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Office   Live   Comes   to   EagleConnect

By [Dr. Elizabeth Hinkle-Turner](#), **Assistant Director - Academic Computing and User Services**

There are many reasons for students and alumni to use the [EagleConnect](#) communication system. For one thing, it provides a great web-based email interface or you can configure it for Outlook. Additionally, users are given 25GB of storage space on the SkyDrive portion of the system.

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EIS Status Report

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

The latest issue of *theEnterprise*, Enterprise Information System Status Report, is now available.

Read more   BOOKMARK

Summer Hours

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The summer sessions are beginning to wind down, but summer schedules are still in effect. Following are the hours for Computing and Information Technology Center-managed facilities as well as other campus facilities for the remainder of the summer.

Read more   BOOKMARK

TODAY'S CARTOON

Click on the link above for an information age laugh.

By the Numbers

VM Statistics:

- Number of VMs: 358
- Storage Space: Close to 10TB

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Campus Computing News

Office   Live   Comes   to   EagleConnect

By Dr. Elizabeth Hinkle-Turner, Assistant Director - Academic Computing and User Services

There are many reasons for students and alumni to use the EagleConnect communication system. For one thing, it provides a great web-based email interface or you can configure it for Outlook. Additionally, users are given 25GB of storage space on the SkyDrive portion of the system. Since all administrative departments and units send all their official communications to a student's EagleConnect email address only, students need to check the system regularly in order to receive all their information about registration, financial aide, class announcements and the like (remember, students can forward their EagleConnect email to a preferred address). Alumni can keep in touch with the university with their EagleConnect accounts and current students get to keep their accounts in perpetuity after they graduate.

Now there is even more reason to use EagleConnect as your digital communication provider of choice: **Free Office!** As of just a little while ago, Microsoft began including Office Live applications in EagleConnect. Office Live applications are web-based (cloud) versions of MS Word, Excel, Powerpoint, and OneNote which provide the full functionality of their Office Suite installed counterparts. **But. They. Are. Free.**

All UNT community members are encouraged to spread the word about the Office online apps in EagleConnect to their users with EagleConnect accounts (all current and former students, alumni, and retirees). The CITC Helpdesk is beginning to really flog these apps in testing to see if there are any 'gotchas' but an initial testing by yours truly has found no such flaw. The only thing to remember is that SkyDrive limits individual document size to 50MB which means that some Powerpoint presentations that might include A/V items would need to be zipped or partitioned-out over several documents. Additionally, the documents only save in the .appx (.docx, .pptx etc) format so they are not backward compatible with Office versions prior to 2007. My initial testing included using the apps in Firefox, Internet Explorer and Safari and all three browsers were 'friendly' with the products.

To get your qualified EagleConnect users started with Office Live, I have provided a step-by-step 'how to' summary below:

Login to EagleConnect - there are two ways to do this: either via my.unt.edu (shown below) or by going to eagleconnect.unt.edu and clicking the login button:
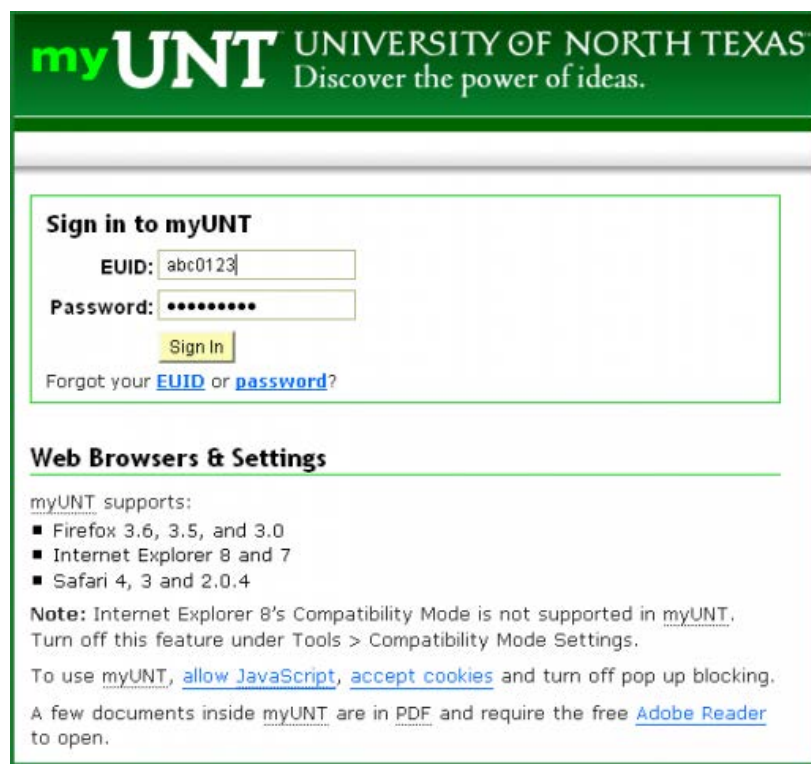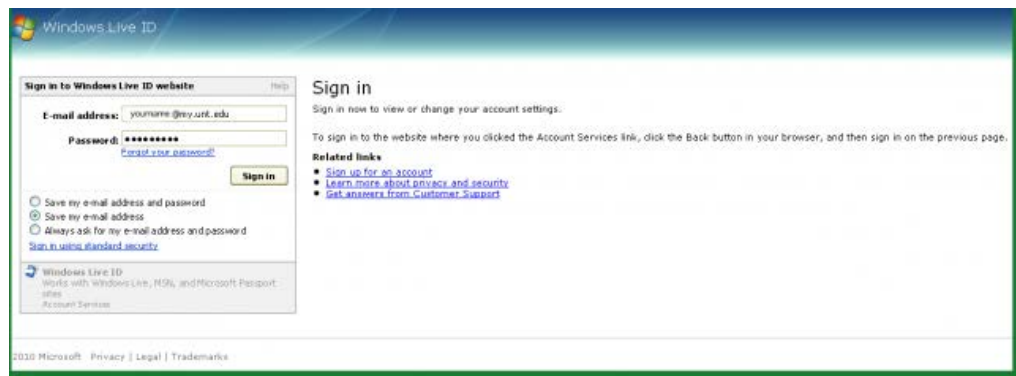
The login page for my.unt.edu
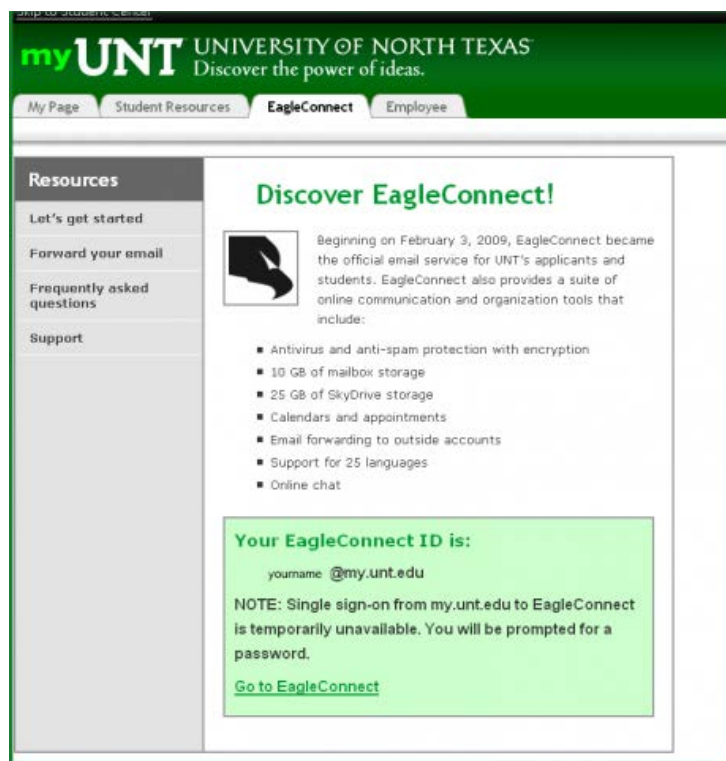
The EagleConnect tab in my.unt.edu

Then login to EagleConnect on this Windows Live ID page with your email address and your UNT password:

The EagleConnect / Windows Live ID login page

Select the Office Pull-down Menu and choose which Office application you wish to use:

*The Office Live Menu in EagleConnect*

In this case, I chose Word so I get a New Document prompt - this Document is by default saved to my SkyDrive but you can save it to your desktop later if you wish:


As you can see, my document opens in a web-based Word that looks and acts amazingly like the Word that is installed on my machine!
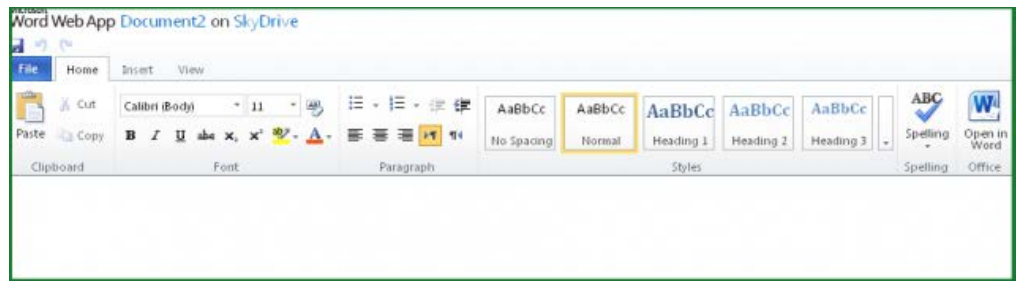
After I finish with my document on the web-based Word, I can save it to my Sky Drive or open it in Word on my machine and save it to my machine. There are also **Share** features:
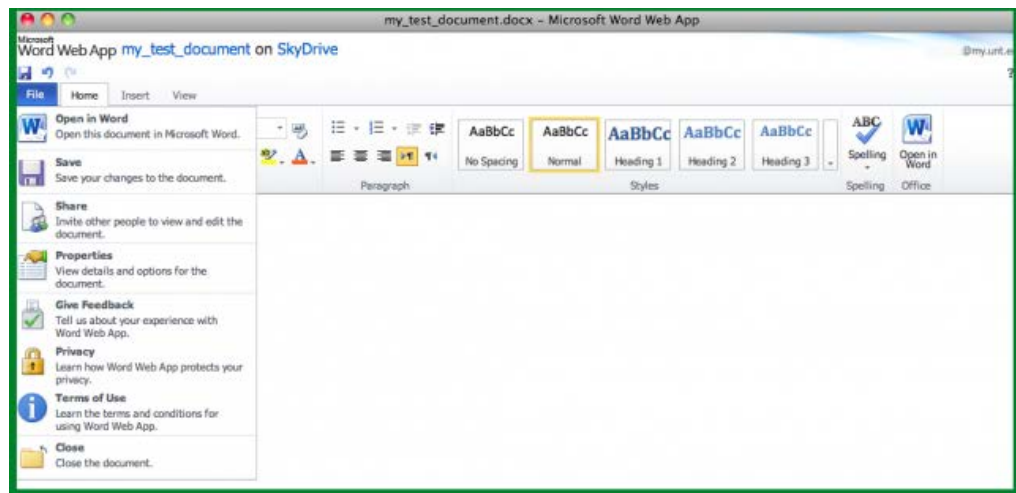
The next two screen shots illustrate that Powerpoint Live and Excel Live look a lot like their installed counterparts as well:
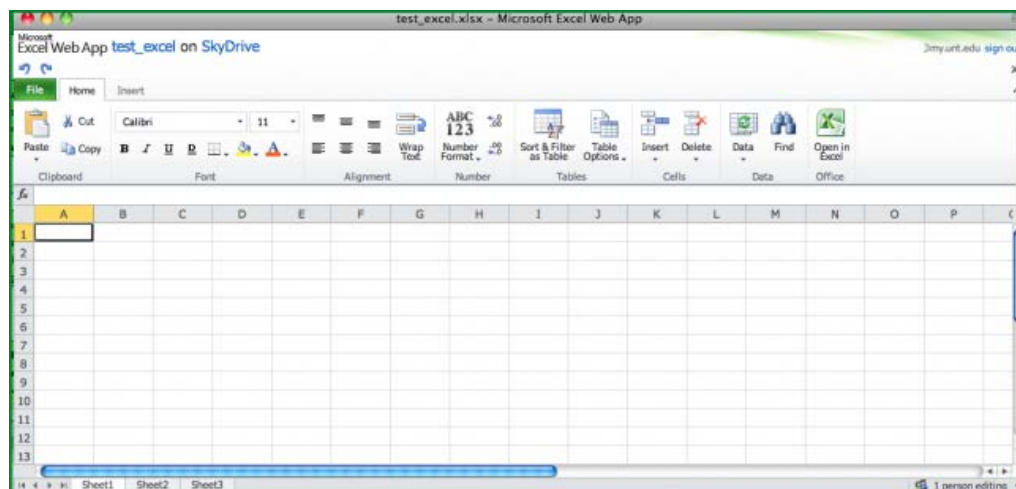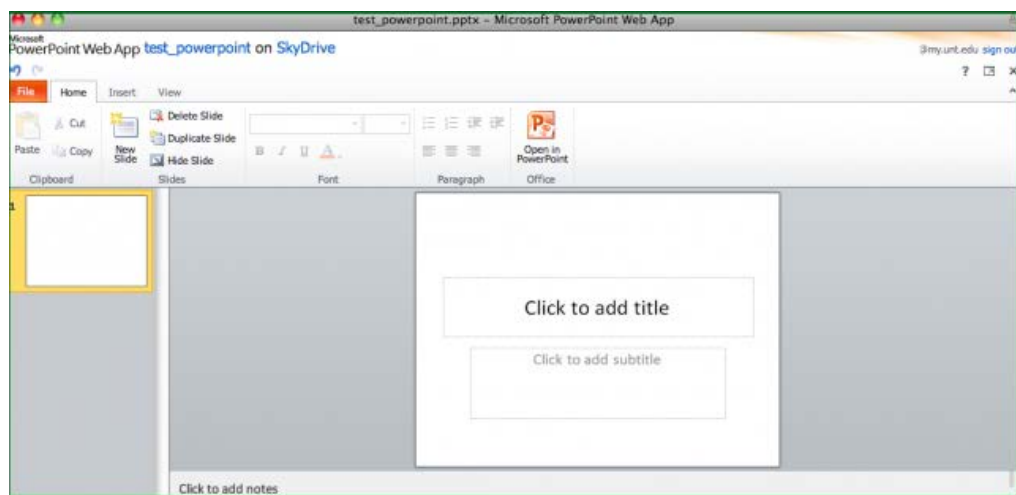
As you can see, the 'Computing Cloud' has now officially come to the students at UNT and everyone is encouraged to spread the news. I am sure that of us can expect to see similar cloud computing applications come our way in the future from a variety of developers. If you have any questions about the Office Live portion of EagleConnect, please contact me at ehinkle@unt.edu. A big 'thank-you' to Lisa Coleman of the CITC Helpdesk for providing me with most of the screen shots for this article.

