

BTech 450 MTN Project

Final Report



Chi-Shou (Chris) Chou

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Abstract

This final report details the contents and work we have done for the BTech project in year 2003. Three of BTech IT students are doing the MTN project sponsored by the Modern technology NZ limited (MTN). The report consists of details of the team, background of the company, introductions of the project, project work content, and future plans.

The project is mainly focused on two parts. One is developing an engineering and information technology knowledge base with the use of MySQL database, apache front-end service with PHP coding. The other part is to fill the knowledge base with information and research topics we have researched during the project period.

So far I have done some research about hardware platform, and some industry/technology combined topics like comparison of the computer systems. This report also shows the progress/work had been done each week throughout the year 2003, and the knowledge/skills I have acquired or applied during the project. The last part is the problems I encountered and how I dealt with problems.

Introduction about the company

Modern technology NZ limited (MTN) is a computer system manufacturer producing Compucon brand servers and workstations. It's base in Albany. MYN has started developing high-tech solutions to complement the range of system of hardware. In 2001, the company worked in partnership with an Internet Service Provider under a new company named Computers New Zealand (CNZ) to offer a Linux based firewall and mail server. Owing to the reputation of the company as the only engineering-based computer company in New Zealand, many IT and PC service provides are looking at CNZ as the source of knowledge.

Services offered by CNZ:

- Full Consultancy - review of client workflow structure, planning of platform installation or migration, preparation of IT policies and procedures.
- Solution Provision - customized information technology solutions from conception to turnkey delivery to staff training.
- Full Liaison - a single channel for the supply of IT equipment and services including file servers, desktops, vendor installation, facility management, usage audits, on-site support and staff training.

About Group Members

Name:	Anisha Ramji	Vincent Yee	Chris Chou
Work Content:	Documentation	MySQL Database	PHP coding
Research Area:	Software	Connectivity	Hardware Platform

About Me

Name:	Chi-Shou (Chris) CHOU
ID number:	2536757
UPI:	ccho093

Papers for this year:

<u>Summer School</u>	<u>First Semester</u>	<u>Second Semester</u>
● <u>Econ 111</u>	● <u>Scigen 201</u> ● <u>InfoSys 339</u> ● <u>Compsci 734</u> ● <u>BTech 450</u>	● <u>Compsci 742</u> ● <u>BTech 450</u>

Papers completed:

- Physics 120, 150, 243
- Math 108, 208, 162
- Stats 108
- InfoSys 110, 222, 224, 329, 339
- Econ 101
- Compsci 101, 105, 210, 220, 230, 314, 334, 335, 375
- Scigen 201

About the project

Project Objectives:

The company wishes to establish the infrastructure and content of an engineering and information technology knowledge base. The infrastructure refers to a framework that will identify, develop if appropriate and accumulate:

- The relevant technical expertise and know-how
- Technology applications in NZ
- Procedures for handling system integration and implementation projects.

This BTech project is designed to be part of the CNZ knowledge development process and to provide a bridge to final year student to reach industry from academic background.

Project Work Content:

This year's work will be a continuation of the work completed by the four students last year. We will continue to complete and polish the development of a MySQL based back-end database and an Apache based front-end web site with the use of PHP. For the contents of the knowledge base, we will have to:

- Establish a technology scoping document for each class of customers
- Identify the state of each technology (E.g. Who are the suppliers and what are the related standards)
- Identify the existence of skills in the NZ IT industry

We will also do some research while we are implementing the knowledge base. The scopes of research are system hardware platform, network and user connectivity, and operating software platforms. Each scope should address key concerns including maturity of standards, functionality, scalability, availability, security, ease of operation and maintenance, market offering, price zoning, and coverage of BTech degree syllabus.

Project Deliverables:

- Business Management QA Manual
- Project Management QA Manual
- Web Site for Public Reference (Restricted Access)
- Knowledge Database of technology Disciplines
- Database of Potential Customers
- Research Reports
- Industry Presentation Slides

Project Plans:

Project Period:	February 2003 – 26 October 2003
Workload	10 Hours per week
Supervisors:	Mr. TN Chan Dr S Manoharan Edmond Chan

Learning Objectives:

We will develop skills about planning, researching, and reporting while we are participating in this project. We act as the R&D division of CNZ and provide information solutions that IT and engineering consultants may require. Learning objectives shall include:

- Application of theories and techniques to solve real life technical problems
- Project planning and team collaboration
- Real life development and maintenance of a web database
- Interface with the IT and engineering industry in NZ
- Technical writing and report presentation

Scope of Learning Topics:

These are the topics I wish to learn by the end of the project process:

- Technical
 - System architecture (iS32 and iA64)
 - System Platform (Springdale)
 - CPU (P4 Northwood and AMD Hammer)
 - System clustering and redundancy
 - Power user computing platforms
 - Database development
 - Software programming and scripting
 - Web service components
 - System integration and interface design
- Commercial
 - IT and engineering market
 - Value adding concept and vertical solutions
 - Business models
- Management
 - Time scheduling and control
 - Specification control and Quality control
 - Contracting and Cost control
 - Human resource organization

Achievements

Research:

For the MTN project the team has done some research on three areas:

1. Operating System & Software
2. Hardware platform
3. Network & User Connectivity

Here is a list of research topics that I have done during the year:

● **Hardware platforms**

- Intel Centrino Technology
- Intel CPUs (Pentium 4, Xeon, Itanium 2)
- Chipsets (Springdale and Canterwood from Intel)
- Hyper-streaming architecture for AMD processors
- RAID for Serial ATA HDD
- Internet Small Computer System Interface (iSCSI)
 - ◆ iSCSI Host Adaptor
 - ◆ iSCSI Initiator (Software)

● **Power Management**

- Advanced Power Management (APM)
- Advanced Configuration and Power Interface (ACPI)
- Desktop Management Interface (DMI)
- Wired for Management (WfM)
- Wake on LAN (WOL)
- Suspend to Ram

● **Network Management**

- Intelligent Platform Management Interface (IPMI)
- Commercial Applications
 - ◆ LANDesk from Intel
 - ◆ OpenView from HP
 - ◆ Tivoli from IBM
 - ◆ Active Directory from Microsoft
- Simple Network management protocol (SNMP)

Comparison among computer systems:

CNZ is a consultancy company as well as a manufacturer producing Compucom branded workstations and servers. Therefore we shall gather information by researching on topics required by customers and IT and engineering consultants. After researching on the hardware platforms and network and power management protocols, my next task was to process the information gathered about computer systems manufactured by CNZ and makes a comparison among the systems. This shall give the customers a good idea of the computer systems and make it easier for them to choose their ideal systems.

Here is an example of the comparison tables:

It shows the CPU and chipsets and all sort of hardware specifications of the computer system as well as the availability (RAID card for data redundancy) and scalability.

	P4 Superhawk Workstation (0W10-10)	P4 Workgroup RAID Server (0W11-12)	Industrial Back Plane System (0W12-01)	P4 Diamond Workstation (0W15-05)	Thunderbird Workstation (0W7-12)	Jasper Workstation (0W13-08)	Proteus Windows Terminal
CPU Supported	UP to P4 3.06G with HT (see Footnote 1)	UP to P4 3.06G with HT	Up to P4 3.6G (HT requires extra ventilation)	Up to P4 3.6G (HT requires bigger chassis & air guide)	Up to Athlon™ XP 2800+	Up to Athlon XP 2200+	CyrixR MediaGXTM LV 200MHz
Chipset	i845GE ICH4	i845GE ICH4	i845GV ICH4	i845GV ICH4	VIA® KT400 VIA® VT8235	VIA® KM266 VIA® VT8233A/8235	N/A
Memory Supported	2 DDR 266/333 Sockets Up to 2G	2 DDR 266/333 Sockets Up to 2G	2 DDR200/266 Sockets Up to 2G	2 DDR 266/333 Sockets Up to 2G	6 memory Sockets DDR400 */333/266 up to 3GB	4 DDR 200/266 Sockets Up to 2G	1 SDRAM Sockets Up to 64Mb
IDE	2 channel Ultra ATA 66/100 4 IDE Devices	2 channel Ultra ATA 66/100 4 IDE Devices	1 Ultra DMA 66/100 2 IDE Devices	2 channel Ultra ATA 66/100 4 IDE Devices	2 channel Ultra DMA 33/66/100/133 4 IDE Devices	2 channel Ultra ATA 66/100 4 IDE Devices	16MB Solid State Flash Disk.
Slots	1 AGP 4X (1.5v) 6 PCI 2.2 32-bit bus slots 1 CNR	1 AGP 4X(1.5v) 6 PCI 2.2 32-bit bus slots 1 CNR	2 PCI 2.2 32-bit bus slots	1 AGP 4X 3 PCI 2.2 32-bit bus slots 1 CNR	1 AGP 8x/4x (1.5v) 6 PCI 2.2 32-bit bus slots 1 CNR	1 AGP 2x/4x 3 PCI 2.2 32-bit bus slots 1 CNR	None

For some of the research reports and reference please refer to the appendixes.

And here are list of topics done by Vincent and Anisha, and we would present and discuss all the research report with the supervisors (Mr. TN Chan and Edmond Chan) each week. TN would tell us how we did it and how we can improve so we could all learn something from the research reports done by the team members.

Research topics on software done by Anisha:

- **Microsoft Greenwich**
- **Jabber Instant Messaging**
- **Windows XP Desktop Deployment site**

The research & development phase also included a major focus on the Linux operating system and it related software, given the scenario of implementing Red Hat Linux into a small business network consisting of a server and 10 clients.

The list of Linux related reports produced to-date includes;

- **Red Hat Linux 9.0 Product Details**
- **Red Hat Enterprise Product Details**
- **Red Hat Linux 9.0 System Requirements Table**
- **Red Hat Linux 9.0 Installation Guide**
- **Linux Emulation software v0.2**
- **Linux Accounting Software v0.4**
- **Hardware Compatibility List**
- **Linux Kernel History v0.1**
- **Linux Implementation Guide**
- **Open Source File Systems**
- **Linux Networking Report v0.4**
- **Linux Network Administrator requirements**

Research topics on Network & User Connectivity done by Vincent:

- **The path from 2G to 3G mobile communication**
- **Specifications for AGP 8X, PCI Express, PCI-X and iSCSI**
- **Long distance (20km) Wireless PABX**
- **Introduction to the 802.11 Wireless Network Standard**
- **802.16a Technology Development and Commercial Deployment**
- **VOIP cell phones**
- **Smart phone vs. PDA**
- **Setting up an ISP business in terms of technologies, equipments and skills required**
 - ◆ User PC – Multimedia PCs equipped to send and receive all variety of audio and video.
 - ◆ User Communication Equipment – Connects the Users' PCs to the "Local Loop".
 - ◆ Local Loop Carrier – Connects the User location to ISP's Point of Presence (POP).
 - ◆ ISP's POP – Connections from the user are accepted and authenticated here.
 - ◆ User Services – Used by the User for access (DNZ, Email, etc).
 - ◆ ISP Backbone – Interconnects the ISP's POPs, and interconnects to ISP to other ISP's and online content.
 - ◆ Online Content – These are the host sites that the user interacts with.
 - ◆ Origins of Online Content – This is the original "real world" sources for the online information.

All the research has helped me to understand more about what really happens inside the computer platforms and the motivation and brilliant ideas to solve real life problems. Also the team members were all benefited from the research report done by each other. We gained experience and knowledge on all three areas, software, and hardware platform and user connectivity. We could use the experience and knowledge to help customers and other company associates. Most important of all, I am able to apply knowledge learnt from university studies and help me and the team members to understand the technologies. The related papers I studied in university are:

- Data Communications (INFOSYS 224)
 - ◆ Networking protocols & theory
- Data Communications Fundamentals (COMPSCI 210, 314)
 - ◆ Linux/UNIX operating systems
- Advanced Data Communications (INFOSYS 329 and 339)

The following pages are my weekly reports to the CNZ, they show the tasks and research I have been assigned to and also the progress and achievement completed at the end of each week. Some of the reports are attached to the appendixes at the end of the report.

