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Edited by Gregory T. Papanikos

THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH



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Edited by Gregory T. Papanikos

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Preface

This abstract book includes all the abstracts of the papers presented at the *8th Annual International Conference on Computer Science & Information Systems, 21-24 May 2012*, organized by the Athens Institute for Education and Research. In total there were 26 papers and 30 presenters, coming from 15 different countries (Brazil, Bulgaria, Canada, Estonia, Hungary, India, Iran, Kenya, Lithuania, Romania, Saudi Arabia, Serbia, Taiwan, UK and USA). The conference was organized into 8 sessions that included areas of Network Information Systems, Computer Modelling and Computer Science Theory, Health Informatics, Management Strategies of Information and other related disciplines. As it is the publication policy of the Institute, the papers presented in this conference will be considered for publication in one of the books of ATINER.

The Institute was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet in Athens and exchange ideas on their research and consider the future developments of their fields of study. Our mission is to make ATHENS a place where academics and researchers from all over the world meet to discuss the developments of their discipline and present their work. To serve this purpose, conferences are organized along the lines of well established and well defined scientific disciplines. In addition, interdisciplinary conferences are also organized because they serve the mission statement of the Institute. Since 1995, ATINER has organized more than 150 international conferences and has published over 100 books. Academically, the Institute is organized into four research divisions and nineteen research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

I would like to thank all the participants, the members of the organizing and academic committee and most importantly the administration staff of ATINER for putting this conference together.

Gregory T. Papanikos
President

FINAL CONFERENCE PROGRAM
**8th Annual International Conference on Computer Science &
Information Systems, 21-24 May 2012, Athens, Greece**
PROGRAM

Conference Venue: [Metropolitan Hotel of Athens](#), 385 Syngrou Ave., 175 64,
Athens, Greece

ORGANIZING AND SCIENTIFIC COMMITTEE

1. Dr. Gregory T. Papanikos, President, ATINER.
2. Dr. Panagiotis Petratos, Vice-President of ICT, ATINER & Associate Professor of Computer Information Systems, California State University, Stanislaus, USA.
3. Dr. George Poulos, Vice-President of Research, ATINER & Emeritus Professor, University of South Africa, South Africa.
4. Dr. Nicholas Pappas, Vice-President of Academics, ATINER & Professor, Sam Houston University, USA.
5. Dr. Vladimir Akis, Head, Mathematics and Statistics Research Unit, ATINER & Professor of Mathematics and Computer Science, California State University, Los Angeles, USA.
6. Dr. Constantine Georgakis, Associate Professor, DePaul University, USA.
7. Dr. Dominique Haughton, Professor, Bentley University and Toulouse School of Economics, USA.
8. Mr Stephen James Hole, Senior Lecturer, Swansea Institute of Higher Education, U.K.
9. Dr. Fotis Liarokapis, Senior Lecturer, Coventry University, U.K.
10. Dr. Ronald Lodewyck, Professor of Computer Information Systems, California State University, Stanislaus, USA.
11. Dr. Barbara Nicolai, Professor, Purdue University, USA.
12. Dr. Vasos Pavlika, Senior lecturer Software Engineering, University of Westminster, U.K.
13. Dr. Abdel-Badeeh Salem, Professor, Ain Shams University, Egypt.
14. Dr. Stilianos Vidalis, Senior Lecturer, University of Wales, Newport, U.K.
15. Dr. Margarita Kefalaki, Director of Communication, ATINER.
16. Ms. Lila Skountridaki, Researcher, ATINER & Ph.D. Student, University of Strathclyde, U.K.
17. Mr. Vasilis Charalampopoulos, Researcher, ATINER & Ph.D. Student, University of Strathclyde, U.K.

Administration: Fani Balaska, Stavroula Kiritsi, Eirini Lentzou, Konstantinos Manolidis, Katerina Maraki & Celia Sakka

C O N F E R E N C E P R O G R A M
(The time for each session includes at least 10 minutes coffee break)

Monday 21 May 2012

08:30-09:00 Registration

09:00-09:15 Welcome and Opening Remarks

- Dr. Gregory T. Papanikos, President, ATINER.
- Dr. Nicholas Pappas, Vice-President of Academics, ATINER & Professor, Sam Houston University, USA.
- Dr. Panagiotis Petratos, Vice-President of ICT, ATINER & Associate Professor of Computer Information Systems, California State University, Stanislaus, USA.

09:15-11:00 Session I: Network Information Systems

Chair: Petratos, Vice-President of ICT, ATINER & Associate Professor of Computer Information Systems, California State University, Stanislaus, USA.

1. *El Emary, I., Professor, King Abdulaziz University, Kingdom of Saudi Arabia. Cloud Computing in Education Systems: Capabilities and Limitations.
2. Ma, Y.C., Assistant Professor, Chang-Gung University, Taiwan. Energy-Aware Parallel Computing on Embedded Processors.
3. Gendron, M., Professor, Central Connecticut State University, USA & Swarr, R., Instructor Management Information Systems, Central Connecticut State University, USA. Defining Cloud Architectures: What Attributes Should an Application or Service have From the Business and Consumer Perspectives.
4. Tabor, T., Graduate Student, University of Portsmouth, UK & Gnanayutham, P., Lecturer, University of Portsmouth, UK. Web Navigation for Motor Impaired Users. (Monday, 21st of May, 2012)
5. Sen, A., Professor, Indian Institute of Management Calcutta, India, Singh, R.J., IBM India Private Limited, India & Sarkar, U., Professor, Indian Institute of Management Calcutta, India. A Partitioned Stochastic Search Algorithm: Application to Multi-unit Winner Determination Problem in Combinatorial Auction.

11:00-12:30 Session II: Computer Modelling and Computer Science Theory I

Chair: *El Emary, I., Professor, King Abdulaziz University, Kingdom of Saudi Arabia.

