Benchmarks Online

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TODAY'S CARTOON

Click on the title above for an information age laugh.

Don't forget to check out our monthly columns. This month's topics:

- **RSS Matters** -- "Resampling Based Statistics in S-Plus for Windows: An Example Using the MANOVA Procedure." Another look at this S-Plus procedure.

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- **Short Courses** -- Spring Short Courses are over, but there are other training opportunities for you this semester.

- **IRC News** -- Minutes of the Information Resources Council are printed here when they are available.

- **Staff Activities** -- New employees, people who are no longer employed at the Computing Center, awards and recognitions and other items of interest featured here.

Research and Statistical Support
University of North Texas

RSS Matters

This article is a reprint from the March 2000 [issue](#) of Benchmarks Online. The title has been changed slightly. Link to the last RSS article here: [A New Face in RSS](#). Link to the last RSS article in this series here: [Interactive Graphics in R (Part II - cont.): Kernel Density Estimation in One and Two Dimensions](#).
*- Ed.*

Resampling Based Statistics in S-Plus for Windows: An Example Using the MANOVA Procedure

By **[Dr. Rich Herrington](#)**, **Research and Statistical Support Services Manager**

This month we take a look at the bootstrap resampling capabilities of S-Plus. S-Plus has general bootstrapping functionality available so that nearly all statistical functions and expressions can be bootstrapped. S-Plus provides both parametric and nonparametric bootstrap confidence intervals.

From the main menu bar, we access the resampling menu from: **Statistics - Resample - Bootstrap**.
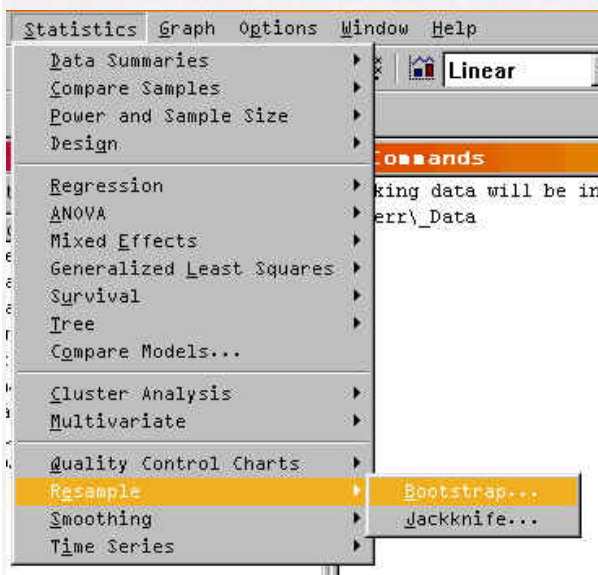
The menu for the Bootstrap facilities has five entry areas for initializing the Bootstrap analysis: **Model, Options, Results, Plot,** and **Jack After Boot**. Each of these option tabs are initialized with default values. However, the critical entry field which does not have a default entry is the **Expression** entry field. Entering an expression to bootstrap can be tricky as this assumes that the user has some knowledge of the syntax of the S-Plus language.
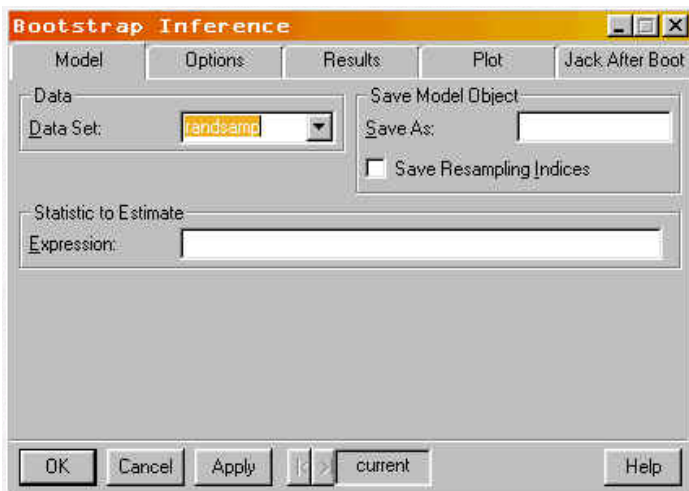
One way of avoiding having detailed knowledge of the syntax used to generate a particular analysis, is to generate the analysis before hand from the drop down menu system. Once this analysis has been run, the syntax used to generate the analysis is displayed. Essentially, the drop down menu system generates the syntax as entry fields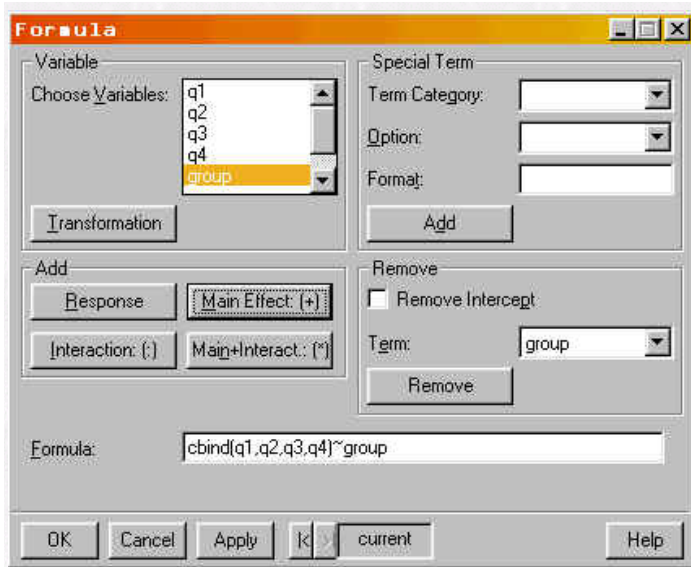 are filled in. After an analysis is run from the menu system, this syntax can be saved, cut and pasted back into the **Expression** entry field. In the following example we will perform a four-group MANOVA with four dependent measures.