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EIS Status Report

By Claudia Lynch, *Benchmarks   Online* Editor

The latest issue of *theEnterprise*, Enterprise Information System Status Report, is now available. Click on the link below to read John Hooper's revelations about a topic of concern to many people in the UNT System in "How I learned to stop worrying and love IT shared services ...". Other items of note can be found throughout the publication including a section called the "Success Gallery." Items in the Success Gallery this time include: "UNT Dallas Utilizes New EIS Communication Generation for Scholarships," "Improvements for Admissions Increases Productivity and Response Times," and "UNT International Prospect Entry Implementation."

http://eis.unt.edu/the-enterprise/2010/jul2010.htm

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Summer Hours

By Claudia Lynch, *Benchmarks Online* Editor

The summer sessions are beginning to wind down, but summer schedules are still in effect. Following are the hours for Computing and Information Technology Center-managed facilities as well as other campus facilities for the remainder of the summer. The Helpdesk continues to maintain their normal hours.

- **Data Management Services** will will maintain their normal schedule.

- The **ACS General Access/Adaptive Lab** (ISB 104) is keeping the following hours this summer:

    Saturday: 10 a.m.-9 p.m.
    Sunday: 1 p.m.-10 p.m.
    Monday - Thursday**:** 9 a.m.-10 p.m.
    Friday: 9 a.m.-10 p.m.

Hours for Other Campus Facilities

Check out the UNT Shuttle Summer Schedule here: http://www.unt.edu/transit/routes_sched.html

General Access Labs

- WILLIS (normal schedule is 24hr/7 days a week):

 Maintaining normal schedule through rest of the summer.

