

# Software Plan

Requested by: Mr. Ken Swarner  
Systems Administrator  
Computer Science Department of Siena College

## TCP/IP Packet Identifier

### Mirage Incorporated

“We are there even if you cannot see us”

[Mirageinc2003@yahoo.com](mailto:Mirageinc2003@yahoo.com)

Prepared by: Paul Aiuto  
Richard Connell  
Lauren Englisbe, Team Leader  
Jayme Gresen  
Jeffrey Habiniak

**September 26, 2003**

**TCP/IP Packet Identifier  
Software Plan**

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### **1.1 Problem Definition:**

With the growth of Transmission Control Protocol/ Internet Protocol (TCP/IP), many do not understand how various types of information are stored in packets. Our client, Mr. Ken Swarner, has requested the development of a colorful web-based application that will show the different components of a data packet. If the packet is composed of another packet, the software will show this. Each packet will be broken up into different fields, such as Data and Address. There will also be a menu that will enable you to change the number system being used (i.e. binary to hexadecimal). This application will allow users to see what is contained within different components in each packet.

### **1.2 System Justification:**

The purpose of our software is to allow the students of our client, Mr. Swarner, and also those of Dr. Lederman, to have a better understanding of what is contained in such packets as TCP and IP. Different packets are composed of other packets, and our software will allow users to clearly see this. Users will also learn what is within each packet and what each field does. This will enhance students' exposure to difficult material and will reinforce the current textbook models available to the students.

### **1.3: Goals for the Project**

The goal of the project is to create a Graphical User Interface (GUI), which can decipher TCP/IP and several other types of networking information packets. The GUI will take a single packet from the database and convert each part of it from binary to a user-friendly readable version.

As a team, our goal is to become further acquainted with TCP/IP and other network packets. We will gain knowledge of how information is represented within a packet. We will solve our client's problem by deploying the necessary software engineering techniques in a working environment.

### **1.4: Constraints on the Project**

The software client must be able to function on both a Linux and a Windows platform. Secondly, the software must be web-based and be able to be read into a Hypertext Transfer Markup Language (HTML) format. Finally, the deadline for this project is April 2004.

## **1.5: Functions to be Provided**

- 1) A database that will store all of the given packets in an organized manner;
- 2) The GUI will import packets from the database and will convert them from binary into a user-friendly language. By clicking on specific pieces of the packet, we will get an in-depth view of the IP packet or its related structures;
- 3) We will keep documentation on all meeting with Mr. Swarner and post them on our website for referral.

## **1.6: User Characteristics**

The main users will be Mr. Swarner and Dr. Lederman. Mr. Swarner will be using this to investigate the structure of TCP/IP packets and Dr. Lederman will be using this as a teaching model to explain how TCP/IP packets are structured and how each field functions. Since this software will be web-based, users will be required to use Internet Explorer and/or Netscape.

## **1.7: Development/Operating/Maintenance Environments**

The system will be developed on the Siena College Software Engineering workstations. The operation of this system will be available on any computer system with either Internet Explorer or Netscape, as the program will be web-based. The maintenance of this system will be determined at a later date.

## **1.8: Solution Strategy**

Our team will use the Linear Sequential Model to develop our client's requested system; specifically the Classic Waterfall Method. This model consists of the following stages:

- 1) Software Plan: In this stage, the team determines the problem that the client is requesting to be solved;
- 2) Analysis: The team meets with the client to gather a comprehensive view of the requirements of the program to be designed;
- 3) Preliminary Design: The team translates the system requirements into software requirements;
- 4) Detailed Design: The team translates those software requirements into machine code and tests the code to correct errors. This stage of the project will take place in the Spring 2004 semester;
- 5) Acceptance Test: The software is installed and documentation is provided to the client to assist the use of the program. This stage will occur in the Spring 2004 semester.