Example

The data set we will use for our analysis will have four groups: a control group and three experimental groups (c1, e1, e2, e3). We see a screen capture of the object browser and the data worksheet:
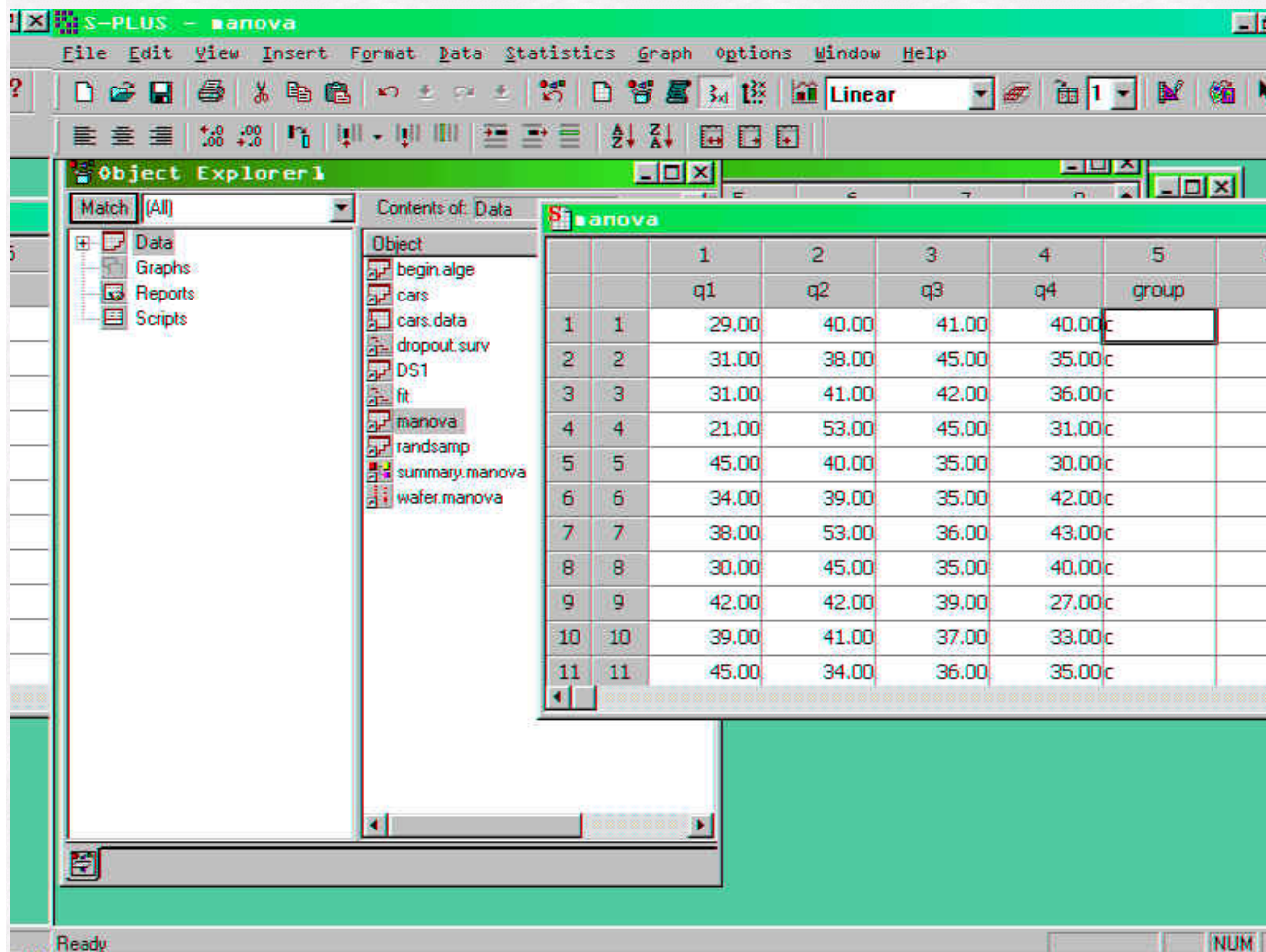
From the main menu bar select: **Statistics - Multivariate - MANOVA**. Select the **Create Formula** tab. Fill out the create formula tab with the following specifics. First select q1 through q4 and click **Add Response**. Then select group and click **Add Main Effect**:

```
Formula                                              _ □ X
┌─Variable────────────────────┐  ┌─Special Term──────────────┐
│ Choose Variables:  q1    ▲  │  │ Term Category:        ▼  │
│                    q2       │  │                          │
│                    q3       │  │ Option:               ▼  │
│                    q4       │  │                          │
│                    group  ▼ │  │ Format:                  │
│                             │  │                          │
│    Transformation           │  │         Add              │
└─────────────────────────────┘  └──────────────────────────┘
┌─Add─────────────────────────┐  ┌─Remove────────────────────┐
│  Response    Main Effect: (+)│  │ ☐ Remove Intercept        │
│                             │  │                           │
│  Interaction: (:)  Main+Interact.: (*)│ Term:   group    ▼ │
│                             │  │         Remove            │
└─────────────────────────────┘  └──────────────────────────┘

  Formula:     cbind(q1,q2,q3,q4)~group

  OK    Cancel    Apply   |< >|  current              Help
```

Select **OK** to return to the previous menu. Select **OK** once more to actually run the analysis. In the report window we see the following:

```
*** Multivariate Analysis of Variance Model ***

Short Output:
Call:
    manova(formula = cbind(q1, q2, q3, q4) ~
        group, data = manova, na.action =
        na.exclude)

Terms:
                  group Residuals
Deg. of Freedom     3       123

Estimated effects may be unbalanced█

Analysis of Variance Table:
           Df Pillai Trace approx. F
    group 3   0.0775        0.8089
Residuals 123
           num df    den df    P-value
    group    12        366      0.6413
Residuals
```

The calling function is listed under **Call**. Copy the **manova(formula.....)** and paste this into your **Commands window**. Use the **summary** function to summarize the call to the manova function. Assign this summary to an object, **man.out**, for example:

```
> man.out<-summary(manova(formula = cbind(q1, q2, q3, q4) ~
+        group, data = manova, na.action =
+        na.exclude))
> man.out
          Df Pillai Trace approx. F num df    den df    P-value
    group 3   0.0775        0.8089     12        366      0.6413
Residuals 123
> names(man.out)
[1] "row.names"     "SS"          "Df"          "Eigen.values" "Stats"        "test"
>
```

Typing **man.out** by itself displays the contents of this object. **names** displays the components of this list. We have six components to this list. To extract the fifth element **"Stats"**. We have to index the list in the following fashion:

```
> man.out[[5]]

, , Statistic
          pillai wilks lambda hotelling-lawley roy largest
group 0.07751211    0.9240134        0.08059128  0.05130897

, , approx. F
          pillai wilks lambda hotelling-lawley roy largest
group 0.8089407     0.8029447        0.7969582    1.564923

, , num df
      pillai wilks lambda hotelling-lawley roy largest
group     12             12                12         4

, , den df
      pillai wilks lambda hotelling-lawley roy largest
group    366     317.7817            356       122

, , P-value
          pillai wilks lambda hotelling-lawley roy largest
group 0.6412999     0.6474587        0.6537033   0.1879375
> man.out[[5]][2]
[1] 0.9240134
> man.out[[5]][3]
[1] 0.08059128
> man.out[[5]][4]
[1] 0.05130897
> man.out[[5]][5]
[1] 0.8089407
> man.out[[5]][12]
[1] 4
>
```

