

create a more complete separation where each component is indicated by a distinct non-overlapping peak and will explore the kinetics of estradiol photodegradation under various environmental conditions.

### Computer Science

A MINIMAL WORKING CONFIGURATION FOR THE ASTERISK VOIP SERVER. Luke D. Acree & Robert M. Marmorstein, Dept. of Computer Science, Longwood University, Farmville, VA 23909. We present a fixed-point algorithm for reducing a large set of configuration lines to a *minimal working configuration*. A *minimal working configuration* is the smallest set of configuration lines that allow an application to provide a pre-defined level of service. We apply our algorithm to the Asterisk voice-over-IP server using a baseline of one *SIP* and one analog phone connection. Using the algorithm, we are able to reduce a configuration with more than eighty files and 12, 000 lines of configuration to a simpler system containing only four files and fifty-six lines. The algorithm finds a *local minimum* configuration which, in practice, is usually the smallest working configuration set. Reducing the number of lines of configuration makes teaching and training easier and also makes it easier to customize a server to provide exactly the desired functionality without introducing security flaws.

BIT PARALLEL SEARCH ALGORITHMS OF MOTIFS IN DNA USING TVCA. S.V. Providence, Department of Computer Science, Hampton University, Hampton, VA 23668. Time-varying cellular automata (TVCA) are a form of cellular automata CA where the transition functions vary over time or are time dependent. The DNA motif search problem is a well-known problem in bio-informatics. Essentially it is the problem of searching for patterns in biological sequences. Two classical approaches utilize computation theory to exploit the power of deterministic finite automata (DFA). A third approach uses a filtering technique. CA is novel in motive searching. We view a CA as an aggregate of NFAs or cells where the NFA transitions are modified to account for neighboring cell states. There is a large body of literature on CA and large body of literature on NFA in motif searching. In this paper we extend work done in a previous paper by the author and the classical approach and explain the usage of a TVCA in motif searching further.

CAN ILLEGAL AND UNETHICAL USE OF TECHNOLOGY BE EFFECTIVELY DETERRED? Angela B. Hayden, Department of Computer Science, Hampton University, Hampton VA 23668. Modern society is advancing at such a high rate of speed that it is virtually impossible for an individual to keep up with the latest technological advancement. The worst part is the rampant disregard for ethics and ethical behavior when using technology. In an attempt to stay current with latest technology, many individuals engage in illegal and unethical practices such as illegal downloading of music or software piracy. These activities can be seen as socially acceptable behaviors. However, as computer scientist, we are well aware of the laws and policies warning against such practices. Therefore, we ask ourselves, what is the

best method for preventing illegal or unethical activity? Would the knowledge of the laws, the possible execution of a penalty, a high probability of being caught, or an enforcement of the penalty decrease the likelihood of a person engaging in illegal and unethical activities?

ON E-MAIL REPUTATION. Bruce C. Chittenden, Computer Science, Governor's School for Science and Technology, New Horizons Regional Education Centers, Hampton, VA 23666. Spam has been a serious problem for several years. However, over the last couple of years and more recently in the last six months the Internet Service Providers have been taking aggressive action to counter spam. These actions include the creation of Blacklists to block Spammers' IP Addresses, a Spam Button on their e-mail User-Interfaces for the user to report spam, Feedback Loops for e-mail senders so they may unsubscribe unhappy users, requiring e-mail Senders to sign their e-mails, and other aggressive measures. An entire industry has emerged around e-mail reputation with such services as creating and managing Sender Reputation Scores, maintaining Blacklists and Whitelists, reporting tools to examine Mail Exchange Server's records, tools to create the infrastructure for signed e-mails, and e-mail Service Providers that claim high deliverability rates. This paper examines the actions that should be taken to improve and maintain an e-mail reputation.

