Elizabeth City State University

Nurturing ECSU Research Talent (N.E.R.T.)

1999-2000 Annual Report

Dr. Linda Hayden, Principal Investigator
Box 672 ECSU Elizabeth City, NC 27909
(252) 335-3696 voice   (252) 335-3790 fax
lhayden@umfort.cs.ecsu.edu
http://nia.ecsu.edu/onr/onr.html

20000724 066

DTIC QUALITY INSPECTED 4

REPORT DOCUMENTATION PAGE

1. AGENCY USE ONLY (Leave blank)

2. REPORT DATE

3. REPORT TYPE AND DATES COVERED
Annual (Technical)

4. TITLE AND SUBTITLE OF REPORT
Nurturing ECSU Research Talent (NERT)

5. FUNDING NUMBERS
N00014-97-1-0650

6. AUTHOR(S)
Dr. Linda Hayden

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
ECSU
1704 Weeksville Road
Eliazabeth City NC 2909

8. PERFORMING ORGANIZATION REPORT NUMBER:
552690

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
Office of Naval Research

10. SPONSORING/MONITORING AGENCY REPORT NUMBER:

11. SUPPLEMENTARY NOTES:

12a. DISTRIBUTION AVAILABILITY STATEMENT
Unlimited

12b. DISTRIBUTION CODE
N00014

13. ABSTRACT (Maximum 200 words)

This technical report documents the 1999-2000 activities of the Nurturing ECSU Research Talent Program. Program activities are further documented on the WWW at http://nia.ecsu.edu/onr/onr.html. The report contains statistics on GPA and enrollment data; Summer 1999 research abstracts; summer 2000 internship placement data; a list of visiting lectures and topics; and copies of academic year research project resports.

14. SUBJECT TERMS

15. NUMBER OF PAGES:

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT:

18. SECURITY CLASSIFICATION OF THIS PAGE

19. SECURITY CLASSIFICATION OF ABSTRACT

20. LIMITATION OF ABSTRACT

ONRCHI COMPUTER V 1.0 11/94

STANDARD FORM 298 (REV 2-89)

Table of Contents

N.E.R.T.

Nurturing ECSU Research Talent
Elizabeth City State University

This program, entitled "Nurturing ECSU Research Talent" focuses on undergraduate education and undergraduate research experiences. Nurturing these young researchers is a primary concern. Highest priority is given to providing them with the guidance and skills to insure their entrance and success in graduate school. Further, each student learns the fundamentals of scientific research, in a team setting, under the guidance of a faculty mentor. Program activities are as follows:

1. Student development activities

    a) Recruitment of high ability minority students;
    b) Providing a precollege/summer experience for recruited students;
    c) Providing research experiences;
    d) Providing a mentor, graduate school counseling and GRE preparation;
    e) Providing funds for student travel.
    f) Providing financial support for students in the form of research scholarships;

2. Infrastructure activities

    a) Enhancement of current computer graphics and operating systems courses;
    b) Development of a new course in computer visualization;
    c) Establishing a visiting lecture series in computer science;
    d) Providing UNIX network management support;
    e) Acquisition of computer equipment appropriate to support of research training.

Executive ▽ Summary

This report documents the 1999-00 activities of the Nurturing ECSU Research Talent Program. The NERT program is supported by three active grants. The parent grant number is N0014-99-1-0990 (phaseout funds through 7/31/2002). The summer program, involving internships and on-campus research training, is supported by the AASERT grant #N00014-97-1-0650(funded through 6/01/2000). During the 1999-00 academic year all new students in the program were supported by the NERT-2003 grant no. N00014-98-1-0749 (funded through 7/30/2003). The program activities are documented on the World Wide Web at http://nia.ecsu.edu/onr/onr.html.

The 1999-00 Office of Naval Research Nurturing ECSU Research Talent program involved 24 undergraduates, mathematics, computer science, physics, and technology majors. Research training meetings began September 8, 1999 and were held every Tuesday and Thursday through April 18, 2000. Meetings were conducted from 5-8 pm. Research training meetings start with a 20-30 minute announcement period during which time students learn about internship opportunities, hear program announcements, give team reports, discuss travel logistics and goals of the program. Following the announcement period, students meet with faculty mentors or attend training on tools used for research. The closing program was held on two nights in April. During the closing program, students made oral presentations of their research training activities. All research teams were also required to complete written reports. Copies of the written reports are included. In addition, students spend 20 hours/week in the undergraduate research computer laboratory completing task sheet requirements and research assignments.

The program this year resulted in 6 out of 6 of the graduating seniors being admitted to graduate school. Statistics on GPA and Enrollment Statistics can be found on page 3.

Summer internship placement was also impressive including: The Naval Research Virtual Reality Laboratory, The Department of Energy,Institute in Computational Science-Scientific Visualization, SCSU Research Institute in Astrophysics, and Univ. of Wisconsin Visualization Research Program. Internship abstracts for 1999 are included in this report. A listing of summer 2000 internship placements is included in this report.

Executive Summary

A total of $110,000.00 in scholarships was awarded during academic year 99-00. An additional $15,000.00 was awarded through the Graduate Success Program to support program alumni who are pursuing graduate degrees. With respect to the Graduate Success Program, three students completed a Masters of Science degree in computer science from North Carolina A&T University.

Students presented their research activities at several undergraduate research conferences including, the Seizing Opportunities to Advance Research (SOAR) on the campus of North Carolina A & T University, and NAFEO High Tech Expo in Washington DC. In addition, juniors attended the Graduate School Focus Program on the campus of Georgia Tech, while seniors attended the Graduate Record Examination Forum in New York. All juniors and seniors registered for and took the Graduate Record Examination (GRE).

Twelve of the program participants received the ONR-NERT Research Program Award (certificate plus $50.00) for having a 3.0 or above cumulative or current GPA in 30 or more hours of coursework. Four students received the ONR-NERT Research Scholars Award (certificate plus $100.00) for having a 3.0 or above cumulative and current GPA in 30 or more hours of coursework. Three students received the ONR-NERT Award of Excellence (certificate plus $1000.00). Each met the requirement for having a 3.0 GPA and having been awarded a fellowship and admission to a graduate program for Fall'00. Included in the appendix is a copy of the Honors Convocation program which list not only the awards described but also a list of those students who made the Chancellor's List, Vice Chancellor's List, and Honor List.

With regards to department infrastructure, The Mathematics and Computer Science Department now offers a course in Introduction to Computational Science and Computer Visualization Techniques. Also the revised Computer Graphics Course is now supported by a laboratory of SUN workstations. Six Silicon Graphic O2 workstations have been added to the undergraduate computer research laboratory network.

Dr. Johnny Houston, professor of mathematics and computer science, arranged the visiting lecture series during 1999-00. The visiting lectures were members of the faculty of 6 Historically Black Institutions and 2 international universities. A list of visiting lectures and topics follows.

Math & CS Department   Visiting Lecture Program

Dr. Johnny Houston, Coordinator

Resources, Opportunities and Access to the North Carolina Super
Computing Center
Kathleen Collins and Steve Thorpe
North Carolina Super Computing Center

A Report on Visit and Scholarly Presentations in Ghana and
Sourth Africa Summer 1999
Dr. Johnny L. Houston
Elizabeth City State University

Computational Fluid Dynamic Applications on Parallel Computers
Dr. Kwai Lam Wong
Joint Institute for Computational Science

Central Sequences and Operator Algebra
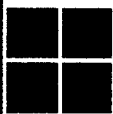Dr. Hemant Pendharkar
Elizabeth City State University

Some Challenging Problems in Computational Science
Prof. H. Thomas Banks
Center of Reearch and Scientific Computation

Mining Reusable Software Code
Mr. James Overton
Mississippi State University

1999-00 Graduate Success Report

Name	University	Degree Sought/Earned
Anderson, Melvin	NCA&T	MS in CS
Archer, Darnley	ODU	MS in CS
Banks, Belinda	NSU	MS in Communication
Basnight, Renee	Hampton Univ.	MS in CS
Bowser, Felicia	NC State	MS in CS
Bright, Teresa	Ohio State	MS in CS
Brown, Michelle	Hampton Univ.	MS in CS
Charity, Donald	Howard Univ.	MS in Math
Creekmore, Santiel	Hampton Univ.	MS in Physics
Felton, Curtis	NCA&T	MS in CS
Felton, Karen	NCA&T	MS in Chem
Fields, Courtney	NCA&T	MS in CS
Fenner, Auther	NCA&T	MS in Math
Fields, Michael	Hampton Univ.	MS in Physics
Fofana, Abdula	Howard Univ	MS in CS
Gardner, Bonnie	Univ. of Maryland	MS in CS
Gatling, Charles	NCA&T	MS in CS
Gayle, Chonda	Hampton Univ.	MS in CS
Gordon. Kim	Virginia State	MS in Math
Hayden, Kuchumbi	NCA&T	MS in CS
Harrell, Jovita	Hampton Univ.	MS in CS
Jones, Alicia	Howard Univ.	MS in CS
Jones, Clarence	Hampton Univ.	MS in Physics
Jordan, Brian	Hampton Univ	MS in Math
Joyner, Sheri	Howard Univ.	MS in CS
King, Barbara	NOVA Southeast	MS in CS
Koltuniak, Eva Dail	Hampton Univ.	MS in CS
McCray, Tim	Hampton Univ.	MS in CS
Mcfadden, Stacia	Michigan State	MS in CS
Monk, Cultilda	Fayetteville State	MS in Math Education
Saunders, Sharon	Hampton Univ.	MS in CS
Thomas, Cathy	Ohio State	MS in CS
Vaughan, Stephanie	Hampton Univ.	MS in CS
Williams, LaVerne	East Carolina U.	MBA

ONR NERT SCHOLARS NOW IN GRAD SCHOOL

Alicia Jones   Santiel Creekmore   Courtney Fields   Marie Koltuniak   Lavern Williams

Donald Charity   Katrina Godwin   Sheri Joyner   Kuchumbi Hayden   Ayonda Moore

Sharon Saunders   Clarence Jones   Brian Jordan   Barbara King   Felicia Bowser

| Student	Major	Year Graduated ECSU	Graduate School
Bowser, Felicia	CS	'98	North Carolina State Univ.
Creekmore, Santiel	Atm Sci	'99	Hampton Univ
Fenner, Auther	Math	'99	Hampton Univ
Fields, Courtney	cs/as	'99	North Carolina A & T
Fields, Michael	Physics	'97	Hampton University
Hayden, Kuchumbi	cs/phy	'99	North Carolina A & T
Jones, Clarence	Physics	'98	Hampton University
Jordan, Brian	Math	'97	Old Dominion Univ
Koltuniak, Marie	CS	'98	Hampton University
Timothy McCray	CS	'97	John Hopkins Univ Ph.D program
Moore, Ayonda	Stat	'99	American University
Saunders-Brown, Sharon	CS	'97	Hampton University
Williams, LaVerne	Bus.Adm	'98	East Carolina Univ.
Charity, Donald	Math	'00	Howard University
Godwin, Katrina	CS	'00	Howard University
Joyner, Sheri	CS	'00	Howard University
Jones, Alicia	CS	'00	Howard University
King, Barbara	CS	'00	Nova Southeastern

Auther Fenner

Completed Graduate Degrees

Chonda Gayle
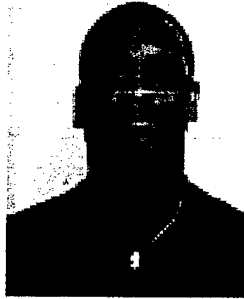
Charles Gatling

Michael Fields

Melvin Anderson

Teresa Bright

Cathy Thomas

Abdula Fofana

Curtis Felton

Anderson, Melvin	CS	M.S.	North Carolina A & T Graduate School
Felton, Curtis	CS	M.S.	North Carolina A & T Graduate School
Gatling, Charles	CS	M.S.	North Carolina A & T Graduate School
Gayle, Chonda	CS	M.S.	HAMPTON UNIVERSITY
Thomas, Cathy	CS	M.S.	Ohio State University - CS
McCray, Tim	CS	M.S.	HAMPTON UNIVERSITY
Fofanna, Abdula	CS	M.S.	Howard University
Bright, Teresa	CS	M.S.	Ohio State University - CS
Fields, Michael	PHY	M.S.	Hampton University
Gordon, Kim	Math	M.S.	Virginia State University

Timothy McCray,

Dr. Hayden with Kim Gordon

Summary 2000 — Internship Report

Student	Class	GPA Cur	GPA Cum	Placement
(7)Freshmen AVG= 3.41				
Newby, Golar	cs	3.47	3.58	Naval Research Lab -Virtual Reality
Banks, Katrina	cs	2.80	2.93	SCSU Research Institute in Astrophysics
Davis, Vincent	phy	4.00	4.00	SCSU Research Institute in Astrophysics
Brooks, Shayla	cs	3.39	3.20	SCSU Research Institute in Astrophysics
Bah, Ramatoulie	cs	4.00	3.91	Network Resources and Training Site
Creekmore, Torrie	cs	3.29	3.34	Hampton University AURORA Program
Williams, Gregory	cs	2.44	2.91	SCSU Research Institute in Astrophysics
(4)Sophomores AVG= 3.15				
Bailey, Bernard	cs	3.71	3.67	NSU REESS
Lassiter, Gregory	cs	2.00	2.75	Dept of Energy
Mattocks, Melvin	cs	3.53	3.41	ECSU Ronald McNair Research Program
(5)Juniors AVG= 3.22				
Gale, Joseph	cs	3.29	3.01	GOFAS Howard Univ.
Powell, Je'aime	cs	3.29	3.21	Naval Research Lab -Virtual Reality
Walker, Ernest	cs	3.53	3.41	Institute in ComScience-Scientific Visualization
Harrison, Keisha	cs	3.06	3.28	Univ. of Wisconsin Visualization Research
Lister, Issac Jr.	math	3.03	3.20	SCSU Research Institute in Astrophysics
(6) Seniors AVG= 3.65				
Charity, Donald	math	3.50	3.44	GOFAS Fellowship -Howard University
Godwin, Katrina*	cs	4.00	3.95	Howard U/ Lucent Technologies
Jones, Alicia	cs	3.75	3.52	GOFAS Fellowship -Howard University
Joyner, Sheri*	cs	4.00	3.70	Howard U/John Hopkins Applied Physics Lab
Kaur, Ravindar	cs	4.00	4.00	U. California Berkley - ONR Fellowship
King, Barbara	cs	3.75	3.25	Graduate School - NOVA University

* GEM Fellowship

N.E.R.T.

Nurturing ECSU Research Talent
Elizabeth City State University

SUMMER 1999 RESEARCH ABSTRACTS ...

Three - Dimensional Battlefield Simulation of Realtime Kosovo

Researcher: Donald Charity
Mentor: Dr. Rob King, ONR-NRL

With the recent Kosovo crisis, the project assigned for research was a Three - Dimensional battlefield simulation of realtime Kosovo. This project when completed will be used for demonstrations at NRL's Virtual Reality Lab. The tools used to complete this project was MultiGen II, a realtime 3D modeling software used to generate the terrain, ARC Digitized Raster Graphics, sattilite collected images of the Kosovo terrain, DTED Digital Terrain Elevation Data on CD-ROM, along with several other application programs used to generate the desired terrain for viewing. Inside MultiGen II the three types of generation methods used were Delaunay database (TIN) Trianglar Irregular Network, The Polymesh database and CAT (Continuous Adaptive Terrain). This type of terrain generation focuses on the LOD (Level of Detail) problems generated by the Polymesh and the Delaunay database. Each terrain generator has its own GUI (Graphical User Interface) controls which allows the user to choose how the final terrain should look. The purpose of the research was to figure out which terrain is best suited to areas of interest by the military; to give accurate data feedbacks of elevation and viewpoints; to give excellent demos to visting officals and other researchers in this area; and to support virtual reality strategic planning.

Virtual Reality Laboratories Web Site

Researcher: Melvin Mattocks
Mentor: Paul Massel, ONR-NRL

The project assigned was to explore the depths of the Virtual Reality Laboratories web site and upgraded the site to reflect current events at the Information's Technology Division of Naval Research Laboratories. After gathering information for the separate topics of research, this information will be implemented into the information banks of the web site. Also incorporated will be graphical images of the equipment used and some insight on the equipment. Telling how it is used and how it is helpful in accomplishing the goals of the researchers that are fabricating it for use by governmental officials. After placing all of the files in the user directory, the beginning of the intensive make over had begun. It was the typical way of preparing a web page. The software used in completing this revision of the site was "jot"; using the programming languages "html" and a small taste of "JAVA";Finding backgrounds that seemed to compliment the text and the name of the page. Using graphics to enhanc or, make the site more attractive. There was also the use of a digital camera to take photos of the new research that had began at the laboratory. New research was also integrated into the site

EL NINO

Researcher: Kuchumbi Hayden
Mentor: Dr. Waldo Rodriguez
Center for Materials Research, NSU

A culmination of interactions between the ocean and the atmosphere, El Niño is the anomalous warming of the southward countercurrent of waters in the eastern equatorial Pacific Ocean, around the western coast of Peru and Ecuador. Normally, the water of this region is cold, rich in nutrients, and flows northward. The Southern Oscillation, a change in the surface pressure between the southeastern Pacific and the western Pacific Ocean, is closely associated with El Nino. Scientists give this relationship-the name ENSO, El Nino-Southern Oscillation.

Usually, the surface pressure in the southeastern Pacific is much higher than the pressure in the western Pacific Ocean. This difference in surface pressure creates a sharp pressure gradient which, facilitated by strong westward trade winds, carries water currents from east to west. These strong winds keep the warm waters in the west from flowing to the east. During El Nino, the difference in the surface pressure between the eastern and western Pacific Ocean decreases, thus diminishing the pressure gradient, and sometimes, even switching the regions of high and low pressure in the ocean. When the surface pressure of the western Pacific Ocean becomes higher than the surface pressure in the east, water currents move from the high pressure region to the low pressure region, from west to east. With the reduced pressure difference in the ocean come weaker trade winds that allow for the eastward movement of the water currents. The overall result is warmer than normal waters in the eastern Pacific, bringing about climatic differences both in areas around the Pacific Ocean and around the world. The worldwide effects of El Nino mark the importance of study and research in this area. The eastward shift of warm waters in the Pacific Ocean bring about increased precipitation in western parts of South America and the United States and droughts in the eastern parts of Asia and Australia. Adverse effects of El Nino due to increased precipitation and droughts include flooding, property damage, brush fires, and crop failures. Careful examination of the various aspects of El Nino will enable both a deeper understanding of this phenomenon and more effective measures to prevent disasters.

OZONE DEPLETION AND POLICY

Researcher: Lakisha Mundon
Mentor: Dr. Waldo Rodriguez
Center for Materials Research, NSU

The ozone layer is earth's primary protection from uvB rays. These ozone molecules are developed naturally under specific conditions in the stratosphere. Satellite data and other studies show that the ozone layer is decreasing overall and seasonally. The major sources of destruction of ozone molecules happen to be the use of CFCs and other ozone depleting chemicals and introducing them to the stratosphere. Decreasing ozone levels have a direct correlation with decreasing phytoplankton levels and increasing cases of skin cancer and development of cataracts. In response to these findings, environmental policies were development of cataracts. To these findings, environmental policies were developed and goals were used to curb alternating phases out of CFCs and other chemicals that break down ozone molecules. Looking at TOMS satellite data from 1978 -1993 Coastal Zone Color Scanner, skin cancer/cataract epidemiological breakdown and CFC phase out data were used to

determine the success of these policies and forecast the future for stratospheric ozone.