We see that wilks lambda (.9240) is the second index for the fifth element of the list, **man.out**. So the complete calling function to the bootstrap function will be:
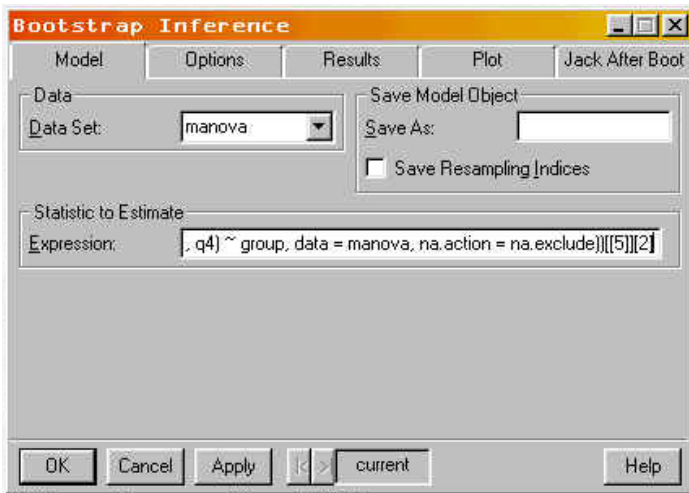
```
> summary(manova(formula = cbind(q1, q2, q3, q4) ~
+       group, data = manova, na.action =
+       na.exclude))[[5]][2]
[1] 0.9240134
>
```
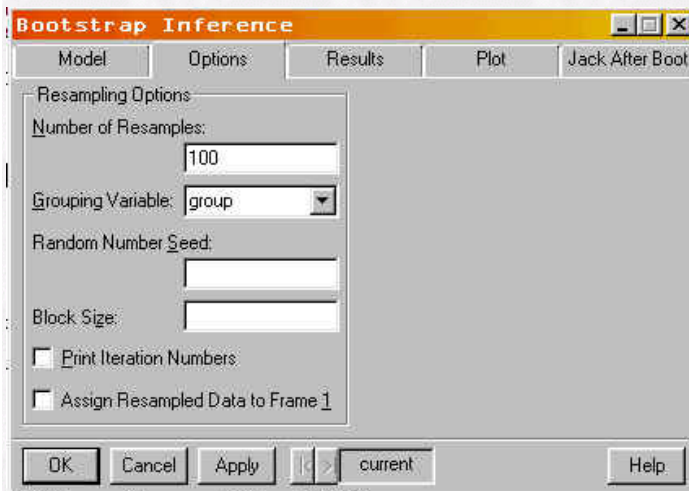
This calling function returns a value of .9240 for wilks lambda for this particular data set. We need to copy this function call: **summary(manova.......))[[5]][2]**, into the **Expression** window on the bootstrap menu.
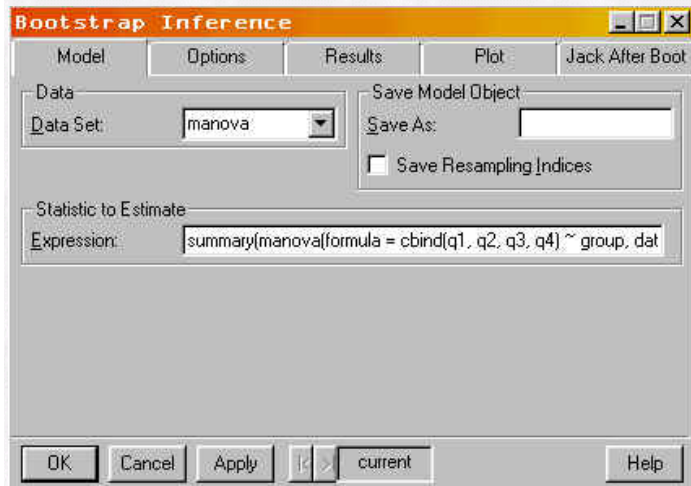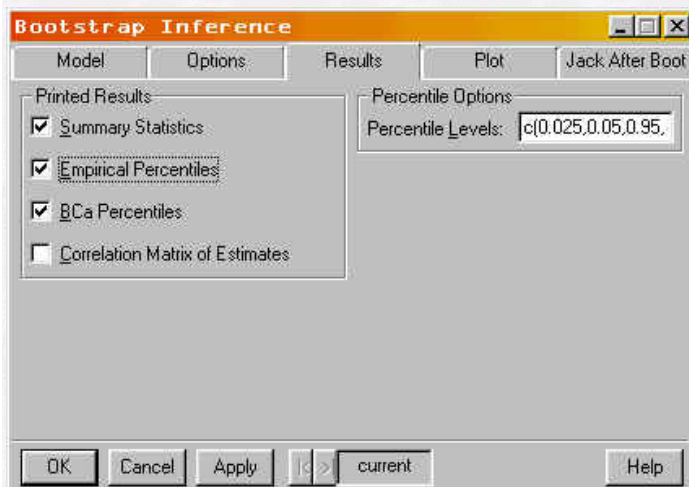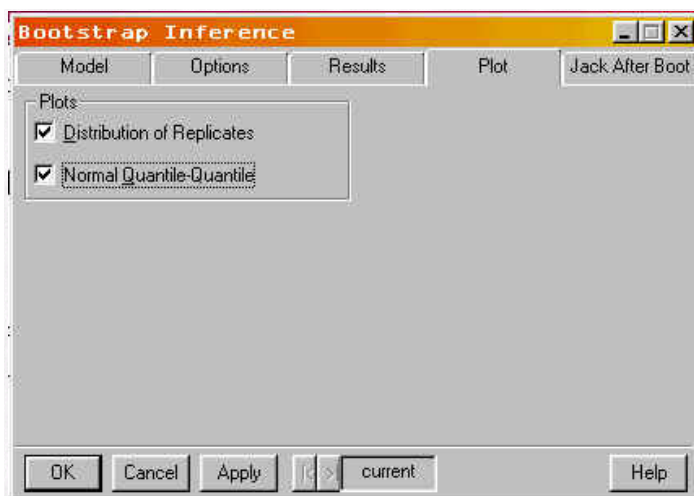
For the **Options** tab we need to select the grouping variable and how many bootstrap iterations we need:

For the **Results** tab we select **empirical percentiles**:

For the **Plot** tab we select **Normal Quantile-Quantile** to see how well the sampling distribution matches with "normal distribution" theory.

```
Bootstrap Inference                          _ □ ×
   Model      Options     Results      Plot     Jack After Boot
┌ Plots ─────────────────────────────────────────
│  ☑ Distribution of Replicates
│  ☑ Normal Quantile-Quantile
│
│
│
│
│
│
│
│
│
│
│
└──────────────────────────────────────────────

  OK      Cancel    Apply    |< >| current                Help
```

Selecting **OK** generates the following report window:

```
        *** Bootstrap Results ***
Call:
bootstrap(data = manova, statistic = summary(manova(formula = cbind(q1, q2, q3, q4) ~ group, data
        = manova, na.action = na.exclude))[[5]][2], B = 100, group = group, trace = F,
        assign.frame1 = F, save.indices = F)

Number of Replications: 100

Summary Statistics:
        Observed     Bias    Mean       SE
Param     0.924  -0.08357  0.8404  0.05491

Empirical Percentiles:
            2.5%          5%         95%       97.5%
Param 0.7348601 0.7518553 0.9250432 0.9352212

BCa Percentiles:
            2.5%          5%         95%       97.5%
Param 0.9100873 0.9213088 0.9448852 0.9448857
```
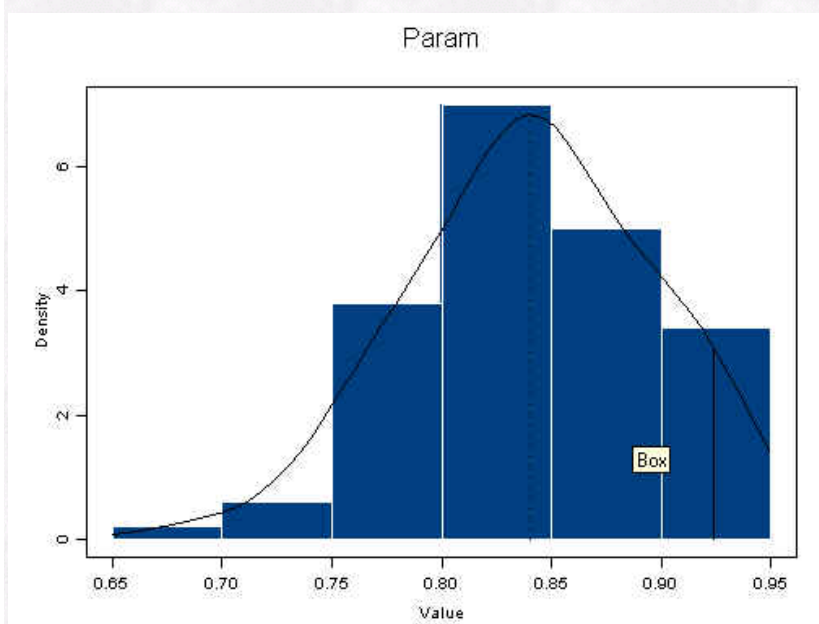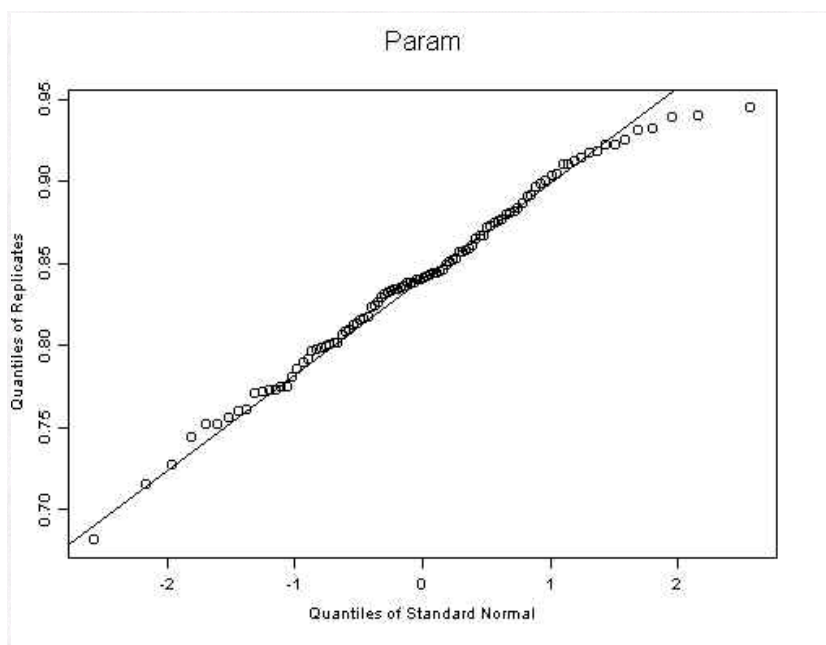
And the following plots:

Param

We see that the empirically resampled sampling distribution for wilks lambda follows normal theory fairly closely except for the right tail region. We see that the upper and lower cut-offs for the 2.5/97.5th and 5/95th percentiles both contain the observed value of wilks lambda. We take this as a failure to reject the null hypothesis for wilks lambda. In general the BCa percentiles will be more accurate than the empirical percentiles.

Further Reading

Davison, A.C. and Hinkley, D.V. (1997). *Bootstrap Methods and Their Application*. Cambridge University Press.

Efron, B. and Tibshirani, R. J. (1993). *An Introduction to the Bootstrap*. San Francisco: Chapman & Hall.

Research and Statistical Support
University of North Texas

SAS Corner

SAS System 9

By Garvii Thomas, Research and Statistical Support Services Consultant

SAS has released its version 9. Here is a link to a video that explains the many features of version 9 better than I could ever do.

Link: http://support.sas.com/videos/sas_v9/

You should get a screen that looks like this:

Enjoy!

Network Connection

By **[Dr. Philip Baczewski](#)**, Associate Director of Academic Computing

When the Internet Works

As a longtime denizen of the on-line community, I have enjoyed the convenience of on-line commerce and have often been able to save money or time by using on-line services. Yet, I am still wary of exposing too much information on line or of using a site which does not provide enough information to support its legitimacy.

I recently had the good fortune to attend a Wednesday practice round at The Masters golf tournament, held at the Augusta National Golf Club. To golfers, the Augusta National is the Mecca of courses and The Masters is the premier event of the year. Tickets for the Thursday through Sunday competition days have been sold out for 30 years (literally). They briefly opened the waiting list once during the past 30 years, but it was quickly closed. Competition round tickets are hard to come by unless you know or marry the right person. The Monday through Wednesday practice, round tickets are a different story. Those are available via a lottery, so if you have the right luck or know someone with sufficient luck, you might find yourself taking a trip to Augusta.

This year the luck was in my favor. Having benefited from a good friend's good chance, I agreed to make the travel arrangements and I went on line to find the lowest fares and rates I could. Finding a reasonable airfare was not too hard. The next step was to find a rental car, since it is cheaper to drive from Atlanta to Augusta than it is to fly that extra leg. I decided to try the [Orbitz](#) website, a travel site backed by a number of different airlines. I found what I thought was a reasonable rate for a mid-size car. I had a confirmed reservation and knowing I was making the reservation two months in advance had little doubt that there would be any problem.

I also found a hotel room between Atlanta and Augusta, since we'd be getting into Atlanta in the evening and planned to stay over night and drive to Augusta in the morning. I've had good luck using [hotels.com](#) and found a reasonable rate at a good-quality hotel. I was wary of hotels.com at first, since you make a prepaid reservation. You can still cancel it and get most (minus hotels.com's service fee) of your money back, and you really can get some good discount rates. So far, hotels.com has worked out great each time I've used the service.

Sometimes, however, the best laid on-line plans get waylaid by the oldest of problems: bad business practices or poor business management. This was the case with the rental car. We arrived (a traveling party of four) at the rental car company, which I'll call "One Buck" rental cars. We were immediately told that they had overbooked their reservations and had no more cars to rent. The unfriendly "One Buck" staff just told us to try the company at the next counter and gave me a piece of paper which promised to reimburse the difference between their cost and another company. Ironically, the paper also said that "One Buck" staff would arrange to find a car from a different company, but the Atlanta "One Buck" staff just sat there scowling.

The Internet had worked fine. The on-line processes had done what they were supposed to do. This was a failure of that classic weakness in all businesses: bad practices or uncaring employees. Having just arrived in an airport during one of the busiest travel weeks they experience, I had visions of four golf enthusiasts with their thumbs out on the side of I-20. Luckily, we were able to find a car from a company that really does try harder and were on our way.

The moral of the story? Sometimes on-line businesses work better than brick and mortar ones. I'll certainly never take my business to "One Buck" any more. I will probably try Orbitz for my future travel needs. They did their job. "One Buck" didn't. And, of course, the azaleas and dogwoods were gorgeous.

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Link of the Month

Each month we highlight an Internet, USENET Special Interest Group (SIG), or similar mailing list(s) or Website(s).

UNT Online Publications

You know about *Benchmarks Online*, but did you know that there are quite a few other publications available online from various UNT departments? Check these out:

- *The Spreadsheet* - The Office of the Controller's newsletter is archived here. This site is important to UNT faculty and staff because, according to The Spreadsheet Website: As interpretations of the law constantly change and new laws go into effect, procedures within the University Controller's Office change. Policies are developed to aid in administering required changes. As a means of notifying the University community immediately of these changes, a publication entitled "Spreadsheet" is distributed to accountholders.

- *InHouse@UNT* - According to their Website, *InHouse@UNT* exists to "foster a sense of community by communicating faculty and staff achievements, showcasing faculty and staff contributions to the university's success, providing news and information relevant to the university, and reporting official actions and policies." It is published twice monthly (except for March and December when just one issue is published) for the faculty and staff of the University of North Texas by the Office of Public Affairs and Information Services.

- *Human Resources Newsletter* - Just like it sounds, the *Human Resources Newsletter* is a publication of the department of Human Resources. It has all sorts of useful information of interest to faculty, staff, and student employees.

Resource Management on a Budget: Part I

We are reprinting this article from the [January 2003](#) Benchmarks Online to get you ready for Part II, coming next month. - Ed.

By **[Shannon Eric Peevey](#), UNT Central Web Support**

In preparation for a conference in April, I have started to accumulate information on inexpensive ways to manage resources, in particular, visual resources. As most of you know, the Texas State Legislature is about to convene again, and the economic outlook for state-funded institutions is looking bleak for the next fiscal year. As we see the private sector scale down, and the lay-offs continue, it can make even the safe haven of a state job a bit unsure. Even if our jobs may not be in jeopardy, our budgets definitely are... At the University of North Texas, we have been feeling the economic crunch this year, and expect to feel even more next year. With this in mind, I am always on the lookout for ways to maintain cutting edge technology, while not spending the dwindling budget that other people in my university desperately need. This leads me to the subject of this article, reviving out-of-date machines through the use of open source operating systems.