## **1.9 Priorities of System Feature**

A key feature of our system is user-friendliness. Mr. Swarner has a similar application that currently works, but it only prints out results in binary. He would like a colorful graphical interface with clickable boxes to demonstrate what is contained within each field of the packet. By using a menu, the user is able to convert the binary digits into other bases, such as hexadecimal. Also contained in this menu will be a description of the purpose of the field. If the packet is composed of other protocols, these too will be shown. From this, we would like to show how a component of the TCP/IP packet works. Therefore, we would like to make a program that is more intuitive for the user.

### **1.10: System Acceptance Criteria**

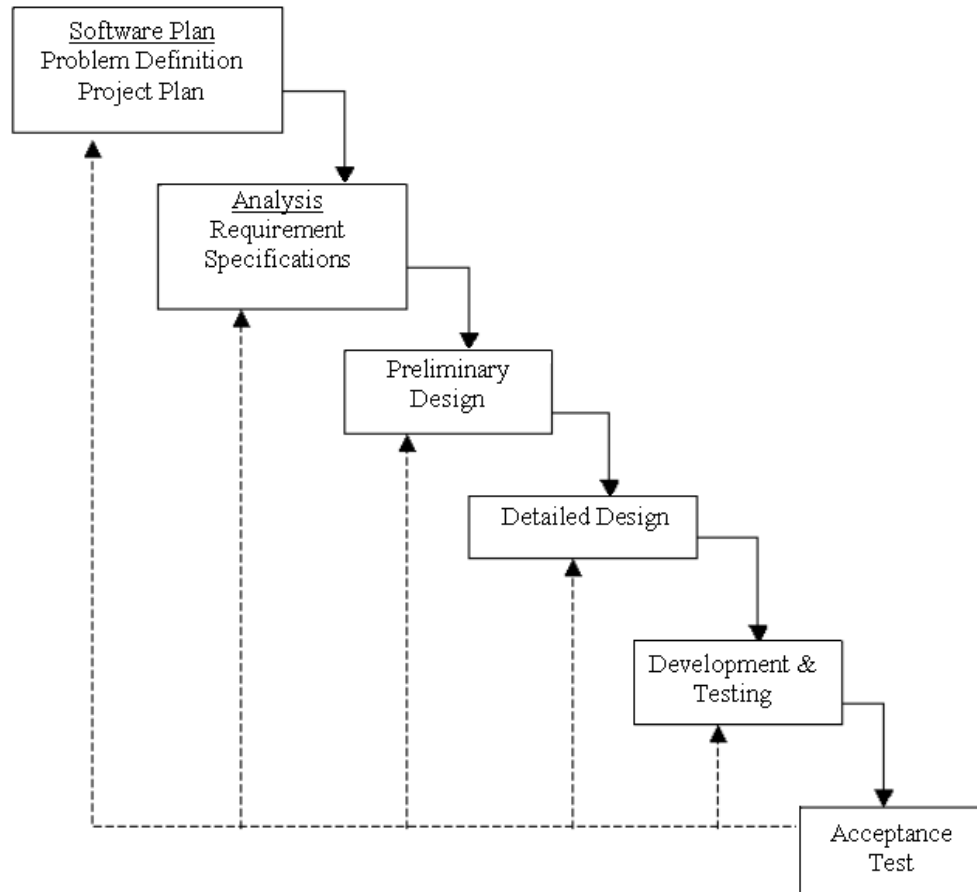
The web-based program will allow for a number of online activities and will, at minimum, allow:

- 1) Users to see the contents of a packet not in binary form;
- 2) Users to see model in a clear, precise manner;
- 3) Users to see the decomposition of a packet;
- 4) Users to pick apart the packet and see what is inside;
- 5) Users to access a menu containing a description of what each field does;
- 6) Access to everyone with a web application.

### **1.11: Sources of Information**

The major source of information for this segment of the project resulted from meetings with our client, Mr. Swarner. Other sources of information include Dr. Lederman's class lectures, the Software Engineering class textbook *Software Engineering: A Practitioner's Approach* by Roger S. Pressman, and previous Software Engineering teams' projects, specifically "Sharpe Software, Inc."