1. Lirkov, I., Associate Professor, Bulgarian Academy of Sciences, Bulgaria. Parallel Implementation of Alternating Directions Algorithm for 3D time Dependent Stokes Equation.
2. Valakevicius, E., Associate Professor, Kaunas University of Technology, Lithuania. An Algorithm for Pricing Options.
3. Vassilev, T., Assistant Professor, Nipissing University, Canada & Pape, S., Undergraduate Student, Nipissing University, Canada. Visibility: Finding the Staircase Kernel in Orthogonal Polygons.

12:30-13:30 Lunch

13:30-15:00 Session III: Health Informatics

Chair: Gendron, M., Professor, Central Connecticut State University, USA

1. Colman, J., Lecturer, SAE Institute, UK & Gnanayutham, P., Lecturer, University of Portsmouth, UK. Assistive Technologies for Brain-Injured Gamers.
2. Pinter, B., Ph.D. Student, University of Pannonia, Hungary, Gaal, B., Associate Professor, University of Pannonia, Hungary, Vassanyi, I., Associate Professor, University of Pannonia, Hungary, Kozmann, G., Professor, University of Pannonia, Hungary. Menugene: A Comprehensive Expert System for Dietary and Lifestyle Counseling and Tracking.
3. *Kang'a, S.G., Fellow, University of Nairobi, Kenya. Developing a Generic Workflow to Guide EMRs Implementation at Health Facilities in Developing Countries-A Kenyan Case.
4. Peart, A., Lecturer, University of Portsmouth, UK & Ross, P., Lecturer, University of Portsmouth, UK. Implementation of a Telecare Service in Portsmouth UK.

15:00-16:30 Session IV: Management Strategies of Information

Chair: *Kang'a, S.G., Fellow, University of Nairobi, Kenya.

1. Routray, S., Associate Professor, IMT Ghaziabad, India & Choudhary, P., Deputy General Manager, HCL, Technologies, Noida, India. IT Retail through Cloud
2. Mateev, M., Chief Assistant Professor, University of Architecture Civil Engineering and Geodesy, Bulgaria. Using spatial data in Windows Azure (SQL Azure and Azure Blob Storage).
3. *Balloni, A.J., Researcher, Center for Information Technology Renato Archer, Brazil, Resende, P.J.P., Researcher, Research and Projects Financing, Brazil & Targowski, A., Researcher, Western Michigan University, USA. Brazil of the Future? Strategizing with the Socio-Technical Management Approach.
4. Ozolit, O.M., Student, Tallinn University of Technology, Estonia, Viies, V., Associate Professor, Tallinn University of Technology, Estonia, Ennet, P., Data Analyst, Estonian Environmental Information Tallinn University of Technology, Estonia, Centre, Estonia, Aigro, J., Student, Tallinn University of Technology, Estonia, Kinks, H., Student, Tallinn University of Technology, Estonia, Kullamaa, R., Student, Tallinn University of Technology, Estonia & Salula, A., Student, Tallinn University of Technology, Estonia. Database Interface Compatibility of the Estonian Water Information System.

16:30-17:30 Session V: Management Strategies of Information II

Chair: *Balloni, A.J., Researcher, Center for Information Technology Renato Archer, Brazil

1. Swarr, R., Instructor, Central Connecticut State University, USA & Gendron, M., Professor, Management Information Systems, USA. Restful Web Services and Cloud Computing: Enablers for Multi-Tier Mobile Applications.
2. Todorov, N., PhD Student, Bulgarian Academy of Sciences, Bulgaria & Kovatcheva, T., Professor, Bulgarian Academy of Sciences, Bulgaria. Comparing Agile and PMBOK® - Time Management.

20:30-22:30 Greek Night and Dinner (Details during registration)

Tuesday 22 May 2012

09:30-10:30 Session VI: Information Assurance

Chair: Arvanitis, T., Reader, University of Birmingham, UK.

1. *Papadopoulos, Y., Professor, University of Hull, UK & Dheedan, A., Professor, University of Hull, UK. Multi-Agent Safety Monitoring System.
2. Oliveira, J.I.F., Professor, Federal Institute Science and Technology of Mato Grosso, Brazil. Protection Piracy on Embedded System.

10:30-12:00 Session VII: Information Technology Education

Chair: *Papadopoulos, Y., Professor, University of Hull, UK

1. Petratos, P., Associate Professor, California State University, Stanislaus, USA. Analysis of Business Online Higher Education Compared to Traditional Face To Face Learning.
2. Ruzic Dimitrijevic, L., Director, Higher Education Technical School of Professional Studies, Serbia. The Role Of Education In Web Accessibility.
3. Arvanitis, T., Reader, University of Birmingham, UK. Understanding Technology Acceptance for e-Learning Innovations.
4. Pole, R., Programme Director, Swansea Metropolitan University, UK, Jones, K., Lecturer, Swansea Metropolitan University, UK, Hole, S., Lecturer, Swansea Metropolitan University, UK & Fakher, A., Student, Swansea Metropolitan University, UK. Success Evaluation: A Tool for Assessing Learning Environments.

12:00-13:00 Session VIII: Computer Modelling and Computer Science Theory II

Chair: *El Emary, I., Professor, King Abdulaziz University, Kingdom of Saudi Arabia.

1. Abdeyazdan, M., Professor, Islamic Azad University Branch Mashshahr, Iran & Mohammad Reza Moini, Bachelor Student, Department of Computer Engineering, Mahshahr Branch, Islamic Azad University, Mahshahr, Iran,. Scheduling in Computer's System using Petri Net.
2. Soviany, S., Researcher, National Communications Research Institute, Romania. A Multi-Level Hierarchical Biometric Fusion Model for Medical Applications Security.