The scenario...

My wife and I enjoy going to have Chinese food at many of the wonderful restaurants in the Garland/Richardson area, and during one of our adventures, we noticed an out of the way store that sold software and computers. On a whim, and because I am a computer geek, we stopped by, and my eyes popped out when we saw old desktop computers for $15... Sure, they were old Compaq Desktoppros, but I knew that they could be used for some wild scheme... Hmm... Pentium 133's, 32 megs of RAM and 1 gig hard-drives... What could they be used for?

Aha!!

What could these machines be used for?! Let me tell you. P133's could work great as a router, web servers, desktop machines, proxy servers, and can even be clustered, in large enough numbers, to be a rather competent super-computer. How is this possible, you might ask? This is possible through the use of open source operating systems, Linux and FreeBSD, (and it's siblings, NetBSD, and OpenBSD.) Many do not realize that these operating systems are optimized to work on old hardware, and can take that hardware, and make it seem young again :)

My Scheme

Through my work, and interest in computers, I have long desired to learn more about routing, load-balancing, and clustering, (as in process-sharing among multiple machines), for quite

some time. The problem has always been the lack of hardware to do it. Most desktop computers, even used computers, are so overpriced, IMHO, that I would rather buy new machines for $100 - $200 more. Therefore, when I saw the old Compaq computers for $15, I saw my chance. We backed up my truck to the store, and drove away with five computers, a 24-port hub, and various cables, wires and keyboards. The time was now. My "scheme" was to build an a load-balanced web cluster from these machines. One machine as the load-balancing router, two machines as the load-balanced web servers, one machine as the database server, and one machine as a storage device, to hold the web content. Now that I had the hardware, I needed to test a variety of operating systems to see which would meet my needs most appropriately for this "scheme".

Enter the Operating Systems...

The first operating system, or OS, that would come to many people's minds is a version of a Microsoft server OS, such as, Windows NT, or 2000. But, Windows hardware requirements are too great for a machine with a P133, 32 megs of RAM and a 1 gig hard-drive. (For instance, Win2k Server needs 1 gig of storage for the OS by itself, not to mention a minimum of 128 megs of RAM.) Besides, the cost of licensing the OS would obviate the savings on hardware, and the operating system does not give me the power and flexibility that I desire in my test environment. Therefore, I began to look at open source OS's that would work well in this environment and give me the power and flexibility needed to create a test environment.

Red Hat Linux

Long a favorite of Linux users in the United States, Red Hat is a fairly mature Linux distribution. (You will understand what I mean by fairly mature later.) It is the standard distribution for many institutions, and it has a good working relationship with many large commercial corporations, such as Oracle, Sun, and Macromedia. These relationships, as well as, the popularity of this distribution make it very easy to find software, commercial and open source, that are configured to work with the directory structure, the package manager, and the libraries that are shipped with Red Hat. As of the writing of this article, Red Hat has released version 8.0, which incorporates a nice desktop scheme, installer, and a fairly up-to-date kernel (2.4.18). (The latest stable is 2.4.20). The gui installer finds most of your hardware, and configures the X Windows system, (the system that is used to run a gui desktop on most Linux systems), rather painlessly, (unusual for most Linux distributions). You log in and go... Very user friendly!

Reason I didn't choose Red Hat Linux: Red Hat has an minimal install size of over 400 megs, (without C compiler and gui desktop). Also, I have never had much luck with the RedHat Package Manager, or RPM, and would like a better package management system, if possible.

SuSE Linux

My favorite distribution for the last two years. This distribution is very popular in Europe, and, as everything German, is very well engineered. It uses the RPM system, and has a very nice gui installer that also finds all of a computers hardware fairly accurately. (I did an FTP install on my Toshiba Satellite laptop, and didn't need to configure any additional hardware after the installation :)) The company stays very up-to-date with packages, and includes KDE 3.X as it's main desktop environment. (In my opinion, the most powerful and easy-to-use desktop environment.) SuSE also ships with the SuSE Firewall, and SuSE Firewall 2, which make it easy to create rules governing Virtual Private Networks and De-Militarized

Zones, and the packets that route through the SuSE box.

Reason I didn't choose SuSE Linux: For all of my grand-standing on the SuSE distribution, there is a glaring flaw... They do not have ISO images available on any FTP sites. This means that you either need to buy the CD version from a store, (yuck!!), download the distribution from an available FTP site for every machine, or create a mirror of the FTP site on your servers... Because I only have a 56k connection at home, I prefer to work from CD, instead of waiting for 20+ hours for the files to be downloaded remotely.

Peanut and Vector Linux

In my search for a small distribution of Linux, I began to search through many of the interesting "minimalist" distributions that can be found in the lists of Linux Online. (You may not know this, but there are many Linux distributions that fit on a single floppy disk!) Of these choices, two distributions seemed to really catch my attention: Peanut Linux, and Vector Linux. Peanut Linux is a 210 meg download, and is designed to be a simple desktop system with an easy setup. This distribution seemed to be very popular, but it lacked one important element... A C compiler. This was definitely not a server distribution. After discovering this fact, I looked to an alternative that came up in the same articles, Vector Linux.

Vector Linux is a slackware-based mini-distribution. (Meaning that Slackware was used as a starting point, and then modified to become a completely separate distribution.) The installer is text-based, and easy to understand. I installed the distribution, without a gui desktop, in a whopping 260 megs of storage. This including a C compiler, SSH, (a more secure replacement for Telnet), and most of the tools that I would need to run a group of load-balanced web servers. I was impressed! (According to the reviews, the gui desktop was very easy to configure, meaning that this would be a great desktop distribution too.)

Reason I didn't choose either Peanut or Vector Linux: Peanut's lack of a C compiler killed it immediately. It seems that the software that would be available for this distribution would be precompiled software. This is not appropriate for a server environment. Vector Linux was a great distribution that would have met most of my needs... Except, it did not have the ability to do a network install. (The Compaqs only have a floppy, so I was planning to boot from a floppy disk, and then automate the installation, much like the JumpStart, (Sun Microsystems), or KickStart, (Red Hat) tools.)

Slackware Linux

Since we talked about a Slackware-based distribution in the previous section, I thought that I should take a leap into the dreaded world of Slackware Linux, the oldest and "most difficult" distribution with which to work. (This was the information that I had gleaned from countless reviews and Google Groups messages...) Was I surprised to find that I was wrong! The install was very easy. I chose the standard install for newbies, and was prompted for all of the information that was needed by the installation program. Very nice! It even prompted me for all of the optional packages during installation, so that I was able to fine-tune the installation to my needs. Very nice! (The final install was about 350 megs. Well within my target range.) I also had the option for a network install, so that I could boot the machines from a floppy, and then install from another network server.

Reason I didn't choose Slackware Linux: The reason that I didn't choose Slackware, was that I didn't know how popular the distribution still is... (After the major distributions, such as Red Hat, SuSE and Debian, have passed Slackware in popularity, I didn't know what the

future might be. Would Slackware be around in five years? Ten?) Also, I had difficulties with the installation of Lilo on the Master Boot Record, and ended up using a boot floppy instead. (This also happened with Vector Linux.) Finally, I was looking for a better package manager than I had been using, (RPM)... Slackware has a package manager, but limited dependency checking... Sorry, Slackware!!