- College of Information General Access Computer Lab (CI-GACLab) (B205):

    May 17-August 13

    Open: Monday - Friday: 10 a.m. – 6 p.m.
    Closed: Saturday & Sunday

    Special Closings:

    Semester Break: August 14 - 25

- MUSIC:

Summer 5wk1 and Summer 5wk2

Monday–Thursday: 8 a.m.–9 p.m.
Friday: 8 a.m.–5 p.m.
Saturday: 10 a.m.-5 p.m.
Sunday: 1 p.m.–8 p.m.

- PACS Computing Center (Chilton Hall):

May 18 - August 13, 2010

Monday–Thursday: 8 a.m.–10 p.m.
Friday & Saturday: 8 a.m.–5 p.m.
Sunday: Noon–10 p.m.

Special Closings:

Semester Break: August 14 - 25

- CVAD (formerly SOVA):

Summer 5wk1 and Summer 5wk2

Monday–Friday: 8 a.m.–10 p.m.
Saturday–Sunday: Noon–8 p.m.

The lab will close at 5 p.m. on the last day of each session, and reopen the following Monday.

- COE:

Maintain normal hours, except **Closed**: Aug 14-25

- COBA:

Business Lab (Downstairs — BA152)

Monday - Thursday: 8 a.m - 11:50 p.m.
Friday: 8 a.m. - 7:50 p.m.
Saturday: 8 a.m. - 7:50 p.m.
Sunday: Noon - 11:50 p.m.

General Access Lab (Upstairs — BA335)

Monday - Saturday: 8 a.m - 7:50 p.m.
Sunday: Noon - 7:50 p.m.

Curry Hall (Team Lab)

Monday - Thursday: 8 a.m - 11:30 p.m.
Friday & Saturday: 8 a.m. - 7:30 p.m.
Sunday: Noon - 11:30 p.m.

- CAS:

GAB 330

10 Week 1 (10W1) - this includes 5 Week 1 (5W1) and 5 Week 2 (5W2) **June 7 - August 13**:
Monday - Thursday: 8 a.m. – Midnight
Friday: 8 a.m. – 5 p.m.
Saturday: Noon - 8 p.m.
Sunday: Noon - Midnight

Special Closings:

Semester Break: August 14 - 25

GAB 550

10 Week 1 (10W1) - this includes 5 Week 1 (5W1) and 5 Week 2 (5W2) **June 7 - August 13**
Open: Monday - Friday: 8 a.m. – 5 p.m.
Closed: Saturday & Sunday

Special Closings:

Semester Break: August 14 - 25

 Terrill 220

 10 Week 1 (10W1) - this includes 5 Week 1 (5W1) and 5 Week 2 (5W2) **June 7 - August 13**
Monday - Thursday: 8 a.m. – 8 p.m.
Friday: 8 a.m. – 5 p.m.
Saturday: **Closed**
Sunday: **Closed**

Special Closings:

Semester Break: August 14 - 25

Wooten 120

10 Week 1 (10W1) - this includes 5 Week 1 (5W1) and 5 Week 2 (5W2) **June 7 - August 13**
Monday - Thursday: 8 a.m. – 10 p.m.
Friday: 8 a.m. – 5 p.m.
Saturday: **Closed**
Sunday: **Closed**

Special Closings:

Semester Break: August 14 - 25

- **UNT Dallas Campus - 155A**:

  Keeping their normal schedule throughout the summer, with the exception of
  the week of August 16:

  August 16-20: Monday - Friday: 7 a.m. – 6 p.m.
  August 21: Saturday: 7 a.m. to 5 p.m.

- **College of Engineering General Access Computer Lab (CENG GACL, englab@unt.edu, Discovery Park, B129, 891-6733)**

  10 Week 1 (10W1) - this includes 5 Week 1 (5W1) and 5 Week 2 (5W2) **June 7 - August 13**
  Open: Monday - Friday: 9 a.m. – 5 p.m.
  Closed: Saturday & Sunday

  Special Closings:

  Semester Break: August 14 - 25

Terminology and schedules for classes offered in the summer has changed in recent years:

SUMmer=Entire Summer Session, 3WK1 = 3-week 1, 8WK1=8-week 1, 5WK1= 5-week 1, 10WK1= 10-week, 5WK2= 5-week 2. All summer sessions will be over by August 13 this year.

- Summer Session 3W1: formerly May Minimester

- Summer Session 5W1: formerly Summer I

- Summer Session 5W2: formerly Summer II.