13:30-14:30 Lunch

17:00-20:00 Urban Walk (Details during registration)

20:00- 21:00 Dinner (Details during registration)

Wednesday 23 May 2012

Cruise: (Details during registration)

Thursday 24 May 2012

Delphi Visit: (Details during registration)

Marjan Abdeyazdan

Professor, Islamic Azad University, Branch Mahshahr, Iran
&

Mohammad Reza Moini

Bachelor Student, Department of Computer Engineering, Mahshahr
branch, Islamic Azad University, Mahshahr, Iran

Scheduling in Computer's System Using Petri Net

Error in the description, design and implementation of policies can cause timing violations, and thus performance which is desired. One approach to ensure correct order is that the programs offer scheduling tasks graph. Schedule that makes up the Monitoring core with using formal methods Petri networks Describe and design them with using SCR table, and in this article, regardless of the design, we focus on Petri method. To show the feasibility of this approach, we use it to describe the behavior monitoring processor.

Theodoros Arvanitis
Reader, University of Birmingham, UK

Understanding Technology Acceptance for e-Learning Innovations

User adoption of innovative e-learning technologies, within a learning community, presents always as a challenge for the technology designers and the content providers. The successful introduction and diffusion of e-learning, as a novel technology, requires the understanding of how best to evaluate the impact of all the technological, social, organisational and cultural dimensions of the innovation, within the context of any human learning activity. The use of empirical, statistics-based, validation models, originating from the field of Information Technologies Management (which can predict user acceptance and diffusion of technological innovations in the context of the workplace) can provide an insight of the future impact of e-learning technologies. In particular, the Davis' modified Technology Acceptance Model (TAM) portrays as a powerful empirical validation and prediction tool of user-related acceptance of information-based technologies in the workplace. The TAM can provide strong insights on how such technologies fulfil the expected user needs and therefore will be diffused as a new service and technology innovation within the broader market they are targeting. In this paper, we are discussing the benefits of the TAM approach into gaining insights on the origin and misspecification of user needs, and elaborating upon the key perceptions of users' evaluations, during the early stages of the development lifecycle of e-learning technologies. We investigate how the model can be adapted for validating user requirements and improve the feasibility position of the new e-learning technologies in being adopted by learners. Specific examples, on using the model in the context of secondary and higher education e-learning approaches, will be discussed.

Antonio José Balloni

Researcher, Center for Information Technology Renato Archer, Brazil,

Paulo J.P. Resende

Researcher, Research and Projects Financing, Brazil
&

Andrew Targowski

Researcher, Western Michigan University, USA

Brazil of the Future? Strategizing with the Socio- Technical Management Approach

In the course of five centuries, Brazil has emerged from a reality of primitive land and has become a multi-ethnic country, considered today one of the world's largest economies. Brazil, with an integrated territory, is aiming to be projected as a relevant player in the complex interplay of world powers.

However, the country had its political thinking "caught" by an economic agenda based on increasingly smaller temporal cycles - quinquennial, biennial, annual, half-yearly, bimestrial, monthly or even cycles of some days of duration -, losing its vision of the desired future. A model of participative management, based on a sociotechnical perspective, represents the opportunity for the emancipation of a political thinking capable of formulating a vision for the long-term future.

Within this perspective and, in view of the sociotechnical approach, the present work has as objective of promoting innovation in the thought of the public/private manager, presently consolidated in a short/medium term vision. In this "Participatory Model of Sociotechnical Management", it is proposed as a tool of change, the sharing of information and the implementation of a common vision, of the future, to the Brazilian citizens.

Jason Colman

Lecturer, SAE Institute, UK

&

Paul Gnanayutham

Lecturer, University of Portsmouth, UK

Assistive Technologies for Brain-Injured Gamers

This paper surveys assistive technologies which make video games more accessible for people who have an acquired brain injury (ABI), whether traumatic or due to another cause such as stroke. As medical care improves, an increasing number of people survive ABI. Video games have been shown to provide therapeutic benefits in many medical contexts, and rehabilitation for ABI survivors has been shown to be facilitated by playing some types of video game. Therefore, technologies which improve the accessibility of games have the potential to bring a form of therapy to a larger group of people who may benefit.

Hardware technologies which may make games more accessible for brain injury survivors are considered. These include brain-computer interfaces (BCI) and eye gaze tracking. Low-cost BCIs aimed specifically at the gaming market have become available in recent years. The operation of these devices is described, and their potential for widening game accessibility is considered. Other types of BCI which may become more widely available in future are also described.

Video games can be made more accessible after they have been developed. This technique is exemplified by the UK charity Special Effect, whose work enables disabled people to play off-the-shelf game software. Another approach to improving accessibility is to incorporate best practice guidelines into the software during the development process. A number of such guidelines are described, which are especially relevant to ABI players. It is proposed that the dissemination of these guidelines among game development practitioners would improve accessibility and thus the therapeutic potential of future games.

Ibrahiem El Emary

Professor, King Abdulaziz University, Kingdom of Saudi Arabia

Cloud Computing in Education Systems: Capabilities and Limitations

In the current time, we see that cloud concept plays a significant implication as a communication medium for a wide range of applications. While it may not be highly interactive in a physical sense, it has strong potential for social interactivity. One of the major applications that benefit too effectively from cloud is E-learning systems that usually require many hardware and software resources. There are numerous educational institutions that cannot afford such investments, so the cloud computing represents the best solution for them. The implementation of a cloud computing in e-learning system has its peculiarities and needs a specific approach. So, the major objective of this paper is to address and discuss how the educational potential of cloud computing may be utilized for advancing the much needed practice of collaboration among educators as well as talking about the positive impact of using cloud computing architectures upon e-learning solutions development.