FreeBSD

Next, we are going to step outside of our Linux distributions, and take a look at one of the open source versions of Unix. The difference between Linux and Unix can be simplified to the kernel of the operating system. (As a matter of fact, that is the main difference.) The Linux kernel was created by Linus Torvalds at the Computer Science department at the University of Helsinki, Finland, and was originally based on the academic-unix-based kernel, Minix. Therefore, any distribution that uses this kernel for their distribution is called Linux. The Unix kernel can be based on any variant of the original Bell Labs Unix. These can be commercial distributions, such as, Sun Solaris, SCO, or academic versions, such as, BSD, from the University of California at Berkeley. That is where FreeBSD comes into the picture.

Originally, the Berkeley Software Distribution, or BSD, was designed for large mainframes and "super computers". But, as prices began to plummet on Intel x86 platforms in the late 1980's, and early 1990's, there became a growing need for a version of BSD that supported these platforms. To meet this demand, a man named Bill Jolitz ported a version for the intel architecture, based on the open-sourced BSD code. This was known as 386/BSD, and in 1993 two groups began to enhance and modify the existing port into one of the most stable open source operating systems available. One of these groups became known as FreeBSD.

FreeBSD is a popular version of Unix, that is designed to run on inexpensive hardware. This, obviously, caught my eye. The minimum requirements for the system: i386 or greater, 4 megs of RAM, and 100 megs of storage. Wow!!! The installation is text-based, but fairly straight-forward. (NOTE: version 4.5 had a hard time finding the PS/2 mouse when using a Belkin OmniView SE 4-port. When searching on the newsgroups, I found that this is a problem with lower-end KVM's and FreeBSD.) The minimal install, around 200 megs, (including C compiler, and various other necessities), was very nice. Also, the maturity of the product is reflected in the manner that the project is managed. The FreeBSD team views FreeBSD as a whole, and not as a kernel with third-party applications added, as does Linux, and the team is made up of multiple groups who must test every aspect of an enhancement to the operating system before adding it into the RELEASE, or stable, code-base. These groups act as auditors, and the stability of the end product is a testament to their dedication. Security fixes are also dealt with in the same manner. The security team is presented with a fix for a known security hole, they test it for several days to make sure that the new code won't break the old, and then they place it in the development tree for a time before incorporating it into the stable source tree. Though I have been a die-hard user of Linux for the past 3-4 years, I find this style of project management a plus. Also, I like the fact that it is possible to use a version of FreeBSD into perpetuity. (ie. It is still possible to install FreeBSD 2.2 – RELEASE on an old machine, and find current packages that work with it. (FreeBSD 2.2 – RELEASE was released in March 1997.))

Reason I didn't choose FreeBSD: Though I wanted to use FreeBSD on my old machines, I found that Macromedia ColdFusion Server did not support, and had no plans to support, a version for FreeBSD, though there is a version for Mac OS X which is based on the FreeBSD kernel. :((I want to work with these old machines to test various dynamic content servers, ColdFusion being one of them.)

Debian Linux

Or more appropriately Debian GNU/Linux, is one of the true open source Linux distributions. The development community, made up of over 900 developers, has created a "Social Contract" with the open source community to keep Debian 100% free, and will not add any component to the operating system that is not 100% free and open source. (All software that is useful to end-users, but does not open source its source code, can be used, but will not be officially added to a release of Debian.) They have also striven to have a stable, error-free linux distribution. To this end, the Debian Community does not contain all of the newest and best versions of third-party applications, or the kernel for that matter, but relies on versions that have been tried and tested.

The newest stable version, is 3.0 release 1, and the installation of the distribution can take a little trial and error to get correct. (ie. The partitioning and initialization of partitions took a while to understand.) Otherwise, the installation was fairly easy, and the minimal install was about 182 megs. (This included everything that I needed, except the web servers and the openssl library. After installing these, the total install was 190 megs. Not bad!!) The package management tool that I enjoy using is the "apt" tool. This tool is configured during installation, and can find application packages from multiple medias. (I've tested the CD-ROM and internet downloads, and have been very pleased with the results.) If you can't find a package on the main source sites listed in the /etc/apt/sources.list, you can search the main web site for the location, and add it to the sources.list file. Run apt-get update, and then apt-get install package, and the apt tool will find, download, and install the package and it's dependencies with no work for the user. (It's a great package manager!! I don't have much experience with the "ports" tools on FreeBSD, but I imagine, it must be very similar.) Debian also has an auto-install tool called Progeny. This tool will help me to reinstall the appropriate image to any new machines that I would like to add to the "web farm". Also, with a growing development team, I can be assured that Debian will be around for quite some time, and that my support needs can be met on the internet.

Reason I chose Debian Linux: I chose Debian GNU/Linux as my open source operating system, because it fit into my hardware needs. With a minimal installation of under 200 megs, Debian will allow my old Compaq machines to come to life, (with room for log files, and mail queues! :)) The package management tools will allow for easy upgrades, and make security fixes a breeze. Also, because it is a Linux distribution, I will be able to run Macromedia ColdFusion MX on these machines...

And there you have it!

In this article, I attempted to look at various distributions of open source operating systems. These included distributions of Linux, and FreeBSD, a popular open source version of Unix. Though it would have been unwieldy to explore each of these operating systems in depth, I made the attempt to qualify the evaluation process by creating a particular environment, and problem, that I was trying to solve with an open source operating system. By doing so, I was able choose 4-5 criteria for which I was evaluating, and able to hit these points in the descriptions. Though this may be a hypothetical situation, as used in this article, the situation is not at all unusual in the "real" world. I feel that it is important for any institution, commercial or state, to evaluate the economic ramifications of discarding "old", out-of-date systems, in order to maintain the technological edge for end-users. I am attempting to show that those systems do not need to go away, and that they can actually be brought back to life with thoughtful consideration to the operating system and applications that run on it. I hope you will continue with me next month, when we look at the installation and configuration of other open source projects, Apache, OpenSSL, PHP, on our Compaq

Deskpro 4000 computers.

See you then!!

Links

- Red Hat Linux www.redhat.com
- SuSE Linux www.suse.com
- Slackware Linux www.slackware.org
- Vector Linux www.vectorlinux.com
- Peanut Linux http://www.ibiblio.org/peanut/
- FreeBSD www.freebsd.org
- Debian GNU/Linux www.debian.org
- Linux Online www.linux.org
- The Linux Kernel Archives www.kernel.org
- Java JumpStart Edition http://www.sun.com/developers/tools/jumpstart.html
- Red Hat Kickstart http://jamesthornton.com/redhat/8.0/rhl-cg-en-8.0/ch-kickstart2.html
- Open Source Definition http://www.opensource.org/docs/definition_plain.html

Short Courses

By [Claudia Lynch](#), *Benchmarks Online* Editor

The Spring Short Courses are over. Please consult the [Short Courses](#) page to see the course descriptions and samples of courses that will most likely be taught this summer.

Customized Short Courses

Faculty members can request customized short courses from ACS, geared to their class needs. Other groups can request special courses also. Contact ACS for more information (ISB 119, 565-4068, lynch@unt.edu).

Especially for Faculty and Staff Members

In addition to the [ACS Short Courses](#), which are available to students, faculty and staff, staff and faculty members can take courses offered through the [Human Resources](#) Department, the [Center for Distributed Learning](#), and the UNT Libraries' [Multimedia Development Lab](#). Additionally, the [Center](#) for Continuing Education and Conference Management offers a [variety of courses](#) to both UNT and the general community, usually for a small fee.

