and ArgusLab to develop mutations *in silico* of the active site in β-glucuronidase and subunit interfaces. Active site mutations were performed at residues that have shown to be of some importance through the enzyme related to β-glucuronidase called β-galactasidase. These active site mutations were developed at the following residues: H296, E297, S360, F365, N412, E413, Y468, and E504, D163, V274, Q507, F281, K277. The subunit interface mutations were performed at the following residues to reduce electrostatic interactions: E6, R71, K13, D16, D319, R43, D77, T7, D477, K157, Y517, D53, R10, K77, N308, E523, H514, K576, and S579. In the future, MC-PRO by Schrodinger will be used to determine feasible mutations for laboratory testing. Through these calculations, mutations will be developed and studied for the interactions between *E. coli* β-glucuronidase and ligands in hopes of learning more about the enzyme mechanism and dimer stability.

Computer Science

NONTRADITIONAL APPLICATIONS OF AUTOMATA THEORY. Bruce Chittenden, Department of Computer Science , Hampton University, Hampton, Virginia 23668. Automata theory is typically taught as a mathematical theory of computation with applications in compiler construction, specifically in the area of lexical analysis. Typically computer science students do not encounter automata theory outside of a course on programming languages or compiler construction, and are therefore left with the impression that automata theory is a fairly abstract mathematically theory which only applies in these areas. I would like to put forward the argument that we should expand how we teach automata theory to include several practical applications such as the specification and verification of protocols. Automata theory provides a rich set of abstractions and tools that every student should learn to apply to many situations that they will encounter in the development of complex software. I have found that automata theory is well suited for the specification and verification of many types of protocols. Any software situation where communications is occurring and state is maintained over a period of time lends itself to a software design and implementation based upon automata theory. The finite state machine is specified symbolically, that is the *inputs*, *outputs*, *states*, and *transitions* are defined in terms of symbols easily understood by humans but difficult in that form, to be used directly by a computer. An Analyzer Program can easily be created that processes the *description* of the Finite-State Machine and generates two tables of integers, *outputs* and *next state*, representing the machine behavior. These tables can be used directly by the computer. The software implementation becomes completely table driven. Using todays programming languages such as C, C++, or Java, this is easily implemented using a switch statement. The significant benefit of this approach is that it pushes the debugging of the protocol from coding and testing phase back into the design phase, therefore reducing the time to deliver working software.

OPEN QUESTIONS REGARDING UPPER BOUND ON MATRIS MULTIPLICATION OF $O(n^w)$ FOR $w < 2.374$. S. V. Providence, Department of Computer Science, Hampton University. Matrix multiplication is a fast algorithm that can be distributed and has fast performance on modern computer systems. A lower

bound of $W(n^2)$ for this algorithm holds even for sparse matrices. The best known lower bounds are $c \times n^2$, for constants $c\ b\ 3$. Strassen suggests matrix multiplication requires strictly more than quadratic time. Several categories for finding an upper bound to this algorithm persist: bilinear algorithms, approximate algorithms and Schönhages theorem, ultra fast solutions to tensor products, and Coppersmith-Winograd algorithm. We examine these approaches with regard to numerical accuracy and stability while considering the current open questions and a possible choice for solution.

A FLUID-BASED STOCHASTIC APPROACH FOR ANALYZING AND MODELING NETWORK TRAFFIC. Yen-Hung Hu, Department of Computer Science, Hampton University, Hampton, VA 23668. In this paper, a fluid-based stochastic approach for modeling normal and malicious network activities is investigated and developed. To achieve the goal of this paper, several existing raw network traffic traces are analyzed first. And then a fluid-based stochastic network model for simulating normal and malicious network traffics according to characteristics of such raw traffic traces is investigated and developed. Since observing that the majority of the collected network traffic traces demonstrates self-similar behavior, this paper investigates this self-similar characteristic and adopts it as a key factor of identifying malicious activities. Several simulation results are included and the raw traffic traces shown in this paper are gathered by the Cooperative Association for Internet Data Analysis (CADIA).

Education

THE WAY FORWARD: UNDERSTANDING OUR ECOLOGICAL PLACE. Emma D. Burnett[1], Alana S. Burton[2] & Eugene G. Maurakis[1], [1]Department of Biology, University of Richmond, Richmond VA 23173, [2]Department of Geology, College of William and Mary, Williamsburg VA 23185. This documentary film explores the modern relationship between Americans and the natural world by examining the perspectives of individuals with unique personal and professional connections to the environment. Interviews conducted with these individuals illuminate numerous facets of our relationship with the environment, from a farmer's reasons for investing in the long-term health of the environment, to a scientist's perspective on the role of skepticism in the pursuit of truth and the biggest challenges to educating the public. Some of the general questions addressed include the implications of our attitude towards the environment on our health and the health of future generations, challenges to the pursuit of general knowledge and understanding, including polarized viewpoints and special interest groups, and potential steps in overcoming these challenges. Through the examination of these topics by interview subjects from different backgrounds and occupations, the film presents various ways of thinking about the environmental problems that we face and highlights the importance of individual action and constructive dialogue.

ENVIRONMENTAL ISSUES AND AMERICAN ATTITUDES. Alana S. Burton[1], Eugene G. Maurakis[2], and David V. Grimes[3], [1]College of William and Mary, [2]Dept. of Biology, University of Richmond, & [3]Old Dominion Appalachian Trail Club. In July