Michael Gendron

Professor, Central Connecticut State University, USA

&

Robert Swarr

Instructor Management Information Systems, Central Connecticut State
University, USA

**Defining Cloud Architectures: What Attributes
Should an Application or Service have From the
Business and Consumer Perspectives**

Samuel Gichohi Kang'a
Fellow, University of Nairobi, Kenya

Developing a Generic Workflow to Guide EMRs Implementation at Health Facilities in Developing Countries-A Kenyan Case

Following the successful Electronic Medical Records systems (EMRs) review exercise that traversed various health facilities in Kenya seeking to find out the degree of functional compliance of the different target EMRs to the Standards and Guidelines for EMRs in Kenya document, a report shall be released by the Ministry of Health (MoH) on the findings. In addition the report shall provide information towards evidence based selection of EMR(s) that the MoH shall recommend for adoption and implementation at the various MoH facilities.

Health facilities develop and adopt different clinical workflows in the process of providing health services. In the process of health facilities transiting from paper based records to EMRs, among the greatest determinants of a successful process is the harmonization of the existing clinical workflow with the EMRs workflow. For best results, the existing clinical workflow ought to be analyzed to eliminate bottlenecks and ensure optimal operation. The resultant clinical workflow then guides the customization of the recommended EMRs during the implementation at the health facilities.

To ensure relevance in a given setup, target health facilities ought to be indentified for assessment of their clinical workflows. This then forms a basis for analysis and modeling of the workflows towards the realization of an optimized generic clinical workflow which guides the customization of EMRs at implementation to ensure harmony between the clinical workflow and the EMRs functional and usability design. This would ensure a shorter period in training the EMRs end users on the system use, easy automation of the existing clinical processes and a structured path towards future EMRs improvement.

Ivan Lirkov

Associate Professor, Bulgarian Academy of Sciences, Bulgaria

Parallel Implementation of Alternating Directions Algorithm for 3D time Dependent Stokes Equation

We consider the 3D time dependent Stokes equation on a finite time interval and on a uniform rectangular mesh, written in terms of velocity and pressure. A parallel algorithm based on a direction splitting approach is efficiently implemented. Our work presents perspectives of the parallelization based on the MPI and OpenMP standards. The work is motivated by the need to improve the parallel efficiency of our implementation of the parallel algorithm. Essential improvements of the first version of the parallel algorithm are made by introducing two levels of parallelism: MPI and OpenMP.

We are targeting the massively parallel computer as well as clusters of many-core nodes. We study the impact of the domain partitioning on the performance of the considered parallel algorithm for solving the time dependent Stokes equation. Here, different parallel partitioning strategies are given special attention. The implementation is tested on the IBM Blue Gene/P supercomputer and two Linux clusters with Intel and Dell Xeon quad core processors. The presented results from numerical tests confirm that decreasing the communication time between processors we obtain better scalability of the algorithm.

Yung-Cheng Ma

Assistant Professor, Chang-Gung University, Taiwan

Energy-Aware Parallel Computing on Embedded Processors

Design of embedded processors has attracted much attention in the last decade and lots of multimedia applications emerged. Typical applications of embedded processors, such as smart phones, require high-performance multi-media processing as well as low-power design to lengthen the battery working hour. Energy-proportional computing scheme is proposed for an embedded processor to meet both high-performance and low-power demand. An energy-proportional processor dynamically adapts its program execution speed and power by application's requirements. DVS (dynamic voltage scaling) processors are such kind of energy-proportional processors. This paper studies the design of energy-proportional processor for future deep-submicron semiconductor processes.

Development of semiconductor manufacturing process shapes our way to design processor architectures. It is reported that, for future deep-submicron processes, leakage power will become the dominant part of a processor's total power consumption. Energy-saving effect of DVS, which is aimed at attacking the switching power, is thus limited with future manufacturing process. On the other hand, various researchers proposed MTCMOS power-gating technologies to shut-down both leakage and dynamic power consumption. We thus study the way to design energy-proportional processor with the emerging power-gating technologies.

We propose a novel approach for energy-proportional computing --- the adaptive IPC (instructions per cycle) scheme. The objective is to minimize the program execution energy to meet the user-specified execution deadline. The proposed technologies are targeted to design a VLIW-DSP processor, which is one of the key components in an embedded SoC. The adaptive IPC architecture is a VLIW architecture with power-gating such that the processor power scales with execution parallelism. Registers set is partitioned and distributed across power domains to make both computation and data-supply power scales with IPC. The architecture lies on the compiler to exploit its energy efficiency. The compiler tries to find out the minimum parallelism to meet performance demand. We propose energy-aware list scheduling algorithms that reduces significant amount of data-transfer energy while building an ASAP (as-soon-as-possible) schedule. Moreover, a modified Chaitin algorithm for weighted graph coloring is proposed to

save energy consumption on register files. Evaluation on MiBench shows that our joint effort on architecture and compiler design saves significant portion of a processor's energy consumption.

Mihail Mateev

Chief Assistant Professor, University of Architecture Civil Engineering and Geodesy, Bulgaria

Using spatial data in Windows Azure (SQL Azure and Azure Blob Storage)

Windows Azure is Microsoft's implementations of Cloud Computing. Geographic Information Systems are one of the areas that can take advantage of Windows Azure, because they need to use huge amount of data, computing resources, communication, scalability and accessibility from different places over the world. This article is about the spatial data – the foundation of Geographic Information Systems.

One of the key points in any GIS architecture is how to store spatial data. Windows Azure proposes new opportunities that could be used from GIS systems. This paper is focused on two solutions: using spatial data in SQL Azure and maintain spatial data from Windows Azure Blob Storage. SQL Azure provides opportunities to use spatial data in a relational database (with the possibility of migration of data from MS SQL Server). Azure Blob Storage solution is to use file-based spatial data such as shapefiles, WKT, XML etc.