Weekly Reports:

15–21 March 2003, Week 1

- Identify an industry sector
- Knowledge implementation
- Research topics

Objectives:

The aim is to select one sector of industry and identify the technology scope it requires.

Approaches:

- Internet research
- Talk to employee of the company (My father)
- Discuss with group members

Results:

The sector I am focusing on is the power companies, their primary focus is not only about generating and transporting electricity but also about developing and delivering long term outsourced maintenance and construction requirements for clients. The companies would require an intranet, database, and mail server for the personnel. The database would mainly hold the information of customers, detail of employees, training manual of the courses etc. They would have installed a firewall for security reasons. The power company would outsource for the IT solutions rather than keep its own IT department.

Discussion:

We have discussed and assigned our duties. I will be responsible for the PHP coding for the knowledge base, and the system hardware platform for the research. I choose these topics because we have taken PHP related course and are familiar with the language and I can consult with them if I encounter problems. The other reason for choosing system hardware platform for my research topic is that I am a DIYer and have always been paying attention to new hardware products and new technologies.

Conclusion:

Once the goals are set for us, we will do our best to achieve them. Now I will start reading notes and books about PHP coding and spend some time search for the material we need for the project.

22–28 March 2003, Week 2

- Research on technology

Objectives:

The aim is to research for system hardware platforms and to understand what the technologies are about.

Approaches:

- Internet research
- Magazines
- Newspapers
- Discuss with group members

Discussion:

After spending hours looking for the hyper-streaming on the AMD webpage, I found nothing but a similar keyword "Hyper-Transport". So I decided to write a report on it. Then I realize that hyper-streaming belongs to SiS for AMD Barton processor from the information you gave me next week. I'll finish the report on hyper-streaming as soon as possible and hand to you before Sunday. Sorry about that.

Conclusion:

I'm still not used to do the research, but I will try harder to make my research skills better.

29 March–5 April 2003, Week 3

- Research on technology

Objectives:

The aim is to research for system hardware platforms and to understand what the technologies are about.

Approaches:

- Internet research
- Magazines
- Newspapers
- Discuss with group members

Discussion:

Finally I found the hyper streaming from SiS, but it's beyond my understanding. I will spend more time try to understand it.

About the SATA RAID, it seems to me it's just the normal PATA RAID replaced by the SATA HDD; and there is only one company producing native SATA RAID controlling chips called Promise. Whereas other controller manufacturers are still producing Serial ATA bridges (chips that convert from Parallel to Serial ATA).

12–18 April 2003, Week 4/5

- Research on technology
- Industry Research

Objectives:

The aim is to research for system hardware platforms and to understand what the technologies are about.

Approaches:

- Internet research
- Magazines
- Newspapers
- Discuss with group members

Discussion:

I also did a little bit research on the DWDM (dense wavelength division multiplexing) for the Southern Cross cable, but it gets too technical and very hard to understand. However it might be the only and best way to increase the bandwidth of the optical cables for the moment, I'll try my best to understand it further.

19-25 April 2003, Week 6

- Research on technology
- Industry Research

Objectives:

The aim is to research for system hardware platforms and to understand what the technologies are about.

Approaches:

- Internet research
- Newspapers
- Discuss with group members

Discussion:

Collected more information for the chipset and the SATA reports, and hope I am getting better in researching. Now the process of the research is quite enjoyable

However there are too many things that I don't understand. I'll keep trying.

We sold our house and my parents are moving to Sydney next month, and I am looking for a place to stay. Hopefully it won't affect the project process.

Week 7

- Research on technology
- Industry Research

Objectives:

The aim is to research for system hardware platforms and to understand what the technologies are about.

Approaches:

- Internet research
- Newspapers
- Discuss with group members

Discussion:

After the meeting with Edmond and group members, we get a rough idea how the knowledge base is structured and there are many works to be done. Also sorry about the industry report, I spent more than 7 hours on it but the result is still poor. I'll try to add more information into it.

Week 8

- Industry Research

Objectives:

The aim is to compare the functions of different computer systems for users.

Approaches:

- Internet research
- Newspapers
- Discuss with group members

Discussion:

Some of the details of the main board don't list the ps/2 ports (for SPG). I just assume that all boards have two PS/2 ports for mouse and keyboard. About the **Industrial Back Plane System**, I couldn't find the information on the CNZ site. I found a link with the same model number;

http://www.msi.com.tw/program/products/slim_pc/slm/pro_slm_detail.php?UID=416&MODEL=MS-6243VA (I have attached the file, 845GV-L.mht)

But I am not sure if this is the one you use. Please correct me and let me know if this one isn't the one you want. I couldn't find the information about most of the cases either, I'll try to look harder and make some change to the paper.

Week 9

- Hardware platform and power management Research

Objectives:

The aim is to research and understand functions of various network and power management tools.

Approaches:

- Internet research
- Magazines
- Discuss with group members

Discussion:

Learnt quite a few things for this week, like if you want to build something or develop a standard for others to follow. The set of rules you made must be easy for people to follow. For example, there are many different power and network management standards, but the concept of them are quite similar. They should be platform independent and provide a guideline for other developers to follow.

These technologies are all quite new to me, but I believe they will be a trend for the market. More and more similar tools will be developed in the future.

Week 10

- Review work
- Identify the relevant academic papers to the project work content

Objectives:

The aim is to review the work done so far and identify specific work that is relevant to an academic paper covered in university.

Approaches:

- Going through the work done in the past 10 weeks
- Compare to the papers in the past three years

Discussion:

We have given the end of semester presentation to the teachers at university. We have also finished writing the report and hand it in this Friday. The team has done great but I'll have to work on my presentation skill. For now we will have to concentrate on preparing for the exams. My exams start on 18th of June and end on 28th, I'll have to study hard in order to obtain reasonable grades.

Week 11

- Hardware platform and power management Research
- Technologies overview

Objectives:

The aim is to research and understand functions of various network and power management tools.

Approaches:

- Internet research
- Magazines
- Discuss with group members

Discussion:

I need to work on my organization skills, sometimes I can see the facts but I can't absorb them and report to others.

I took a CCNA skill test on Wednesday (2nd July), and it's very tricky. Only one out of nine people took the test before us passed the test. I have to take the test again on Friday and hopefully I will pass this time.

Week 12 & 13

- network management Research
- Knowledge base implementation

Objectives:

The aim is to research and understand functions of various network and management solutions provided by various companies.

Approaches:

- Internet research
- Discuss with group members

Conclusion:

Network management solutions provided by different companies are actually quite the same. They all address similar solutions to particular business requirements like data storage, data backup and recovery, security issues, network monitoring and management, performance and availability issues. They might use different devices and software to implement the solution but they might use the standard protocols (e.g. SNMP) to monitor and keep track of the network and status of the devices.

Week 14 & 15

- network management Research
- Knowledge base implementation

Objectives:

The aim is to research and understand functions of various network and management solutions provided by various companies.

Approaches:

- Internet research
- Discuss with group members

Conclusion:

Finally we are making some progress on the knowledge base. We will get together more often in the following weeks to work on the project and the project really needs to be done as soon as possible.

The Microsoft active directory is really a huge topic and contains lots of new information to me. And I can only guess that Tivoli or Open View used Active directory to implement the network storage functions because they don't mention how they implement it on the website (Or I probably miss them). It's a rough report and will be updated soon.

Week 16&17

- Network management Research
- Knowledge base implementation

Objectives:

The aim is to research and understand functions of various network and management solutions provided by various companies.

Approaches:

- Internet research
- Discuss with group members

Progress:

Last Saturday we spent the whole morning and afternoon working on the knowledge base, and spent most of our time improving the access levels of the staff and clients using the KB. We came up with two proposals to implement the access level; one is directly attach a table of access level to each person. The other is creating another table recording all the access levels and linking the person to the access levels. The former one is easier to implement but inflexible, and the latter one is more difficult to implement but can be changed easily in the future. After all we agreed on the latter one and started to write codes for it. The complete percentage is about 30%, and should be finished by end of next week.

The big picture is really a big challenge for me; I will try to improve it as soon as possible. And the Microsoft iSCSI initiator was only announced a month ago, and there isn't much information about it.

Week 18 & 19

- iSCSI Research
- iSCSI HBA Research
- Knowledge base implementation

Objectives:

The aim is to research and compare functions among various iSCSI products provided by various vendors.

Approaches:

- Internet research
- Discuss with group members

Progress:

We have to work as fast as we could in order to finish the knowledge base in time.

Vincent and I will spend the whole week next week and complete as much as we could. The news section is about 90% completed.

It's kind of tough for me to discover three major vendors that manufacture adapters for iSCSI. Many major vendors like Cisco, Datalink, and Lucent Technologies only produce HBA for fiber channels. Only a few companies produce both iSCSI and FC adapters. Since iSCSI and FCIP are open standards, why don't they produce more products to attract customers with different needs?

Week 20 & 21

- Research for Architecture of Pentium 4, Xeon, and Itanium 2
- Knowledge base implementation

Objectives:

The aim is to research and compare features and benefits among different CPUs.

Approaches:

- Internet research
- Discuss with group members

Progress:

I am still working on the big picture of hardware and network management and hopefully I can get better outcomes than last time.

I can't clearly declare the difference between Xeon and Pentium 4. My opinion is that Xeon is the advanced version of Pentium 4 with lower system bus and larger cache with almost the same architecture and features supported (One more feature is that Xeon supports multi-processor).

Knowledge Base:

Introduction:

The IT and engineering (ITE) division of Computer New Zealand (CNZ) requires an infrastructure to help manage projects and utilize the knowledge for the staff. Therefore the Knowledge base is established according to the requirements.

Requirements:

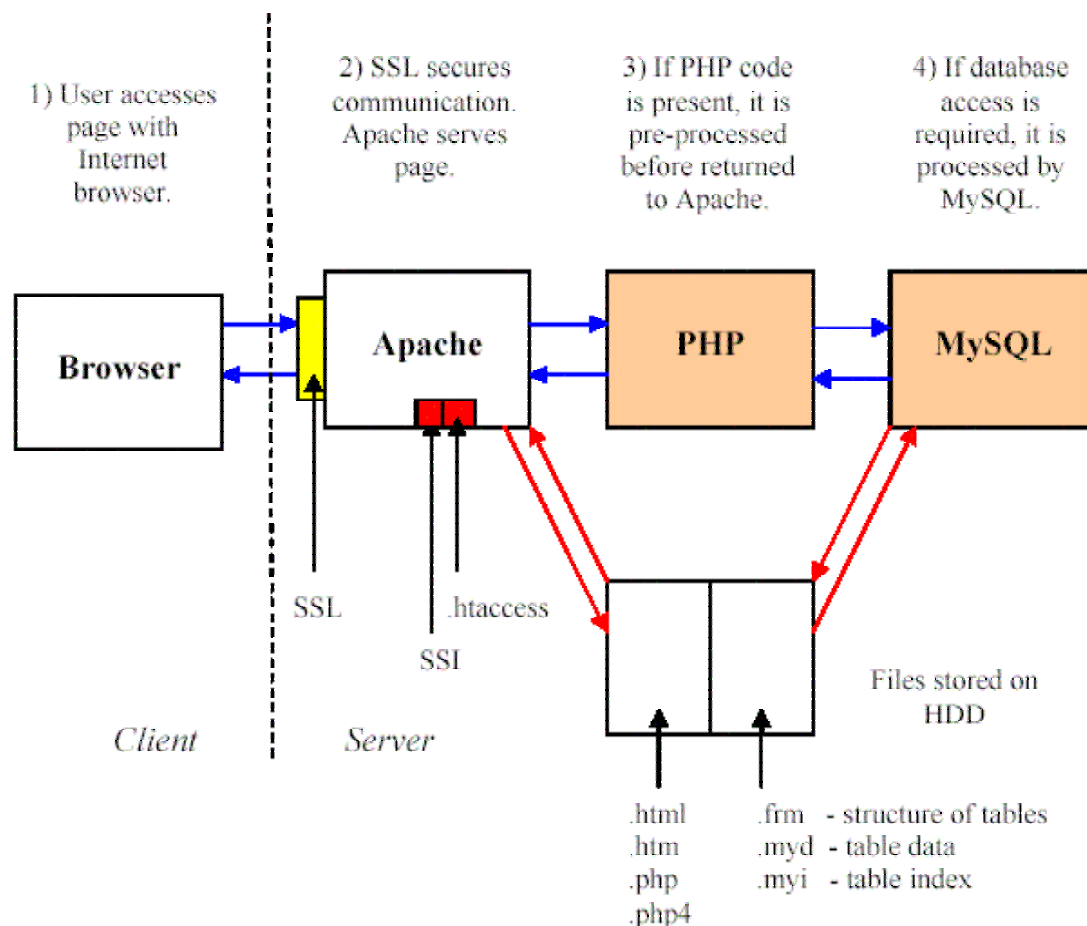
Continue the development of a MySQL based back-end database and an Apache based front-end web site with the use of PHP. Establish a Technology Scoping Document for each class of target customers, identify the state of each technology (who are the suppliers and what are the related standards), identify the existence of skills in the New Zealand IT industry. Expand the scoping document to show up to 2 levels of knowledge areas, search for sources of information and knowledge, and register key points and guidelines for each.