## 2.1: Life-Cycle Model: Linear Sequential (Classic Waterfall) Method



### Software Plan

The purpose of the software plan is to define the problem that is to be solved and establish a preliminary plan of action.

### Analysis

The analysis process is mainly software-based. The team aims to understand the nature of the program which they are building, so they must understand the information domain for the software, as well as its required function, behavior, performance, and interface.

### Preliminary Design

Software design is a multi-step process that focuses on four distinct attributes of a program: data structure, software architecture, interface representations and procedural or algorithmic detail. The design process translates requirements into a representation of the software that can be evaluated for quality before the beginning of the coding process.

### Detailed Design

In this phase of the model, the design is translated into a machine-readable code.

### Acceptance Test

After code has been generated, testing begins. The testing process focuses on the logical internals of the software, ensuring that all statements have been tested. In this way, errors may be corrected and it can be established that defined input will produce actual results that agree with the required results.

### Support

Software support and maintenance allows changes and adaptations to be made if necessary; for example, a customer requiring functional or performance enhancements. Support reapplies each of the preceding phases to an existing program rather than a new one.

(Cited from Pressman, pp. 28-29.)

## **2.2: Organizational Structure**

Mirage Incorporated is comprised of the following members:

<u>Name</u>	<u>E-mail Address</u>	<u>Phone Number</u>
Paul Aiuto	paul.aiuto@students.siena.edu	(518) 782-6474
Richard Connell	richard.connell@ students.siena.edu	(518) 782-6347
Lauren Englisbe	lauren.englisbe@ students.siena.edu	(518) 782-6352
Jayme Gresen	jayme.gresen@ students.siena.edu	(518) 782-6080
Jeffrey Habiniak	jeffrey.habiniak@ students.siena.edu	(518) 438-3635

Mirage Incorporated is organized as follows for the TCP/IP Project:

Lauren Englisbe – Team Leader  
Paul Aiuto – Systems Administrator  
Richard Connell – Webmaster  
Jeffrey Habiniak – Webmaster  
Jayme Gresen – Librarian

The team structure of Mirage Incorporated is democratic decentralized. Decisions on problems and approach are made by group consensus. There will be no hierarchy.

The work assignment for each member is as follows:

Team Leader – Organizes meetings and interviews for the team, as well as between the team and the client; guides the team throughout the semester.

Systems Administrator – Maintains the team users' accounts and is responsible for software administration.

Webmaster – Creates and maintains the project web page.

Librarian – Maintains all team documents and records of all team meetings.

### **2.3: Preliminary Staffing and Resource Requirements**

Our required software resources will include a database management system such as Oracle and a web page editor such as Dreamweaver, as the application will be web-based. We may also use a Hypertext Preprocessor (PHP) editor, Visual C++, and Visual Basic. The hardware resources we require include computer systems, printers, and services. Our primary resources include those directly involved with the project: Mr. Ken Swarner of the Siena College Computer Science Department, and Dr. Timoth Lederman, our Software Engineering professor.

### **2.4: Preliminary Development Schedule**

Please refer to the preliminary development schedule or Gantt chart on pages 10 and 11 of this document.

### **2.5: Project Monitoring and Control Mechanisms**

In addition to the client interviews, the project team members will meet frequently to discuss where the project stands and to decide on the appropriate next steps for each member. The project team will assess the client's responses to the team's presentations of the Problem Definition/Project Plan, Software Requirements Specifications and Preliminary Design to verify that the ideas of the project team match up with the client's needs. Throughout our development, we will be continually testing our system. If at any time either the project team or client establishes that the program is not meeting the necessary needs, the project team will take the proper steps in correcting the problem.

### **2.6 Tools and Techniques to be Used:**

Computers with Dreamweaver, Microsoft Project, and Microsoft Office will be used. Our team will be using Dreamweaver and PHP to develop our web application, and C++ for the software that the web application will run off of. Models provided by Mr. Swarner along with software engineering techniques will be used throughout the process of creating our system.