Approach: Research is based on several prototypes designed to use spatial data from Windows Azure. When used SQL Azure decision is based on SQL Spatial, enabling the use of OGS.

In both solutions (SQL Azure and Azure Blob Storage) communication with customers is through Web Services.

Results: As a result of the study are different real workable solutions to spatial data in Windows Azure was compared with traditional client-server and multi-tiered solutions. As a result of the comparison is a technical and economic substantiation on the advantages of Cloud Computing in particular Windows Azure in Geographic Information Systems.

José Ivo Fernandes Oliveira

Professor, Federal Institute Science and Technology of Mato Grosso,
Brazil

Protection Piracy on Embedded System

In recent years, embedded systems present in electrical and electronic devices have become widespread refined and improved, and they offer greater convenience in human life. For these reasons, there have been a variety of researches in this line. The main feature of these systems, in contrast to general purpose systems, is its high interaction with electronic products, in different situations that require real-time capabilities. In this context, the security of the embedded systems has become considerably important in that it forms also have sophisticated piracy. Among the various forms of attacks the vulnerabilities of systems, stand out external attacks, exploiting these flaws are left in the projects by teams of developers or businesses on the ground that the safety of the project is not essential, either for lack of time or belief that legal protection should be sufficient thereby reducing costs. This article aims to show the relevance of the use of development techniques and project management whose primary focus is the protection of embedded systems implemented in FPGA Bitstream encryption code, thereby ensuring intellectual property and lifecycle of the application.

Ott Madis Ozolit

Ph.D. Student, Tallinn University of Technology, Estonia,

Vladimir Viies

Associate Professor, Tallinn University of Technology, Estonia,

Peeter Ennet

Data Analyst, Estonian Environmental Information Tallinn University
of Technology, Estonia, Centre, Estonia,

Jaan Aigro

Ph.D. Student, Tallinn University of Technology, Estonia,

Hannes Kinks

Ph.D. Student, Tallinn University of Technology, Estonia,

Robert Kullamaa

Ph.D. Student, Tallinn University of Technology, Estonia
&

Ain Salula

Ph.D. Student, Tallinn University of Technology, Estonia

Database Interface Compatibility of the Estonian Water Information System

Our goal is to develop a number of applications, mostly computational models, for an Estonian Water Information System (WIS) which will use many different databases, which in turn have been created for storage of environmental data in Estonia. The Estonian surface WIS has to obtain data mainly from three Estonian Environment Information (EEIC) databases, the Environmental Register, the Information System of Environmental Permits and the Information System of Estonian Nature. Since these databases are not inherently interconnected, a bridge-type add-on service is needed to ensure correct communication between our databases and models, especially since our models can also be dependant on each other.

While there is already a tool developed by the Estonian government, X-tee (X-road), to allow seamless communication between government administrated databases, we are not limited by its constraints as of yet. The databases we need are fortunately all being administrated in-house and in the future, X-road will indeed be included in our bridge service, nicknamed ROOMA (Rome). We have defined the term as a backronym

- Relational, Object-Oriented, Models, Databases (“Andmebaasid” in Estonian).

The models are linked – the result of one model can provide input to a different model. The models are also linked to EEIC databases for automatic installation and initialization. As such, the applications as well can be linked, and must be, if a complex modelling result is needed. This is where Rome comes into play, to make sure that all data is converted to a machine-readable, specific format that our components can understand.

The system interface is realised using Geographic Information System (GIS) technology. This technique allows us to test various scenarios and to take coincidentally into account the influence of different measures on the whole basin and also provide an interactive map service for our userbase to make queries with.

Yiannis Papadopoulos
Professor, University of Hull, UK
&
Amer Dheedan
Professor, University of Hull, UK

Multi-Agent Safety Monitoring System

Online safety monitoring, i.e. the real time detection, diagnosis and correction of hazardous failures, is an essential task in the operational phase of most safety critical systems. Although current safety monitoring mechanisms deliver this task to some extent, the problem of effective and timely safety monitoring is still largely unresolved. One aspect of the problem is the type of the knowledge that is required by an automated safety monitor: should it be a set of rules defined by experts or based on engineering models and what kind of knowledge should such models contain? A second aspect of the problem arises from the increasingly distributed nature of modern systems which questions the effectiveness of monolithic monitoring systems and demands increasing distribution and collaboration of safety monitoring functions as a precondition for delivering timely and effective monitoring.

In this paper, we address the safety monitoring problem through an intelligent distributed monitoring mechanism. This mechanism is based on a Multi-agent system (MAS) and uses knowledge about normal and failure behaviour that is derived from a systematic safety analysis process. By exploiting this knowledge and real-time observations of the system, agents deliver a wide range of functions which include detection, diagnosis and correction of failures, both locally and globally via MAS collaboration. The system employs an architecture of BDI (Belief-Desire-Intention) monitoring agents. These are deployed over the target system and they exploit the safety knowledge to perform local monitoring of sub-systems and work together to deliver higher level safety monitoring functions at system level. The paper shows that such knowledge could be composed of fault trees and state-machines and arranged into a Semantically Distributed Error Model (SDEM). The potential advantages of the new distributed monitor are increased flexibility, composability and extensibility in a safety monitoring approach, and ultimately achieve a more cost-effective on-line safety monitor. The approach is demonstrated on an aircraft fuel system case study.

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Implementation of a Telecare Service in Portsmouth UK

Telecare is the term given to the combined use of technology, processes and services to support safety, wellbeing and independence to vulnerable people. The technology generally consists of sensors located within the home that monitor the user; these include devices such as falls monitors, bed exit monitors, door monitors etc. When a sensor alarm is activated a response is initiated, often through a dedicated call centre. Most Telecare services are location based; the sensors and response are located in and tied to the user's home.