Analysis of aircraft measurements of cirrus cloud properties over the Tropical Western Pacific for a climate model experiment

Researcher: Alicia M. Jones
Mentor: Dr. Everette Joseph, Howard Univ.
Dept. of Physics and Atmospheric Science

The Great Climate Debate and Our Changing Climate are two articles that reflect the growing concern over the enhanced greenhouse effect (global warming) and how pollutants are harming our environment. It is believed that the anthropogenic increase of atmospheric trace gas concentrations, which has been occurring since the pre-industrial period, is the primary cause of the observed increase in the global mean atmospheric temperature observed over the same period. Atmospheric scientists use global climate models to investigate this issue. The models, however, are limited in their ability to properly represent all the processes in the climate system, and thus produce results with many uncertainties. Cloud processes, particularly those of high clouds, are among the least understood and thus poorly represented processes in climate models.

This project is being conducted in support of research to improve the representation of high cirrus cloud infrared radiative properties in climate models. Specifically, cloud properties derived from aircraft measurements over the Tropical Western Pacific are processed and analyzed for a model validation experiment. The results of this experiment should provide further insight into the role of cirrus cloud in climate change.

ColdFusion Code (CFML) Project

Researcher: Joseph Gale
Mentor: Calvin Mackey
Goddard Space Flight Center

This project involved using ColdFusion code (CFML) to track media record in a database. The project was designed to provide a more efficient and user-friendly manner for the users on the various networks to track and manage records on various types of media. Accessing the targeted data involved connecting to an Informix database on a foreign server that did not have the application ColdFusion Server. The project also included installing programs to upgrade a Sun Ultra 10 system from Solaris 2.6 operating system to Solaris 2.7. The system was configured for jumpstart and sysid auto configuration, however the upgrade required disabling auto configuration on eosops setup.
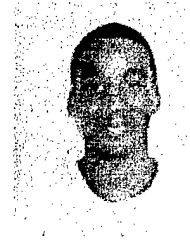
Range Experiments Using a ND:YAG Micropulse Laser

Researcher: Santiel Creekmore
Mentor: Dr. Russel DeYonge
NASA Langley LIDAR Lab

This research effort involves the construction and testing of a tabletop 1.064m lidar system developed at Langley Research Center. The system consists of a VEM SW 1064 Microlaser by Litton Inc., an InGaAs detector, and an oscilloscope. The pulsed laser hit an aluminum plate at various distances from the laser. A lens near the detector collected the scattered light from the plate. The captured light was then focused onto an InGaAs optical detector. The output from the detector was measured by an oscilloscope, which

showed both the trigger laser pulse and the pulse scattered from the aluminum plate. The time difference between these pulses gives the total distance traveled by the laser pulse. Results were achieved for several ranging experiments conducted over a 3m range from the laser in increments of 0.3m.

Wake Votex/Aircraft Encounters

Researcher: Sheri Joyner
Mentor: Dr. Sonya Smith, Howard University

This project investigates the aerodynamic effects of wake vortex/aircraft encounters on ER-2 aircraft. A wake vortex is area of low-pressure turbulence that flows behind a moving object with a circular motion and tends to form a vaccum in its center as it draws subjects towards it. All aircraft form wake vortices when their winds are producing lift, which is derived from the difference of the low pressure on top of the wing and the high pressure on the bottom surface of the wing. We are concerned with the effect that the wake vortices have on aircraft during landing and takeoff as well as aircraft in flight.

This area of research is of great importance for several reasons; one being that airports are trying to maximize their capacity. In order to accomplish this air traffic controllers will have to reduce the spacing between each aircraft during take off and landing. Thus, there has to be a vortex hazard criterion developed to identify the location and strength of wake-vortices left behind by other aircraft. This vortex hazard criterion is required to ensure the safety of the airplanes, the pilots and the passengers from the training vortices. A part of this research will be to study mathematical models, which attempt to characterize vortex effects that are acceptable for

operational use. These models are designed to take in consideration that atmospheric conditions, the vortex decay, the interactions of the vortex with the ground, and the clear air turbulence.

PDF Conversion

Researcher: Courtney Fields
Mentor: Mr. Will Gorman and
Mr. Eric Gabler
Federal Aviation Administration

This summer project involved converting Microsoft Word and Microsoft Excel files to pdf (portable document files) documents, so that each link would be compatible for an HTML file. The site upon which my research was based was the Department of Transportation FAA website, under the department of Airports, Program, and Planning 530. My duties included conducting research about airport files, comparing and contrasting airport locations with approved passenger facility charges, converting files, inserting new webpages and upgrading links to several webpages for the intranet Organizational Chart site. Other assignments included installing software for federal government employees, training on HTML, and briefing weekly to mentors and managers.
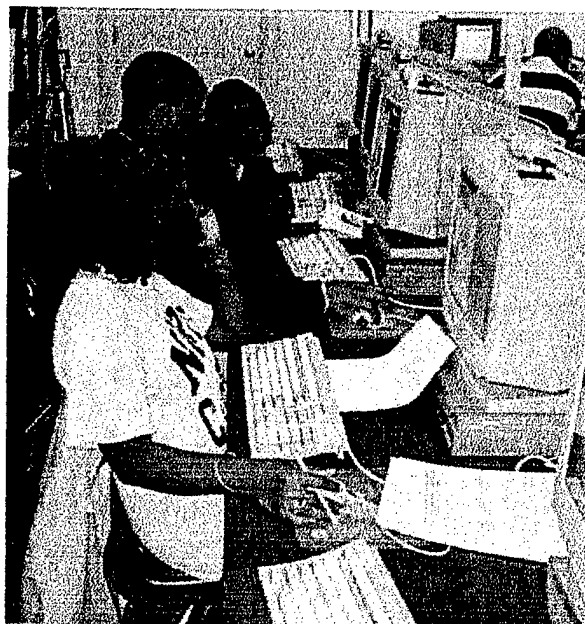
Dr. Linda Bailey Hayden has been selected as one of the African American Women in Science and Technology to be featured in the Black Creativity 2000 Exhibition by the Chicago Museum of Science and Industry. Black Creativity is the largest celebration of its kind in the city of Chicago and the nation. Each year, approximately 70,000 people visit the exhibit during its run. The mission behind Black Creativity is to highlight the achievements and accomplishments of African Americans to the country and the world. This year, the museum will feature women in the scientific and industrial community. The exhibit is scheduled to run January 15, 2000 through March 5, 2000. Dr. Hayden serves as principal investigator for *The Nurturing ECSU Research Talent Program* funded by the Office of Naval Research.

Dates to Remember

❄ **ETS Graduate Record Examination Workshop Sept. 23-25, 1999.**

❄ **Computational Fluid Dynamics Applications on Parallel Computers Lecture by Dr. Kwai Lam Wong, Joint Institute for Computational Science, University of Tennessee. Dr. Johnny Houston, Coordinator. Sept. 23, 1999.**

❄ **Modifying and Using CGI Scripts Training Oct. 7, 1999.**

❄ **Celebration of Women in Mathematics Oct. 18, 1999.**

❄ **Internship Roundtable Oct. 26, 1999 2 - 3:30 pm 116 LH.**

❄ **ECSU Homecoming Oct. 30, 1999.**

❄ **LISA System Administration Conference Nov. 9-12, 1999.**

❄ **Focus 2000 Graduate School Focus Jan. 13 - 16, 2000.**

❄ **NAFEO High Tech Undergraduate Research Expo Feb. 17, 2000.**

❄ **Final Research Team Oral Reports April 6 and 11, 2000 5-6:30pm 116 Lester Hall.**

1999 - 2000 Statistics

Major Discipline	Number of students enrolled at school (by year)				Number of Students enrolled in ONR Program (by year)				Number of students graduated		Number of Graduate Professional School	
	FR	SO	JR	SR	FR	SO	JR	SR	total	ONR	total	ONR
Chemistry	0	2	2	7	0	0	0	0	4	0	1	0
Computer Science	66	47	28	39	6	4	4	5	12	5	5	5
Mathematics	2	5	6	21	0	0	1	1	4	2	2	1
Physics	3	0	0	0	1	0	0	0	0	0	0	0
Totals	71	54	36	67	7	4	5	6	20	7	8	6

	Mean GPA for all	Mean GPA for ONR
Freshman	2.36	3.41
Sophomore	2.48	3.15
Junior	2.76	3.22
Senior	2.96	3.65
Total	2.64	3.36

ONR GRE average score: 1350

PHYSICS RESEARCH TEAM
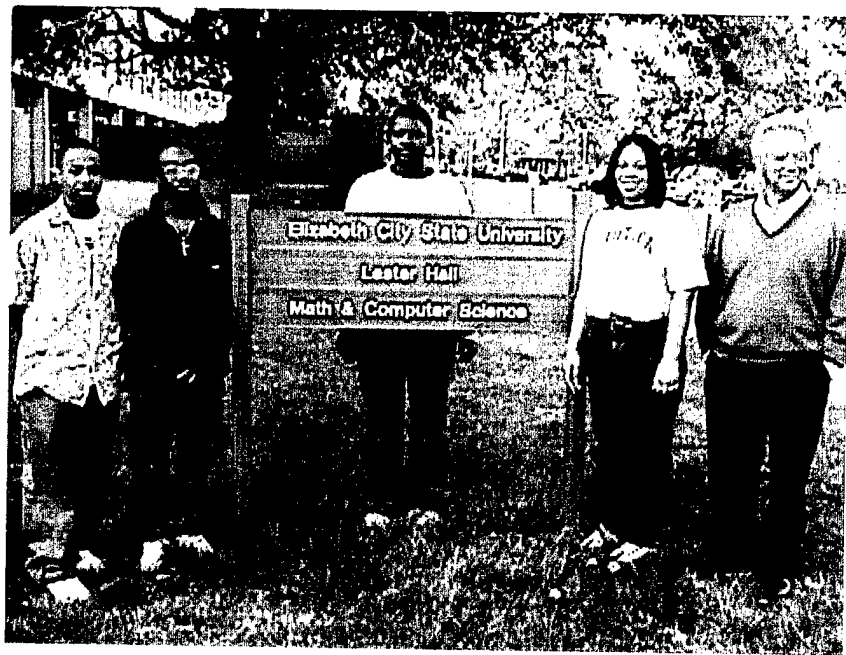
Mentor:
Dr. Latif Choudhury
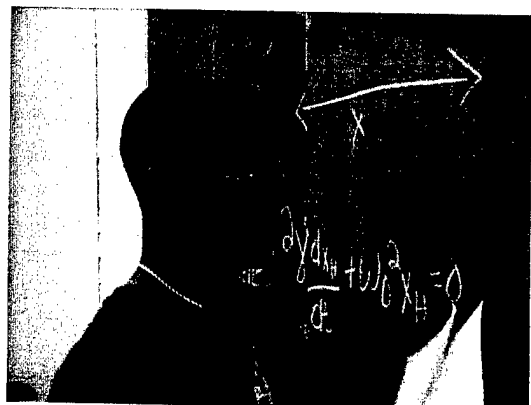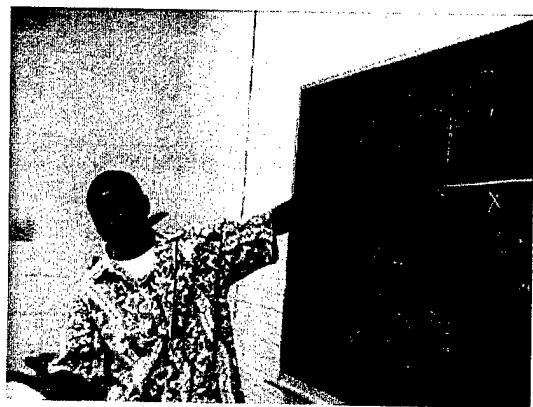
Team Members:
Ramatoulie Bah
Torrie Creekmore
Vincent Davis
Alicia Jones

Motion Of A Harmonic Oscillator Under The Influence Derivative Of Delta Type Of Forces

Alicia Jones
Department of Mathematics and Computer Science,

Ramatoulie Bah
Departments of Physical Science and Mathematics and Computer Science,

Torreon N, Creekmore, and Vincent A. Davis
Department of Physical Science, Elizabeth City State University.

Mentor: Latif Choudhury

Abstract

In this work we set up the equation of motion of a mass according to Newton's second law of motion. The mass is tied to a spring under the simultaneous action of air resistance and a time dependent derivative of delta type of force. It leads to a second order first degree inhomogeneous differential equation. We solve the equation rigorously using residue theorem of complex variable. The solutions are obtained under different possibilities of parameters introduced. We the develop a Mathematica program to plot three dimensional diagrams of the displacement as a function of time and natural frequency under different parametric restrictions.

1. Introduction

A spring is a very important device which lets us visualize physical problems in simplified fashion. If we tie a mass to the spring and allow it to move on a smooth plane, it will execute simple harmonic motion without damping. If however we assume that the surface is not totally smooth the mass will experience a resistive force opposing the motion. In such case the vibration of the mass will be damped. The same effect will also be experienced by the mass if we incorporate air resistance. On the top of it we can subject the mass to a periodic force. We can also take a special driving force proportional to a delta function or a superposition of delta functions at different times. This case has been studied by Creekmore, Pugh, Jones, and Mundon [1]. This paper deals with a driving force proportional to the derivative of a delta function depending on time t. In section 2 we develop the mathematical formulation of the problem by setting up a differential equation [2-6]. In section 3 we solve it rigorously. In section 4 we develop a

Mathematica program to show the graphical representation of the solution we obtained earlier. In section 5 we discuss the different aspects of the result.

2. Mathematical Formulation

Let us start with a spring one end of which is tied with the wall. On the other end we fix a mass m. We allow the mass to slide on a rough plane. We then subject the mass to a derivative of time dependent delta type of force. From Newton's second law of motion the differential equation satisfied by the position of the mass is given by the relation:

$$m\frac{d^2x}{dt^2} + b\frac{dx}{dt} + kx = a\delta'(t). \qquad (1)$$

$$\frac{d^2x}{dt^2} + 2\gamma\frac{dx}{dt} + \omega_0^2 x = \frac{a}{m}\delta'(t). \qquad (2)$$

We can change the equation into the following form if we define $\gamma = b/2m$ and $\omega_0 = \sqrt{(k/m)}$:

The general solution of Eq.(2) is given by

$$x = x_h + x_p \qquad (3)$$

where x_h and x_p satisfy the following equations:

$$\frac{d^2x_h}{dt^2} + 2\gamma\frac{dx_h}{dt} + \omega_0^2 x_h = 0, \qquad (4)$$

and

$$\frac{d^2x_p}{dt^2} + 2\gamma\frac{dx_p}{dt} + \omega_0^2 x_p = \frac{a}{m}\delta'(t). \qquad (5)$$

There are three different relationship between ω_0^2 and γ for which we get different solutions. We only look for solution where $\omega_0^2 > \gamma^2$. Under this condition we get damped

$$x_h = Ae^{-\gamma t}\cos(\Omega t + \theta_0) \qquad (6)$$

harmonic oscillation for x_h

where $\Omega = \sqrt{(\omega_0^2 - \gamma^2)}$.

4 Particular Solution

We can rewrite the differential equation Eq.(5) as follows

$$Lx_p(t) = \frac{a}{m}\delta'(t) \tag{7}$$

where we have defined

$$L = \frac{d^2}{dt^2} + 2\gamma\frac{d}{dt} + \omega_0^2 \tag{8}$$

We know that the delta function [6,7] can be expressed by an integral representation Therefore

$$\delta(t) = \frac{1}{2\pi}\int_{-\infty}^{\infty} e^{ikt}dt . \tag{9}$$

$$\delta'(t) = \frac{i}{2\pi}\int_{-\infty}^{\infty} ke^{ikt}dt. \tag{10}$$

We can easily show that the particular solution $x_p(t)$ can now be expressed as follows:

$$x_p(t) = \frac{ai}{2\pi m}\int_{-\infty}^{\infty} L^{-1}\left(ke^{ikt}\right)dk = \frac{ai}{2\pi m}\int_{-\infty}^{\infty} \frac{ke^{ikt}}{(ik)^2 + 2\gamma(ik) + \omega_0^2}dk. \tag{11}$$

The denominator under the integration sign has zeroes at

$$k = z_1 = \Omega + i\gamma, \quad \text{and} \quad k = z_2 = -\Omega + i\gamma . \tag{12}$$

We can therefore write

$$x_p(t) = -\frac{ia}{2\pi m}\int_{-\infty}^{\infty} \frac{ke^{ikt}}{(k - z_1)(k - z_2)}dk$$

$$= -\frac{ia}{2\pi m}\left[\left(1 + \frac{i\gamma}{\Omega}\right)A(z_1) + \left(1 - \frac{i\gamma}{\Omega}\right)A(z_2)\right] , \tag{12a}$$

where

$$A(z) = \int_{-\infty}^{\infty} \frac{e^{ikt}}{k - z} dk \quad .$$ (13)

A{z) can be computed by straight forward contour integration. We define a function

$$g(w) = \frac{e^{iwt}}{w - z} \quad .$$ (14)

The function g(w) is a meromorphic function in complex w-plane except at the point w=z in the upper half plane as shown in the Fig.1.

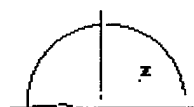**Fig 1**

Using the residue theorem the closed integration along the contour shown in the diagram is given by the relation

$$\oint g(w)dw = 2\pi i \, \mathrm{Re} \, \mathrm{sidue} \, \mathrm{at} \, z$$ (15)

The closed integral can now be split one along x –axis and one in the upper half circle. The contribution for the upper half circle disappears for large t. Calculating residue, we obtain

$$A(z) = 2\pi i e^{izt}$$ (16)

Then the final form of particular solution can now be expressed as

$$x_p(t) = \frac{a}{m} \left(\sqrt{1 + \frac{\gamma^2}{\Omega^2}} \right) e^{-\gamma t} \left(\Omega t + \tan^{-1} \left(\frac{\gamma}{\Omega} \right) \right)$$ (17)

Collecting now both homogeneous and particular solutions together we find the most general solution x as

$$x = x_H + x_P = Ae^{-\gamma t}\cos(\Omega t + \theta) + \frac{a}{m}\left(\sqrt{1 + \frac{\gamma^2}{\Omega^2}}\right)e^{-\gamma t}\cos\left(\Omega t + \tan^{-1}\frac{\gamma}{\Omega}\right) \quad (18)$$

5. Graphing

In the previous sections we have found the rigorous solutions of the problem when a force proportional to the derivative of delta function acts on a mass depending on t. The result is given by the Eqn. (18). The equation involves two constants A and θ which we could determine using two boundary conditios. However since we are only interested in the over all general behavior of the final solution, we would give these constants some arbitrary values and use Mathematica to graph them.