Other objectives of the knowledge base are:

- Identification of potential clients and suppliers
- Implementation a gateway displaying project status and information for clients
- Implementation a portal of technical specifications and reports for staff
- Implementation of web server
- Documentation of project deliverables
- Research for related information and standards

Knowledge base Architecture:

We went through the design and the user interface of the knowledge base and got a rough idea of how the KB works and have been implemented. Then we discuss about how we are going to implement the KB and make some changes to it.



The diagram above shows the architecture of the knowledge base. The KB consists of three parts: MySQL database, Apache web service and PHP code to communicate between Apache server and the database. We mainly focused on the PHP coding and documentation and modify the database.

Hardware and software used for the Knowledge Base:

Hardware:

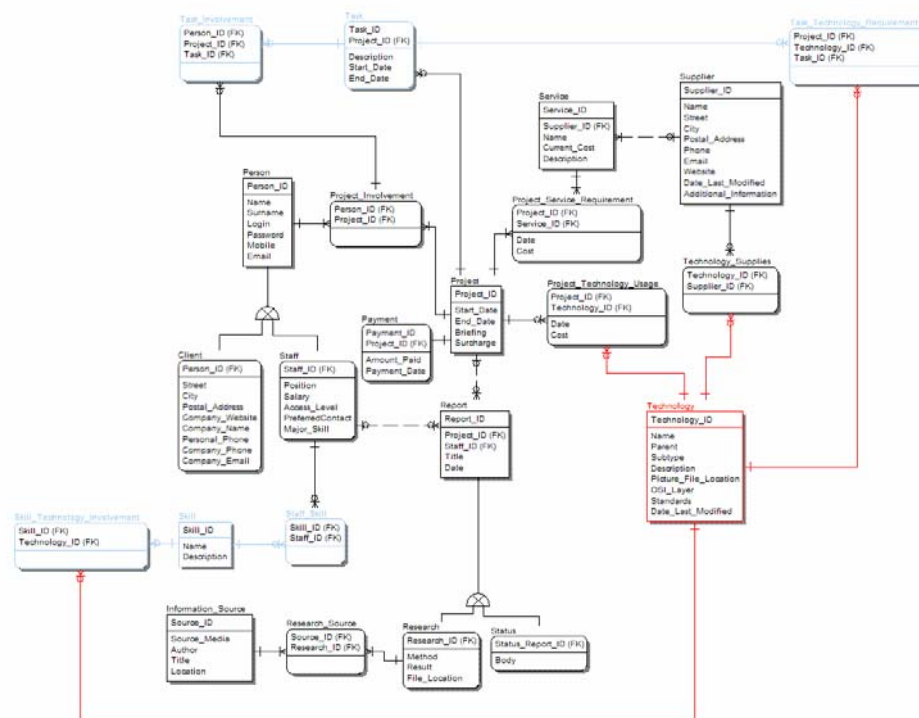
- Processor: Intel Celeron 300A
- Memory: 128MB PC-133 SDRAM
- Mother Board: ASUS P2B-F
- Hard Disk: Seagate U6 20GB
- Ethernet Adaptor: Accton EN1207D-TX

Software:

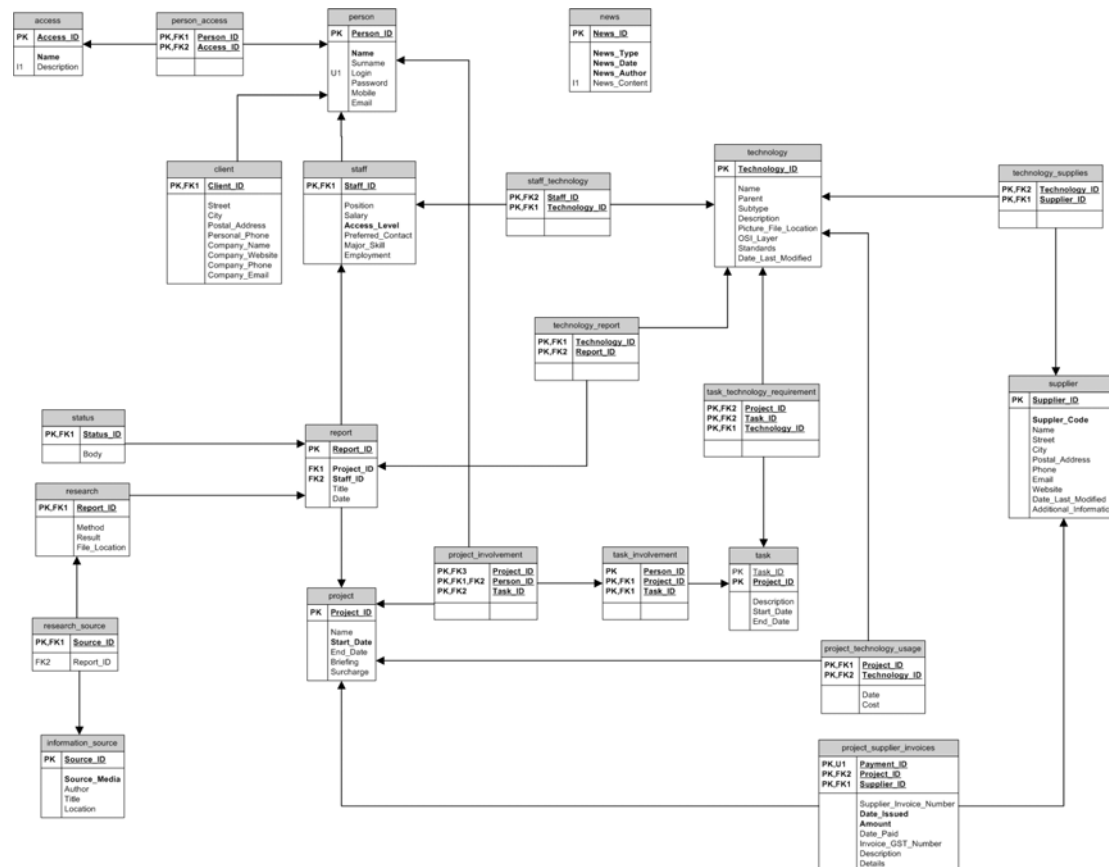
- Operating System: Linux Red Hat 7.3 (Kernel 2.4.18)
- Web Service: Apache 2.0.39
- Front End: PHP 4.2.2
- Database: MySQL 3.23.51

Database Design:

We reviewed the architecture and design of the database and made some changes to them.



ERD for the Database Version 1.1



ERD for the Database Version 1.2

Some major changes to the database:

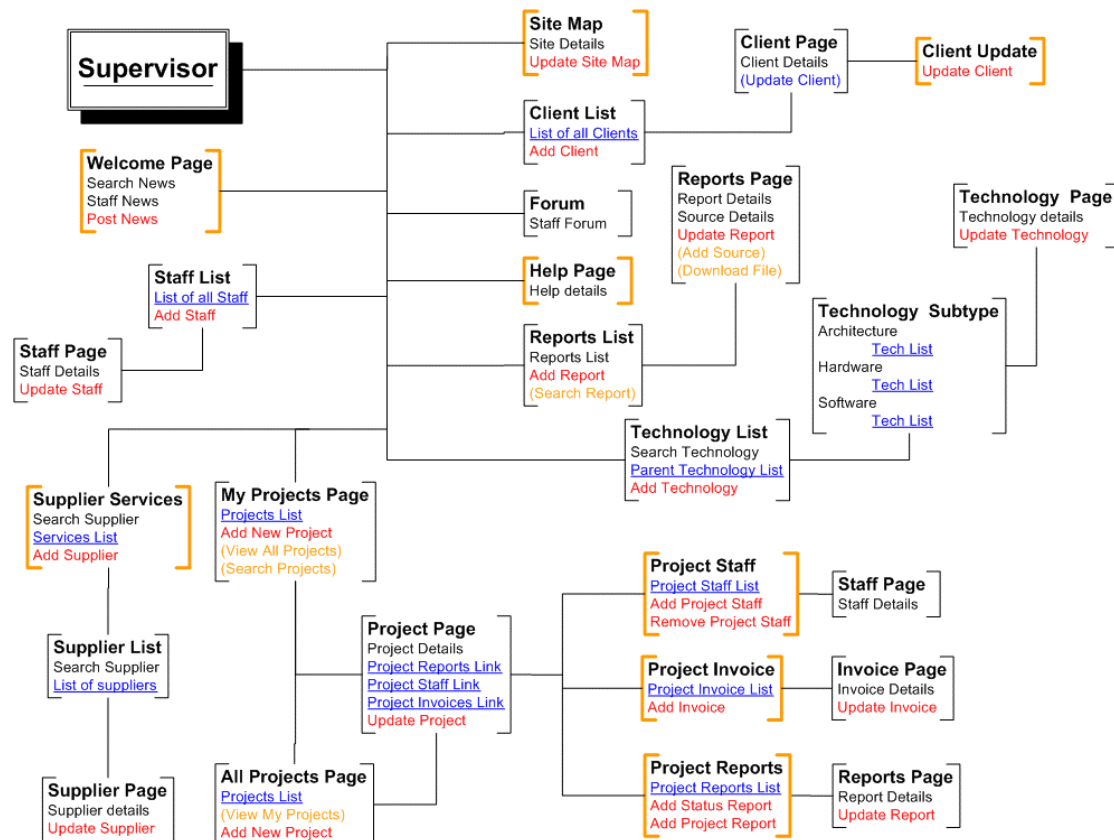
1. Added Access level table and associative table for linking person and access level.