GroupWise Training

GroupWise 6 classes for the spring semester are about to begin. Class descriptions can be found [here](#). Following is the schedule for 2003:

- Intermediate GroupWise I - April 22 *or* April 24

- HTML Messaging - May 1

You may now register online by [clicking here](#) or by clicking "register" from the top of the class description page. You can still register by phone by contacting Melanie Betterson in Human Resources at x4246.

If would like to have a Basic GroupWise seminar for your area, please contact Jason Gutierrez, Campus Wide Networks, jasong@unt.edu .

Center for Distributed Learning

The Center for Distributed Learning offers courses especially for Faculty Members. A list of topics and further information can be found at http://www.unt.edu/cdl/training_events/index.htm The center also offers a "Brown Bag" series which meets for lunch the first Thursday of each month at Noon in ISB 204. The purpose of this group is to bring faculty members together to share their experiences with distributed learning. One demonstration

will be made at each meeting by a faculty member with experience in distributed learning. More information on these activities can be found at the Center for Distributed Learning Website.

Technical Training

Technical Training for campus network managers is available, from time to time, through the Campus-Wide Networks division of the Computing Center. Check the CWN site to see if and when they are offering any training.

UNT Mini-Courses

These are a variety of courses offered, for a fee, to UNT faculty, staff and students as well as the general public. For additional information surf over to http://www.pware.com/index.cfm .

Alternate Forms of Training

Many of the General Access Labs around campus have tutorials installed on their computers. For example, the College of Education recently acquired some Macromedia Tutorials for Dreamweaver 4.0, Flash 5.0 and Fireworks 4.0.

The Training Web site has all sorts of information about alternate forms of training. Computer Based Training (CBT) is one of the alternatives offered. Of particular interest are courses available via SkillSoft/SmartForce. See http://www.unt.edu/smartforce/ for more information.

IRC News

Minutes provided by Sue Ellen Richey, Recording Secretary

IRC Regular and Ex-officio Voting Members: Judith Adkison, College of Education; Donna Asher, Administrative Affairs; Craig Berry, School of Visual Arts; Lou Ann Bradley, Communications Planning Group; Cengiz Capan, College of Business and GALC; Bobby Carter, UNT Health Science Center; Matt Creel, Student Government Association; Christy Crutsinger, Faculty Senate; Jim Curry, Academic Administration; Don Grose, Libraries and University Planning Council; Joneel Harris, EIS Planning Group; Elizabeth Hinkle-Turner, Student Computing Planning Group; Tom Jacob, College of Arts and Sciences; Abraham John, Student Development; Jenny Jopling, Instruction Planning Group; Armin Mikler, Research Planning Group; Kenn Moffitt, Standards and Cooperation Program Group; Ramu Muthiah, School of Community Services; Jon Nelson, College of Music; Robert Nimocks, Director, Information Technology, UNTHSC; John Price, UNT System Center; Philip Turner, School of Library and Information Science and University Planning Council (Chair, IRC); VACANT, Graduate Student Council; VACANT, Staff Council; VACANT, University Planning Council; Virginia Wheeless, Chancellor, for Planning; Carolyn Whitlock, Finance and Business Affairs; IRC Ex-officio Nonvoting Members: Jim Curry, Microcomputer Maintenance and Classroom Support Services; Richard Harris, Computing Center and University Planning Council; Coy Hoggard, Computing Center/Administrative; Judy Hunter, GALMAC; Maurice Leatherbury, Computing Center/Academic; Doug Mains, UNT Health Science Center; Patrick Pluscht, Center for Distributed Learning; Sue Ellen Richey, Computing Center (Recording Secretary); Ken Sedgley, Telecommunications.

There are no IRC minutes this month.

IRC Meeting Schedule

The IRC generally meets on the third Tuesday of each month, from 2-4 p.m., in the Administration Building Board Room. From time to time there are planned exceptions to this schedule. There was no meeting in December. All meetings of the IRC, its program groups, and other committees, are open to all faculty, staff, and students.

Staff Activities

Transitions

The following are new employees:

- **Dennis Scroggins**, Program/Project Specialist, EIS Project.

- **Bob Blake**, Programmer/Analyst, EIS Project.

- **Subhransu Mishra**, Programmer/Analyst, EIS Project.

- **Mike Murdock**, Programmer/Analyst, EIS Project.

- **John Mitchell Smith**, Computer Support Specialist, EIS Project.

- **Misty Wells**, Computer Systems Manager, Central Web Support.

The following people no longer work in the Computing Center:

- **McKenna Metcalf**, I/O Operator (part-time).

- **Brandon Campbell**, Data Entry Operator..

Awards, Recognition, Publications

The following people were recognized as Soaring Eagles in the April 2003 issue of the *Human Resources Newsletter*:

- **Lance Harris** and **Scott Windham**, Communications Services, were thanked for their hard work to ensure that video conferences run smoothly.

- **Rhonda Holmes**, Administrative Assistant UNT Research Park, was praised for her "coordination and organizational skills" during the recent move out to the Research Park.

- **Sharon McSherry** and **Dan Strange**, UNT Fiscal Systems, and **Judy Tate**, Printing Services, were lauded for their "dedication, expertise and staying past midnight to complete a project on schedule.

- **Alana Skoric**, EIS Project, was thanked for "downloading crucial information, so that we may better serve our students."

- **David Walden**, Telecommunications, was thanked for the outstanding job he did assisting the Psychology Department.

The following people were recognized for their years of service to UNT in the April 4, 2003 issue of *InHouse@unt*:

- **Jenny Brooks**, Programmer/Analyst, Student Services Data Systems - 15 years of service .

- **Cathy Hardy**, Academic Database Administrator, Academic Computing Services - 15 years of service.

Campus Computing News

Computing Center to Discontinue Dialup Network Services

By **Dr. Maurice Leatherbury**, Senior Director of Academic Computing

The Computing Center's Premium Remote Access Service has been losing subscribers and, unfortunately, money, for the past year. As users have shifted to direct Ethernet connections in the dorms or have chosen to get broadband access from either the phone company (DSL) or the cable company (cable modems,) the income from PRAS has dropped to the point that it won't even pay for the phone lines that users dial into. Faced with that continuing loss in revenue as well as a probable budget cut next fiscal year, UNT's Computing Center will cease providing both paid (PRAS) and free dialup network service to the University's users effective August 31, 2003. Both the Information Resource Council and the Council of Deans have discussed the question of dropping dialup service and have approved the change. Existing users of the premium service will continue to receive service through the length of their existing contracts.

A number of factors weighed in the decision to drop dialup line support:

- At the current subscription numbers, UNT would lose over $7,000 per year on the paid and free lines just on the cost of the phone lines. Other expenses of supporting dialup services include the cost of a technician to support the equipment into which users dial, the cost of help desk wages, and the replacement costs of the dialup equipment. The State's budget problems will probably result in a reduction in the Computing Center's budget next fiscal year, and it was not considered cost-effective to continue supporting a money-losing service.

- UNT's dialup service was initiated about seven years ago when no cost-effective alternative Internet Service Provider operated in the Denton area. But with the growing popularity of the Internet, there are now close to three hundred ISPs that provide Internet service to the Denton area. UNT's paid and free dialup services simply don't compare well with commercial services:

  - The free remote access service connects at a maximum 33.6kbps, while most ISPs connect at 56kbps.

  - We don't have a 24 X 7 help desk.

  - We don't provide a nationwide "roaming" service that allows connection to our network through a local phone call when traveling outside of the local area, instead of dialing long distance into UNT's dialup lines.

- We only provide a single e-mail address to subscribers instead of two to dozens of e-mail addresses for subscriber's family members as do commercial ISP's.