All along we would choose the constants A=1 and θ=0. In Fig. 2 we plot x_h as a function of t. We also set Ω=5.
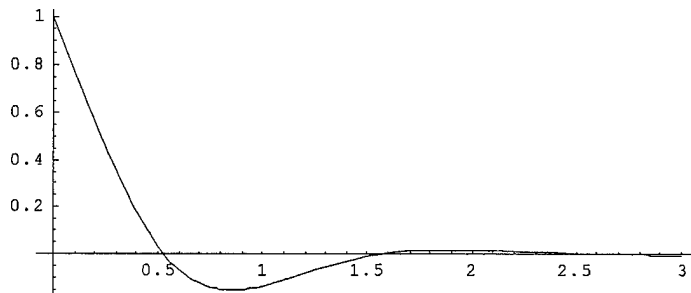
Fig. 2

In Fig.3 we plot the particular solution $x_p(t)$ as a function of t, with same values for the constants A,, θ, and Ω.
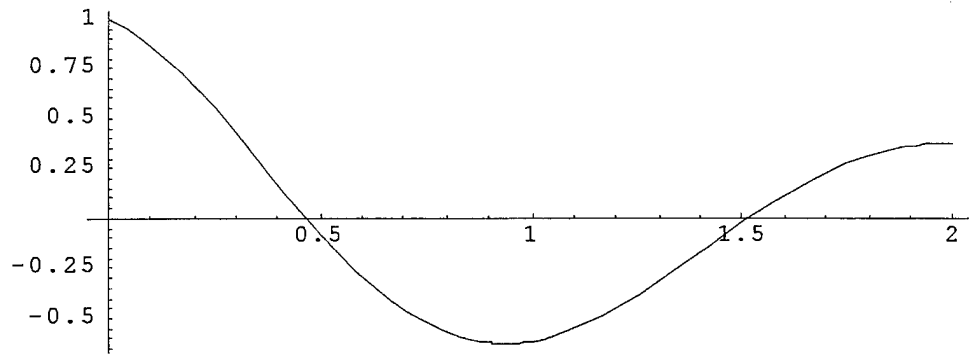
Fig. 3

In Fig.4 we plot $x = x_h + x_p$ as a function of t. We have also shown there x_h, and x_p in the same graph.
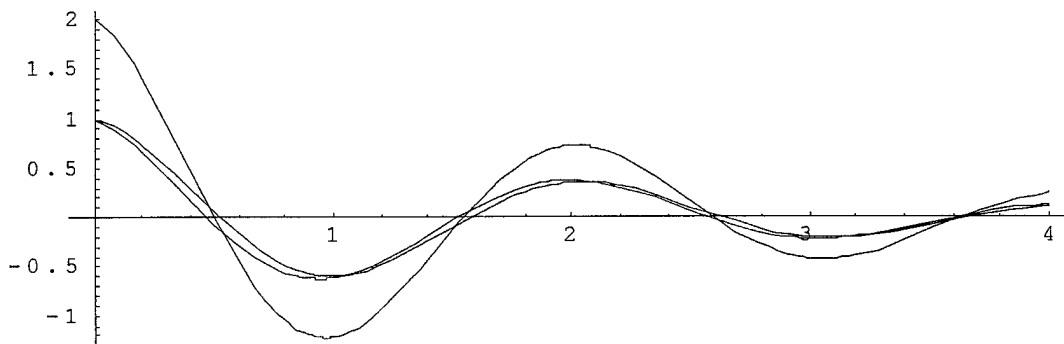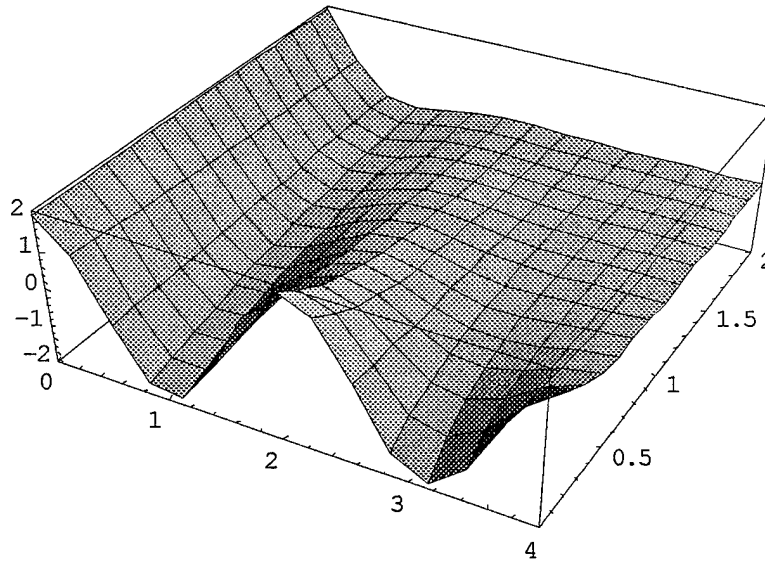

Fig. 4

We now plot x as a function of t and γ over a reasonable domain. The three dimensional graph is given in Fig. 5.

Fig, 5

6. Conclusion

We set up the differential equation of the motion of a mass tied to a spring subjected to a frictional force and a derivative of delta function force. We successfully solved the differential equation using contour integration. We then graphically showed how the final solution behaves by using Mathematica program.

7. Acknowledgement

We would like to thank intensely Dr. Linda Hayden for all the encouragement and support without which this work could not have completed. We are also grateful to the entire faculty and staff of the ONR Program for all the help, and making the facility available to us. We owe to them our heartiest thanks for that. We would like to thank our mentor, Latif Choudhury, for all the time and patience during our tortuous period of learning.

8. Reference

1. S. J. Creekmore, M. D. Pugh, A. M. Jones, and L. Mundon: Motion of A Harmonic Oscillator under the Influence of Delta Type of Forces:NERT Annual Report, ONR, 1998-1999.
2. R. Decher: Energy Conversion System, Flow Physics and Engineering. Oxford University Press (1994).
3. G. Leitman-Goldsmith: Problems in Mechanics. McGraw-Hill Inc. (1964).
4. J. Norwood, Jr.: Intermediate Classical Mechanics. Prentice Hall (1979).
5. W. Seto: Schaum's Outline on the Theory and Problems of Mechanical Vibrations. McGraw-Hill (1964).
6. D. Griffiths: Introduction to Quantum Mechanics. McGraw-Hill.
7. P. A. M. Dirac: The Principles of Quantum Mechanics. McGraw-Hill.
8. E. Merzbacher: Quantum Mechanics. Wiley and Sons.

SYSTEM ADMINISTRATION RESEARCH TEAM

Team Members:

Gregory Williams
Golar Newby
Bernard Bailey
Ernest Walker
Gregory Lassiter

Katrina Banks
Tina Lassiter
Shayla Brooks
Melvin Mattocks

Mentors: Dr. Hemant Pendharkar
Mrs. Marie Koltuniak

Office of Naval Research
1999-2000 System Administration Research Team

Mentors

Dr. Linda Hayden: Rm 114 Lester Hall, 335-3696
lhayden@umfort.cs.ecsu.edu

Dr. Hemant Pendharkar: Rm 110 Lester Hall, 335-3726
hemant@umfort.cs.ecsu.edu

Ms. Marie D. Koltuniak: Rm 113B Lester Hall, 335-3645
koltuniak@umfort.cs.ecsu.edu

Researchers

Bernard Bailey
Katrina Banks
Shayla Brooks
Tina Lassiter
Melvin Mattocks
Golar Newby
Ernest Walker
Gregory Williams

Team Website:
http://nia.ecsu.edu/teams00/systemadmin/index.html

Abstract

The 1999 - 2000 System Administration Research group is upgrading old/unusable SGI Indigo workstations into useable and productive computers. The research group was given nine Indigo Systems and one SGI 02 (the server) to build a network. After taking the nine Indigos apart, the research group utilized the components from individual systems to make two useful computer systems. The server was upgraded to run the operating system IRIX 6.5.6.

The group carried out research on jumper settings for the hard drives. This was necessary since each rebuilt Indigo was using three hard drives. The research group was able to get a deep understanding about SCSI devices and SCSI controllers.

Once installation of the operating system was completed the systems was then customized for enhanced security and usage. This was achieved by using the Graphical User Interface (GUI), provided by the IRIX 6.5.6 operating system as well as by using the command line of the IRIX shell. Combined with internet resources and help pages (man pages) on the IRIX operating system, the research group was able gain a deeper understanding of the IRIX environment.

The research group learned about important system administration related tasks. From this research, the group implemented these tasks on this new network. The server is setup as an NIS and NFS server for this network.

Hardware System Components

System Unit	SiliconGraphics	Iris Indigo	CMNBO3475
Hard Drive	Seagate	Barracuda	ST32550N
Hard Drive	Seagate		ST11200N
Keyboard	SiliconGraphics		
Keyboard	SiliconGraphics		9500801
Mouse	Geprute Sicherhelt	Family 5100	041-0136-001
Monitor	Sony	Color Display	GDM-17E11
Twisted Pair Transceiver	Lantonix	LTX-T	IEEE 802.3 10Base-T

IRIS Indigo - A New Class Of Computer

Silicon Graphics' IRIS Indigo workstation represents the original blending of workstation performance with PC simplicity. IRIS Indigo has created a new class of computer called the RISC PC. Plus it offers all of the advanced 3D graphics capabilities that you expect from Silicon Graphics. But it doesn't stop there, Indigo is a lot more than just a computer. It's the concept that drives our design philosophy; one dedicated to people with extreme design, visualization, and compute needs.

Indigo Technology

In order to meet the needs of our customers, IRIS Indigo workstations implement the highest performance technologies available. At the heart of these systems is a workstation engine based upon the MIPS RISC architecture - either the 32-bit R3000A or the 64-bit R4000 processor. IRIS Indigo takes these fast CPU's and surrounds them with a system architecture that is unrivaled in the industry.

The R4000 CPU-based IRIS Indigo's system bus supports a 266MB/sec sustained transfer rate. These same IRIS Indigo workstations utilize 1MB of secondary cache to support the R4000's 16KB of on-chip data and instruction cache. These system elements combine to produce industry leading application performance.
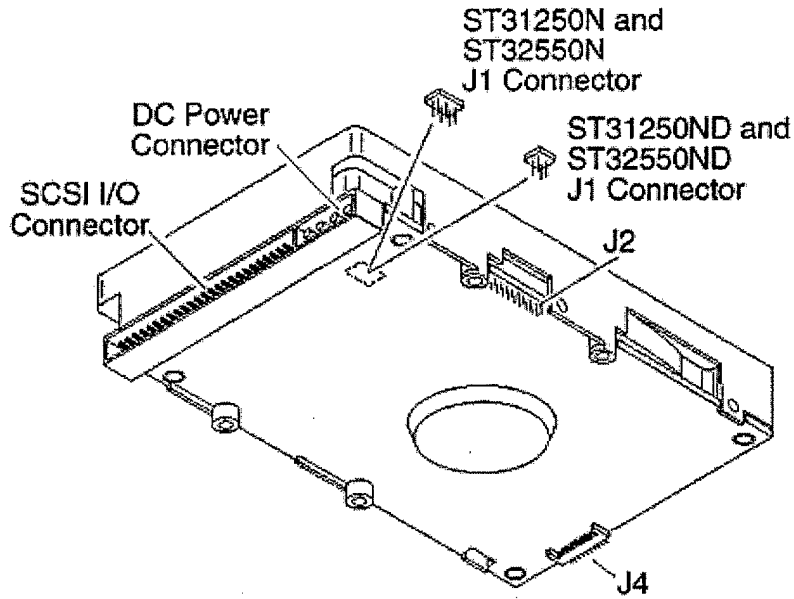
SiliconGraphics

ST32550N Seagate Barracuda 2LP
Capacity: 2.54 GB
Speed: 7200 rpm
Seek time:8 ms

1

Figure showing disc drive PCB with labels:
- SCSI I/O Connector
- DC Power Connector
- ST31250N and ST32550N J1 Connector
- ST31250ND and ST32550ND J1 Connector
- J2
- J4

The major advantages of Barracuda drives are that they are low-cost, high-performance random-access storage devices, which support disconnect/reconnect, multiple initiators, self-configuring host software, and automatic features which relieve the host from knowing the physical characteristics of the targets—logical block addressing is used.
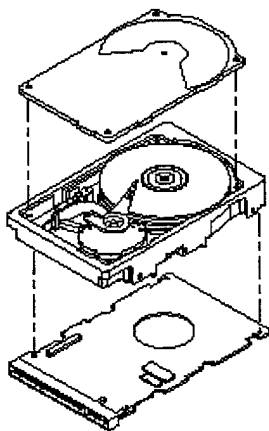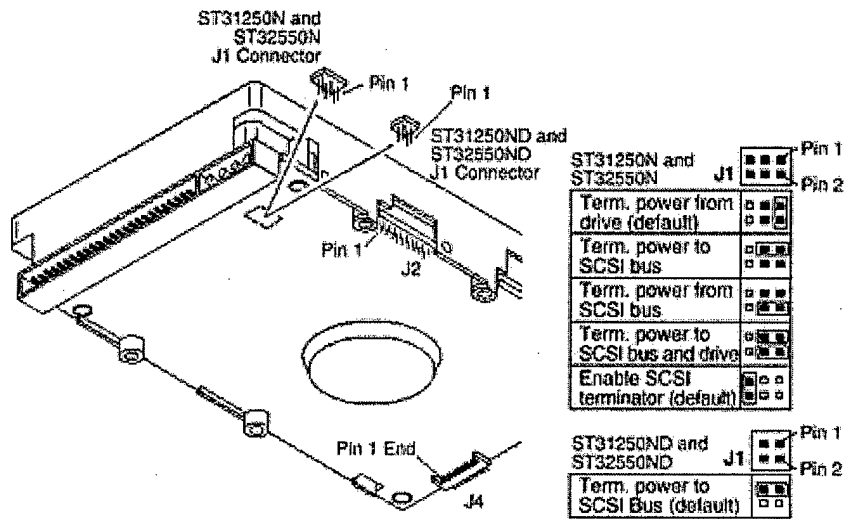

Figure 2. Barracuda 2LP disc drive (exploded view)

The head and disk assembly(HDA) is sealed at the factory. Air circulates within the H DA through a non-replaceable filter which maintains a contamination-free environment H D A environment.

2

ST32550N Seagate Barracuda 2LP
Jumper Setting

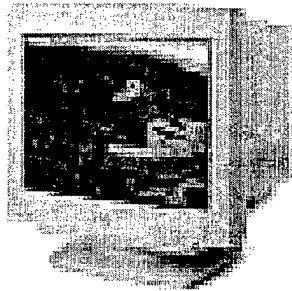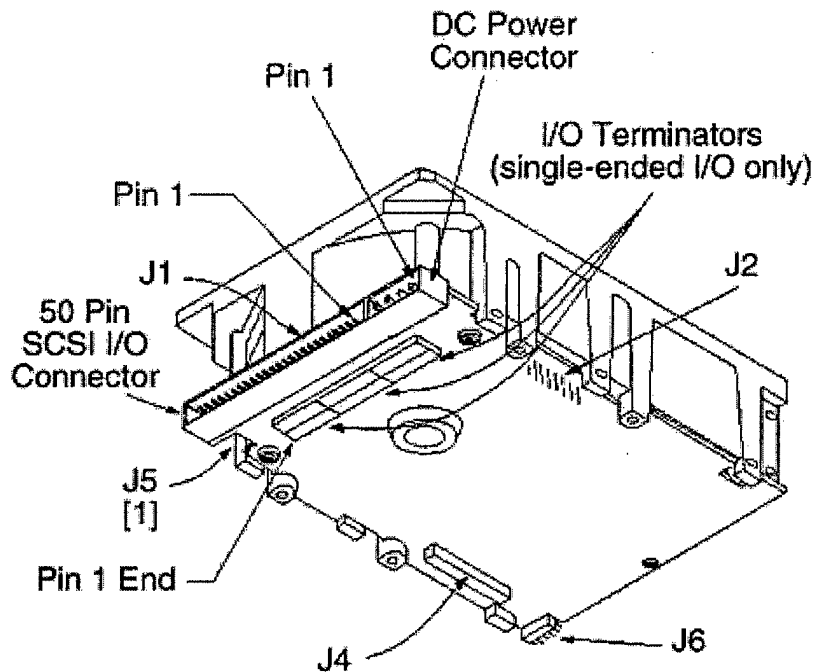The jumpers were set by a combination of on-line support, technical support, and local experts.

SiliconGraphics

Seagate ST11200N
Hawk 1
1.05 GB
5400 rpm
10.5 ms
Capacity: 2.54 GB
Speed: 7200 rpm
Seek time:8 ms

3

DC Power
Connector

Pin 1

Pin 1

I/O Terminators
(single-ended I/O only)

J1

J2

50 Pin
SCSI I/O
Connector

J5
[1]

Pin 1 End

J4

J6

Silicon Graphics GDM-17E11 Specifications

Screen Attributes
16" Aperture grill
16" viewable image
.26 mm dot pitch

Input Signal
Video Signal : Analog
H Frequency : 30-82 KHz
V Frequency : 50-150 Hz
Sync Signal : Green
Compatibility
Mac Adapter : Mac Sync
PC Adapter :

Input Connector
13W3

Maximum Resolution
Maximum : Up to 1152x870
Macintosh :

Flicker free :

Power Use
Power Supply :
Consumption : maximum

Video Bandwidth
100 Mhz

User Controls
Analog controls
BR, CT, VE, CV

Plug and Play

Dimensions and Weight
Height : 14.9
Width : 15.9
Depth : 18.7
Weight : 60

- LTX-T TWISTED PAIR (10BASE-T) TRANSCEIVER CONNECTS TO STANDARD AUI
PORT ON A HOST/DEVICE AND ALLOWS
- CONNECTION TO UTP TOPOLOGY. LTX-T CAN ALSO BE USED IN CONJUNCTION
WITH ETS/EPS SERVERS AND OTHER AUI INTERFACE PRODUCTS.

twisted pair

<*hardware*> A type of cable in which pairs of conductors are twisted together to randomise possible cross-talk from nearby wiring. Inadequate twisting is detectable using modern cable testing instruments.

transceiver

Transmitter-receiver. The physical device that connects a host interface (e.g. an Ethernet controller) to a local area network. Ethernet transceivers contain electronics that apply signals to the cable and sense other host's signals and collisions.

Monitor

Brand: SONY
Model: GDM-17E11

Horizontal Frequency: 30-82KHz
Vertical Frequency: 50-120hz
Sync Type(s) Supported: NA
Maximum Resolution: 1280 x 1024
Connector Type: 13W3
Size: 17
OEM: SGI MONITOR
OEM Model: NA
SaturnGL Compatible: Yes, BIOS number: 0
C1 Compatible: YES
BIOS: 6085
P1 Switch Settings:

Once the new drives are installed, formatting these new drives is appropriate before any installation should begin. Under the maintenance window the research group used the maintenance command line prompt. One of the first tasks that the research group checked for on the new system was the hardware. If the jumper settings were correct then the drives would be seen when the command *hinv* was typed. The external CD Rom would also be seen using that command. The command *boot –f dksc(0,5,8)sashARCS dksc(0,5,7)stand/fx.ARCS –x* tells the computer to boot from the disk on SCSI control zero, device number five. The command also tells the system that it is going to be reformatted.