### **2.7: Programming Languages**

For the development of the TCP/IP project, we will be using Microsoft Visual Basic, C++, PHP, and for our website we will use HTML and Dreamweaver.



## **2.8: Testing Requirements**

There will be a thorough testing of this system throughout the development process. Team members as well as other students will also aid in the testing.

## **2.9: Supporting Documents Required**

Supporting documentation will be provided to our client on the following dates:

- 1) Problem Definition/Project Plan – September 22, 2003
- 2) Software Requirements Specifications – October 27, 2003
- 3) Preliminary Design – November 24, 2003

## **2.10: Manner of Demonstration and Delivery**

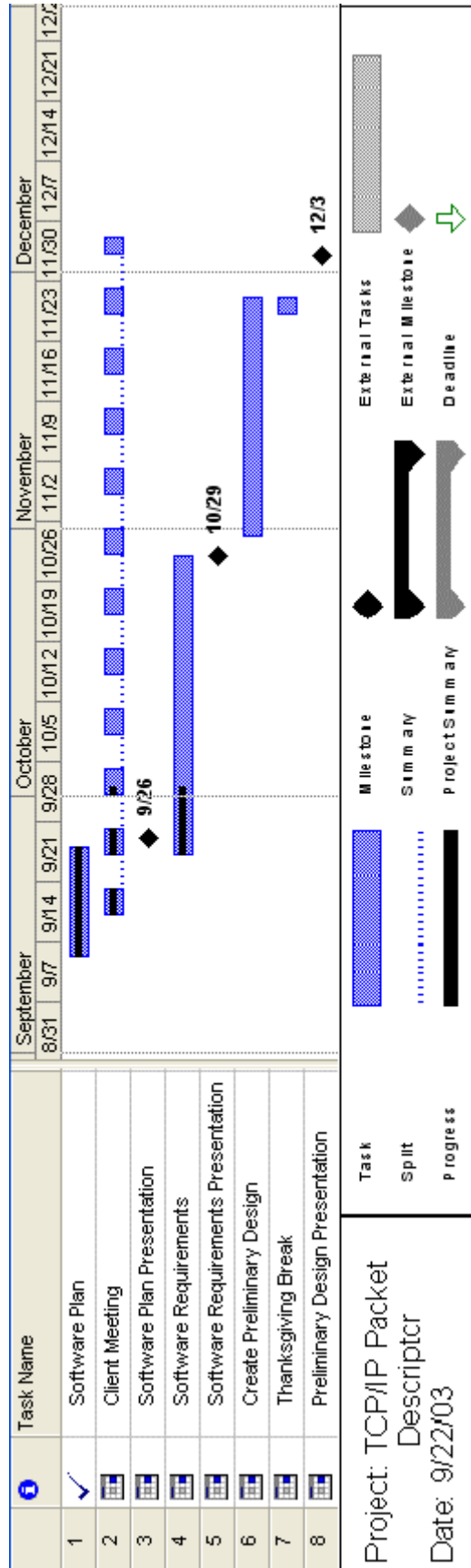
There will be many presentations given throughout the development. They will consist of PowerPoint presentations, speeches, demonstrations, and handouts. The purpose of our presentations will be to make sure our client's goals are being met, and to show what we have completed to date. Dates of presentations are as follows:

- 1) Problem Definition/Project Plan – September 22, 2003
- 2) Presentation: Problem Definition/Project Plan – September 26, 2003
- 3) Software Requirements Specifications – October 27, 2003
- 4) Presentation: Software Requirements Specifications – October 29, 2003
- 5) Preliminary Design – November 24, 2003
- 6) Presentation: Preliminary Design – December 4, 2003