This paper discusses the feasibility of extending Telecare into a mobile service. There are two areas under consideration; elderly users with mobility problems, who require falls detection and those suffering early dementia and are prone wandering and becoming lost.

The introduction of Global Positioning Services (GPS) and Location Based Services (LBS) in many 'Smart Phones' combined with GPRS to locate and contact the user allows for active tracking. Active tracking devices collect data including GPS location, speed, heading and sometimes 'trigger events' and then transmit the data in real-time via cellular or satellite networks to a computer or data centre for evaluation. When a network is not available the device stores data in internal memory and will transmit stored data to the server later when the network becomes available again.

Unlike location based Telecare where response is always the user's home address, the response service now has to respond to a set of GPS co-ordinates. The main problem that has been identified is loss of signal. Although coverage is good there are still areas where either the GPS or GPRS cannot acquire a connection, known as 'Black Spots'. This would mean, in the event of an emergency, response could only be directed to the 'last known location'.

This paper uses data collected during a pilot study conducted in East Sussex UK to propose that through the use of data collection and data analysis, data mining techniques can be used to evaluate and predict a user's location based on last known co-ordinates and historic data. The paper identifies the benefits not only to the elderly or early dementia but can be extended to utilise sensors to capture the personal health

data such as blood pressure or heart rate readings. This data could be transmitted along with the GPS location data and alerts configured for abnormal readings. Predictive algorithms could be used on historical data stored within the system. Normal patterns of behaviour could be recorded and deviations from these patterns could activate an alert.

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**Analysis of Business Online Higher Education
Compared to Traditional Face To Face Learning**

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MenuGene: A Comprehensive Expert System for Dietary and Lifestyle Counseling and Tracking

We present a lifestyle and nutrition counseling expert system which provides advices for several illnesses, including cardiovascular diseases which are known to be the most common cause of death. Changes in lifestyle and dietary intake can significantly improve risk factors.

MenuGene supports all major steps of dietary and lifestyle counseling. The backbone of the system is an extensible, comprehensive food composition database that represents Hungarian cuisine. A GA based artificial intelligence module, MenuGene Daemon, which is able to generate meal plans that satisfy the given numerical constraints and harmony rules is currently in evaluation phase. Our API, MenuGene Data Services, can be used to integrate with third party systems. Two user interfaces can be used to enter dietary and physical activity logs: Dietlog, which can be used from regular internet browser, and HealthTrack which is an application for Android phones. Consumed meals and physical activities / exercises can be selected from a well-organized set structure, or using search. If the exact meal is not found a set can be selected instead. Our anamnesis module DietAnam can calculate personal RDA values even for some illnesses. Smartphones' integrated accelerometer is used by our tool to estimate the calories burnt by physical activity, using the Harris-Benedict formulas. This estimate, the personal goal (e.g. losing 2 kgs within 2 months), and the computed personal BMR value are used to compute the recommended daily energy intake. The user receives a daily assessment based on the logged energy consumption compared to the recommended value.

Our previous research showed that with respect to the quantity of the basic nutrients ca. 15% accuracy can be achieved by our Dietlog interface. The popularity of smartphones can make the precision of

logging even better. We are currently running a clinical evaluation test to validate our daily energy balance calculation algorithms.

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Success Evaluation: A Tool for Assessing Learning Environments

The development of ubiquitous computing, new pedagogic approaches and an increasing need to become more cost effective present's opportunities and challenges to both Education and Information Technology communities. The constant introduction of new sophisticated and ubiquitous technology provides much more flexibility to learn than ever before, that learning is no longer location specific, but instead enables individuals to learn anything, anywhere at any time, a development termed e-learning.

Whilst some confine e-learning to the Internet, e-Learning can be delivered through many forms of digital media including CD-ROM's, encyclopaedia disks, virtual learning environments (VLE) and websites. Consequently, as a result of the wide range of courses and activities that are available, e-learning has become a key supporting tool in the 21st century and has already influenced teaching and the way in which training is provided. Traditional approaches to learning incorporated teacher-centered strategies, however learning styles are evolving and becoming more student-centered, that technology is enabling participants to configure and develop learning environments to match their own learning styles.

Despite the rise in popularity of e-learning, there is little evidence supporting the measurement of the success of these environments or even that they fully meet the requirements of the participants. Approaches to e-learning have typically focussed on the use of technology to create more detailed and interesting learning environments with limited evaluation of system quality, success or even user satisfaction.

This paper proposes an evaluation tool to assess the quality of e-learning systems to gauge their success and the level of user satisfaction

they generate. The tool developed is a modified version of WebQual, an instrument used within the e-commerce sector to evaluate the quality of usability, information and interaction of websites. The new assessment tool includes an additional element learning, from a participant perspective irrespective of their stakeholder status.

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IT Retail through Cloud

Cloud Computing has been in vogue since last couple of years, with a distinct phenomenon of Cloud Sourcing that is picking up across industry. Another increasingly visible trend is about miniaturization of the computing devices, with a growing trend towards mobile computing. We the Authors, see a unique possibility unfolding in the future, which could see a merger of these two trends.

Today, most of the mobile application markets are dominated by the gaming solution companies and others catering to individual mobile IT users. Tomorrow, if CIOs are going to act like symphony orchestrators of IT applications over Cloud, as many futurists are predicting, then, it is quite probable that companies might commence sourcing their IT needs over the cloud in a classic "Retail Format". We call this possibility as "IT Retail through Cloud" where a company could purchase their IT needs for a short duration like a retail consumer, and pay it like a utility, with inherent flexibilities of retail consumer with competitive choices at various features and price points.