Once the computer reads the command line its starts to go into a default mode. Certain options then appear from which the research group choose to repartition the drive number one. This step sets up the swap space for the computer. As an administrator many options are open to how the system can be set up. As a research group the option of our mentors greatly influenced the set up of the system. The swap space was set to 384 which is double the memory of the system. The swap space is the physical memory that the computer has, this is also known as RAM.

After the general set up of the new drives is completed the software is ready to be installed into the system. Using an external CD Rom drive each of the software disks is loaded. The order of the CD loading is very important, in order to have a successful installation. The order of CDs that research group used was:

1) Overlays 1

2) Overlays 2

3) Foundation 1

4) Foundation 2

5) Latest Applications CD

6) ON3 / NFS

7) Development Foundation

8) Development Libraries

9) Other Software that might be needed or desired.

The system asks for these CDs the first time to access whether or not the system hard that is selected can hold the operating system. Each CD will be asked for twice. The second time the CD is put in is when the actual installation accurse. This process can be rather lengthy, depending on the speed of the CD loader and the speed of the computer.

Once the operating system, IRIX 6.5.6 is loaded the actual System Administration can begin. The operating system prompts the users for a root password. It is very important that as an administrator to not leave this account unprotected. A reminder of good System Administration ethics is needed from this point on. The root user (who is also known as the super user) has accsess to all file systems on that computer. The Administrator has the power to lock or close any file that he / she might decided is nessessary.

Once this password has been created other open accounts will need to be protected. This can be done using the Graphical User Interface(GUI). The GUI contains the tools that the system administrator uses to manage accounts on the network. The system manager contains the main parts of the GUI. These are the disk manager, system shutdown, NFS (Network File System) manager, Network Setup, Login Setup, User Manager, Port Setup, Restart System, System Setup, Swap Manager, Print Manager, and the System Log.

The disk manager show the disk information for the particular machince that you are working on. It shows the disk type, controller type, controller number, and the amount of disk space available. The Network File System manager shows the remote mounted file system that are on the machine. Network setup is where the system administrator sets the preferences for the NIS or Network Information System. Login Setup is where the login preferences are set. User Manager is the tool that allows you to create and modify user accounts on the network. To create a user account you must first log in as root. Once logged in you go into the system manager and click on security and access control. From here you access the user manager. Next you click add, to add a new user to the system. You then proceed through the various tasks entering the information needed. Once the NIS is turned on you will be able to chose either a local or network access account, but for now a local account is created. The network access account will give the user access to all the machines on the network. The system gives a user id, primary group, and a home directory. These can be changed by the system

administrator. The shell program that we are using is the tcsh shell. Once all the information is entered and everything is correct then click ok and the system sets up the language for the new user.

The print manager gives the name, type, and default printer sttings for the printer on the network. It also allows your to add and remove printers from the network. The system log takes the filter messages and logs the date and time that the messages were sent.

UNIX is a very popular operating system that is used by a significant number of companies of the computer industry. When we use the term operating system we mean, the collection or suite of programs, which aid in the computers performance. Working with UNIX, whether it is for use on a personal computer or a mainframe, has its difficulties. There are the occasional feelings of confusion and frustration. The UNIX commands are the essential elements of working with system administration. The System Administration team has come across many of these commands, some not as easy or as difficult as others, with the help of the book, UNIX System Administrator's Interactive Workbook, by Joe Kaplenk. This textbook provided us with hands-on techniques for using UNIX commands. Some examples of commands that we have used are as follows: man, *ls, cat, cp, mv, rm, mkdir, cd, pwd, grep, and passwd, hinv, ifconfig –a, whereis*, and *find*. We have come across many in our research, but this report will only discuss a few.

First of all, the *man* command is used to display the online documentation for almost any program in UNIX. In order to search a command in man pages or manual

pages, you must know exactly what the command is that you are looking for. You can also *man* man to find out information on the *man* command. The *ls* command is used to list information about files and directories. The *cat* command is used to print a file. The *mkdir* command is used to create a directory and the *cd* command is used to change your current directory position. Another command we learned in the beginning was the *pwd* command. If at any point you type in a command and access to a file is denied, then you are probably in the wrong directory. Therefore, *pwd* is useful, because it tells you who's directory you are in and *cd* will allow you to change your directory position.

The shell is a very important aspect of executing UNIX commands. The shell is a command line interpreter (CLI), which means that it interprets the commands that the user types in and makes it possible to carry it out. The commands are themselves also considered to be programs. After a command has been executed and terminated the shell gives the user another prompt.

ARTICLE REVIEW

Infowar: ak-47's, lies, and videotape
By Neil Munro

The article, infowar: ak-47s, lies, and videotape was telling about the issue of info war. Info war is not just about the "hacker war", but it goes deeper into the national security. Info war also involves the T.V. Coverage in which a country has when there is a crisis, but some crises receive more coverage than others. This is also because of the info war. Info war can also be used to start hate wars or provide peace. Key components in this aspect are the Internet and the T.V. Broadcasting aircraft. There has been an issue

of who should overlook the info war, which is now headed by the FBI because many of

the pentagon's operations fall under the info war heading. The FBI is needed to that the

security of large corporations is maintained to prevent lawsuits from customers that may

have been hurt through a security breakdown. Many companies had to pull the plug on

deals that would have made millions of dollars because the deal could lead to further

problems involving security. At this moment all info war disputes are fought in

Washington. It has been suggested by John Arquilla, a professor at the naval

postgraduate school, that the government should develop a security plan similar to one

during the cold war. But this could take a while with all the infighting in the government.

Intrusion
By Terrance Goan

This article is about trying to find ways that can can stop intruders from entering a

network. Stopping the intruders is not the only concern they also want to be able to find

these intruders. It says that they must find out where can these intrusions occur. They

can occur at universities, companies, military institutions, and research institutions.

There are basically two types of attacks, which are outsider attacks and insider attacks.

Outsider attacks are attacks that are performed by an unauthorized computer user. Insider

attacks are those that are performed by a person with access to a computer system. They

have evidence that can be relied on during the intrusions. Evidence falls under two

classes called direct and indirect. Direct evidence is that takes the form of well-defined

patterns of activity known to be malicious. While anomalous behavior, it is hoped that

illegal, intrusive, or criminal activity can be detected as a result of pursuing a reasonable

suspicion. There are several ways noted in this article to locate intruders. These include audit trails, network monitors, tripwires, honeypots, configuration checking tools, operation system commands, anomaly detection systems, and alert messages. To determine the success of an intrusion detection system must operate in a deliberate manner. System administrators or computer security personnel have the role of judge and jury when it comes to intrusion detection. We can improve the effectiveness by intelligently selecting and connecting data from a body of complementary and redundant evidence sources.

COMPUTER NETWORKING RESEARCH TEAM

Mentors:

Mr. Robert Harris
Dr. Linda Hayden
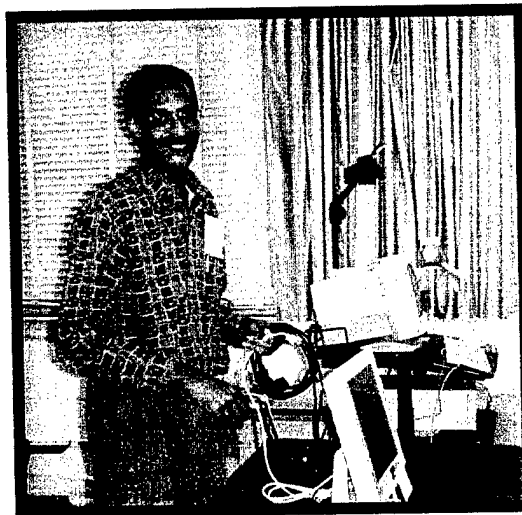
Team Members:

Donald Charity
Sheri Joyner
Joseph Gale
Katrina Godwin
Issac Lister

Networking Team
Homepage: http://nia.ecsu.edu/teams00/network/network.html

April 11, 2000

Team Mentors

Mr. Robert Harris, Mentor
Network Administrator
113 B Lester Hall

Dr. Linda Hayden
Principal Investigator
114 Lester Hall

Team Members

Sheri Joyner, Senior, Computer Science Major
Katrina Godwin, Senior, Computer Science Major
Joseph Gale, Junior, Computer Science Major
Donald Charity, Senior, Mathematics Major
Isaac Lister, Junior, Mathematics Major

Abstract

This years research involved telecommunication mediums with a special focus on ISDN circuits, video conferencing standards, practices and applications, unix network and server applications, Ethernet LAN topology, network firewall applications and the study of ISP components and operations.

The research also involved testing and certification of our Intel Team Station video conference system for use with the ATT ISDN video conference bridge system. After some debugging efforts with the vendor and telecommunication carriers, our site was successfully certified for dial-out and dial-in at 384kbps using 3 ISDN circuits/6 B-channels and 128kbps using 1 ISDN circuits/2 B-channels. Our site ID is 3020903. This enabled our NRTS site to participate in NASA MU-SPIN sponsored video conferences.

The existing umfort server serving as mail and file server was retired. The server was plagued by performance and resource problems as a file server during high demand periods (i.e. training sessions) and as a mail server it lacked adequate security against open mail relaying (spamming). As a result two new servers were built as independent file and mail servers. To create the new file server, an SGI 02 was upgraded to 256M of RAM, the root file system was repartitioned to allocate 768Mbytes of swap space, the operating system was upgraded to IRIX 6.5.6 and the user file system was upgraded to 9GB.
The new mail server was created on an SGI Indy platform which was upgraded to 128M of RAM, the root filesystem was upgraded to a 4GB hard drive and IRIX 6.5.6 was loaded. The /etc/sendmail.cf file of sendmail version 8.8.8 was configured to take advantage of built-in anti-relay rules and the /etc/sendmail.cR file was used to denote that only hosts from our cs.ecsu.edu domain would be permitted to relay mail through the mail server. In addition, IMAP4 which supports the IMAP4, POP2 and POP3 remote mail access protocols, was installed along with PINE version 4.10.

To address the issues of network bandwidth, speed and contention during periods of high traffic the research team studied to understand the problems associated with the existing network of shared 10bmps hubs as it contributed to the problems of network bandwidth, speed and contention. Further study revealed how 100mbps Ethernet switches could greatly help to alleviate the issues dealing with network bandwidth, speed and contention. Following the provisioning of a new fiber run between Lester Hall and the campus telecommunications building and the installation of a 100mbps fiber module in the Cisco Catalyst 2820 ethernet switch located in the campus telecommunications building, the network team successfully with implemented four Cisco Catalyst 2924 Enterprise switches in the first floor telco room of Lester Hall. In addition, a secure telecommunications equipment cabinet was outfitted and installed in the telco room for the NASA and ONR lab and offices.

The problem of denial of service attacks, host intrusions and network intrusions was studied as well as a viable solution to help protect our network and series of hosts from such security compromises. A Sun Ultra 10 Server and SunScreen EFS firewall software is being built and configured to address these threats. The server is being outfitted with a mirrored hard drive to help minimize network outages due a hard drive failure and multiple Ethernet ports to initially support our NRTS and ONR facilities and could eventually support the entire Math and CS Department.

We studied the components and practices of Internet Service Providing and brought together components within our own facilities to provide dial-up internet access. A 3Com Remote Access Server 1500 and the 3 video conferencing ISDN circuits were brought together successfully to provide the remaining components to provide dial-up internet access from within the NASA and ONR facilities.

Intel TeamStation System

At the beginning of the semester our group started our research with the Intel

TeamStation System, a video conferencing system. The Intel TeamStation System is a

multi-purpose, PC Based conference room workstation, which includes

videoconferencing, Internet access, corporate network access, PC applications, and data

collaboration. The Conference System consist of:

- A high performance workstation with an Intel Pentium III processor (500 MHz)

- Microsoft Windows NT Workstation 4.0

- Intel TeamStation System software version 5.0

- Intel TeamStation System Document Server

- Intel LANDesk Virus Protect

- Remote control camera w/ 6 presets/ auto-tracking w/ 12x zoom

- NEC MultiSync XV29- 29" SVGA display

- 1 Omni-Directional (Desktop) microphone

With the additions of:

- Microphones w/ 3 Shure wireless transceivers

    o 2 Handheld wireless

    o 1 Lapel wireless

- Mackie Micro Series 1202-VLS- 12 channel Mic/ Line Mixer

- Wireless keyboard/ mouse

The TeamStation uses H.320 ISDN (Integrated Services Digital Network) standards as well as H.323 IP standards for videoconferencing. We have three BRI (Basic Rate Interface), each consisting of 2B channels and 1D allowing us to run at 384Kbps on the ISDN standards. Our team certified our cite with the AT&T videoconference network at 384Kbps and 128Kbps. We dialed and received videoconference calls between the AT&T Bridge at both 128Kbps & 384Kbps.

Remote Access System

The Networking Team's next project was the Remote Access System. We used the 3COM Super Stack 1500. A Remote Access System allows you to be your own ISP (Internet Service Provider) such as AOL or Prodigy. To have an ISP you must have switched and dedicated access circuits, modems, a remote access server, a DNS server, a router, and circuit connection to the web. All of this is included in the POP (point of presence.) It uses the same ISDN circuits as the TeamStation. The users or customers must have a modem to communicate with the remote access server. A router is...
And the connection the worldwide Internet is switched. We set up and manage accounts through a web inter face so it can be access from anywhere on the worldwide web. We designated local access numbers 337-9011 through 337-9016 for dial-up access. We have three BRI with 2 B channels each allowing only six users at one time. Our Remote Access Server has slots for 4 BRI's, so we have one extra for future upgrade.

Indy Upgrade

One of the important projects that were worked on by the networks team is the upgrading of the Indy's in the SGI Lab. The Indy's in the SGI lab has the following settings:

Hard Drive Size	1 Gig
Memory Size	64 MB
Operating System	IRIX 5.3
Swap Space	40 MB
Netscape	Netscape 3.01 without JavaScript plug-ins

In order to take advantage of the latest operating systems, IRIX, install newer software applications, and improve the performance of the Indy workstations. Being that new technology and software are being developed all the time, it is very important that in a research lab one maintains the hardware of the Silicon Graphics. The networking team took those things into consideration and decided to upgrade the Silicon Graphics workstations. At first, the networks team only upgraded one workstation to measure its performance with the new hardware and software settings. On this SGI Indy workstation the new configuration is as follows:

Hard Drives Size	4 Gig
Memory Size	128 MB
Operating System	IRIX 6.5.6
Swap Space	384 MB

Netscape	Netscape 4.7 with JavaScript plug-ins

Like all technology, when you make changes to a system you have to reconfigure that system. After installing the operating system, the settings that must be performed are the settings of the DNS, password files, time zones file, network connection, NIS connection to the Apollo server for password authentication, using NFS to mount the file systems on the Apollo file server and mort mail server, and the mounting of the network file system.

In order to set the Network Connection aspects, the following steps need to be taken:

(1) After logging onto the system, from the tool chest select System Manager.

(2) Click on Network and Connectivity.

(3) From this menu, you are given a list of tasks. These tasks allow you to set up connections to the local network and the Internet.

(4) Click on set up and start Networking.

(5) Using the GUI interface you can select the network interface to configure. This refers to the type of networking hardware used to connect you workstation to the network.

(6) Using the GUI interface, you can specify a hostname and IP address.

(7) Using the GUI interface, you can confirm your settings

(8) After you confirm your settings, your workstation network connection has been properly setup.

In order to set the NIS aspects, the following steps need to be taken:

(1) After logging onto the system, from the tool chest select System Manager.

(2) Click on Network and Connectivity.

(3) From this menu, you are given a list of tasks. These tasks allow you to set up the NFS and NIS connections.

(4) Click on Set up and start NIS. This task lets you configure NIS on your workstation. By making use of NIS, your workstation has access to a database of information about other workstations on the network.

(5) Using the GUI interface, you must first enter a NIS domain name. Your network administrator should provide this NIS domain name.

(6) Using the GUI interface, you must specify the host resolution order. The host resolution order determines the order in which your workstation searches for information about other workstations on the network.

(7) After the completion of the above steps, you must confirm you settings.

(8) After the confirmation of the setting you have set up the NIS component.

To set the NFS component, you must take the following steps:

(1) After logging onto the system, from the tool chest select System Manager.

(2) Click on Network and Connectivity.

(3) From this menu, you are given a list of tasks. These tasks allow you to set up the NFS connections.

(3) Click on Set up and start NFS. This task lets you configure and turn on NFS on your workstation.

(4) Next, you need to specify whether to mount file systems automatically.

(5) After you finish making your settings, you need to confirm your settings.

To mount a network file system component, you must take the following steps:

(1) After logging onto the system, from the tool chest select System Manager.

(6) Click on Network and Connectivity.

(3) From this menu, you are given a list of tasks. These tasks allow you to mount a network file system.

(4) Click on mounting a network file system. This task allows you to access file

systems located on remote workstation on the network.

(5) Next, specify the type of file system you want to mount.

(6) Next, specify the duration of the mount.

(7) Next, select a remote file system to mount.

(8) Next, select a local mount point.

(9) Next, set access permissions.

(10) Next, confirm you settings.

(11) After you confirm your setting, you have just completed the mounting of a

file system.

After you set the above settings, you must use the chkconfig to turn off damon or files

that you do not need.

Future Plans

On the aspects of future plans, the network team has hopes of performing the following tasks:

(1) Cloning the other workstations.
(2) Install GIMP on all workstations (GNU Image Manipulation Program)
(3) Installing SoftWindows 95

Apollo (Root File Server)

Another important project that were worked on by the networks team is division
of the old umfort server, which served as both file server and mail server. Before the
modifications the settings were as follows:

Hardware Platforms	R4600 Processor at 133 Mhz
Hard Drive Size	1 Gig
Memory Size	64 MB
Operating System	OS Version 5.3
Swap Space	80 Meg

The new SGI O2 file server was named Apollo, while the new SGI Indy, the new
mail server retained the name umfort. After the modifications the setting are currently as
follows:

Hardware Platforms	SGI O2 with R10000 Processor at 250 Mhz R10000 Math Coprocessor CD-ROM Drive 100 MBPS Fast Ethernet Interface 1 MB on-board cache
Hard Drive Size	4 Gig
Memory Size	256 MB
Operating System	OS Version 6.5.6
Swap Space	768 Meg

There are several advantages of this upgrade. With the new operating system, there comes a newer Netscape and JavaScript plug-ins. Because with OS Version 5.3, there were java error but with this newer version there will be no java errors. Also, the upgrade makes the system faster and it has more memory to run many software programs.

Future Plans

As far as future plans, the networks team has hopes of the following aspects:

(1) Upgrading to a 20 G hard drive

(2) Establishing quotes, which allocate each individual with a certain amount of space.

(3) Setting up cron jobs, which means that backup files will be made daily for the files that have been changed onto a secondary hard drive.

(4) Adding GIMP to each platform. GIMP is similar but better than Photoshop. GIMP's performance is slower with GIMP over the network therefore this explains why we have chosen to place it on every platform.

Cisco Switches

Another major project was upgrading the network from shared hubs to switches. The purpose for the upgrade was to reduce contention and increase speed. The problem with shared hubs was primarily contention. Requests had to share bandwidth, therefore they do not get the advantage of full bandwidth and speed. As for switches, requests do not share bandwidth. This allows for full use of bandwidth and speed.