- We don't provide nearly as many newsgroups as most commercial ISP's and in fact are investigating whether we will continue to support newsgroups at all.

- The personal Web site service we provide is subject to State regulations about commercial use of state property so users can't advertise goods or services as they could on commercial ISP's sites.

- More than half of the workload at UNT's central computing help desk is related to dialup problems. With the Enterprise Information System starting to come on line this Fall, the help desk will be supporting that new system's end users. We'd have to either increase the number of help desk workers or reduce support for some other service, such as WebCT, if we added the EIS support without reducing dialup support. Budget constraints prevent us from hiring additional staff, and the other services that the help desk supports are considered more mission-critical than dialup support.

- The remote access equipment has reached the end of its useful life and we are faced with a significant expense to upgrade the equipment to keep it operating satisfactorily.

- ISPs can offer a wide range of products including broadband and DSL Internet access (high-speed access generally provided by the local phone company as DSL or by the cable company as cable modem service). It is technically impossible for UNT to provide similar services, so potential subscribers to PRAS that obtain high speed services from an ISP further decrease the number of paid subscribers to our remote access service, with an accompanying decrease in revenue for an already money-losing service

Alternatives for Dialup Users

With nearly 300 ISPs serving the Denton area, students, faculty and staff, have many options from which to choose. Many of the ISPs offer Internet service for $10.00 per month, and many also offer higher speed broadband services at additional charges. ISP locating services are available on the web from www.isp.com or www.ispfinder.com, or by using one of the many search services like Yahoo, Google or MetaCrawler. To find an ISP on a search service, simply enter "ISP Denton Texas," "ISP locator" or "$10 ISP Denton Texas."

Those who can afford broadband service (around $40 to $50/mo.) can ask their local phone or cable provider about service to their homes. Although DSL or cable service isn't available in many locations, those who have subscribed to those types of service have been relatively pleased with their speed and reliability.

As an alternative to paying for Internet access, there are a number of ISPs that offer free dialup services. Although these services are free, you may have to pay the "price" of having to see advertisements on everything you view on the Web with those services. Again, one of the ISP finders can help you find those free services.

The Computing Center is working with Purchasing and Payment Services to see if the University can negotiate with one or more ISP's to offer former users of UNT's remote access services a special deal for using their service. We expect to know the outcome of that effort by mid-June 2003.

Additional information

The Helpdesk has started a Frequently Asked Questions page to which you can refer for additional information about the discontinuance of the dialup lines. You can also E-mail Maurice Leatherbury at leatherb@unt.edu if you don't find the information you're looking for there.

Academic Mainframe Services to be Terminated

By **Dr. Philip Baczewski, Associate Director of Academic Computing**

The following information may be very important if you have an active Academic Mainframe account. This information applies only to Academic Mainframe Services such as CMS and MVS/batch and NOT to Administrative Mainframe Services such as SIMS or NOBIS.

As announced in May of 2002, Academic Mainframe Services will be terminated for individual account holders on **May 31, 2003**. For additional information, please review the following articles from *Benchmarks Online*:

http://www.unt.edu/benchmarks/archives/2002/may02/mainframe.htm
http://www.unt.edu/benchmarks/archives/2002/october02/comp.htm

If you have Academic Mainframe program or data files that you wish to preserve, you will need to download them from CMS before May 31, 2003. The following articles will assist you in downloading mainframe files:

http://www.unt.edu/benchmarks/archives/2002/november02/mainframe.htm
http://www.unt.edu/benchmarks/archives/2002/december02/mainframe.htm

If you no longer use your mainframe account and do not need your files, then no further action is required on your part. Otherwise, if you haven't done so, please take action now to begin the download process. ACS staff will be glad to consult with you if you need additional help. Please contact me via e-mail if you have questions or require consultation assistance.

Dr. Philip Baczewski   (baczewski@unt.edu)
Associate Director of Academic Computing
University of North Texas

This Just In . . .

By Claudia Lynch, Benchmarks Online Editor

Usenet Newsgroup Services to be Discontinued

The Computing Center will discontinue offering Usenet newsgroup services, according to Bahram Paiani, who administers the service. Due to low usage, UNT's Usenet news service will cease operation on August 31, 2003.

Anyone who has local Newsgroups set up for their departments and/or organizations can contact Bahram to discuss changing to a 'listserv' mailing list alternative.

Exam Processing

In an effort to protect secure information that Computing Services handles in regard to exams, Data Entry will now be sending exam results to professors via E-mail. Jo Ann Luksich, Data Entry Supervisor, states that they will only provide printouts by request, since they can be printed from E-mail. According to Luksich, this will help to provide more efficient service and, perhaps, save a few trees. Please contact Jo Ann of you have questions/comments about this policy.

Conference Proceedings Available Online

By Claudia Lynch, Benchmarks Online Editor

The 2003 EDUCAUSE Southwest Regional Conference (formerly EduTex) came to Dallas this past February. This year's theme was "IT in Higher Education: Mobilizing the Mission." Many of the sessions now have post-conference information associated with them on the Conference Sessions Website. That information includes, oftentimes, written papers, audio/video, or PowerPoint presentations. Sandy Burke, Computing Center Helpdesk Manager, presented "Seeing the Forest and the Acorns in the Decision Tree" at the conference.

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IRC News
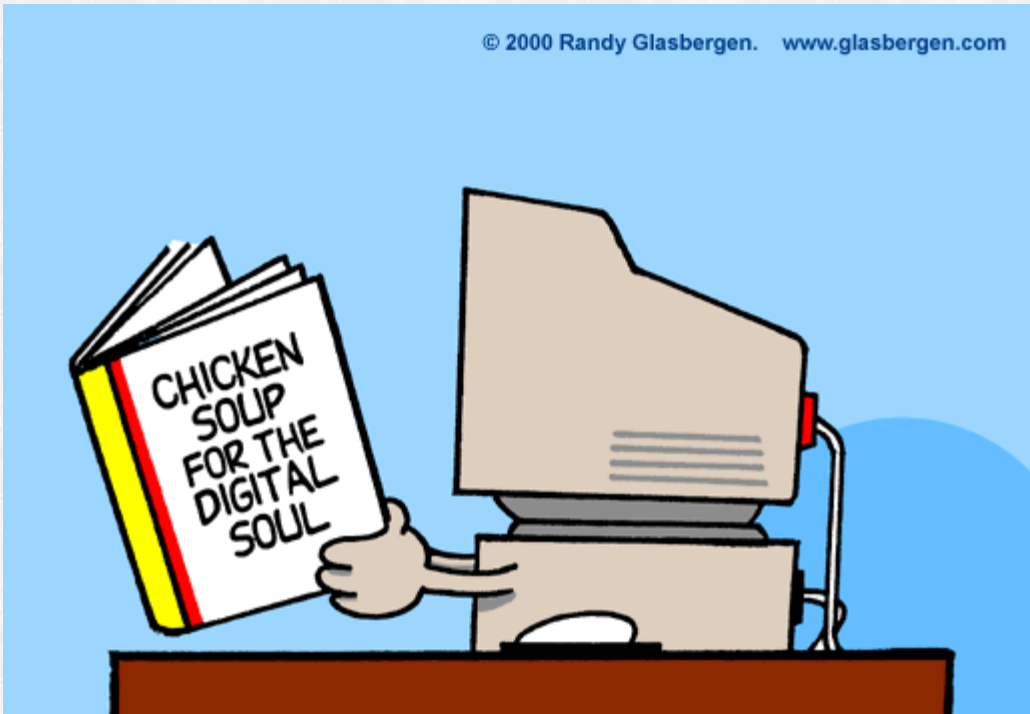
Staff Activities

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