Originally, the access levels were divided into three groups:

- ◆ Supervisor
- ◆ Staff
- ◆ Client

The supervisor has the highest level of permission and is able to add/delete/update/view all the information inside the knowledge base. For example a supervisor can perform:

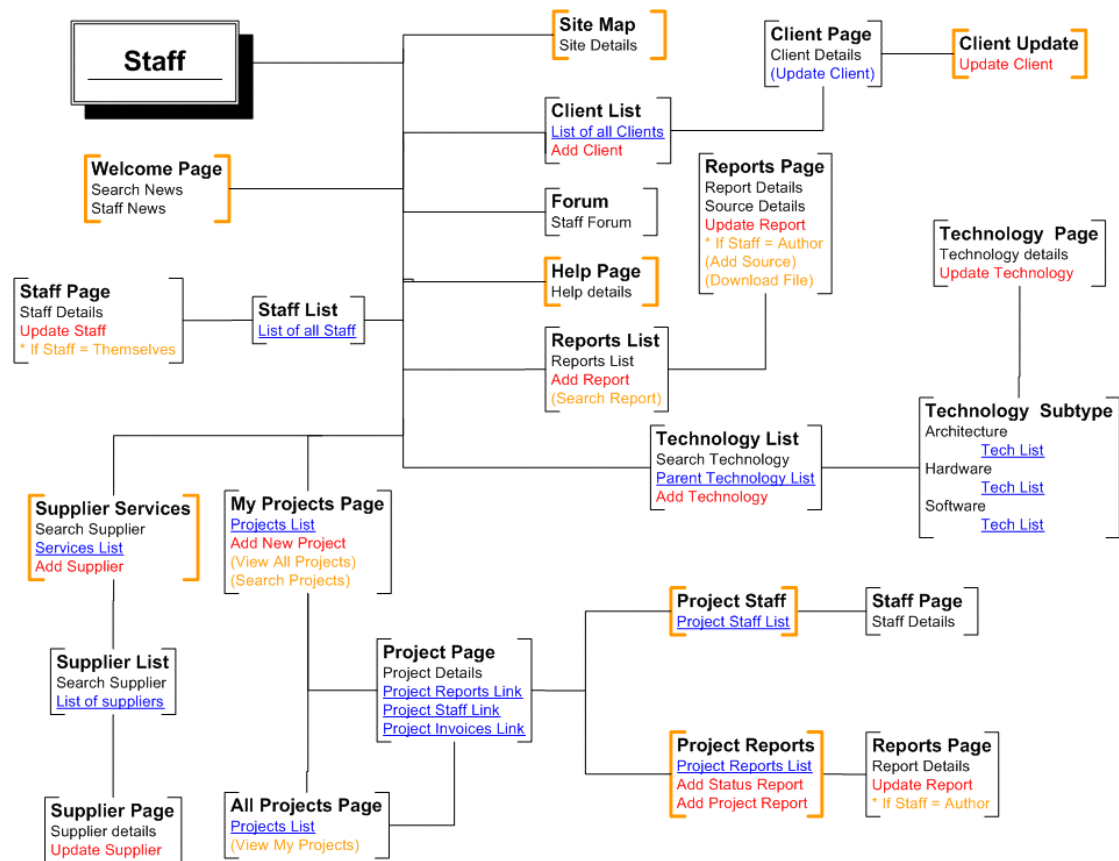
- Add/remove/update details of staff and clients
- View all the information about projects and update the status of the projects
- Add/remove/update technology trees and details of suppliers



The diagram above is the functions that the functions supervisor may perform in the KB. The blocks in orange are the entities that we have modified or added more functions into them.

The **staff** has the medium level of permission and is able to add/delete/update/view certain information inside the knowledge base. For example a staff can perform:

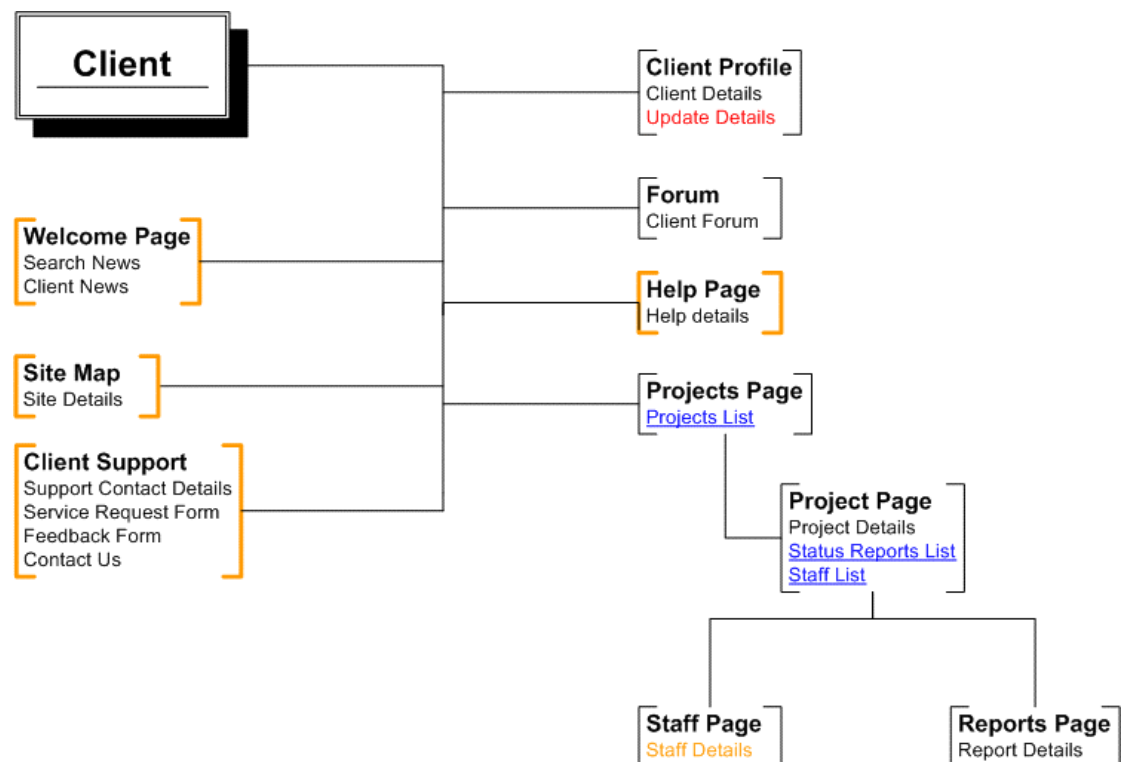
- Update details of staff him/herself
- Add/remove/update details of clients
- View all the information about projects and update the status of the projects only if he/she is involved in the project
- Add/remove/update technology trees and details of suppliers
- Post/update News to the knowledge
- Post/update/remove status reports or research reports



The diagram above is the functions that the functions staff may perform in the KB. The blocks in orange are the entities that we have modified or added more functions into them.

The **client** has the lowest level of permission and is only able to view certain information inside the knowledge base. For example a client can perform:

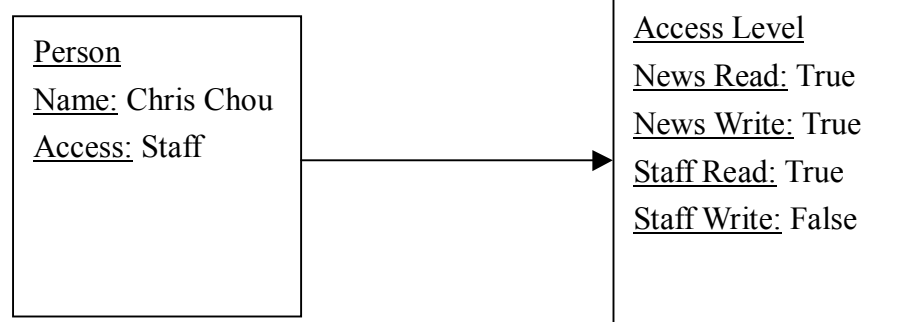
- Update details of client him/herself
- View the information about projects only if he/she is involved in the project
- Post/update News to the knowledge
- Use the forum to contact other members



The diagram above is the functions that the functions client may perform in the KB. The blocks in orange are the entities that we have modified or added more functions into them.

Originally, every person in each class of access level would be given exactly the same permission. But soon we found out that this is not we wanted, we would like to give each person different kind of permissions even if they are in the same class of access level. So we created an access level table and associated the table with each person. The access level table contains the permissions to each section of the knowledge base and we were able to set permission to each person easily.

Example of the access level:



The diagram above shows the staff has the permission to view and add/update/remove the News section of the knowledge base. He also has the permission to view all staff but with no permission to add/remove other staff.

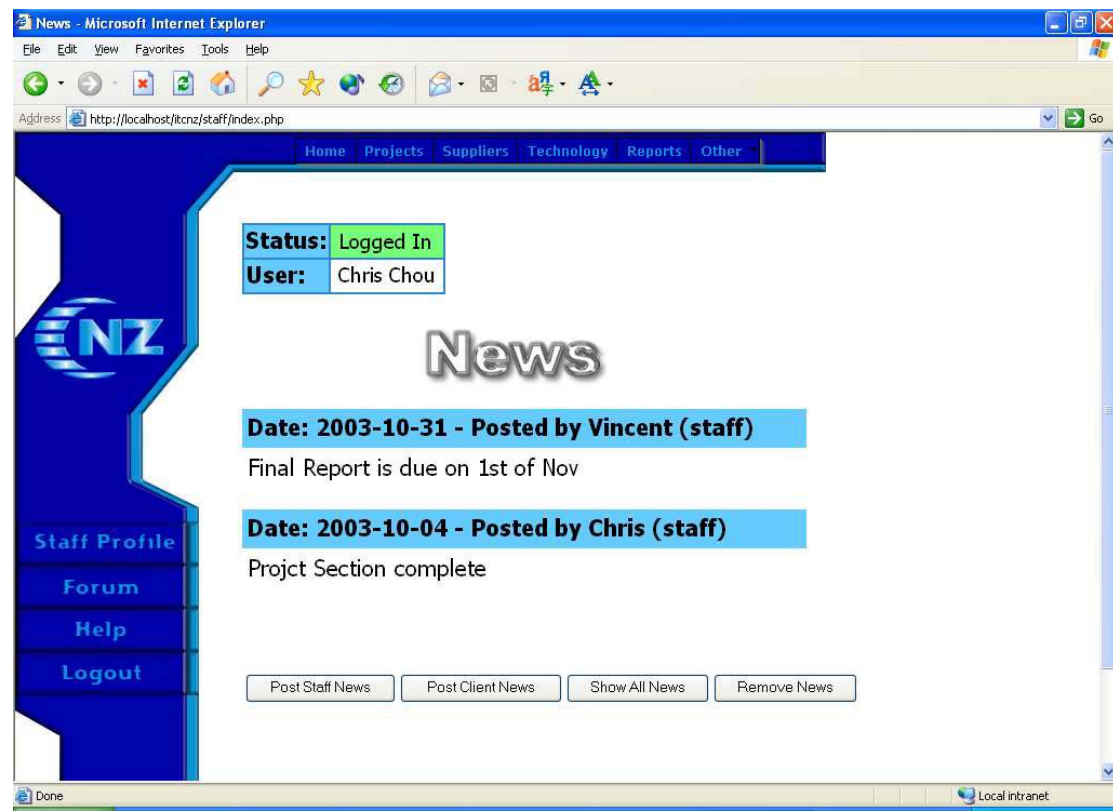
2. We also remove some unused table from the database and modified some of the attributes from certain tables.