In order to accomplish this, four Cisco Catalyst 2924 Enterprise switches were installed. All four Catalysts have twenty-four autosensing 10/100 Mb/s ports,

autonegotiation of speed, and half- or full-duplex operation for 10/100 Mb/s. Two of the Catalysts contain two fiber module expansion slots. A 100 Mb/s fiber module was purchased and installed in a Cisco Catalyst 2820 switch located in the campus telecommunications building. The campus telecommunications department provisioned a new fiber link between Lester Hall and the campus telecommunications building. The old fiber link between the 10 Mb/s shared hubs in Lester Hall and Doles Hall remained active to insure a smooth transition to the new network. There is now 100 Mb/s running across multi-mode fiber to the campus backbone.

To support the switches, various management options are available. One management option is an embedded HTML-based management tool that displays live images of switches and graphical user interfaces. Another option is accessing the command-line interface (CLI) for configuration tasks. A Simple Network Management Protocol (SNMP) compatible management station running such platforms as HP OpenView or SunNet Manager can be utilized for management purposes.

Future plans include implementing one of the aforementioned management options and creating Virtual LANs (VLANs). A VLAN is a group of end stations with a common set of requirements that map workstations on some other basis than geographic location (for example, by department, type of user, or primary application). VLANs have the same attributes as a physical LAN, but end stations can be grouped even if they are not physically located on the same LAN segment. VLANs on supported switches limit unicast, multicast, and broadcast traffic flooding. Flooded traffic originating from a particular VLAN is only flooded out other ports belonging to that VLAN.

VISUALIZATION
RESEARCH TEAM
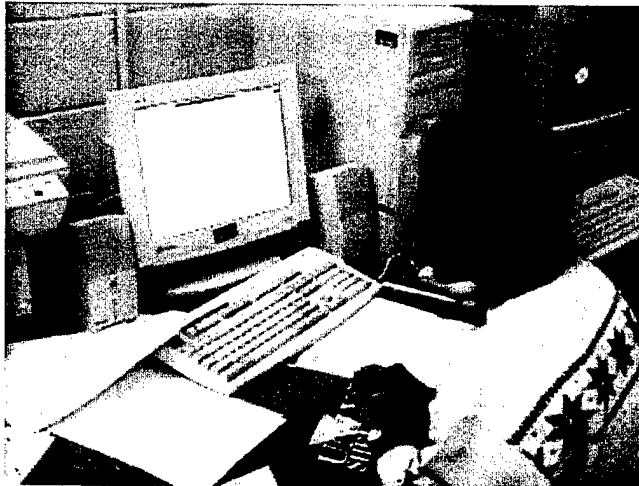
Team Members:

Keisha Harrison
Ravindar Kaur
Mentors:
Dr. Linda Hayden
Ms. Eileen Seshun
Dr. Kossi Edoh
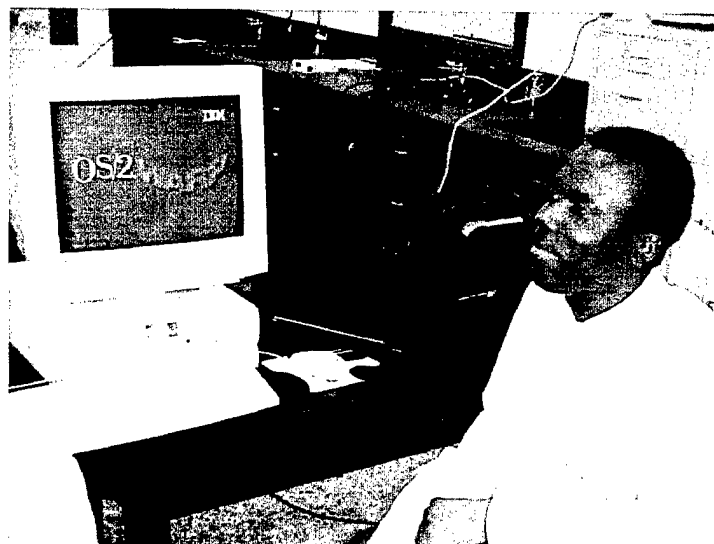
Visualization Team
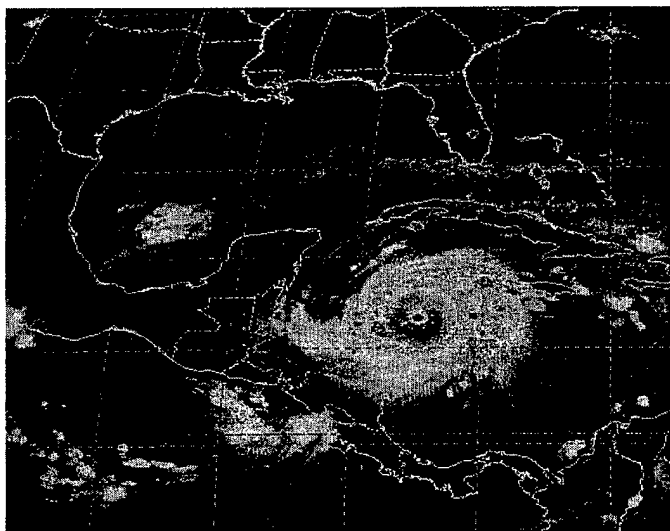
Group Members:
Keisha Harrison
Ravinder Kaur
Gary Cordon

Mentor:
Dr. Kossi Edoh
252-335-3664
LH 112
kedoh@umfort.cs.ecsu.edu

Webpages:
Group – http://nia.ecsu.edu/onr/nvisual.html
Keisha Harrison – http://nia.ecsu.edu/sp/kharrison/index.html
Ravinder Kaur – http://www.apma-nc.com/rpk
Gary Cordon – http://www.geocities.com/Cordonne-2000

April 11, 2000

Scientific visualization is a form of technology that allows people to interpret the meaning of billions of pieces of information in a visual form. With the use of animated depictions, researchers are able to view data that was once unobservable. Scientific visualization helps to solve problems and helps to promote and explain information to researchers, which helps to improve comprehension and provides new insight to problems.

The Goddard Space Flight Center is now working on an educational program for secondary schools and science centers. They are using digital satellite technology to distribute satellite imagery data from NASA and NOAA directly to schools. This program is aimed to promote students interest in learning. Goddard feels that this program is a way to reach kids and to restore their interest for technical skills, using spinoffs from Goddard's Space research.

Goddard feels that the value of this educational project can be divided into three categories. The first is the desire to learn. Throughout our inner cities our young people are faced with a major problem, they are not interested in learning. Technology is being introduced to young people in the form of video games, R rated movies, and unproductive internet surfing. This project provides a unique way of learning that will not only educate, but will introduce students to technology. With this project, teachers and educators are able to observe more interest in the student wanting to learn.

The second value that this project offers is content based learning. Satellite imagery offers a wide span of learning. The subjects that students are able to learn while using this software include: meteorology, geography, physics, environmental science, biology, oceanography, and much more. This project not only exposes students to

1

science related topics, but exposes them to satellite imagery, one of our newest forms of technology.

The third and most important value that this project offers is a way to improve student's critical thinking skills. Critical thinking skills are very important and necessary in this day and time. This project helps improve skills such as evaluation and reasoning, to name a few.
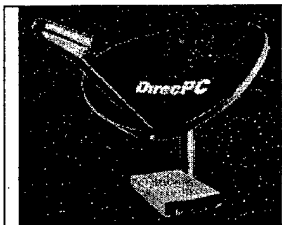
In there efforts to increase students learning, Goddard has set up websites for students and teachers. Students are able to explore the "You Be the Scientist" website and see what students at other schools are doing. They are able to view images created and customized by students and to chat with students about various projects. Goddard also provides interactive conferences which allows students and teachers to get a feel for what other schools are doing and learn new ways to use the GVAR software. The videos expose students to different places and new forms of technology.

In addition to the "You Be the Scientist" website, Goddard also offers the "Cool Space" website. This website is primarily for teachers. The website provides teachers and educators with different activities that can be used in the classroom. The activities are designed to help the student and the teacher learn how to use the program. They also provide teachers with ideas for educational projects.

Installation

To receive the GOES satellite data, a small 21-inch DirecPC dish must be installed. A computer that will act as a data receiver and network server must also be installed.
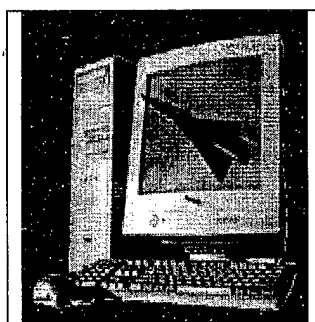
The requirements for the dish are as follows:

21-inch DirecPC System:
21-inch DirecPC dish .
PCI receiver board .
Antenna mounting kit
100 foot RG-58 coaxial cable.

In order to install the dish, the team had to first put the dish together before mounting it on the roof. Upon assembling the dish, the dish had to be taken up to the roof of Lester Hall. In order to be able to receive live real-time data from the satellite the dish had to be mounted and pointed towards the GOES-8 satellite that is orbiting the earth near the equator. Therefore the dish had to be pointed at a 60 degree angle and pointed towards the southwest. After pointing and positioning the dish, it had to be secured to the roof to insure that it was sturdy.

Once the satellite was in place, the only thing left to do is install the computer and all of its software components.

The requirements for the computer are as follows:

Computer Server System:
Intel Celeron 333 MHz processor
128 MB ECC PC-100 SDRAM
17 GB Ultra2/Wide SCSI hard drive
32x CD-ROM drive
17-inch MultiSync monitor
OS/2 Warp v4 Install Image w/ complete service and updates
Remote Access Client to allow remote maintenance of system

The installation process was fairly easy. We were required to unzip files, create directories and create folders. Once the software was installed correctly, we were able to receive real-time satellite data from the GOES satellite.

Goes Variable

Goes Variable is software that allows users to open and customize images. NASA and NOAA have a ground station that collects data from flight missions. The data is then compiled and sent via the digital satellite, Direct PC. The data goes into a special PC server that can be connected to a local area network. Any client computer with a java compatible web browser can access and manipulate the data files. There are two tools that are used to open and manipulate the data. One is the SuperLooper and the other is the Scientific Image Viewer.

SuperLooper

SuperLooper is a tool that is used to open and look at the real time data. SuperLooper is a powerful easy to use JAVA applet that supports a wide range of image processing functions. It is run within a web browser on any modern computer with a JAVA 1.1 enabled web browser.
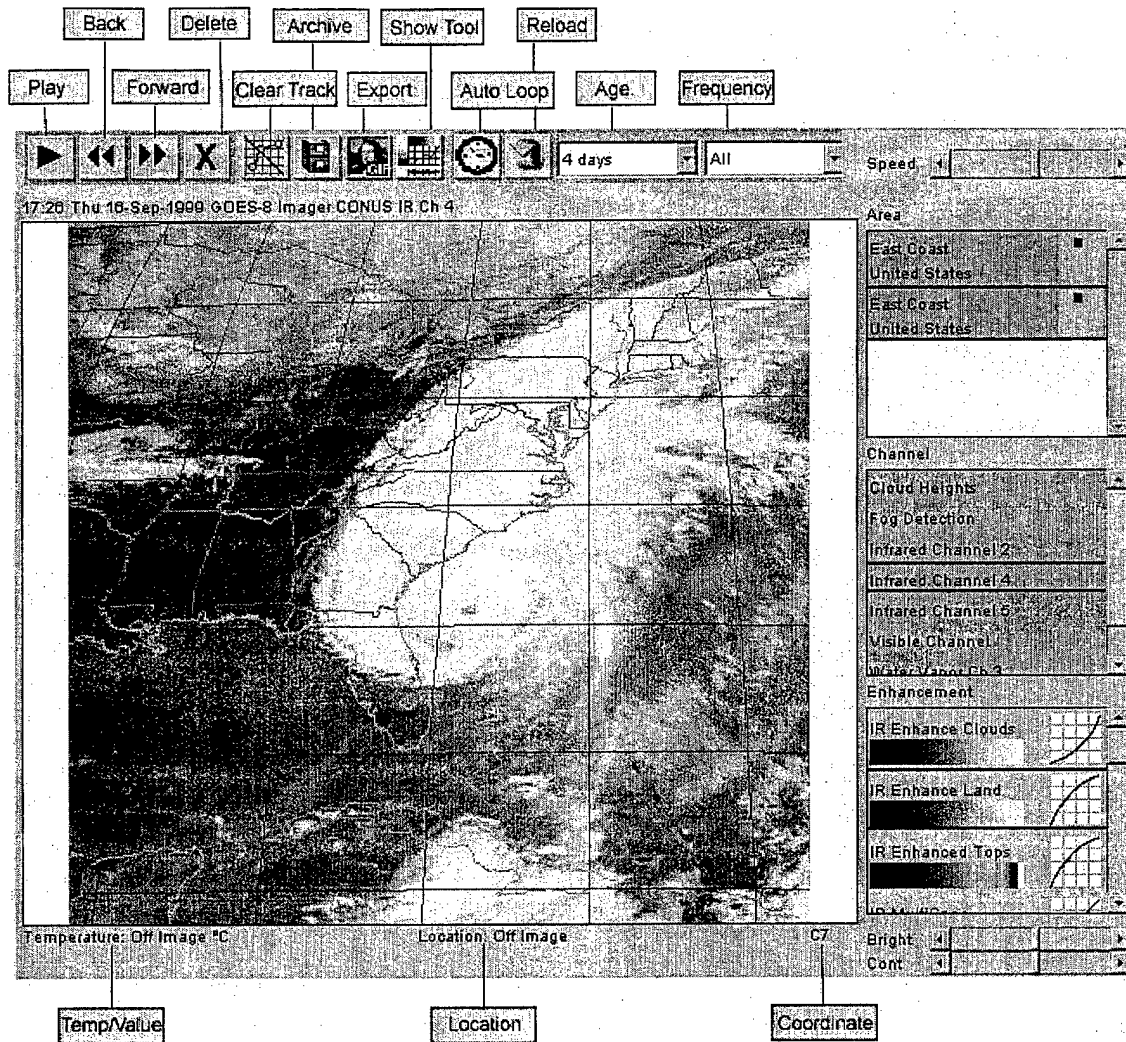
This picture of the SuperLooper contains various controls. Play control is used to play a

loop of images that have been loaded and pressing the button again stops the loop

animation. The back and forward buttons allow images to be moved back and forward in

image sequence. The export button allows users to export current data sets which are

being viewed or export the whole loop of datasets. Show Tools shows a separate window

containing a powerful toolset. The autoloop button starts automatic looping. Pressing it

again stops the automatic looping. Reload button, reloads the loop. Age in the

SuperLooper explains how long in hours or days to go back from the most current image

in a resource. Frequency is the time spacing between the images that are loaded. Speed

button controls the speed of the loop. The temperature scale is the calibrated range of temperatures for the range of pixel values across the X-axis. Location is the latitude and longitude that the mouse cross hair is passing over. One can see the value change as the mouse moves over the image. Temp/Value field display the calibrated temperature and the raw pixel value of the pixel that the mouse cross-hair is passing over. The change of value can be seen as the mouse moves over the image. Enhancement defines the enhancement to apply to an image. Enhancement consists of the palette, the temperature/albedo range, and the enhancement curve. Area is defined as rectangular regions relative to the spacecrafts imager.

To start creating a loop using the SuperLooper one must select Age, Frequency, Area, Channel, and Enhancement. A data set is then loaded which specifies the age and frequency criteria. If it finds a dataset it will load it and display the image. Once the loop is loaded it can be played by pressing the play button. The speed of the loop can be controlled by using the speed control button. The zoom feature actually re-sectors and reloads data at the best resolution for the selected area. It allows users to zoom in and see vivid details. To zoom an area, press down the mouse button and drag the mouse to the lower right corner of the area, a marquee will appear showing the selected zoom area as you drag. After selecting the area, release the mouse button and a menu will appear. Press zoom and within a few seconds it will begin loading a new loop of images of the selected area at the best possible resolution.

To plot the track of a storm, mark a point in each image of the loop. This point may be the edge of a front or the eye of a hurricane. The SuperLooper will draw a series of lines between the mark points on each image in chronological order. Each of these

line segments will have two numbers next to it. The number to left or top is the speed in kilometers per hour. The number to the right or bottom is the distance in kilometers. To mark a point, move the crosshair mouse pointer to the location and click the mouse button, a menu will appear. Select Storm Track from the menu. A dot will appear. When the loop is put in motion the storm track will remain displayed and the current point will show up in a different color. To clear the storm track there is a button on the toolbar, Clear Track.

Scientific Image Viewer

The other tool to manipulate the real time data is the Scientific Image Viewer. It is more mature and more powerful than the SuperLooper. It is designed to be run on the SuperFeed Server and can also be run on Pentium class PC's that have the OS/2 Warp operating system installed on them. This system has many similarities to other graphical interfaces like Windows and the Mac.

To start the viewer, double click with the left mouse button on the icon labeled Scientific Image Viewer icon. A blank Viewer window will appear. Select File from the menu bar and select Open from the pull-down menu. Select the viewer file from the Select Images to View list. After selecting the files, hit the ok button. A channel will appear, select a channel. The Create window will appear for each image selected. A Viewer window will appear with an image in it within several seconds. Multiple images can be viewed at once by opening more than one image in the create screen. A create window will appear corresponding to each image selected, with the title of the image located at the top. These images must be individually enhanced.

To add enhancements or change a current image, view enhance is used. This will change the current view. View-Create will add another view with the enhancements indicated and will not replace the current view. To view only a portion of the image, create a box around the area to select. The histogram will appear for only the area selected. View Create will create a view of the area selected while enabling the user to return to the original view. The zoomed in view will be created after pressing Okay in the Create box.

Scaling determines the scale that the view will be seen on the screen. The higher the scale number the higher the resolution. When an image is first called up, the scaling is automatically selected by Fit in Window. The histogram is a graph that represents the amount intensity that appears within the image.

To bring out detail of certain items in an image, move the mouse to the area on the image to bring out. By clicking the right mouse button, four markers are available in different colors. Select one of these marks to mark the intensity of the pixel. The marks will appear on the histogram and on the enhancement curve to show where the values lie. Now highlight just that section on the histogram and use View and Enhance to further bring out the details.

Enhancement curve is used to bring out detail from a certain area without clipping out all other details. To do this use the marking tool to highlight certain areas, then go to the View-Enhance screen and Construct the enhancement curve or use Enhancement Curve in the Show menu. The enhancement curve shows the mapping of the intensities in the image to colors or shades. There are four non-linear enhancement curves which bring out detail of things such as land and clouds. To stretch out the lighter shades on the

image, like clouds, use the curve that curves downward. For land detail, a curve that curves upward is useful. The Styles box on the Enhancement screen should default automatically to the proper settings for the image type. One can rotate or flip the image. The purpose of the Styles box is to reorient images that are transmitted upside-down or backwards. These options allow users to get the image into the right perspective. The palette box contains a palette list and 2 checkboxes, invert and default, and provides a way of choosing different color or greyscale palettes. The default palette is shades of grey. The invert button inverts the palette from top to bottom or swaps the colors of shades. The Overlay is a representation of geographical boundaries. It is useful in locating regions that may not be visible because of cloud cover. The aspect ratio changes the aspect ratio of the view (height and width). The aspect ratio can be changed by using the scroll bar on the bottom and right of the Selected Aspect window.