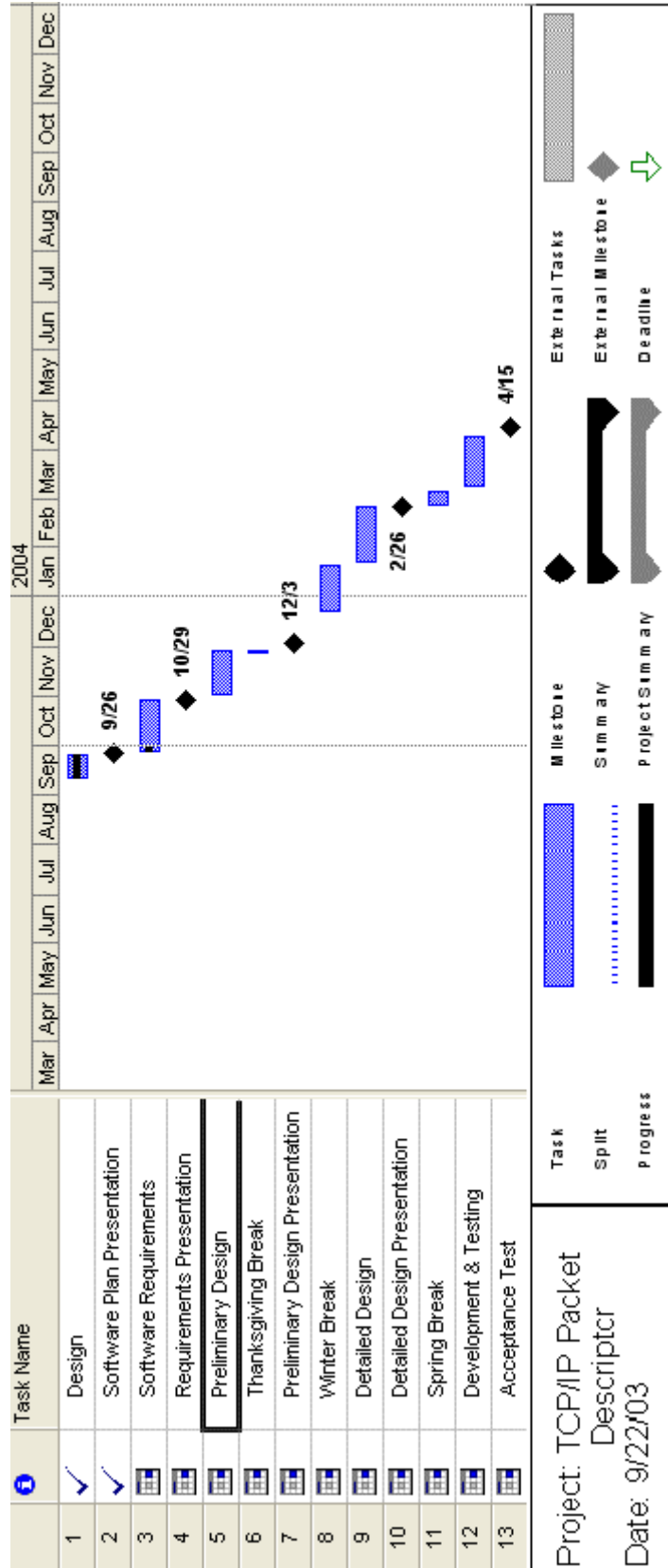
## **2.11: Sources of Information**

The major source of information for this segment of the project resulted from meetings with our client, Mr. Swarner. Other sources of information include Dr. Lederman's class lectures, the Software Engineering class textbook *Software Engineering: A Practitioner's Approach* by Roger S. Pressman, and previous Software Engineering teams' projects, specifically "Sharpe Software, Inc."

### 3.1: Gantt Chart (Current Semester)



# Gantt Chart (Entire Year)



## 3.2: Glossary of Terms

**Code:**

The symbolic arrangement of data or instructions in a computer program or the set of such instructions.

**GUI:**

*Graphical User Interface:* A user interface based on graphics (icons, pictures, and menus) instead of text; uses a mouse as well as a keyboard as an input device.