Implementation of the database:

We have been going through the codes and the database design and made some changes to the database. This was a great opportunity for us to apply the skills and knowledge learnt from university and make practical use of them. The related papers I studied in university are:

- Database Systems (INFOSYS 222)
- ◆ Database design and implementation
- OOA and OOD design of software (COMPSCI 230)

Web site design and implementation (PHP Coding):



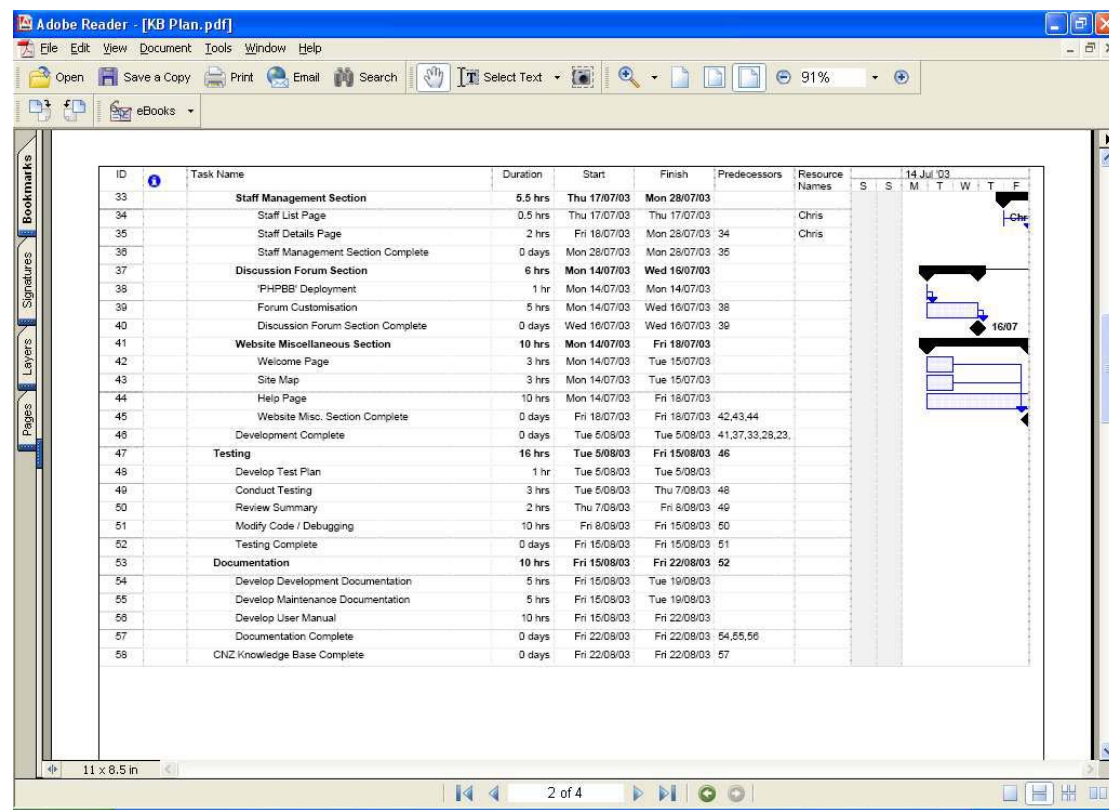
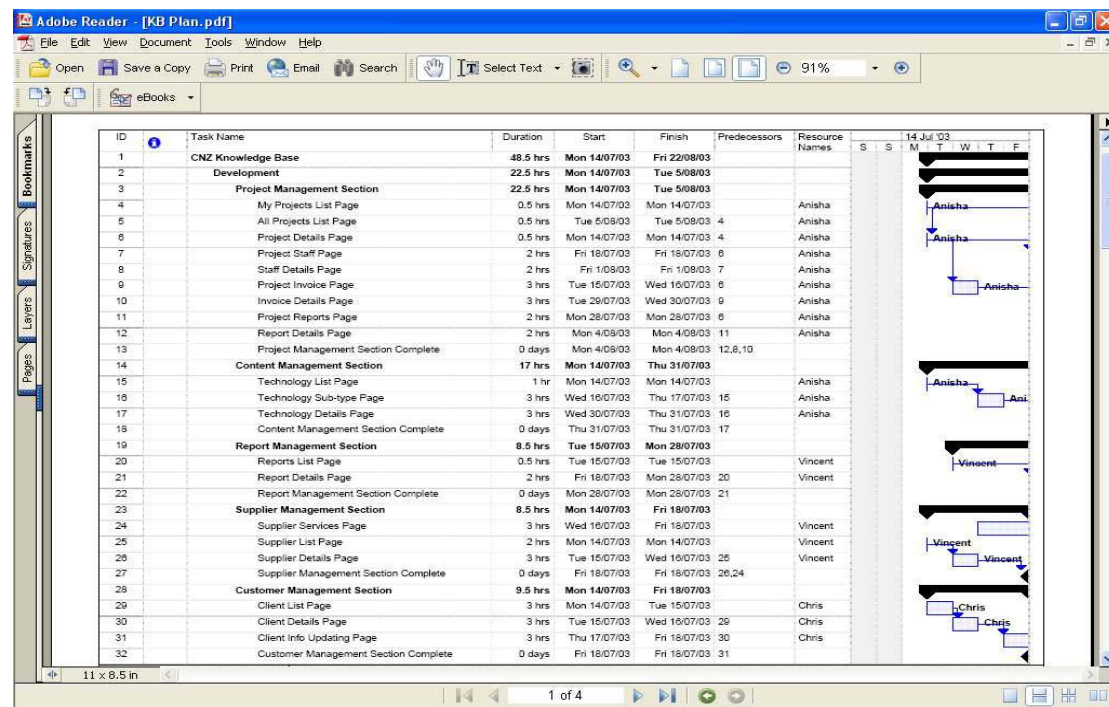
Screen shot of the main page of the knowledge base

There were many sections to be completed at the beginning of second semester, and our supervisor (Edmond Chan) had assigned each of us with several tasks. Edmond also made the Gantt chart for the time management and team collaboration.

Here are the screen shot of the Gantt chart; it shows which sections were assigned to each team members and the duration of the work.

The tasks we were assigned to:

Anisha	Vincent	Chris
Project Management Section	Report Management Section	News Section
Content management Section	Supplier Management Section	Customer Management Section
	Technology Management Section	Staff Management Section
		Access Level



News Management Section:

The News section is the section for staff and client to post/update and remove news about the company, project and events.

The screenshot displays a web browser window with the title "CNZ :: ITE - Add News - Microsoft Internet Explorer". The address bar shows the URL "http://localhost/itcnz/staff/enterNews.php?staffNews=true". The browser's menu bar includes "File", "Edit", "View", "Favorites", "Tools", and "Help". The toolbar contains various icons for navigation and actions.

The web application interface features a blue sidebar on the left with the "CNZ" logo and a list of links: "Staff Profile", "Forum", "Help", and "Logout". The main content area has a top navigation bar with links: "Home", "Projects", "Suppliers", "Technology", "Reports", and "Other".

In the main content area, there is a status box indicating "Status: Logged In" and "User: Chris Chou". Below this is a large heading "Add staff News". A "Back To News" button is positioned below the heading. Further down is a form with the following fields:

- Author:** A text input field containing the value "Chris".
- Date:** A text input field containing the value "2003-10-31".
- Content:** A large text area for entering the news content.

At the bottom of the form are two buttons: "Add Staff News" and "Reset". The browser's status bar at the bottom indicates "Done" and "Local intranet".

Post News

Remove News - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://localhost/itcnz/staff/selectNews.php

Home Projects Suppliers Technology Reports Other

Status: Logged In
User: Chris Chou

Remove News

Author	Date	Type	Content
☐ Vincent	2003-10-31	staff	Final Report is due on 1st of Nov
☐ Chris	2003-10-04	staff	Project Section complete

Remove Selected News Back

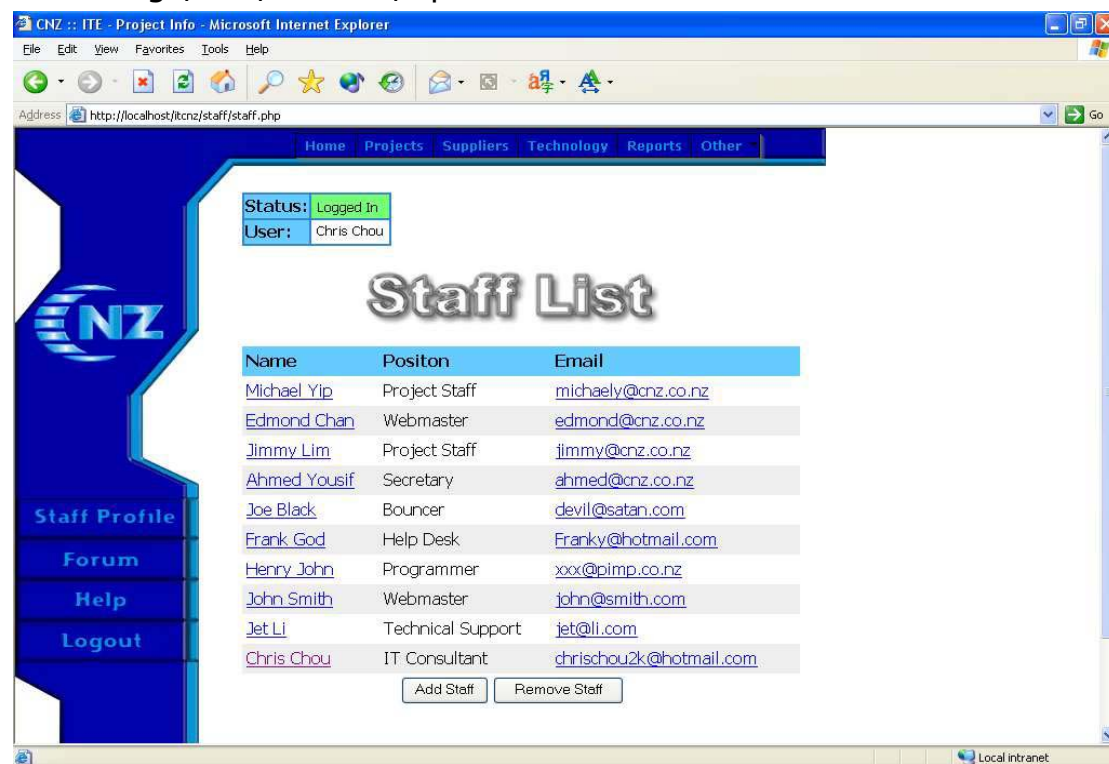
Staff Profile
Forum
Help
Logout

Done Local intranet

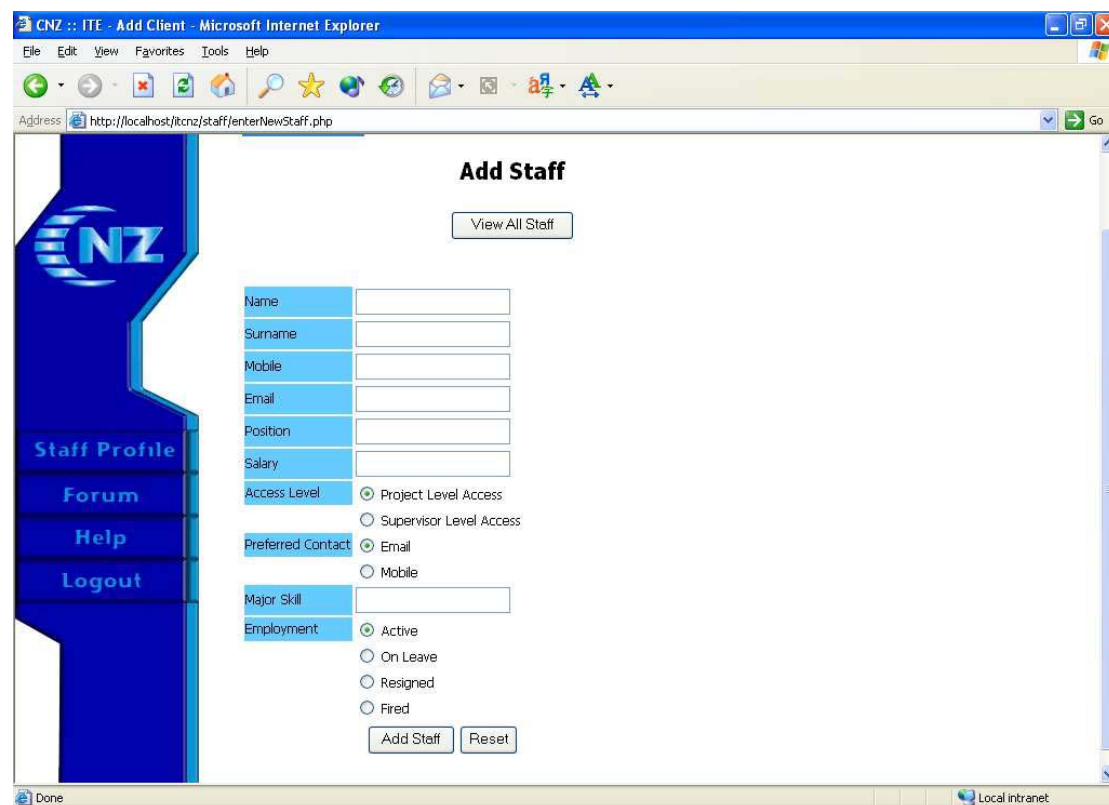
Remove News

Staff Management Section:

The staff management section is the section for staff and supervisor to manage/add/remove/update details of staff.