Looping allows animating a series of images that are the same type, cover the same area, and the same channel. Looping allows users to view a series of images in the order they were received. To setup an Automatic Loop, receive the initial image and enhance it. Using Loop Options, set the maximum number of images to auto loop. If one wants to change the enhancement of the loop including the area to loop, select one image from the loop and enhance it to the specifications. An image can be removed from the loop by selecting the Remove from the Loop menu. To start a loop, select Start from the loop menu. Options in the Loop menu allow users change the amount of time between images, how long one want to pause at the end of the loop, the number of auto loop images which will limit the number of images in the loop.

References

http://www.aquilasys.com/menus/frames/html/superfeed.htm

http://198.85.48.54/gdmanage/servlet/BasicLogin

http://198.85.48.54/gvardoc/gvardoc.html

http://coolspace.gsfc.nasa.gov/

http://coospace.gsfc.nasa.gov/ybts

http://cimss.ssec.wis.edu/wxwise/satio/

MULTIMEDIA RESEARCH TEAM

Team Members:
Je'aime Powell
Johnathan Williams
Gregory Lassiter
Barbara King

Mentors:
Mr. Jeff Wood
Dr. Linda Hayden

Multimedia Research Project
Streaming Real Video via the Web
Mentor - Jeff Wood
April 19, 2000

The projected goal of this research project was to conduct a study to determine the most effective way to stream real-time video clips over the internet. After realizing the different levels of expertise in our group some pre-training was necessary. This training involved preparing the team to handle the project in segments to produce the best results. Aspects covered were understanding the various components involved with streaming, such as the process of capturing, how to capture, how to convert the capture, the audience being targeted and why and the compressions involved when the conversion of the clips took place.

In preparing to precede with this project a determination was made on what software, hardware and other components would be most value to complete this task. The choices made were RealProducer Plus for PC, the G3 Power Macintosh, and Windows NT 4.0. RealProducer is a multimedia production environment designed to help convert large amounts of audio and video content to a streaming format suitable for distribution via Web sites. Real Audio and Video streaming is rapidly becoming a necessity for a large segment of websites. Streaming media is a method of making audio, video and other multimedia available in real-time, with no download wait, over the Internet or corporate intranets.

Streaming media systems consist of the following five elements: Encoders & Tools, used to create or capture and edit multimedia Data

Types, which are transmitted by centrally located Servers over Networks to individual client, on a live or on-demand basis.

A typical implementation of a streaming media system might involve two networked computers (one equipped with a video capture card), a video camera and/or microphone, and an audience viewing the content on a PC. The computer's video capture card digitizes the video signal, and the Encoder software compresses the digital signal into either a streamable digital file, to be edited later, or a live stream for immediate broadcast. This file or live stream is transmitted over a network to a computer with Server software installed. It is also possible to use a single, powerful computer for both encoding and serving. The digitized film of the event is then accessed on a live or on-demand basis by multiple end-users with Player software on their personal computers or other personal electronic devices, such as WebTV.

The following are the system configuration used in processing the streaming video. In addition to the configuration elements the software needed or connections were RealProducer, AVI conversion software, and s-video/video connections to acquire the VCR captures.

bandwidths are not running simultaneously, because this causes

bottlenecks in the transmission. Also the clips need to be stagger, and

start the presentation with low bandwidth clips. The multimedia team

web address is 198.85.48.116.

Multimedia Team
URL: 198.85.48.116

Mentor: Jeff Wood
jkwood@interpath.com

Members:

Je'aime Powell

Barbara King

Gregory Lassiter

Team Task

To conduct a study to determine the most effective way to stream real-time video clips over the internet.

What is streaming?

Streaming is a method of making audio, video and other multimedia available in real-time, without a download wait over the Internet.

What is needed for streaming?

❖ Encoders & Tools — (Audio editing, Video editing, Animations & Presentation tools, Test editing, Image editing, Web pages)

❖ Data Types — (Audio, Video, Animation, Images Text, MIDI)

❖ Servers — Windows NT (95), Linux, Solaris, Unix

❖ Networks — HTTP, ADSL, TCP/IP, Cable Modems

❖ Clients — Personal Computers (Mac, Windows, Unix, WebTV) & headset

System Configuration

Platform	Hard Drive	Memory	Operating System	Processor
PowerPC G3	1.2 GB	32 Mb	OS 8.1	266 Mhz
Windows (server)	17 GB	256 Mb	NT 4.0	550 Mhz

Conversion Steps on the Macintosh

❖ Edit the ESS video for appropriate clips.
❖ Use Apple Video Player to convert the clips to simple text movie.
❖ Converted the simple text clips to avi files using an avi conversion software.
❖ Using fetch move the files over to the NT server to be used by Real Producer.
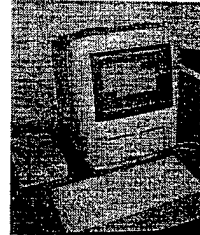
Je'aime will give detail on the Creation of the Multimedia Team Server

Publishing your RealMedia Web Page
(Using RealProducer to put your RealMedia file on SLIM's Real Server)
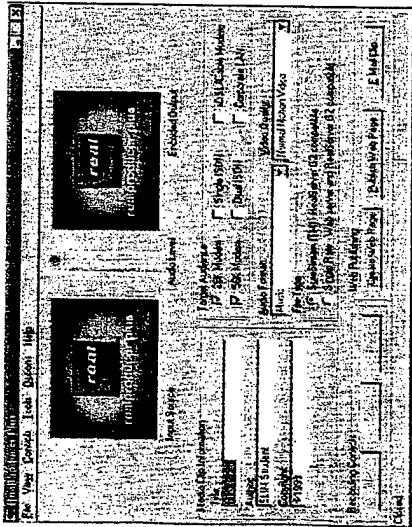
Step One:
To begin, click on the "Publish Web Page" button located in the lower right-hand corner of the "RealProducer Plus" main screen.

Return to top
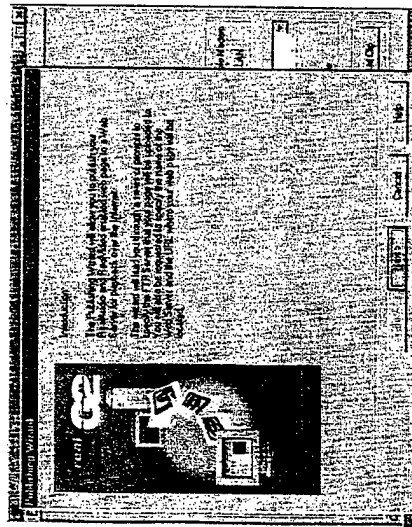
Step Two:
An introduction to the Publishing Wizard will appear in a pop-up window. Click "Next>" to continue.
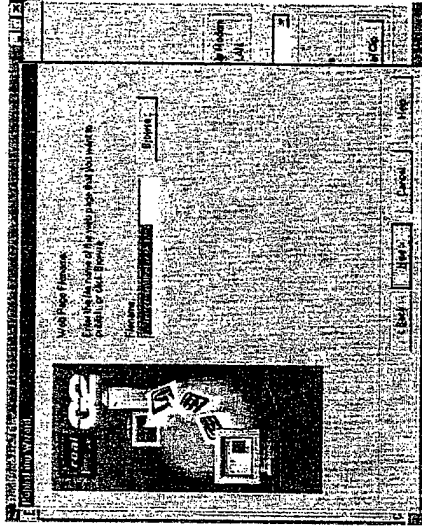
Return to top

Step Three:
The Publishing Wizard will ask you for the location of the HTML file created when you designed the web page (from the previous section of this tutorial).
Enter C:\comptr\minithebreak.html in the "Filename" textbox and the click "Next>."

Return to top
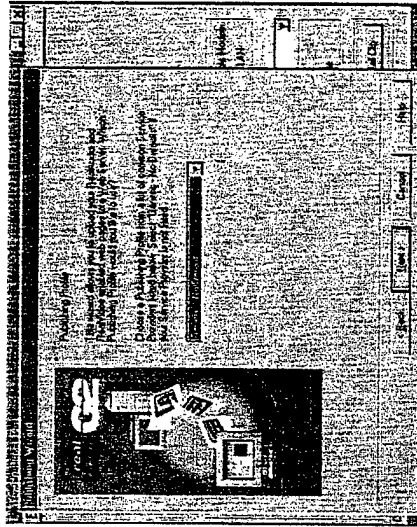
Step Four:
Here, the Publishing Wizard asks for a Publishing Profile. Select "Generic-No Defaults" from the drop-down text box and click "Next>" to continue.

Return to top

Step Seven:
This window of the Publishing Wizard is merely a verification of the server and directory location so that users can locate your page.

Notice that the full URL of your about-to-be published web page appears in the third textbox.

Click "Next>" to continue.

Return to top

Step Eight:
The RealMedia HTML file is now ready to be uploaded to the SLIM Real server. The Publishing Wizard displays the upload status.

To begin the upload automatically, click "Next>." A pop-up window should appear indicating the status of the upload.

Return to top
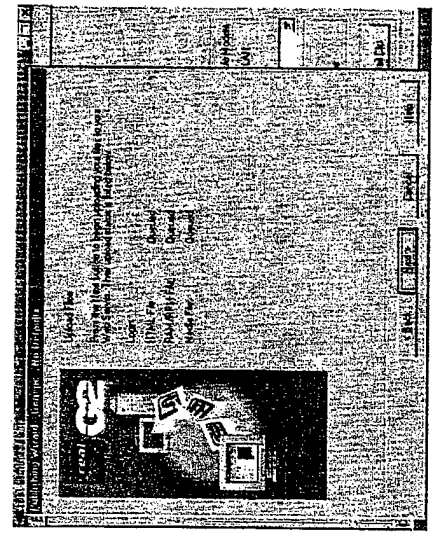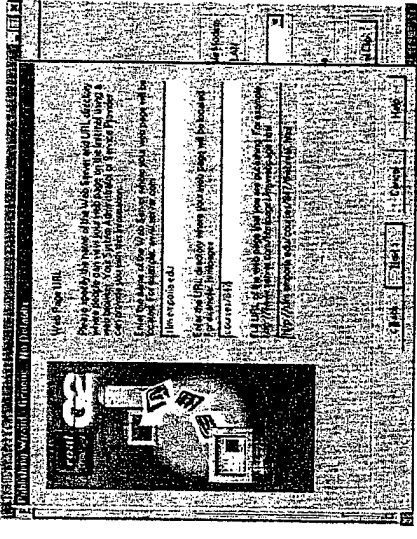
Step Five:
The Publishing Wizard now asks you to specify a streaming method. Select "Stream media clip from a standard Web server" and click "Next>" to continue.
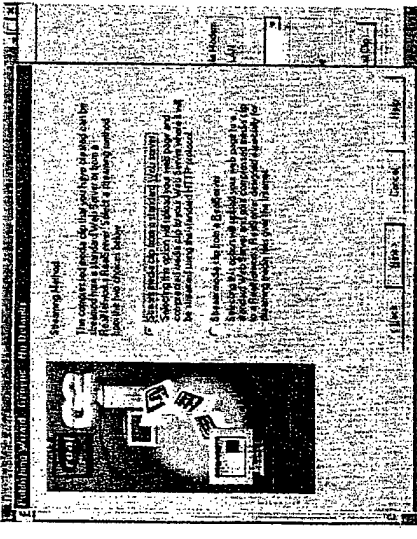
Notice that the words "Generic-No Defaults" now appears in the title bar along with "Publishing Wizard."
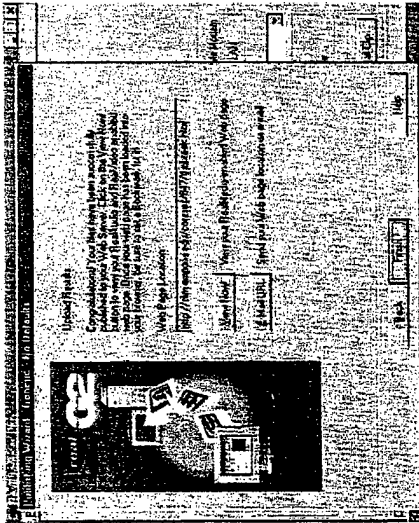
Return to top

Step Six:
This page requires a lot of attention to detail. Server information is inputted here.
First, enter the name of the server where the RealMedia file will be published. For our example, enter "slim.emporia.edu."

Next, enter the directory where the page will be copied to. For our example, enter "courses/847."

Finally, enter the User Name and Password information. (Advisory)

Click "Next>" to continue.

Return to top

SLIM Homepage

Need to Review?
Click on the one of the following links:

Conversion to RealMedia format

Creation of RealMedia Web Page

Publishing the RealMedia Web Page
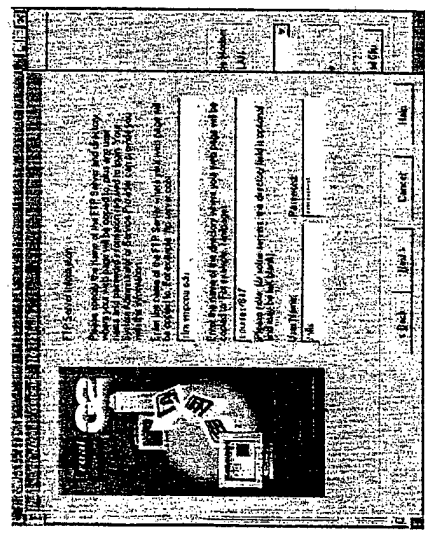
Step Nine:
This window shows that the HTML file has uploaded successfully. Notice that the web page location is indicated in this window. You may want to bookmark this location for future reference.

This window also give the options of viewing the web page or e-mailing the web page location.

To exit the Publish Wizard, click "Finish."

Return to top

The Break

Step Ten:
You may want to view the web page in your browser. Type in the web page location in the "Location" text box and enter. Remember you need RealPlayer to view the streaming video. RealPlayer can be obtained at http://www.real.com.

Return to top

You are now finished with this tutorial!!!!
Comments and questions concerning this tutorial can be sent to
Dave Mills, School of Library and Information Management student and member of the SLIM I.T. Lab staff.
Dave's E-mail: dbmkkfhk@yahoo.com

http://www.slim.emporia.edu/resource/rwt_producer/publish.htm

Software — Real Producer

Reach the widest possible audience
Backwards player compatibility gets your content to more than 95 million unique registered RealPlayer users
Visual RealMedia file editing
The RealMedia Editor allows you to change start and end times, paste files together, view stream properties, and preview any RealAudio or RealVideo files
See what your audience sees
Modem simulator feature allows you to preview and simulate your presentation in a variety of network scenarios
Enhanced Flexibility
Video scaling allows you to import video at any size and use the RealProducer Plus to scale the image size down for the Web

For more Information
http://www.real.com

Server Topography

Server
T1
Internet
Windows NT
Apache
Real Server Basic

Software — Apache

The Apache Project is a collaborative software development effort aimed at creating a robust, commercial-grade, featureful, and freely-available source code implementation of an HTTP (Web) server. The project is jointly managed by a group of volunteers located around the world, using the Internet and the Web to communicate, plan, and develop the server and its related documentation. These volunteers are known as the Apache Group. In addition, hundreds of users have contributed ideas, code, and documentation to the project. This file is intended to briefly describe the history of the Apache Group and recognize the many contributors.

For more Information
http://www.apache.org

Software — RealServer Basic

The RealServer Basic 7.0 Server is an open standards-based software system that delivers choreographed multimedia presentations --audio, video, images, slides, web pages, and text --over the Internet or corporate Intranets.

RealServer Basic 7.0 includes Intel Streaming Web Video Technology, Live SureStream, and customizable HTML-based administrative interface.

For more Information
http://www.real.com
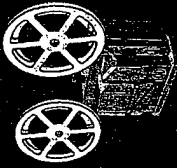
Movie to Web – Take One

Record the desired movie.

Tip:
Try to use a tripod if possible and attempt to keep the sound as balanced as possible.

Server Topography– Take Two

Import your movie into a computer with a video capture card.

Tip:
We found that *avi* (windows) format works better than a *mov* (quicktime) format

VCR/ Camcorder

AVI File

Server Topography– Take Three

Use Real Producer to take the large, non-streaming AVI file and turn it into a web ready RAM file.

AVI

Real Producer

RAM

Server Topography– Take Four

Lastly, use Real Producer to publish your new streaming media web page.

RAM

APACHE

Users

Equipment

Gateway 5200 Series Server Specs

CPU: 550 Intel Xeon
RAM: 256mb
Hd: 20G
Network Card: 10/100
Acer CDRW CD-ROM

For more Information
http://www.gateway.com

Software

Windows NT 4.0

Windows NT Workstation 4.0 is supported by all major business software applications and delivers significant improvements--including lower TCO, increased reliability, enhanced security, and a better overall performance.

Organizations of all sizes can realize many of the features and advantages listed below. If you want to standardize your desktops and try out Windows NT Workstation 4.0, order the Business Readiness Kit-available free in the United States and Canada.

For more Information
http://www.microsoft.com/ntworkstation/overview/default.asp

Overview

Equipment
*Gateway 5200 Series

Software
*Windows NT 4.0
* Apache Web Server
*Real G2 Server Basic
*Real Producer

Movie to Web Steps

Creation of the Multimedia Team Web Server

Appendix

- Highlights and Photo Pages

- Honors Convocation Program

PHOTO HIGHLIGHTS ...

SEPTEMBER 2, 1999

The First Research
Training Meeting
for the Year !!!