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Today's Cartoon

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www.glasbergen.com

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"My wife doesn't let me bring my BlackBerry
on vacation. If you need to reach me,
call my shellphone."

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Network Connection

By Dr. Philip Baczewski, Director of Academic Computing and User Services

The Plan

This past March, the FCC released the National Broadband Plan for the U.S. This effort was mandated by the American Recovery and Reinvestment Act of 2009 which "directed the Federal Communications Commission (FCC) to develop a National Broadband Plan to ensure every American has 'access to broadband capability.'" After a series of public workshops and collaboration with other government agencies, six goals were identified for increasing access and utility of broadband technologies in the U.S. and the plan has it's own web site where you can read all about it.

As online media has become more rich with pictures, video, animations, and applets, broadband Internet communications has become essential for gaining access to the full experience of the Internet. It is now more common for some information and services to be only available via the Internet. Many organizations (including UNT) accept job applications only via and Internet site. Online banking, online instruction, and online shopping are all enhanced by broadband access.

It's not surprising that broadband networking is seen by some as a foundation for economic growth. According to an article in Information Week, the U.S. ranks fifth among G7 countries in percentage of their populations with broadband access, with the U.S.'s 26.5% stacked up against 29.4% in Canada and Germany. We don't seem far behind, but if almost 3/4 of the U.S. population doesn't have broadband access, we've still got a ways to go to achieve a level of ubiquity that the power grid and even the telephone network enjoy.

Goals

The National Broadband Plan goals seek to support "a more productive, creative, efficient America." The plan lists the following goals:

1. At least 100 million U.S. homes should have affordable access to actual download speeds of at least 100 megabits per second and actual upload speeds of at least 50 megabits per second.

2. The United States should lead the world in mobile innovation, with the fastest and most extensive wireless networks of any nation.

3. Every American should have affordable access to robust broadband service, and the means and skills to subscribe if they so choose.

4. Every American community should have affordable access to at least 1 gigabit per second broadband service to anchor institutions such as schools, hospitals and government buildings.

5. To ensure the safety of the American people, every first responder should have access to a nationwide, wireless, interoperable broadband public safety network.

6. To ensure that America leads in the clean energy economy, every American should be able to use broadband to track and manage their real-time energy consumption.

And to achieve these goals, the plan recommends the establishment of a "Broadband Strategy Council to coordinate the implementation of National Broadband Plan recommendations." Bold strategy, indeed.

Some of these goals seem aspirational in nature, such as leading in mobile innovation and tracking energy consumption. Some seem in the practical public interest, such as increasing the communication capabilities of public

institutions and public safety organizations. That every American should have access to affordable broadband service and that 100 million households should have access to 100 Megabit download speeds are interesting goals to consider, since there are current standards for comparison. 100 Megabit per second (Mbps) is the de facto standard for most enterprise IP networks. All UNT offices with wired Internet access have a 100 Mbps connection. Most home broadband Internet access operates at speeds between 1 and 25 Mbps.

Networking Terminology

Perhaps a refresher in networking terminology is in order here. Networking is usually described in terms of bandwidth, or in other words, how much information can be transfered over a network at a time. The smallest unit of computer information is the bit, short for binary digit. It takes 8 bits to represent one of the characters you are reading on this page. 100 Megabits is 100,000,000 (one hundred million) bits, or 12.5 million characters. If you had one or two online books in text format, you could transfer them over a 100 Mpbs network in one second. Of course, that data rate is a theoretical maximum. In reality, there is overhead (additional information) in the networking protocols which support the communication which will make the actual rate of transmission slower than the theoretical, so maybe it would take 1.5 seconds.

Ironically enough, the Broadband Plan doesn't define "broadband" very well, although there is an extensive discussion of current networking availability and the current demographics of broadband access. Broadband has been traditionally defined in relation to dialup networking at speeds of 56 kilobits per second. Anything above 256 kilobits per second is considered broadband speed. That's still 400 times slower than the 100 megabits per second that is set as the desired standard for home broadband service. But at least one goal may be partially fulfilled by the fact that 3G Cell phones with data service are technically broadband devices, and those devices are available to all Americans, although they may not be affordable. By some accounts, 80% of people accessing the Internet soon will be doing so on mobile devices, so mobile networks will be a big player in America's broadband future.

What's available locally?