List of Staff



Addition of a staff

Status: **Logged In**
 User: Chris Chou

User Details

ID	27	
Name	Chris	
Surname	Chou	
Login	chris1	
Password		Please retype password:
Mobile	211404193	
Email	chrischou2k@hotmail.com	
Position	IT Consultant	
Salary	\$0	
Access Level	supervisor	
Preferred Contact	email	☒ Email ☐ Mobile
Major Skill		
Employment	active	

Update details of Staff

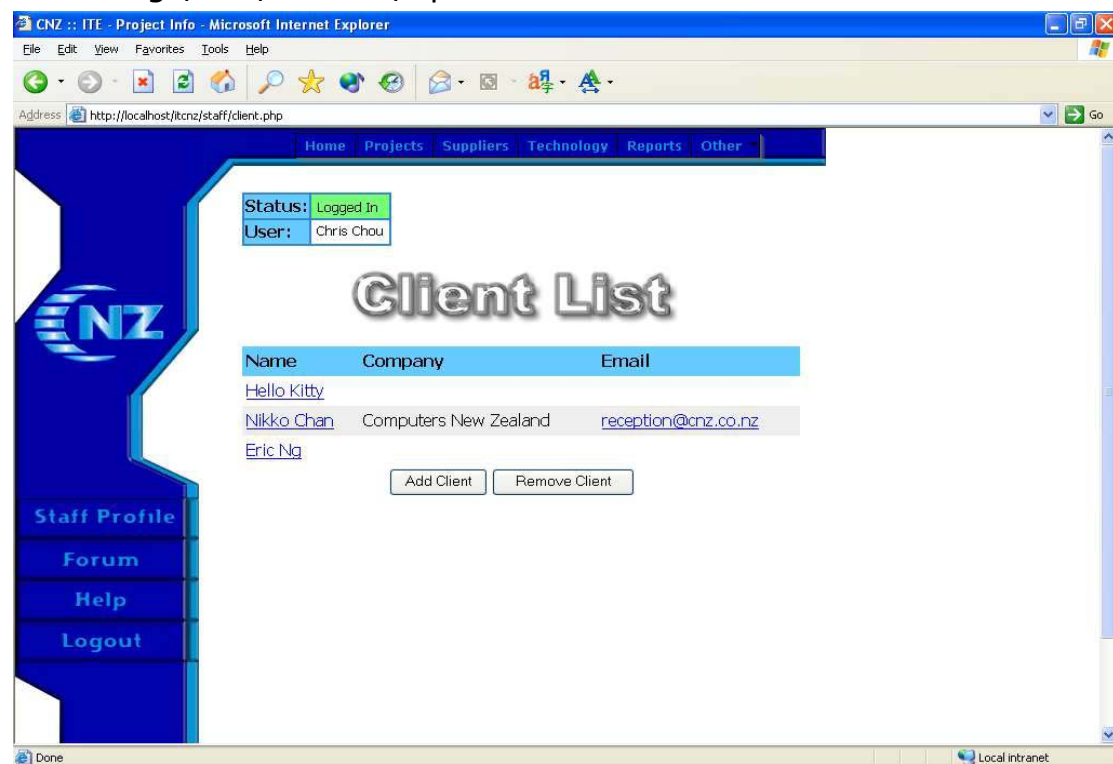
Remove Staff

Name	Position	Email
☐ Michael Yip	Project Staff	michaely@cnz.co.nz
☐ Edmond Chan	Webmaster	edmond@cnz.co.nz
☐ Jimmy Lim	Project Staff	jimmy@cnz.co.nz
☐ Ahmed Yousif	Secretary	ahmed@cnz.co.nz
☐ Joe Black	Bouncer	devil@satan.com
☐ Frank God	Help Desk	Franky@hotmail.com
☐ Henry John	Programmer	xxx@pimp.co.nz
☐ John Smith	Webmaster	john@smith.com
☐ Jet Li	Technical Support	jet@li.com
☐ Chris Chou	IT Consultant	chrischou2k@hotmail.com

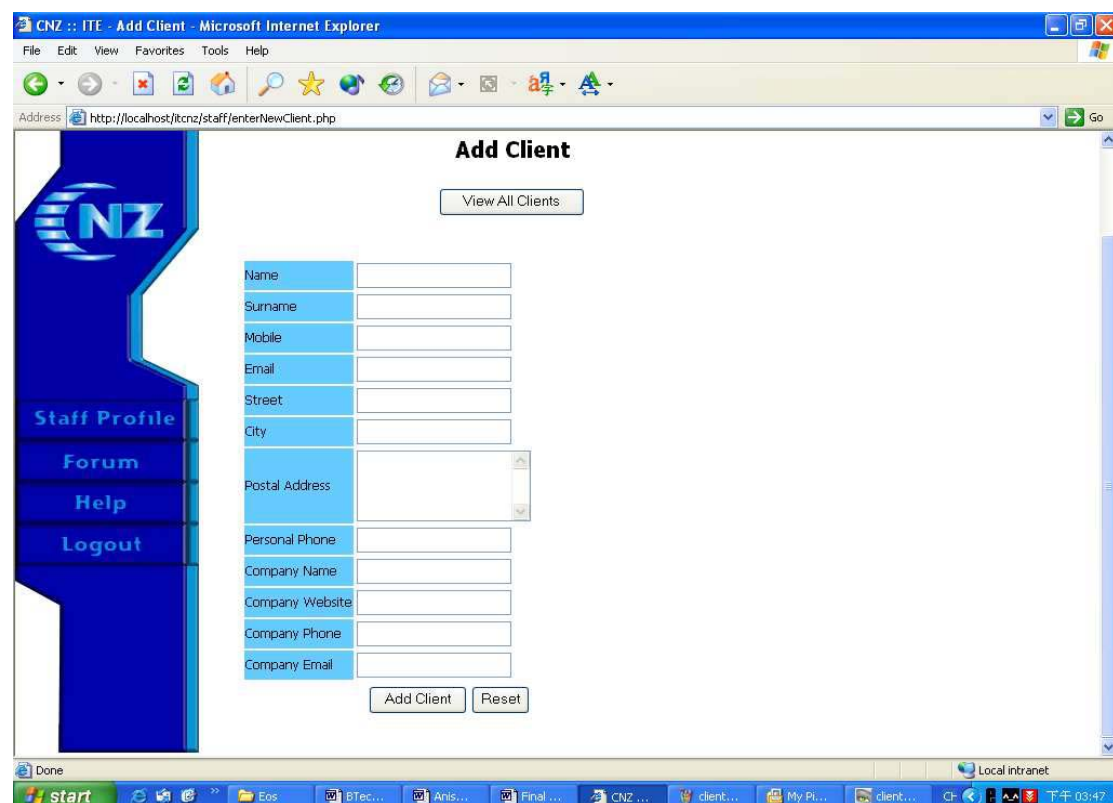
Removal of a Staff

Client Management Section:

The client management section is the section for staff and supervisor to manage/add/remove/update details of clients.



List of clients



Addition of a client

Client Details

Client Profile
Forum
Help
Logout

ID: 7
Name: Nikko
Surname: Chan
Login: nikko1
Password:
Mobile: 21696969
Email: nikko@cnz.co.nz
Street: 12 Bocage Lane
City: Auckland
Postal Address: 12 Bocage Lane, Hobsonville, Auckland
Personal Phone: 21232323
Company Name: Computers New Zealand
Company Website: http://www.cnz.co.nz
Company Phone: 4153303
Company Email: reception@cnz.co.nz

Please re-type to confirm

Update details of a client

Remove Client(s)

Status: Logged In
User: Chris Chou

Home Projects Suppliers Technology Reports Other

Name	Company	Email
☐ Hello Kitty		
☐ Nikko Chan	Computers New Zealand	reception@cnz.co.nz
☐ Eric Ng		

Staff Profile
Forum
Help
Logout

Removal of a client

Implementation of the knowledge base:

We had put a lot of effort into completing the knowledge base for the second half of the year. We improved and almost completed the KB. This is a great opportunity for us to apply the skills and knowledge learnt from university and make practical use of them. The related papers I studied in university are:

- ◆ Database Systems (INFOSYS 222)
- ◆ PHP coding (COMPSCI 334)

Skills Developed and knowledge acquired:

1. Specification of computer hardware platforms
2. Network and power management protocols
3. Report writing and presentation skills
4. Time management and team collaboration skills
5. Communication skills
6. Know how to set up the environment for MySQL, Apache and PHP
7. Increased my knowledge of PHP programming
8. Increased research skills
9. Increased skills of drawing of ERD and Database diagrams
10. Strengthened my skills and knowledge on linking the PHP and database together
11. Increased the skills of designing a web site.
12. Learnt and actually involved in the operation of a company
13. Been to conferences and widened my views
14. Learnt how to work as a team and help each other
15. Gained confidence on presentation and report writing

Project Conclusion

Overall it has been a very successful and fruitful project to all of us, we are very happy that we had been assigned to work on the MTN project. I have gained lots of knowledge and skills from the project and practiced many skills acquired from the four years of studying at University. Many skills like research and team collaboration skills were developing while working on the project. These skills and knowledge I didn't learn from University are invaluable to me. I also gained confidence by practicing the skills and knowledge learnt from University, they are no longer abstract theories but useful resources to me.

We were quite impressed that we finally made the knowledge base operational. And when I think that one day the knowledge base is actually being used by the company, and it makes me feel that all the hard work we had put in worthwhile.

In conclusion, during the project period I have submitted around 40 research report and weekly reports, and the team has made the knowledge base operational and ready to use. Our supervisor, Mr. TN Chan, says that the knowledge base might take 3-4 years to complete. So I believe that the knowledge base will be completed and full operational in no time.

The final year project is truly a must-do project; it provides a bridge between the theories acquired from University of Auckland and commercial application in the IT industry. It also provides invaluable experience and great opportunity for IT students. This is the most substantial year of the four year of studying at University of Auckland!

Appendix

Research Reports:

Research on hardware platforms Intel Springdale, Canterwood

Classification:

Springdale & Canterwood:

Next generation chipset for Intel CPU (Northwood and Prescott) with integrated RAID, twin bank DDR and CSA technologies.