Researchers:
Bailey, Bernard SO/JR
Banks, Katrina FR/CS
Brooks, Shayla FR/CS
Charity, Donald SR/MATH
Creekmore, Torreon FR/PHYSIC
Davis, Vincent FR/PHYSIC
Gale, Joseph JR/CS
Godwin, Katrina SR/CS
Harrison, Keisha JR/CS
Jones, Alicia SR/CS
Joyner, Kennethdra FR/CS
Joyner, Sheri SR/CS
Kaur, Ravinder JR//CS
Lassiter, Gregory SO/CS
Lassiter, Tina SO/CS
Mattocks, Melvin SO/CS
Mizelle, Angela JR/CS
Newby, Golar FR/CS
Powell, Je'aime JR/CS
Smith, Tarron So/CS
Williams, Gregory Jr. FR/CS
Williams, Jonathan JR/CS
Walker, Ernest JR/CS
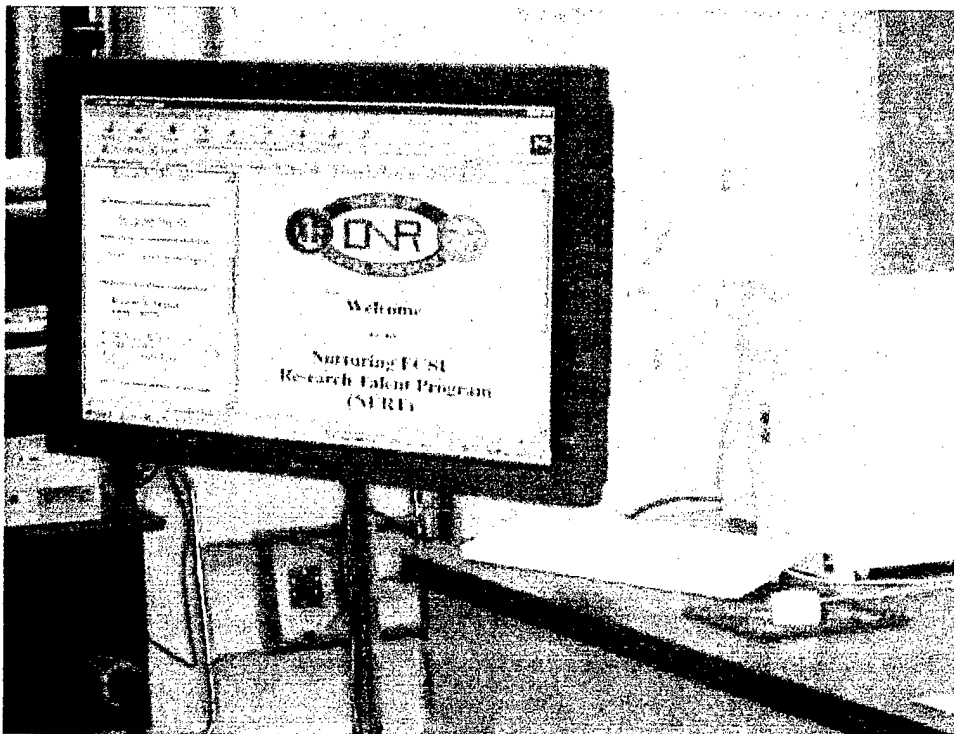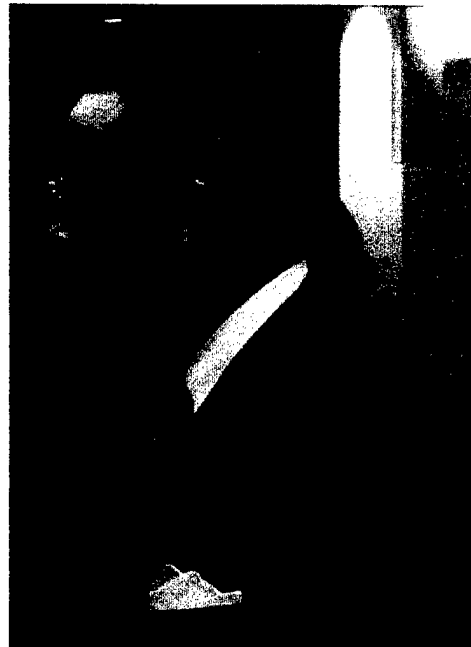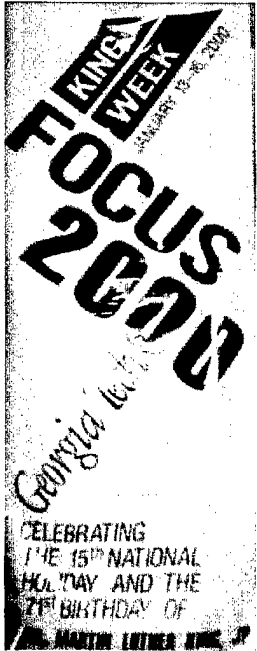
Left: FOCUS Dinner Speaker, Dr. Calvin Mackie, Asst. Prof. of Mechanical Engineering, Tulane University. Right: Mr. Robert Haley, GaTech Director of Special Projects.

FOCUS 2000 Attendees: Above, Ernest Walker, Je'aime Powell, Keisha Harrison. Below Dr. Cheryl Lewis, Mrs. Marie Koltuniak, and Ravinder Kaur. Not Shown: Dr. Linda Hayden

NAFEO High Tech Expo Feb. 15, 2000
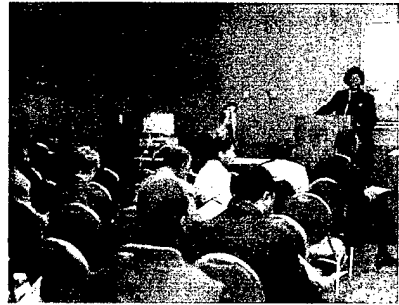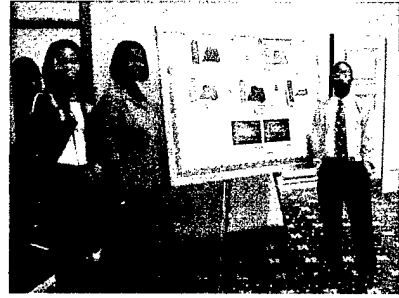
ECSU students attending the High Tech Expo included: Vincent Davis, Sparkle Sutton, Kendra Clayton, Katrina Banks, Ramatouglie Bah, Olajymoke Adekanmi and Torreon Creekmore. The High Tech Expo was jointly organized by Dr. Lousie White and Ms. Dollie Clayton(NAFEO), Dr. Diola Bagayoko, Dr. Robert L. Ford, and Ms. Luria Shaw (LS-LAMP); Dr. Linda Hayden (ECSU-ONR). Dr. Aprille Ericsson-Jackson, NASA Aerospace Engineer was the main speaker. Dr. Ali Khan (ECSU) also spoke.

LISA99
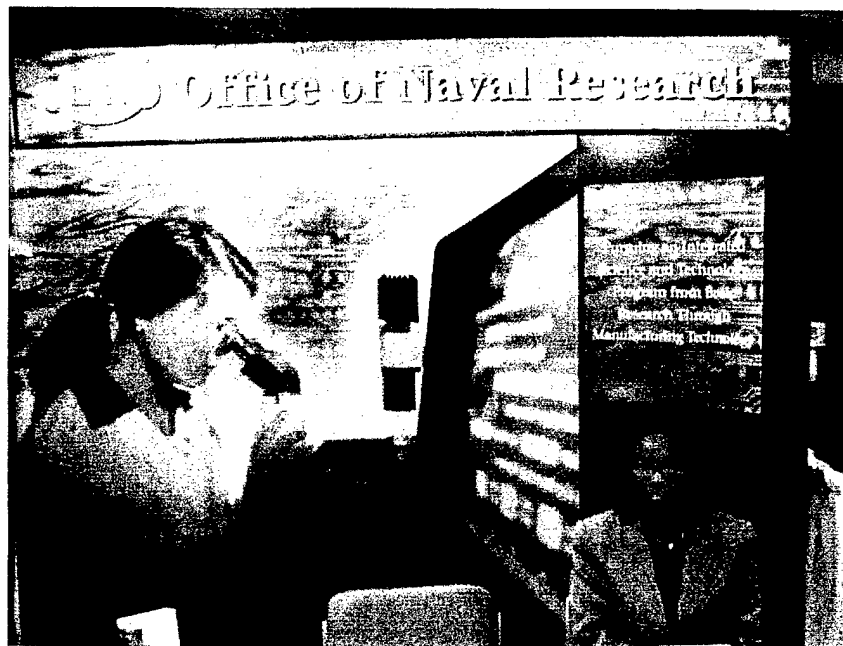
Conference & Exhibition

Registration

Maturing Systems
Administration
LISA'99 Invited Talk

Geoff Halprin
The SysAdmin Group

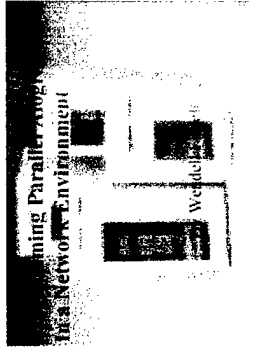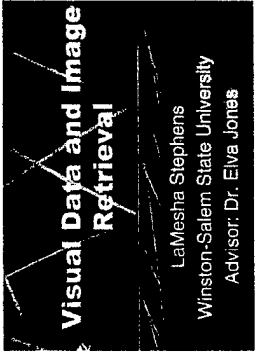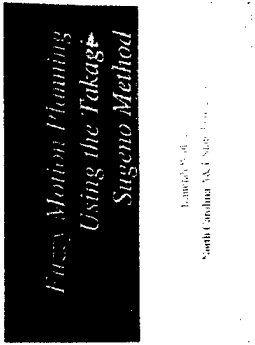NOVEMBER 1999

;login:

LIVE FREE OR DIE

UNIX

Front row: Ravindar Kaur, Keisha Harrison, Gregory Williams, Katrina Banks. Back row: Vincent Davis, Golar Newby, Shayla Brooks. Shown left: Torrie Creekmore and Dr. Linda Hayden. Bottom Left is: Dr. Hemant Pendharkar.

Satellite Imagery Training

Visualization Team members (Keisha Harrison, Ravinder Kaur, Olajymoke Adekanmi and Ramatoulie Bah are shown during the *YBTS Satellite Imagery Training* Churchland Middle School Portsmouth, VA Oct. 22-23, 1999. The team mentor is Dr. Kossi Edoh. Students are shown with Mike Comberiate, Spacecraft Systems Manager, Goddard Space Flight Center and Dr. Linda Hayden, NASA-NRTS PI.

ADMI 2000 "Liftoff to a New ERA" The Symposium on Computing at Minority Institutions

Visual Data and Image Retrieval

LaMesha Stephens
Winston-Salem State University
Advisor: Dr. Elva Jones

...ming Parallel Prog...
...n a Network Environment

*Path Motion Planning
Using the Takage-
Sugeno Method*

Digital div-ide

Alice 3D
Environment

Agent-Based Transaction Processing

Hayward Tinte

Computer Science Department

North Carolina Agricultural and Technical State University

Dijkstra's Algorithm

This algorithm also computes the edge... on a minimum spanning tree, however.

It starts from ONE vertex to all points on the graph.
It cannot be used with negative values.

Start Here!

Denotational   Semantics

Denotational
Definition

ACCESS   STORAGE

COMPUTER
GAME
DATA
STRUCTURES

R-Tree

Greedy Algorithms

Presentation by:

Department of Computer Science

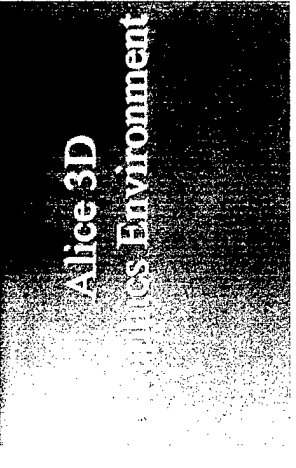ADMI 2000 Liftoff to a New Era (The Symposium on Computing at Minority Institutions) June 1-4, 2000 Radisson Hotel – Hampton, Virginia. Shown are highlights from the Student Poster Session.
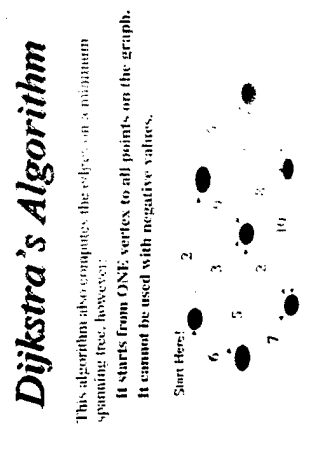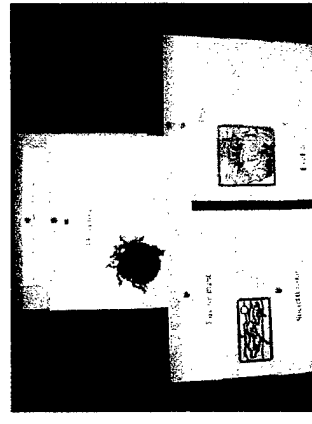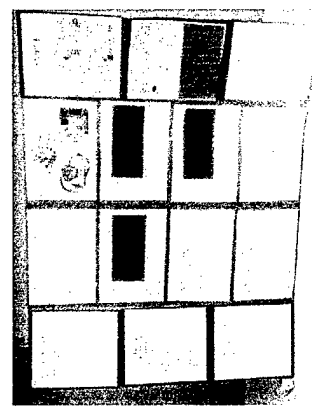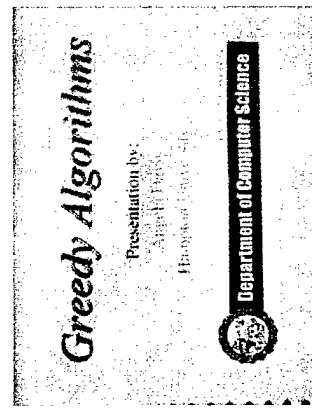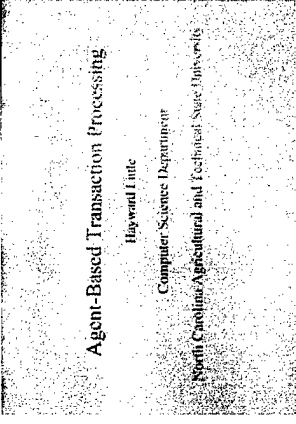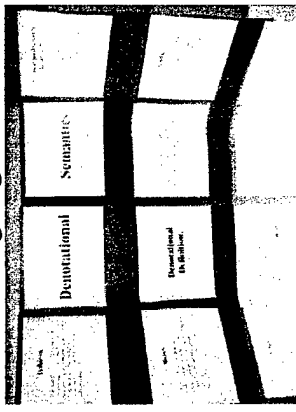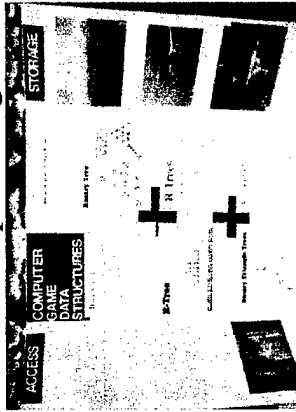
ADMI 2000 *Liftoff to a New ERA*
The Symposium on Computing at Minority Institutions

The Symposium on
Computing at
Minority Institutions

June 1 - 4, 2000
Radisson Hotel Hampton, Virginia

Elizabeth City State University

ELIZABETH CITY, NORTH CAROLINA

MICKEY L. BURNIM, CHANCELLOR

Honors Convocation

Thursday, April 20, 2000

2:00 o'clock in the afternoon

Fine Arts Complex Auditorium

ART DEPARTMENT
Art Academic Award ......P. Gae Adams
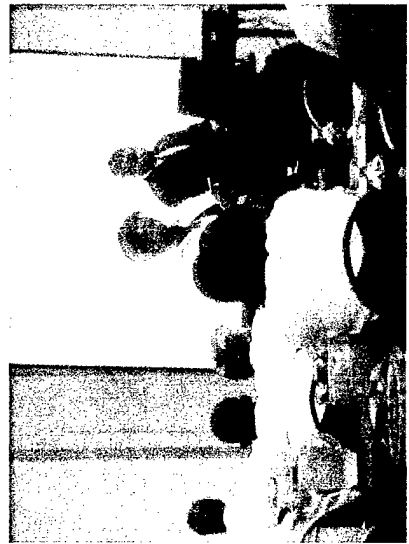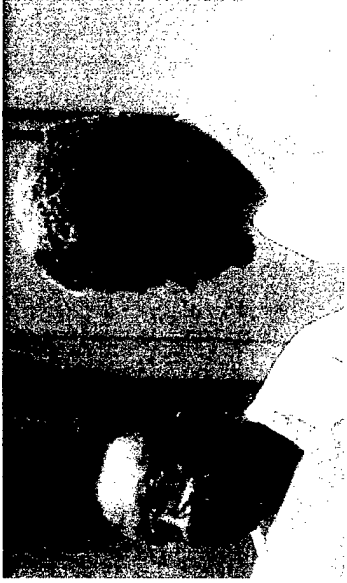Art Award to Athlete ......Marcus Riddick
Artistic Achievement Award ......Harriet Evans
Outstanding Art Student ......Larry Boston

BIOLOGY DEPARTMENT
Clarence E. Biggs Award ......Bettina Holloman
Curtis D. Turnage Award ......Clarice Johnson
Evans-Patterson Science Award ......Bettina Holloman
Certificate of Merit - Freshman ......Bryan Hawkins
Certificate of Merit - Sophomore ......Carinthia Cherry

BUSINESS AND ECONOMICS DEPARTMENT
Senior Student-of-the-Year ......Sarah Foster
Junior Student-of-the-Year ......Stephanie Kelly
Accounting Scholastic Achievement Award ......Andrew Bowman
Business Administration Scholastic Achievement Award ......Angela Betts
Finance/Economics Scholastic Achievement Award ......Tracy Taylor

DIVISION OF EDUCATION
Charles A. Bryant Senior Scholarship ......Jemeka Cameron
Lois W. Green Graduating Senior Award in Teacher Education ......Chanteal Reynolds
Outstanding Seniors in Psychology ......Bethaney Hague
Kendra Parker, Vernecia Townes
Outstanding Performance in Elementary Education ......Menervia Mangum
Outstanding Performance in Special Education ......Ingrid McEntire
Outstanding Performance in Middle Grades ......Dawn Tillett

EDUCATIONAL TALENT SEARCH PROGRAM
Academic Excellence Award ......Torren Creekmore, Quinton Moore
McNair Scholars Eagle Award ......Rodshawn Branch, Uyless Dewberry
Maricia Granby, Keisha Harrison, Alicia Jones
Sheri Joyner, Rebecca Maestas, Kenya Madric
LeVar Mizelle, Veronica Overton, Kendra Parker, Melitta Turley
McNair Scholars Challenger Award ......Clarice Johnson
Ravinder Kaur, Waquita Lane
McNair Scholars Excellence Without Excuse Award ......Katrina Godwin, Bettina Holloman

GENERAL STUDIES DIVISION
Division of General Studies Award ......Antonio Barrow

GEOSCIENCES DEPARTMENT
Department of Geosciences Academic Excellence Award ......Kenyatta Lee
David Swinney, Justin Winslow, Jessica Yelverton

INCENTIVE SCHOLARSHIP PROGRAM
Outstanding Freshman Incentive Scholar ......Audrey Dance
Outstanding Sophomore Incentive Scholar ......Tiffany Jones
Outstanding Junior Incentive Scholar ......Jeanette Watson
Outstanding Senior Incentive Scholar ......Bettina Holloman

LANGUAGE, LITERATURE & COMMUNICATION DEPARTMENT
Graduating Senior Award ......William Nelson
E. M. Spellman Award ......Stacy Brock

MATHEMATICS & COMPUTER SCIENCE DEPARTMENT
The J. L. Houston Excellence in Mathematical Sciences Award ......Katrina Godwin
The Umfort E. Locus Excellence in Computer Science Award ......Chevonne McWilliams
ONR-Nurturing ECSU Research Program Award ......Ramatoulie Bah
Katrina Banks, Shayla Brooks, Torreon Creekmore
Vincent Davis, Joseph Gale, Keisha Harrison, Barbara King
Melvin Mattocks, Golar Newby, Je'aime Powell, Gregroy Williams
Office of Naval Research Scholars Award ......Bernard Bailey, Donald Charity
Ravinder Kaur, Ernest Walker
ONR-NERT Award of Excellence ......Katrina Godwin
Alicia Jones, Sheri Joyner

MILITARY SCIENCE DEPARTMENT
ROTC Academic Excellence Ribbon ......Joseph Kurtzweil

CLUBS AND ORGANIZATIONAL AWARDS

The Alpha Kappa Alpha Sorority Scholarship
     Delta Theta Chapter ....Albert Walker, III

The Alpha Kappa Alpha Sorority Scholarship
     Zelta Kappa Omega Chapter ....Trenette Clark

