dresden Congress decided on the winners in 4 different categories.

The categories are based on the number of participants of the exhibitions.

Prof. Dr.-Ing. Dr. h. c. Gerhard Fettweis has won the award in the category of over 1,000 participants for the exhibition „Design, Automation & Test in Europe" (DATE 2012) – The European Event for Electronic System Design & Test, 12th– 16th March, 2012. Congratulations!

NEW Publications - A-Group

A02
S. Krone and G. Fettweis
Communications with 1-Bit Quantization and Oversampling at the Receiver: Benefiting from Inter-Symbol-Interference
in Proceedings of the 23rd IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC´12), Sydney, Australia, September 9 - 12, 2012   AWARD

N. ul Hassan, A.E. Pusane, M. Lentmaier, G. Fettweis and D.J. Costello Jr.
Reduced Complexity Window Decoding Schedules for Coupled LDPC Codes
in Proceedings of the IEEE Information Theory Workshop (ITW´12), Lausanne, Switzerland, September 3 -7, 2012

M. Mesyagutov, G. Scheithauer and G. Belov,
New constraint programming approaches for 3D orthogonal packing
the EURO Summer Institute on Cutting and Packing in Porto in July 2012 and will be published in Transactions in Operations Research, Scholarship

A03
J. Richter, Ch. Scheunert and E.A. Jorswieck
An Efficient Branch-and-Bound Algorithm for Compute-and-Forward
in 23rd IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Sydney, Australia, September 9 - 12, 2012

A05
M. Jenning and D. Plettemeier
4 x 4 Butler-Matrix for 170 GHz Applications
in 2012 IEEE International Conference on Wireless Information Technology and Systems, Maui, Hawaii, USA, November 11 - 16, 2012

A07
K.J. Wolter, M. Bieberle, H. Budzier, G. Gerlach and T. Zerna
Zerstörungsfreie Prüfung elektronischer Baugruppen mittels bildgebender Verfahren
Verlag Dr. Markus A. Detert, 2012 (ISBN13: 978-3-934142-43-5)

R. Rieske
Photonic System Integration of Optical Wave Guides in MOEMS, Bio and Nano Packaging Techniques for Electron Devices: Advances in Electronic Device Packaging
Springer Verlag, 2012 (ISBN-13: 978-3642285219)

R. Rieske, S. Sohr, K. Nieweglowski and K.-J. Wolter
Assembly tolerance requirements for photonics packaging of multi-cell laser power converters
Proceedings of the 4th Electronics Systemintegration Technology Conference (ESTC 2012), Amsterdam, Netherlands, September 17 - 20, 2012

A08
E. Franz, S. Pfennig, A. Fischer
Communication Overhead of Network Coding Schemes Secure against Pollution Attacks
Technical Report TUD-FI12-07, TU Dresden, May 2012

S. Gerbracht, E. Jorswieck, G. Zheng, B. Ottersten
Non-regenerative Two-Hop Wiretap Channels using Interference Neutralization
to appear in Proceedings of IEEE International Workshop on Information Forensics and Security (WIFS 2012), Tenerife, Spain, December 2 - 5, 2012

NEW Publications - B-Group

B01
C. Wilke, S. Richly, G. Püschel, C. Piechnick, S. Götz and U. Aßmann
Energy Labels for Mobile Applications
to appear in Proceedings of First Workshop for the Development of Energy-Aware Software
(EEbS 2012), 2012

B02
St. Borgwardt and R. Peñaloza, A Tableau
Algorithm for Fuzzy Description Logics over Residuated De Morgan Lattices
In Markus Krötzsch and Umberto Straccia, editors, Proceedings of the 6th International Conference
on Web Reasoning and Rule Systems (RR 2012), volume 7497 of Lecture Notes in Computer Science, pages 9–24. Springer, 2012.