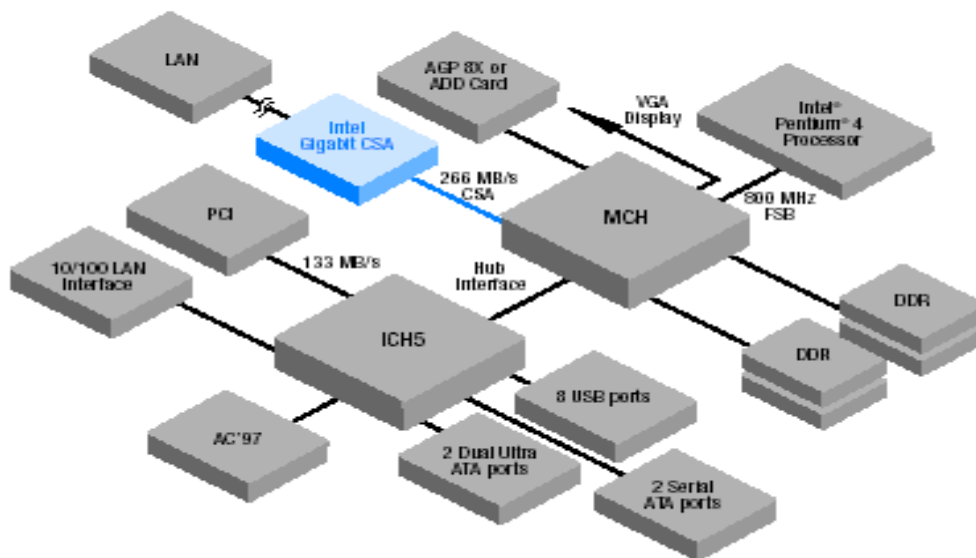
Intel® Springdale Chipset (865)

Features:

Springdale will feature support for 533/667 MHz buses, four DIMMs supporting up to 4GB of dual channel DDR 266/333 memory, AGP4X/8X, and CSA for GbE (Gigabit Ethernet) as a communications port. It also supports:

- UDMA 66/100 and Serial ATA 150
- Eight USB 2.0 ports, and eight PCI masters
- Support Pentium 4 and Celeron 478
- Hyper-Threading Technology

CSA (Communication Streaming Architecture) - Reducing the Bottleneck for PCI Networking: By creating a new communications interface that directly connects the Memory Controller Hub (MCH), to the network controller, Intel has created Communication Streaming Architecture (CSA). Communication Streaming Architecture (CSA) is a new communications architecture that creates a dedicated link from the MCH to the network interface (Figure 3), offloading network traffic from the PCI bus. CSA, based on HubLink Architecture, provides a throughput of 266 MB per second, making it twice as fast as the PCI bus interface.

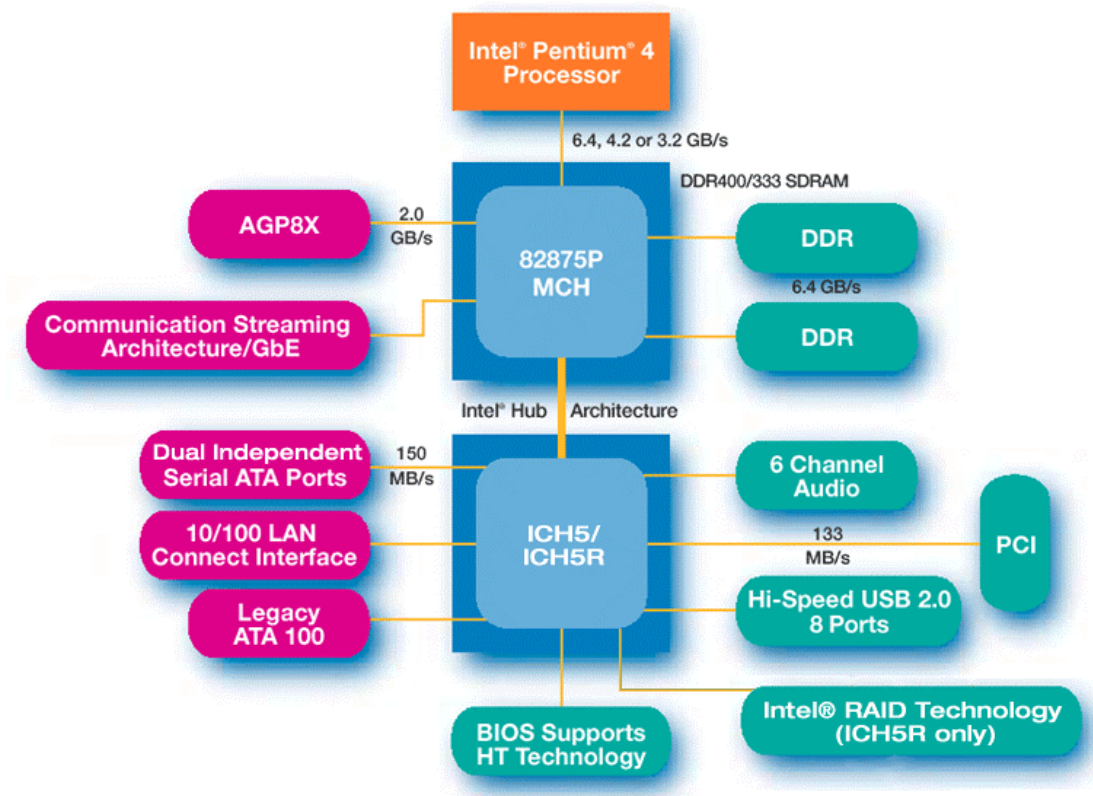
Figure 3. CSA-based architecture**Competition:**

VIA PT600 and SiS 655FX chipsets will support similar features to the Springdale with poorer performance but better price.

Intel® Canterwood Chipset (875P)

Features:

Canterwood chipset will support 3.06 GHz+ P4 CPU on 800MHz FSB, Dual DDR 400 memory, Intel Hyper-Threading Technology, Intel Performance Acceleration Technology (Increases memory and system-level performance by optimizing internal data paths).



Intel Canterwood 875P

Memory Bandwidth and Requirements for Dual Channel:

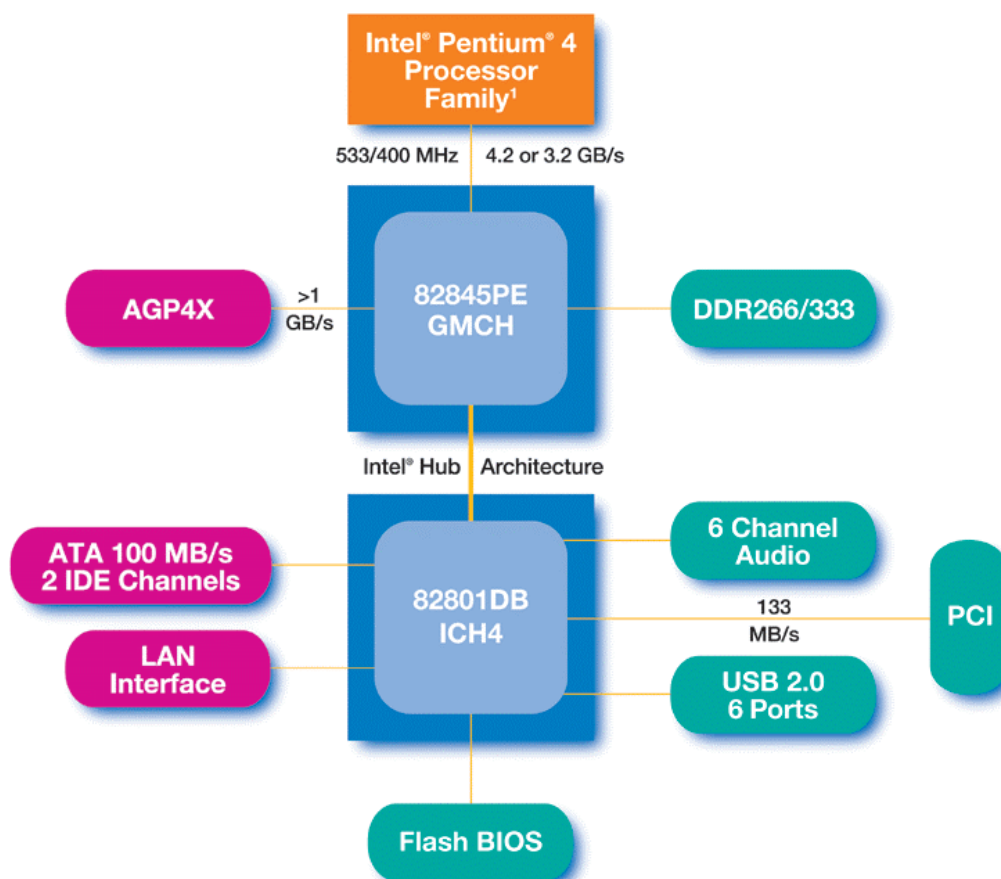
With optimal features, the theoretical memory bandwidth is 6.4 GB/s, which is therefore synchronous to the bandwidth of the CPU. If desired, however, asynchronous operation is also possible. The 6.4 GB/s value is calculated from 200 MHz memory clock x 8 bit x 2 (Double Data Rate) x 2 channels.

In order to activate dual-channel mode, the DIMM configuration for each channel must be consistent with that of the other, including:

- the same module capacity in pairs (2 x 128 MByte, 2 x 256 MByte, 2 x 512 MByte, etc.);
- the same DRAM technology (2 x 256 Mbit or 2 x 512 Mbit);
- the same DRAM bus width (x8 or x16);
- single-sided or dual-sided modules must be used in pairs;
- memory slots must be fitted symmetrically (first Channel A, Slot 0 and Channel B, Slot 0, then Channel A, Slot 1 and Channel B, Slot 1).

Comparison with the complementary technologies:

Canterwood is based on the previous 845PE chipset, developed with DDR333 and optimized to support the Intel® Pentium® 4 processor supporting Hyper-Threading Technology, adding intelligence to help manage and prioritize multiple threads received from the microprocessor.



¹ Validated with Intel® Pentium® 4 processor in the 478-pin package

Intel 845PE chipset

Here is the comparison between these two chipsets:

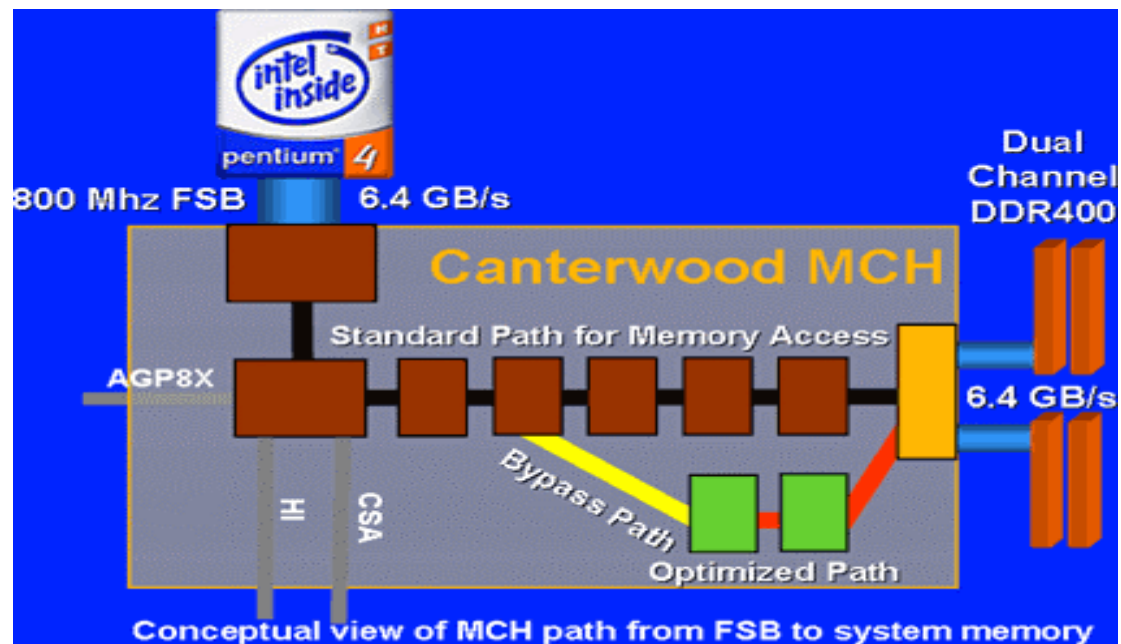
Features	845PE	Canterwood 875P
System Bus	400/533 MHz	400/533/800 MHz
Hyper-Threading Technology Support	Yes	Yes
Intel® Hub Architecture	Yes	Yes
DDR SDRAM	266/333	Dual-Channel DDR 266/333/400 SDRAM Memory with ECC Support
AGP Interface	4x	8x
USB 2.0	Yes	Yes
Ultra ATA/100	Yes	Yes
AC'97 Controller	Yes	Yes
Intel® Communication Streaming Architecture	No	Yes
Dual Independent Serial ATA Controllers	No	Yes
Integrated Intel® RAID Technology	No	Yes

Intel® Performance Acceleration Technology:

Intel uses a small trick in order to squeeze an extra drop out of the MCH. Through an improvement in the logic design, the manufacturer has succeeded in saving one cycle when the CPU requests to perform a memory access, and a further cycle with the DRAM Chip Select.