**Gantt Chart:**

A chart that depicts progress in relation to time, often used in planning and tracking a project

**HMTL:**

*Hypertext Transfer Markup Language:* A markup language used to structure text and multimedia documents and to set up hypertext links between documents, used extensively on the World Wide Web.

**Hypertext:**

A computer-based text retrieval system that enables a user to access particular locations in web pages or other electronic documents by clicking on links within specific web pages or documents.

**Internet:**

An interconnected system of networks that connects computers around the world via the TCP/IP protocol.

**Linear Sequential Model:**

Sometimes called the *classic life cycle* or the *waterfall model*, this model suggests a systematic, sequential approach to software development that begins at the system level and progresses through analysis, design, coding, testing, and support.

**Linux:**

A trademark for an open-source version of the UNIX operating system.

**Network:**

An openwork fabric or structure in which cords, threads, or wires cross at regular intervals.

**Open-Source:**

A method and philosophy for software licensing and distribution designed to encourage use and improvement of software written by volunteers by ensuring that anyone can copy the source code.

**PHP:**

Hypertext Preprocessor (server-side scripting language)

**Packet:**

The unit of data sent across a network. "Packet" is a generic term used to describe a unit of data at any layer of the OSI protocol stack, but it is most correctly used to describe application layer data units ("application protocol data unit", APDU).

**Protocol:**

A standard procedure for regulating data transmission between computers.

**Software:**

Written programs, procedures, or rules and associated documentation pertaining to the operation of a computer system and that are stored in read/write memory.

**TCP/IP:**

*Transmission Control Protocol/Internet Protocol:* A protocol for communication between computers, used as a standard for transmitting data over networks and as the basis for standard Internet protocols.

**UNIX:**

A powerful operating system developed at the Bell Telephone Laboratories.

**Paul J. Aiuto**

**Present Address**

Siena College, SPOB 2010  
515 Loudon Road  
Loudonville, NY 12211  
(631) 513-6336  
Email: Paul.Aiuto@students.siena.edu

**Permanent Address**

10 Wycomb Court  
Coram, NY 11727  
(631) 474-1785

**OBJECTIVE**

To find a position with in a company where my computer knowledge and skills will be enhanced and used to improve the productivity and efficiency of the corporation.

**EDUCATION**

**Siena College**, Loudonville, New York  
B.S. in Computer Science May 2004

**RELEVANT COURSEWORK**

Procedural Design and Programming, Software Fundamentals, Data Structures, Assembly Language, Networks and Communications, Object Oriented Design, Database Management, Operating Systems, System Administration

**EMPLOYMENT**

**Internship**, First Albany Corporation, New York, NY May 2003 - present

- PC/LAN Infrastructure Support Technician
- Troubleshoot Windows 2000/NT problems that end user have
- Maintain Software and Network connectivity for users

**Salesperson**, Port Jeff Bowl, Port Jefferson, NY March 1998 - present

- Work the control desk
- Develop problem solving skills and people skills
- Develop decision-making tactics

**Web Page Design**, Port Jeff Bowl March 2000-2003

- Create a web page
- Display and advertise products in an efficient manner
- Develop important people skills and decision-making tactics

**Computer Consultant**, ITS Siena College March 2002-present

- Assist people with their computing needs
- Troubleshoot problems computer users may have
- Develop people and problem solving skills

**COMPUTER SKILLS**

- Skilled in Microsoft Word, Microsoft Works, Front Page, and PowerPoint.
- Proficient in troubleshooting hardware and software problems on computer systems.
- Learning program languages and operating systems such as C, C++, Scheme, Windows 95/98/NT/2000/XP, Dos, UNIX, Assembly, Object Oriented C++ (OOP), Linux,
- Learning software packages and protocols such as: Lotus Notes, Bloomberg, Reuters Bridge, Brass, Adobe Acrobat 5.0, TCP/IP

**Richard R. Connell**

**School Address:**  
**SPOB 2982**  
**515 Loudon Road**  
**Loudonville, New York 12212-1462**  
**Phone: (518) 782-6347**

**Permanent Address:**  
**P.O. Box 14434**  
**Albany, New York 12212**  
**Phone: (518) 286-3190**

**Objectives:** To obtain a position in a firm as a Computer Programmer, or Program manager, where my knowledge of Oracle, C++, HTML, or Assembly Language will be of value to my employer.