K. Lehmann and A.-Y. Turhan
A Framework for Semantic-based Similarity Measures for ELH-Concepts
In Luis Fariñas del Cerro, Andreas Herzig, and Jérôme Mengin, editors, Proceedings of the 13th
European Conference on Logics in Artificial Intelligence, Lecture Notes in Artificial Intelligence, pages
307–319. Springer Verlag, 2012

R. Peñaloza and A.-Y. Turhan
Instance-based Non-standard Inferences in EL with Subjective Probabilities
In Uncertainty Reasoning for the Semantic Web II, Lecture Notes in Computer Science. Springer-Verlag, 2012. To appear.

B03/B04
Ch. Baier, M. Daum, B. Engel, H. Härtig, J. Klein, S. Klüppelholz, St. Märcker, H. Tews and M. Völp
Waiting for locks: How long does it usually take?
in 17th International Workshop on Formal methods for industrial critical systems, Paris, France, August 27 – 28, 2012

Ch. Baier, M. Daum, B. Engel, H. Härtig, J. Klein, S. Klüppelholz, St. Märcker, H. Tews and M. Völp,
Chiefly symmetric: Results on the scalability of probabilistic model checking for operating-system code
Systems Software Verification Conference, Sydney, Australia, November 28 - 30, 2012

B03
Ch. Baier, J. Klein, S. Klüppelholz
Synthesis of Reo Connectors for Strategies and Controllers Fundamenta Informaticae
to appear

B04
H. Tews, M. Völp and T. Weber
On the Use of Underspecified Data-Type Semantics for Type Safety in Low-Level Code
Systems Software Verification Conference, Sydney, Australia, November 28 - 30, 2012

B05
T. Kissinger, B. Schlegel, M. Böhm, D. Habich, W. Lehner
A High-Throughput In-Memory Index, Durable on Flash-based SSD
In: SIGMOD Record, September 2012

B06
W. Dargie
Analysis of the Power Consumtion of a Multimedia Server under Different DVFS Policies
in 5th International Conference on Cloud Computing (IEEECloud 2012), Honululu, Hawaii, USA, June
24 - 29, 2012

Congratulations to.......

Stefan Krone!
The paper „Communications with 1-Bit Quantization and Oversampling at the Receiver: Benefiting From Inter-Symbol-Interference" has been selected as one of the **Best Student Paper Awards!**

Waltenegus Dargie!
The paper „Dynamic Power Management in Wireless Sensor Networks: State-of the Art, IEEE Sensors Journal, Vol. 12, No.5 May 2012 is **one of the 25 most downloaded Senors Journal papers in the month of July, 2012!**

Marat Mesyagutov!
The 2012 **Scholarship of the Euro Summer Institute on Cutting and Packing** was handed out to him for the paper: New constraint programming approaches for 3D orthogonal packing by Marat Mesyagotov, Guntram Scheithauer, and Gleb Belov.

Welcome to....

Veronika Thost (sub-project B02) !

We welcome you to HAEC and wish you every success with your work and research.

Dates for your diary 2013

Research Festivals 2013

January, 10th 2013:   General Assembly, Dresden Room BAR II63a

February, 27th - 28th 2013 :   cfAED Research Festival, Dresden

July, 2nd - 3rd 2013:   HAEC-Research Festival, off-campus

HAEC Seminars 2013

Date	Time	Room	Project
16.01.2013	9:00 – 10:30 am	BAR II 63 a	A02 (Prof. Fettweis)
20.02.2013	9:00 – 10:30 am	BAR II 63 a	A04
20.03.2013	9:00 – 10:30 am	BAR II 63 a	A02 (Prof. Fischer)
24.04.2013	9:00 – 10:30 am	BAR II 63 a	A05
29.05.2013	9:00 – 10:30 am	BAR II 63 a	A06
26.06.2013	9:00 – 10:30 am	BAR II 63 a	B01
04.09.2013	9:00 – 10:30 am	N.N.	N.N
16.10.2013	9:00 – 10:30 am	N.N.	N.N
13.11.2013	9:00 – 10:30 am	N.N.	N.N.
11.12.2013	9:00 – 10:30 am	N.N.	N.N