The current paper takes shot at investigating this possible future trend, where we believe "IT Retail through Cloud" shall emerge as one of the most viable ways of exploiting Cloud. We have developed a framework based on exploratory research of a range of academic and practitioner literature and upon consulting with industry experts. The hypotheses arrived at, have been evaluated by industry experts and academicians.

We believe that this study could have critical implications for the future and this shall not only spark of an interesting debate on Cloud adoption strategies in research fields but also perhaps, ignite a few adventurous entrepreneurs in the IT industry to explore this as a distinct business proposition.

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The Role of Education in Web Accessibility

The paper discusses the issue of accessibility on the Web and its importance in general, and in the area of education of web designers in particular. The prevalence of use of the Web around the world requires better and qualitative access to its content. The website is accessible if it has been designed to provide the same opportunity to every user to access it, even under difficult conditions. The organization W3C (World Wide Consortium), which deals with web standards development, defines the web page content as accessible if it can be used by people with some kind of handicap. In order to make accessible websites, all problems that can arise regarding the user must be identified, as well as the obstacles that may occur when navigating through the site. Difficulties and problems can be of psychological and physical nature, but also technical, temporary or due to poor experiences in using the content from the Web. Therefore, Wikipedia defines the term web accessibility more comprehensively: "Web accessibility refers to the inclusive practice of making websites usable by people of all abilities and disabilities. When sites are correctly designed, developed and edited, all users can have equal access to information and functionality" (Wikipedia, February10, 2012).

The Higher Education Technical School of Professional Studies in Novi Sad, Serbia, has included in the syllabus of future web designers such topics that teach them about the importance of accessible web pages and how to design them. Additionally, students explore the accessibility of different websites with automatic software, and lecturers have participated in the project on training people with hearing problems to use computers and the Internet. Interesting results have been obtained in testing websites by a group of visually impaired students and people less experienced in using the Web.

Thanks to these studies, our students of web design have realized the importance of creating accessible web pages, they themselves started to investigate and collect material for their final work and got involved in projects of training persons with special needs.

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A Partitioned Stochastic Search Algorithm: Application to Multi-unit Winner Determination Problem in Combinatorial Auction

With the penetration of the Internet and the ease of carrying out an auction by both the bidders and the auctioneer the electronic auction market is already huge and is expanding rapidly. The paper presents a novel stochastic partition-based search technique to solve the winner determination problem associated with the multi-unit combinatorial auctions. The algorithm uses an innovative divide and conquer formulation in the search framework so that solutions to sub-problems remain additive. The stochastic divide and conquer strategy embedded in a depth-first branch and bound search framework, called multi-partitioning search, significantly reduces the computational overhead in solving optimal and near-optimal solutions to large problem instances. The winner determination problem associated with the multi-unit combinatorial auctions is much more complicated than its single-unit counterpart. In Combinatorial Auctions, multiple goods are available for auction simultaneously, and bidders bid for combinations of goods called bundles. Often the value of a good to a potential buyer may depend upon what other goods she wins in the auction. The auctioneer attempts to maximize her auction revenue under constraints imposed by the availability of goods and known information about the bids. The problem which is known as the winner determination problem, attempts to find out the winning bids that will maximize the revenue. The application of the proposed algorithm to this problem demonstrates the efficacy of the algorithm. Experimental results with the benchmark problem suites from CATS 2.0 using uniform and decay distributions are presented. The results exhibit saving in computation can be as high as 99% while compromising less than 1% of the revenue.

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A Multi-Level Hierarchical Biometric Fusion Model for Medical Applications Security

The paper proposes a hierarchical biometric data fusion model which is designed to provide the performance enhancement for the recognition task in biometric identification and verification systems designed to provide medical applications security. The hierarchical approach is relying on more classifiers combination within a multi-level biometric fusion hierarchy. The multi-level biometric fusion model includes both of pre-classification fusion with optimal feature selection and the post-classification fusion based on the similarity scores weighted sum. The proposed solution increases biometric recognition accuracy based on a suitable feature selection, as much as not all of the feature vectors components support the performance improvement degree. The novelty of our approach is the combination between feature-level biometric fusion and matching-score/decision-level biometric fusion, ensuring more distinguishing information for the authentication task. This approach is suitable for high and medium-security level applications, such as the telemedical ones, as much as the user authentication is one of the most important mechanism to protect the medical databases.

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Restful Web Services and Cloud Computing: Enablers for Multi-Tier Mobile Applications

As vendors increase the capability of hand held mobile devices, growing numbers of power users adopt these devices as their primary means of Internet access. These power users will demand more sophisticated mobile applications that may not fit within the constraints of a mobile device. Applications that create high resource utilization (processor or memory) or have special information requirements need to offload parts of the application to another platform. This paper examines the resource and information requirements of certain types of applications, describes why a multi-tier architecture is necessary for deploying more sophisticated applications on a mobile device, and shows how RESTful web services and cloud computing enables multi-tier mobile applications.

We are experiencing the early phases of a disruptive innovation, which is the adoption of a technology that displaces a dominant one. SMDs are displacing desktop computers, laptops and netbooks as the means of Internet access. During the early phases of the adoption of a disruptive technology the Information Systems (IS) community abandons some of the best practices of the previous technology epoch. We have not fully considered the advantages of a multi-tier architecture for mobile applications, which were learned during the adoption of the last disruptive innovation, the personal computer. We need to re-engineer multi-tier applications for SMDs.

There are two primary requirements for this multi-tier architecture for mobile computing: a lean, widely-available, lightweight protocol to connect to Internet applications, and a robust, widely-available Internet platform for applications. This paper takes the position that RESTful web services is the best method for communicating between a mobile application and an Internet application and that cloud computing is the best choice as the Internet application platform. In this paper we show how RESTful web services and cloud computing enables multi-tier mobile applications. This paper discusses these technologies and an example application.