**Employment:** Siena College, Loudonville, New York.  
Department of Institutional Advancement

**July 2001** Clerical Position  
**To the Present**

**Duties:** **Inputting** Data on all Siena Alumni, Students, and Financial Donors in the **Banner Database**.  
**Maintaining** our Database by categorizing and updating all data on a daily basis to ensure that all information is always current.  
**Assist** all other employees when needed, **Filing** and **Typing** correspondence, etc.

**Education:** Siena College, Loudonville, NY  
**(2000 to the present)** Computer Science Major/Business Minor. Class of 2004

**Courses:**

- Data Structures
- Object Oriented
- Analysis of Algorithms
- Assembly Language
- Graphic Design
- Database Management (using Oracle in SQL Language)
- Discrete Mathematics
- Economics
- Accounting
- Marketing Management

**1996-2000** Bishop Maginn, High School, Slingerlands St., Albany, N.Y.

**Others:** HTML and web design. (Self-taught)

**Reference:** Available on request

# Lauren A. Englisbe

Present address: (until 5/04)  
Siena College  
SPOB 3470  
515 Loudon Road  
Loudonville, NY 12211-1462  
Telephone: (518) 782-6352

Permanent address:  
9 Mayfair Drive  
Slingerlands, NY 12159  
Telephone: (518) 439-2455  
E-mail: lengli@hotmail.com

**OBJECTIVE:** to obtain a challenging position in the field of Computer Science

## **EDUCATION**

**Siena College**, Loudonville NY  
B.S. Computer Science, French Minor, May 2004  
Cumulative GPA: 3.84; Computer Science: 3.67; French: 4.0; Delta Upsilon Sigma National Scholastic Honor Society  
Study Abroad: The American University of Paris, France, Spring 2003

## **COMPUTER EXPERIENCE**

- Languages: C++, Basic, MIPS Assembly, Scheme
- Operating Systems: UNIX, Windows 3.x/9x/NT/2000/XP
- Software Packages: Microsoft Office, Microsoft Visual C++, Microsoft Visual Basic/.NET 2003, Windows CE, Visual Turing, EZWin, OpenGL
- Database Management: Oracle 9i, Microsoft SQL Server/ CE

## **RELEVANT COURSEWORK**

Procedural Design and Programming, Data Structures, Computer Architecture and Assembly Language, Object-Oriented Design and Programming, Analysis of Algorithms, Database Management, Communications and Networks, Computer Graphics, Software Engineering

## **RELEVANT WORK EXPERIENCE**

**Team Leader**, Fall 2003, Software Engineering Class, Siena College

- Organized and supervised group during software planning process
- Established group meetings and project reviews with client and class instructor

**Computer Science Tutor**, September 2003 until present, Siena College, Loudonville, NY

- Assisted students with computer programming difficulties in several languages

**National Science Foundation Research Experience for Undergraduates Program**, May-August 2003 – “Wireless Distributed Data Synchronization”

- Researched synchronization applications between handheld computers and central databases
- Translated a program using an ADOCE connection designed in Embedded Visual Basic into a Visual Basic.NET 2003 environment with Remote Data Access
- Improved program functionality with respect to connectivity and explored time-sensitivity issues

## **ADDITIONAL WORK EXPERIENCE**

- **Shift Supervisor**, 2003-present, Starbucks Coffee, Niskayuna, NY; **Sales Associate**, 1999-2002

## **ACTIVITIES**

- **Ski Instructor**, 1996-1998, Ski Windham Disabled Program, Windham, NY



# Jayme M. Gresen

## **Present Address**

Siena College, SPOB 2407  
515 Loudon Road  
Loudonville, NY 12211  
(518) 782-6080; E-Mail [jayme.gresen@students.siena.edu](mailto:jayme.gresen@students.siena.edu)

## **Permanent Address**

66 Cascade Terrace  
Niskayuna, NY 12309  
(518) 785-6057

## OBJECTIVE

A position in the computer science field which will allow me to utilize my present skills while also furthering my knowledge.