However, this only works with the 875/ Canterwood **and** 200 MHz FSB.

The Springdale does not have PAT. Generally, the selection process for the Canterwood and Springdale chipsets is made based on "Speed Binning," as it is already known in the fabrication process of CPUs. If the silicon does not meet the requirements of the Canterwood qualification, such as PAT, then it can only be put through the Springdale qualification test. The chip makes a trip to the garbage bin only when it fails both of the tests.



Intel® Prescott processors

Intel's next-generation desktop platform based on the Intel® NetBurst™ architecture and code-named Prescott. Prescott is slated to be one of the first high-volume chips to be made using Intel's 90-nanometer process and incorporating Intel's Hyper-Threading (HT) Technology.

Features:

- 800MHz FSB
- 16k L1 cache
- 1MB L2 cache (Doubles current Pentium 4 cache)
- Advanced Hyper-Threading Technology
- Expected $\geq 3.2\text{GHz}$ (scaleable up to 5GHz)
- Availability: Q4 03

Reference:

<http://www.theinquirer.net/>

<http://www.intel.com/apac/eng/products/mobiletechnology/index.htm>

<http://.tomshardware.com/>

<http://developer.intel.com/design/network/papers/252451.htm>

845PE:

http://www.intel.com/design/chipsets/845pe/index.htm?iid=ipp_desk_chip+prod_845pe&

Internet Small Computer System Interface (iSCSI)

Introduction:

iSCSI is an Internet Protocol (IP)-based storage networking standard for linking data storage facilities, developed by the Internet Engineering Task Force (IETF). By carrying SCSI commands over IP networks, iSCSI is used to facilitate data transfers over intranets and to manage storage over long distances. The iSCSI protocol is expected to help bring about rapid development of the storage area network (SAN) market, by increasing the capabilities and performance of storage data transmission. Because of the ubiquity of IP networks, iSCSI can be used to transmit data over local area networks (LANs), wide area networks (WANs), or the Internet and can enable location-independent data storage and retrieval.

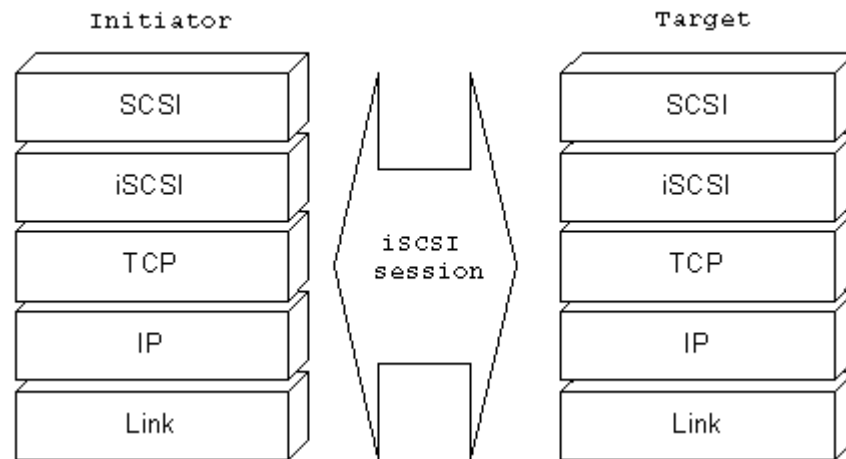
How iSCSI works:

When an end user or application sends a request, the operating system generates the appropriate SCSI commands and data request, which then go through encapsulation and, if necessary, encryption procedures. A packet header is added before the resulting IP packets are transmitted over an Ethernet connection. When a packet is received, it is decrypted (if it was encrypted before transmission), and disassembled, separating the SCSI commands and request. The SCSI commands are sent on to the SCSI controller, and from there to the SCSI storage device. Because iSCSI is bi-directional, the protocol can also be used to return data in response to the original request.

Competing Technology:

iSCSI is one of two main approaches to storage data transmission over IP networks; the other method, Fibre Channel over IP (FCIP), translates Fibre Channel control codes and data into IP packets for transmission between geographically distant Fibre Channel SANs. FCIP can only be used in conjunction with Fibre Channel technology; in comparison, iSCSI can run over existing Ethernet networks. A number of vendors, including Cisco, IBM, and Nishan have introduced iSCSI-based products (such as switches and routers).

Below is a model of the iSCSI protocol levels which allows us to get an idea of an encapsulation order of SCSI commands for their delivery through a physical carrier.

**Commercial deployment of iSCSI:**

IBM TotalStorage IP Storage 200i -- The IBM TotalStorage™ IP Storage 200i provides storage that is directly attachable to an Ethernet LAN. This product implements newly emerging industry standards for the transport of SCSI storage protocols over IP, commonly referred to as iSCSI.

**Product highlights:**

- Delivers industry-leading iSCSI technology
- Provides support for 109.2GB up to 3.52TB of RAID storage
- Supports Windows NT®, Windows® 2000, and Linux environments
- Gain many of the benefits of a Storage Area Network (SAN), through implementation and deployment on a more easily managed, and lower-cost IP-based Ethernet network

HP StorageWorks SR2122 iSCSI storage router –

IP Storage product that delivers SAN-like storage across an Ethernet network. The HP StorageWorks SR2122 iSCSI Storage Router is an iSCSI to Fibre Channel Bridge that enables access to block storage on a Fibre Channel SAN across an Ethernet network. The SR2122 Storage Router is the first HP storage product delivered to this emerging market of customers looking to extend the benefits of their existing FC SAN's. Some of the basic benefits include: consolidated storage, improved disk utilization, centralized backup and management and improved utilization of IT staff experience and expertise.

**Product Features:**

- **Affordable:** delivers SAN storage at significantly lower cost than FC SAN storage
- **Flexible:** supports two Ethernet and two Fibre Channel connections
- **Integrated:** fully tested by HP standards to work with key subsystems

Cisco MDS 9500 Series of Multilayer Directors - Layering Intelligent Features onto a High Performance Core to Provide Uncompromising High Availability, Security, Scalability, and Ease of Management.



Product Features:

- High availability director: The Cisco MDS 9500 Series combines non-disruptive software upgrades, stateful process restart/failover, and full redundancy of all major components for a new standard in director-class availability; supports up to 256 1 / 2 Gbps auto-sensing Fibre Channel ports in a single chassis and up to 768 Fibre Channel ports in a single rack—1.44 Tbps of internal system bandwidth ensures smooth integration of future 10-Gbps modules
- Multiprotocol / multitransport: The multilayer architecture of the Cisco MDS 9500 Series enables a consistent feature set over a protocol agnostic switch fabric; seamlessly integrates **Fibre Channel**, **iSCSI**, and **FCIP** in one system. Flexible architecture allows integration of future storage protocols.
- Comprehensive security framework: The Cisco MDS 9000 Family supports RADIUS authentication, SNMPv3, role-based access control, SSH, SFTP, FC-SP, Virtual SANs, hardware-enforced zoning, and Access Control Lists (ACLs).

Scalable Expansion with Maximum Investment Protection

Available in 6-slot, 9-slot and 13-slot configurations for up to 256 1 / 2 Gbps Fibre Channel ports in a single chassis and up to 768 Fibre Channel ports per rack, the Cisco MDS 9500 Series provides smooth scalability for your growing storage needs. 1.44 Tbps of internal system bandwidth provides up to 160 Gbps to each module, ensuring the MDS 9500 Series is ready for integration of future 10-Gbps interfaces.

Introducing VSAN:

Another industry first for the Cisco MDS 9500 Series of Multilayer Directors, VSANs allow more efficient SAN utilization by creating hardware-based isolated environments within a single SAN fabric. Each VSAN can be zoned as a typical SAN and maintains its own fabric services for added scalability and resilience. VSANs allow the cost of SAN infrastructure to be shared among more users, while assuring absolute segregation and security of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis.

Cisco MDS 9500 Series System Summary

	Cisco MDS 9506	Cisco MDS 9509	Cisco MDS 9513
Available slots	6	9	13
System bandwidth (Terabits/sec)	1.44 Tbps	1.44 Tbps	1.44 Tbps
Redundant supervisor	Yes	Yes	Yes
Max Fibre Channel ports/chassis	128	224	256
Max iSCSI/FCIP ports/chassis	24	48	80
Rack units	7	14	19
Chassis/rack	6	2	2
FC ports/rack	768	448	512
Power supply options	AC and DC	AC and DC	AC

EMC Symmetrix DMX3000 - are fully integrated, high-performance networked storage systems optimized for server consolidation and heavy transaction-processing loads.

Product Features:

Absolute availability, non-disruptive everything

With DMX3000, you're always online. All three solutions go far beyond simple redundancy with non-disruptive upgrades and operations, online reconfigurations, and component serviceability—with no adverse effects on applications or service levels.

Advanced replication

Now the Symmetrix DMX series offers a range of replication options to address the varied requirements of your applications. New **EMC SRDF/Asynchronous** software enables you to copy and send any amount of data, any time, over any distance—and it's interoperable with **EMC SRDF**. With new **EMC Snap** software, you can reduce replication costs and recovery-point objectives by creating space-saving, logical point-in-time images of production volumes.

Expanded connectivity options

DMX3000 system offers exceptional connectivity flexibility. Each port can be individually configured as FICON for mainframe connectivity, Gigabit Ethernet for remote mirroring, and now, iSCSI—a first for high-end storage. And all models offer full support and compatibility for mainframe, open systems, and iSeries systems.

The new triple-bay **Symmetrix DMX3000** satisfies the most demanding high-performance/high-capacity consolidation requirements. With from 192 to 576 drives for a maximum capacity of over 84TB, the DMX3000 offers up to 128GB of global memory and up to 64 Fibre Channel host ports or ESCON channels and/or 32 FICON, Gigabit Ethernet, or iSCSI connections.

Appendix:

STORAGE OPTIONS provided by Dell:

	Networked Storage		Direct Attached		Tape
	Improve manageability, usability and costs by moving your storage out of your server		Satisfy immediate storage needs for overloaded servers		Protect your data and improve your backup with Dell's easy to use tape products
Product	☐ Storage Area Networks	☐ Network Attached Storage	☐ SCSI Disk Arrays	☐ Fibre Disk	☐ Tape Backup Drives
Use	Intensive data processing and management of large quantities of storage	File Sharing	Simple storage attached directly to your server or basic clustering	Buy the building blocks of a SAN as needed. Attach more servers as you grow	Simple single-server backup to automated backup for up to 28TB of data
Environment	300 GB or more with 1-100 servers	160 GB or more attached to an IP network or a SAN	Attach up to 2 servers directly to the array		Ranges from single internal tape drive to multi drive-tape libraries

References:

http://whatis.techtarget.com/definition/0,,sid9_gci750136,00.html

<http://www.digit-life.com/articles2/iscsi/>

<http://h18004.www1.hp.com/products/storageworks/sr2122/index.html>

http://www.cisco.com/en/US/products/hw/ps4159/ps4358/prod_brochure09186a00800c465a.html

http://www.dell.com/us/en/biz/topics/segtopic_storageHome.htm

http://www.emc.com/products/systems/symmetrix_DMx1000.jsp