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Web Navigation for Motor Impaired Users

The traditional communications media such as telephone, music, film, and television have been redefined by the Internet, by services such as Newspaper, book, blogging and web feeds. The Internet has enabled interactions through social networking sites.

There are 650 million persons with disability worldwide with 577,000 persons in the UK alone. By expanding the World Wide Web to millions of disabled persons, exclusion is reduced and organisations are able to offer their online services to a larger audience.

This paper focuses on the motor impaired users who often feel excluded from the information society as it can be difficult or impossible to use today's software applications. Common browsers for example are immutable as opposed to adaptable for disabled users. The complexity lies in the variations of ability and impairment of the individual, a one system fits all approach makes the target audience larger allowing a greater chance of success.

Similar systems have been reviewed and it was discovered that existing systems are designed with specific input devices in mind, rather than on the movement a user can perform in relation to their disability. To this end the focus has been placed on dynamic processes of interaction. Using evolutionary prototyping in conjunction with SSM the system was developed in an iterative way in line with users' feedback.

The results showed that by focusing on dynamic processes of interaction, and placing the power in the interface itself all motor impaired users could use one system, something that is not possible in mainstream browsers. Using an onscreen keyboard and virtual click the number of clicks required to write a word were reduced to zero.

This paper demonstrated the issue of point and click for the motor impaired and the artefact proved that this could be overcome. By empowering users with freedom and flexibility complexities were broken down as were accessibility barriers.

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Comparing Agile and PMBOK® - Time Management

The paper compares the processes and practices defined by the internationally recognized standard - Project Management Body of Knowledge (PMBOK® Guide) and the Agile software development methodologies (becoming extremely popular and attractive nowadays). The goal is to show that there is a considerable mapping between mentioned approaches for software projects management. The paper emphasizes on the knowledge area of Time Management, following the PMBOK® defined processes and comparing them to the Agile techniques and practices.

It is a common opinion that Agile and PMBOK® ideologies for managing a software development projects are quite contradictory. Agile values and focuses on the final results and collaboration, whereas PMBOK® relies on the well documented project planning and its strict monitoring and control.

A Guide to PMBOK® defines nine knowledge areas within the project management lifecycle. Each of them consists of several processes comprising a full set of 42 processes in the standard. In this paper we focus on one of the areas - Project Time Management. For this area we go through its underlying processes, inputs, tools, techniques and outputs and look for corresponding practices in agile software development methodologies which actually cover the items defined in the PMBOK® process.

It is important to state that we do not select a particular agile methodology (e.g. XP or Scrum) but consider them as a whole because of the following reasons:

- The latest trends in software development are to use the term “agile” as a general notion, emphasizing on the iterative approach and agile practices we use as a natural response to the current pressing business needs and expectations. It is not stated that “we work under Scrum” but rather that “We are agile”.
- Many of the latest agile practices are not considered part of a concrete methodology. Most of these practices have established a common naming although some methodologies contain elements of

them (e.g. planning poker, agile retrospective, continuous integration, etc.)

- Different methodologies offer different set of practices and using a combination of them will help us to better map to the PMBOK® processes.

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An Algorithm for Pricing Options

To price call or put options it is need to have a good model of the probability distribution of the underlying asset. The most models like Black and Scholes and similar use Brown motion to describe the price dynamics, i.e. the normal distribution is used to fit the log returns of the underlying asset. The empirical investigation showed that historical prices of most financial assets do not follow the normal law. Most researchers use other more complicated distributions to describe the behavior of asset prices. However such distributions make analytic modeling less tractable, and potentially make numerical modeling a more attractive alternative.

Stock prices are usually assumed to follow a Markov process. These processes are important models of security prices, because they are often realistic representation of true prices and yet the Markov property leads to simplified computations.

To get a Markov process the distributions must be Poisson or exponential. Unfortunately, usually it is insufficient, and then a convenient representation for more general distributions is by means of fictitious exponential stages. The aim of the work is to construct an algorithm using continuous Markov processes with countable space of states to model the dynamics of stock prices and, consequently to evaluate the price of the options.

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Visibility: Finding the Staircase Kernel in Orthogonal Polygons

We consider the problem of finding the staircase kernel in orthogonal polygons, with or without holes, in the plane. Orthogonal polygon is a simple polygon in the plane whose sides are either horizontal or vertical. We generalize the notion of visibility in the following way: We say that two points a and b in an orthogonal polygon P are visible to each other via staircase paths if and only if there exist an orthogonal chain connecting a and b and lying entirely in the interior of P . Furthermore, the orthogonal chain should have the property that the angles between the consecutive segments in the chain are either $+90^\circ$ or -90° , and these should alternate along the chain. There are two principal types of staircases, NW-SE and NE-SW. The notion of staircase visibility has been studied in the literature for the last three decades. Based on this notion we can generalize the notion of star-shapedness. A polygon P is called star-shaped under staircase visibility, or simply s -star if and only if there is nonempty set of points S in the interior of P , such that any point of S sees any point of P via staircase path. The largest such set of points is called the staircase kernel of P and denoted $\ker P$. Our work is motivated by the work of Breen. She proves that the staircase kernel of an orthogonal polygon without holes is the intersection of all maximal orthogonally convex polygons contained in it. We extend Breen's results for the case when the orthogonal polygon has holes. We prove the necessary geometric properties, and use them to derive a quadratic time, $O(n^2)$ algorithm for computing the staircase kernel of an orthogonal polygon with holes, having n vertices in total, including the holes' vertices. The algorithm is based on the plane sweep technique, widely used in Computational Geometry. Our result is optimal in the case of orthogonal polygon with holes, since the kernel (as proven) can consist of quadratic number of disjoint regions. In the case of polygon without holes, there is a linear time algorithm by Gewali, that is specific to the case of a polygon without holes. We present example of our algorithm's results.