## EDUCATION

**Siena College**, Loudonville, NY  
B.S. in Computer Science, Minor in Mathematics, May 2004  
GPA: 3.1/4.0; Dean's List 2002-2003

## COMPUTER EXPERIENCE:

- Programming in C/C++, JavaScript, Visual Basic, Scheme, OpenGL, HTML, Assembly
- Database background: Oracle/SQL

## RELEVANT COURSEWORK:

Computer Graphics, Database, Object Oriented Programming, Data Structures, Assembly Language, Scheme, Analysis of Algorithms, Discrete Structures I & II, Numerical Methods

## EXPERIENCE

**Computer Programmer Intern, BEST Systems**, Albany, NY, May 2003-August 2003

- Developed pro-active strategy to attack return of mail due to bad addresses
- Organized and educated staff of 50 people in relation to changes needing to be made
- Provided programmers with a schedule of the year for creating bills for 12 accounts
- Suggested strategies to save approximately \$20,000/year on cost of extra postage for returned mail

**Customer Service Representative, BEST Systems**, Albany, NY, May 2000-Present

- Clarified questions from patients on their bills via phone
- Assisted in achieving monthly goals through performing additional duties
- Managed distribution of work to other employees on the team
- Trained approximately 15-20 employees on the computerized billing system and upgrades as implemented

**Senior Cashier, Faddegon's Nursery**, Latham, NY, August 2000-December 2000

- Responsible for opening and closing the store
- Administered and monitored money being put into registers and secured it at night
- Trained approximately 6-10 employees on the computer system and customer relations
- Focused on customer service and satisfaction
- HAZCOM trained

## ADDITIONAL EXPERIENCE

**Data Entry Clerk, BEST Systems**, Albany, NY, January 2000-April 2000

**Cashier, Faddegon's Nursery**, Latham, NY, September 1998-August 2000

## LANGUAGE SKILLS

**Languages:** Proficient in Spanish

## JEFFREY RYAN HABINIAK

8 Dogwood Lane  
Loudonville, NY 12211  
(518) 438-3635  
E-Mail: [Jeffrey.Habiniak@siena.edu](mailto:Jeffrey.Habiniak@siena.edu)

### **OBJECTIVE**

A position in the field of computer programming and computer information management.

### **EDUCATION**

**Siena College**, Loudonville, NY  
B.S in Computer Science and Minor in Math, May 2004  
GPA: 3.0/4.0

**Quinnipiac University**, Hamden, CT, Fall 2001  
Dean's List, Fall 2001

### **EXPERIENCE**

*Customer Service Representative*, Avis-Rent-A-Car, Albany, NY 2002

- Responsible for inspection and check in of car returns.

*Notetaker*, Siena College, Loudonville, NY, 2001-2002

- Took class notes for a disabled student.

*Temporary*, Blue Shield of NENY, Albany, NY, 2000-2002

- Processed and filed medical claims.
- Typed and mailed medical billing letters.

*Technician*, D. Leto Telecommunications, Guilderland, NY, 2000

- Programmed Telephone systems.
- Ran CAT5 cable and terminated cables.

### **COMPUTER SKILLS**

Languages: Scheme, C++, HTML, Oracle/SQL, SPIM.  
Software/OS: Win95/98/ME/XP, Internet, Word, Excel, PowerPoint, Photoshop.  
Courses: Procedural Design-Programming  
Data Structures  
Comp Arch and Assembly Language  
Object-Oriented Design  
Analysis of Algorithms  
Numerical Methods  
Data Base Management  
Computer Graphics