The Delta Sigma Theta Sorority Scholarship
     Elizabeth City Alumnae Chapter..Waquita Lane

Class of 1967 Scholarship Award ....Branden Anderson
                                            Christopher Patterson

WHO'S WHO

Rayshawn Askew	Phebe Eley	Michelle Lewis
Joseph Batts	Sarah Foster	Veronica Overton
Stacy Brock	Christa Gallop	Adriane Patterson
Tyrell Carr	Bethaney Hague	Ebony Sneed
Kimberly Carter	Joshua Henson	Vernecia Townes
Nellie Clark	Clarice Johnson	Albert Walker, III
James Cooper	Arnold Jones	Jeanette Watson
Kizzy Crawford	Waquita Lane	
Samantha Royster-Cunningham	Gregory Lawson	

Honors Spring Semester 1998-99

Chancellor's List: 3.75 to 4.0 Average

Leigh-Anne Jean Allen
Derrick Q. Alston
Christy Dallina Ambrose
Karen Pearce Arizmendi
Beth V. Ashley
Connie Lane Ashley
Vivian Alberta Baars
Kim B. Ballance
Amy Aileen Barclift
William Neal Barnes
Chenay Beamon
Heather Anne Beatty
Yong Hu Beck
Sherry Loraine Bedsole
Pamela A. Bodley
Theo N. Bohn
Jeremy Boone
Latausha Jeanell Boone
Andrew Kiddoo Bowman
Kathleen Bowman
Monique LeShawn Boyce
Rodshawn Lamont Branch
Alice Megan Brewin
Nancy V. Brinkley
Tammy Brinkley
Teresa K. Brinkley
Stacy Brock
Flora May Brooks
Carly Morgan Brothers
Janine Robin Brouse
Armecia Renee Buck
Kimberly Renee Bunch
Ruth Ann Burgess
Jennifer Lynn Campbell

Genia M. Canada
Adam M. Canales
Karl Bass Chappell
Darlene Chatman
Annette E. Cherry
Carinthia Amanda Cherry
Latonya L. Cherry
Cynthia Michele Christian
Trenette Tyrell Clark
Angela Jenae Cohoon
James S. Cooper
Cynthia Askew Croswait
Michelle Marie Cullipher
Lorita A. Dance
Tarsha Joy Darden
Richard Scott Darling
Kathleen Delaney Davis
Mark Allen Delosreyes
Annette Marie Dixon
Gwenette Nicole Dixon
Carol Johnson Dunn
Mary Catherine Dyer
Larry C. Elmore
James E. Everett, III
Sandy Rae Farrow
William Thomas Fehlberg, Jr.
Courtney DeAnn Fields
Carrie L. Finney
Theodore Paul Finney
Karla Jo Ford
Sarah Burgin Foster
Michael D. Fournier
Steven Lee Gilchrist
Andrea Shawndale Glasper

Felicia S. Goodwin
Maricia R. Granby
Nicole Marie Gray
Penny Lynne Gurganus
Melissa Hall-White
Keisha L. Harris
Trenelce C. Hassell
Nykeeya Reneé Hatten
Christie P. Hawkins
Susann H. Heidler
Joshua Frederick Henson
Melody Degina High
Nicole M. Hoffler
Susan C. Hoggard
Bettina Shaunee Holloman
Sherri Genese Horner
Benita Earl Hurley
Eldon E. Jackson
Suzanne Crystal Jacobs
Joya Maticia Jenkins
Clarice Ruth Johnson
Connie Leigh Jones
Harvey Reginald Jones, Jr.
Jason Lee Jones
Lisa Whitehurst Jones
Susan Marie Jones
Ravinder P. Kaur
Christina Marie Kearney
Stephanie Guttu Kelly
Karen Forbes Kidd
William Arnold Kight
Chastity J. Kinsey
Erica Gaston Knight
William E. Krimmel, III

Barbara K. Lamb
Tracy Anne Lane
Waquita Nicole Lane
Kimberly Annelce Lawrence
Harold Vincent Lawson
William Moses Ledford
Rebecca Lynn Leonard
Dennis Eugene Linney
Kelsey L. Lodge
Benjamin L. Long
Toby Gene Long
Timothy Allen Lyons
Crystal Diane Macon
Terri Lynn Mallonee
Katrina E. Maltba
Samantha Marshall
Altovise T. Martin
Ingrid McEntire
Valerie Renea McQuillen
Cheveonne McWilliams
Rhonda H. Meadows
Samantha Jean Meier
Kisha Aleandra Melton
Gina R. Miller
Stephanie Margaret Miller
Tammy Miller-White
Julie Ann Motta
Tamisha Sha'Ron Murphy
Pantina Shamone Murrell
William Baker Nelson, Jr.
Thanh Van On
Bobby Joe Owens
Pamela Anne Parnell
Loretta Joy Parsons

Gena Kelly Penn
David Jason Perdue
Wendilyn Price Pierce
Tracy Benton Port
Kendra Shanae Powell
Carol A. Pressnell
LaDonna S. Price
Sharon Lee Priest
Donetta Renea Privott
Michael D. Pugh
Mashawnda E. Razor
Cynthia Leigh Reed
Chanteal Reynolds
Kristen Denise Riddick
Sabrina Kimberly Robinson
Monica Howell Rousseau
Christine H. Russell
Karen Cornelia Saunders
Talarisha Shenay Saunders
Videl André Sawyer
Shirley Wynne Schoolfield
Megan Elizabeth Seymour
Travis Brandon Shepard
Sachwinder P. Singh
Nikita Shawne Small
Debra Gregory Smith
Kacey Lynn Smith
Stacy Marie Smith
Mandy L. Sparks
Amanda Kay Stallings
Sheryl D. Stevens
Roxanne P. Stewart
Donna Thornton Stiles
Kendra L. Stone

Janet M. Stone-Neilsen
Kristin Elaine Suchy
Linda Rae Sutton
Stephanie Michelle Sutton
April A. Tarkenton
Tishania A. Tatem
Benjamin Maurice Taylor
Robin Lane Taylor
Tracy A. Taylor
Zaneta Cowell Taylor
Andrea Carol Temple
Molly Catherine Thompson
Rebecca Renee Thompson
Dawn Woodroof Tillett
Sarah Jean Lebow Tolson
Catina Pauline Tudder
Tracy Nicole Twiddy
Paulette Myers Wagner
Rebecca Lee Walston
Lisa Chiao-Ling Wang
Lynda J. Ward
Tyrone Ward
Jeanette Watson
Wendy L. Whitley
Julie Davis Williams
Xavier Keshawn Wise
Derek Daniel Witcher
Toni Lee Wood
Washuri Nicole Woodard
Colin Reid Woodley
Craig Lee Woodward
John Patrick Workman

Vice-Chancellor's List: 3.50 to 3.74 Average

Rocky L. Allen
Mister Ashew
Bernard Wesley Bailey, Jr.
Stephenie Wynette Bailey
Connie Pendleton Balduf
Lakisha Shawnette Basnight
Carroll Biondi
Susanne Denise Blevins
Crystal Del'Borah Bloomfield
Crystal R. Bond
June Y. Bond
Latonya M. Bond
Shanta Danielle Bowman
Trisha Gail Breeding
Patricia P. Brewer
Karen Lee Briggs
Tracy M. Brooks, Jr.
Richard S. Bullock
Kathryn Dail Burgess
Derrek W. Burrus

Tyrell Carr
Amanda Reneé Chastain
Gamaliel R. Cherry
Monica Yvette Chesson
Irmina A. Chmielewska
Latoya Patrice Clark
Charna A. Cooper
Jennifer K. Cooper
Karin Deniece Davis
Uyless M. Dewberry, Jr.
Tamika N. Dickens
Geraldine Dickerson
Sabrina L. Dillard
Robin Jeycea Duckett
Terry McCoy Edwards
Dixie Blanche Estus
Arthur Lee Fenner
Alfred Ray Ferguson
Paula L. Forehand
Leroy R. Fowler, III

Christa L. Gallop
Felicia L. Gibson
Gregory Jason Gilbert
Christopher Gladney
Bethaney Linn Hague
Edward Hall, Jr.
Patty Twiford Halstead
Otoya Lemanda Harrell
Wynet Vernesia Harrell
Keisha Lashawn Harrison
Barbara Grace Hendrix
Donna Jean Highsmith
Barbara Divene Hines
Markisha Jackson
Alicia Michell Jones
Nina M. Jones
Tiffany Lynne Jones
Quinton L. Jordan, Sr.
Niel Andrew Jordon
Sheri D. Joyner

Katina Genaé Khan-Anthony
Latonya N. Lee
Bersada Elaine London-White
Christie N. Long
Kenya T. Madric
Holly Barkwell Meads
Tonya R. Mitchell
Amy Lynn Mizell
Pamela Wilson Modlin
Miriam Nayeli Mojarro-Quintero
Tonisha Hinton Mozelle
Mathew Christopher Myers
Damond Lamar Nollan
Kendra Lyvette Parker
Adriane Danielle Patterson
Christopher Ryan Patterson
Auicie Perry, III
Victesha Roshane Pettaway
Brian K. Phelps
Teri Simpson Phthisic

Stacey Colson Pierce
Latasha R. Powell
Serena Catherine Price
Nells Francisco Ribeiro
Bonita Jeanne Robinson
Samantha Royster-Cunningham
Geneva B. Saunders
Kimberly M. Seymore
Elaine Victoria Shannon
Darlene Helle Skinner
Amity N. Sledge
Leeka Catherine Sock
Earlyn Rayona Sprulli
Anita G. Staples
Brian Scott Thompson
Terrance William Thornton
Chrystal H. Towe
Vernecia Von Townes
Albert Roscoe Walker, III
Ernest Walker, III

Melissa Anne Walker
Nikki S. Walton
Damien Andrew Walz
Chashia Reneé Washington
Cynthia Sue Watts
Lasindra R. Webb
Joycelyn V. Whidbee
Roxanna Elizabeth White
Glenna Marie Whtehurst
Demetric Jerrod Wiggins
Charlie Percel Williams
Shakeeba D. Williams
Jan Marie Willingham
Alvin Lamont Wilson
Amanda H. Wilson
Pierre Jovan Wood
Jerri Renita Zachary
Diane R. Zeuner

Honor List: 3.00 to 3.49 Average

Pamela Gae Adams
Belinda Ann Agee
Joyce Lashun Allen
Shamaina Ty'Klea Allen
Jannie Lureasa Anderson
Cynthia Michelle Arendts
Battina Doreen Armstrong
Rebecca Dawn Armstrong
Rayshawn Lamar Askew
Amwar Vashon Atkinson
Nicholas Alan Augsburger
Laura Boone Ausby
Shelly Marie Barrack
Colina N. Bartlett
Joseph Boyd Batts
Carolyn D. Bazemore
Jairar Martez Belcher
Juanita Arlene Bell
Alayna D. Benson
Joslin M. Bentley
Charles Lindbergh Berry
Kenya N. Bethea
Milton Thomas Bond
Sheanna L. Bonner
Angie D. Booker
Larry Jefthro Boston
Lucy Ann McMurrin Bowe
Tameka Roshelle Braswell
Ronel Lee Brewer
Stephanie Anne Brickhouse
Tamarah Michea' Bridges
Kevin Lee Briggs
Shaunté Nekeisha Brodie
Anthony Shane Brown
Cartrell K. Brown
Theric Eugene Brown
Tonia Darselle Brown
Yamicka Marie Brown
Tyshaun Lemoan Bryant
Mark Anthony Bumper
Kendra Yarnell Bunch
Tinika Lyvette Bunch
Tahwana M. Burks
Sabrina Butts
Jameka Linette Cameron
Beth Anne Carpenter
Abrian Cherwanda Carter
Kimberly Michelle Carter
Tarkisha Carter
Winter Suzanne Cartwright
Karen Melissa Carver
Anthony Tyrone Chambers
Darian Chamblee

Donald Dwight Charity, Jr.
James Anthony Cheatham
Ebony Rebecca Cherry
Ivy V. Cherry
Latrisha Chantel Cherry
Nannette Eileen Cherry
Robbins Lorain Cherry
Roy Carlton Cherry, Jr.
Tanesha Michelle Cherry
Nellie Marie Clark
Lemuel Cobb, Jr.
Monica Lukeisha Cofield
Amy Marie Colanero
Divern Martinez Combs
Alva R. Cooper
Stephanie Elizabeth Cooper
George Donald Copeland
Gary Lee Cordon, Jr.
Yvonneda Nicole Cowell
Michele Diane Cox
Kizzy Victoria Crawford
Santiel Creekmore
Rebecca Ann David
Kindred Dwayne Davis
Lataja Davis
Melvin Douglas Dawson
Nicole Newbern Derby
Sharlena Downing
Tanisha Delaine Draughn
Felicia Nicole Drew
Shenay Marvetta Dunston
Phebe Antoinette Eley
Shamelya England
Spencer Lamonte Faulkner
Terrell L. Fennell
Stephanie Fenner
Keisha Yvonne Ferguson
Michael A. Flanigan
Elaine Fleetwood
Carl Bradley Foster, Jr.
Margie A. Flucher
Joseph Andrew Gale
James D. Gatling
Omar Ulysses Gordon
Tanya Sherrell Granger
Keashia Tiameaka Green
Latisia Simone Green
Fitema Amea Gregory
Montorio Hand
Anthony Demoné Harding
Bessie Loretta Hardy
Holly Renee Harris
Teneshia Danielle Harris

Tonya Hughes Harris
Lakeisha N. Harvey
Victoria Rose Hassell
Sherepha Nicole Hatchel
Kuchumbi Linwood Hayden
Van-Dee Hetherington
Mary L. Hill
Richard Allen Hodges, Jr.
Kristal Jade Holley
Christina Ewell Hutchinson
Leverne Jackson
James A. Jacobs
Chelsea James
Lamond James
Marcia Sutton James
Rhonn Malique James
Cherelle Keena Jenkins
Venita Francine Jenkins
Hope F. Jennings
Jamaal M. Johnson
Joseph Louis Johnson
Joyeria Dashaun Johnson
Karen Johnson
Travlous LaQuanda Johnson
Vickie Marie Johnson
Vickie Y. Johnson
Crystal Lashaun Johnston
Charles R. Joley, Jr.
Arnold L. Jones
Brian Anthony Jones
Danielle Katnece Jones
Hope Yvette Jones
Stacey Paulette Jones
Tyrone Jones
Tina Denae Keyes
Lecia King
Rickey Edward King
Tiffanie Elizabeth King
Diallo N. Lane
Tonica Lashon Lanier
Gregory B. Lassiter
Tina Renee Lassiter
Gregory Owen Lawson
Anthony Jamar Lewis
Christy Davina Lewis
Michelle Estelle Lewis
Chianti M. Lloyd
Christopher Anthony Lopez
Tiffany L. Lumsden
Rebecca A. Maestas
Laura Patricia Marquette
Melvin Lee Mattocks

Anna Lauren May
Kenneth Allen Mays
Daniele McCain
Donise Lechelle McCune
Cathy G. McDaniels
Latasha McNair
Kimberly D. McPherson
Patsy E. Mercer
Kenneth Miller
Allison Hughes Mims
Angela Jeanette Mitchell
Jason Andrew Mitchell
Lavar Dominick Mizelle
Shayvonna Mizelle
Swany Citlalic Mojarro
Andrea D. Moore
Ayonda Deshonne Moore
Craig Brandon Moore
Elton K. Moore
Helen W. Moore
Cynthia Marie Morris
Jermaine Darnell Moses
Rebe Latorie Mosley
Sheree LaMone Moye
Collier Mullins
Michael Munoz
Latoya S. Murphy
Latashia Newsom
Chad Charles Nicoll
Natarsha Vonshel Nixon
Letisha Nowell
Anna Walrimu O'Brien
Tuan Van On
Afua Opokua Opoku
Jammie Lavern Outlaw
Devine D. Overton
Trequita Darnee Overton
Crystal Dianne Owens
Tori Shanise Padgett
Inger Leverdia Parker
Janell Tyrice Parker
Keyochia L. Parker
Khalil Dequan Parker
Linda Worrell Parker
Patrica L. Parker
Sakina Lashay Parker
Toriano A. Parker
William Whitman Peele, III
Lamelka Toinette Pelham
Danny Jermaine Person
William Thomas Phelps
Amy Pollard

Aisha Latoya Powell
Judy Louise Powell
Marisa D. Powell
Arvaz K. Purdie
Robbie D. Ramsey
Karen D. Rankins
Brenda Katrice Rawls
Dedric S. Reid
Tiffney R. Reid
Kimberlie Lynne Riddick
Monica Razor Riddick
Tracey Nicola Riddick
Michael Tremain Roberson
Susan Ellen Roberts
Tabitha Fawn Romano
John Leewood Rook
Termaine T. Ross
Letitia Rena Roulhac
Russell Todd Rowson
Ross O'Nell Sampson
Carol Fighmaster Saunders
Jenise Renada Sawyer
Sharonne Tramaine Sawyer
Shericka N. Sawyer
Melinda Harrell Scaff
Garrick Devon Scott
Lashawn Scott
Jolyquin C. Sessoms
Kimberly Dawn Shearin
Tiffany K. Shearn
Crystal Deon Simpson
Cynthia Ann Simpson
Jenelle Brandi Simpson
Beshelya D. Smith
Bradley Keith Smith
Christopher L. Smith
Kendra Cella Smith
Mortisse A. Smith
Tarron Jamar Smith
Ebony Latoria Sneed
Katie Carol Spence
Zenika Shenell Spence
Spanishia Dorothy Spragley
Eric Wendell Staten
Keisha L. Stephenson
Shauna Jaquay Steward
Tisa Sheree Stiles
Tamela L. Stith
Stephanie Lynn Sutton
Jamaal Deanté Taylor
Joan Harrell Taylor
Nicole S. Taylor

Varick Theron Taylor
Lisa Diane Temple
Felecia Anette Tetterton
Anthony Eugene Thatch
Cecilia Renee Thomas
Trinesha L. Thompson
Melitta Hodge Turley
Christopher W. Turner
James P. Turner
Kanika N. Turrentine
Mazzie L. Twine
Johnkevia D. Tyson
Tiffany Valentine
Monica Valentine
Tishema Yvonne Valentine
Natalie N. VanHorn
Shameika T. Vick
Cierra Disireé Walker
Nekia Dionne Walker
Nicole Lynette Walker
Sherry Anita Walker
Free Lee Walston, Jr.
Lakeisha Walton
Kizzy Dimanda Ward
Kimberly Luanda Ware
Angela Michelle Watford
Samuel Leo Watson
Richard L. Webb
Tamkia L. Wesson
Shaketa Dion Whitaker
Jamella Tianna White
Melissa Marie White
Ronald Keith White
Clifford C. Whitehurst
Jason Lee Whitford
April L. Whitley
Fioria Demeka Wiggins
Latasha Manika Wilder
Amber Dawn Williams
Aretha Chanté Williams
Christina G. Williams
Cortisha Jennelle Williams
Dawn Nichole Williams
Jonathan Shelton Williams
Sherri Dionne Williams
Tasha Lynette Williams
Thomas Wilson Williams
Kenya L. Wilson-Turner
Jennifer Ann Winston
Jessica Cleo Yelverton
Katchina Yunkee Young
Tamara Young