POPULATING THE MACONACHY CUBE. Robert A. Willis Jr. Department of Computer Science, Hampton University, Hampton, VA 23668. The purpose of this presentation is to explain the essential elements of the Maconachy Cube as seen above. The Maconachy Cube is a graphical representation of possible security scenarios one must account for in Information Assurance. Each element of the cube can be seen as representing a triplet of indices in a three dimensional array. For instance the triplet 1, 5, 2 can be seen as representing the *transmission, non repudiation, technology* triplet. The Maconachy Cube has been widely adopted as a paradigm for Information Assurance excellence, education, curricula development and for providing a "multidimensional view required to implement robust IA programs". This information assurance model covers every aspect of information security. The presentation will also outline the development of the Cube using both independent student research and a Software Development class. Keywords: Triplet, Information Assurance, Maconachy, Information States, Security Countermeasures, Security Services.

TRUSTWORTHY COMPUTING MODEL. Yen-Hung Hu, Department of Computer Science, Hampton University, Hampton, VA 23668. In order for a system to perform reliably, the main components of such a system must be installed and configured properly to provide appropriate operations to satisfy daily needs. These components include hardware, operating system, network protocol, application, and data. However, even though a system seems to work properly, it doesn't mean that this system is trustworthy. A trustworthy system must be able to enforce protection upon security, privacy, and usability. This research surveys and investigates several existing mechanisms to enhance trustworthiness of each component, as well as

studies their performance. A novel trustworthy computing model has been developed for enhancing trustworthiness, as well as served as the criteria to assess trustworthy computing systems.

POWER AWARE PARALLEL AND DISTRIBUTED COMPUTING USING HETEROGENEOUS SYSTEMS. S.V. Providence and A. Alexander, Department of Computer Science, Hampton University, Hampton, VA 23668. Energy efficiency is among the more important issues in supercomputing and high performance computing. We have a novel means of investigating power consumption on a cluster computer system. We examine the iotzone package which is traditionally used to measure file system performance in Linux clusters and use it to give indications of power consumption proportional to file system activity. Typical method use dynamic voltage and frequency scaling which are describe in this paper. We then explain our approach and postulate its efficacy.

DISTANCE ANALYSIS OF GENE EXPRESSION PROFILE: USING GLOBAL SIGNATURES ASDIAGNOSTIC TOOLS. Lei Wang, Ganiraju Manyam, Boris Veytsman, Ancha Baranova. School of System Biology, George Mason University, Fairfax, VA. Center of Liver Diseases, Inova Fairfax Hospital, Falls Church, VA. Betty and Guy Beatty Center for Integrated Research, Inova Health System, Falls Church, VA. Department of Bioinformatics & Computational Biology, The UT MD Anderson Cancer Center, Houston, TX. The traditional protein or RNA biomarkers usually suffer from either low specificity or unsatisfactory reproducibility. Here we propose a novel approach that involves measuring global distance between entire gene express profiles of normal and diseased tissues. Psoriasis, a complex autoimmune disease which pathogenesis is still not fully understood, provides an excellent model disease in which only a portion of a patient's skin will be affected, making it possible to study the difference between lesions, uninvolved skin from patients and healthy skin from non-diseased controls. To address the performance of global distances as biomarkers, we analyzed the data generated by microarray experiments and used Mahalanobis distance as an estimation of the degree of differentiation. The effectiveness of global signatures was compared with that of traditional specific signatures, which are defined as highest ranked differentially expressed genes. We demonstrated that global distances of gene expression profiles can serve as reliable good classifiers, and therefore it is worth considering to use them as diagnostic tools.

## Education

SERVICE-LEARNING IN ENVIRONMENTAL STUDIES: THREE SUCCESSFUL APPROACHES FOR UNDERGRADUATE EDUCATION. Woodward S. Bousquet, Environmental Studies and Biology Departments, Shenandoah University, Winchester, VA 22601. Over the past three decades, service-learning in higher education has expanded considerably. More high school students arrive with service experience, service is built into undergraduate courses,