As an exercise in evaluating how close we are to affordable home-based 100 megabit per second Internet service, I did an informal survey of the local Dallas/Fort Worth broadband providers based on their published information on their websites. The following chart summarizes what I found. For comparison purposes, the highest speed service for each company is listed, although most have a range of speeds at a range of costs.

Company & Service	Top Download Speed	Top Upload Speed	Initial Monthly Cost
Verizon FIOS	50 Mbps	20 Mbps	$139.95
Comcast Internet	50 Mbps	10 Mbps	$59.95
Charter Internet	25 Mbps	3 Mbps	$54.99
ATT U-verse	24 Mbps	N/A	$65.00
Clear Internet	6 Mbps	1 Mbps	$40.00
ATT DSL	6 Mbps	768 Kbps	$24.95

This is not meant as a buying guide and a couple of disclaimers are needed here. Speeds are rarely as fast as advertised since they are generally theoretical maximums which also don't take into account variables such as other network traffic or local influences such as wireless signal strength or the capability of connecting devices. Costs are rarely as low as advertised (after adding taxes, fees, and any other required services, etc.) But, it is evident that affordable 100 Mbps networking is not an option at least for homes in the Fort Worth/Dallas area and we have a ways to go before 100 Mbps download and 50 Mbps upload speeds are a reality.

According to the National Broadband Plan availability map, most of the Dallas/Fort Worth metropolitan area has the highest level of home availability of broadband service greater than 4 Mbps, in the 91-100% range. Only Denton, Dallas, and Ellis counties fall in the lowest range of housing units **without** such service at 0-2000. The rest of the area counties fall within the 2001-5000 range or higher. So, there seems to be a gap between availability and adoption of broadband service. It is also obvious from the map, that availability of broadband services is lowest in rural areas that lack the level of communications infrastructure found in urban centers.

The Plan does have recommendations to address this lack of broadband availability, including a "Connect America Fund" to subsidize the development of infrastructure in areas where commercial interests aren't driving broadband implementation. Also recommended is a "Mobility Fund" to deploy 3G networks in underserved areas. The Plan also recommends that "Congress should make clear that state, regional and local governments can build broadband

networks." Whether or not Congress agrees is yet to be seen.

Suggestions

The Plan seems to mostly recommend throwing money at the problem, and that may be the only solution for rural America. However, it seems that with a few regulatory changes, competition could drive the development of faster and more reliable Internet service. A couple suggestions are:

- Unbundle service from monopolies based on geographic location.

  - Right now if I think that Verizon FIOS is the best service, I can't get Verizon FIOS without moving into their service area. Currently, there are at most only a couple of options for wired broadband Internet service and they usually come down to a choice between your local phone company and your local cable TV company. Wimax (such as the Clear Internet example above) service is independent of a specific geographic service area, but Wimax doesn't operate at the higher bandwidths that wired services can support.

- Unbundle mobile devices from mobile service providers.

  - Right now, if you think Sprint's service is the best, you are limited to a Sprint phone. Even if you can buy an "unlocked" device, it may not be affordable, since the cellular carriers are subsidizing certain cellular devices, rather than letting the market determine what the actual value of those devices are. As an illustration, price a new "unlocked" phone and then a new netbook or laptop. You may be able to afford the laptop, but possibly not the phone.

- Pass a Federal law to prevent blocking of municipal or community networks by corporations or state and local governments.

  - You'd think that just like community utilities, community networks would be seen as a useful infrastructure, but the blocking of municipal networks has been an issue here in Texas in the recent past.

It's that simple!

In other words, in the best American tradition, let's break up some monopolies and let the marketplace drive the development of services based on their true value. And where the marketplace doesn't operate, rely on the American tradition of community to be sure that all Americans have access to these new technologies. That's a simple plan.

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RSS Instructional Services

Research and Statistical Support (RSS) is a division of Academic Computing and User Services whose mission is "to facilitate access to current research tools and statistical methodologies and to promote these methods to the research, instructional, and administrative communities at UNT; to encourage a collaborative research environment for researchers through the development and use of innovative computing technologies; to provide training and consultation in the appropriate use of statistical methodologies and computer software; and to facilitate access to data collection and data management technologies." In keeping with that mission, the RSS group has recently developed three *online courses in SPSS, SAS, and R*. Links to those courses and more can be found here under the "Short Courses" heading:

http://www.unt.edu/rss/Instructional.htm

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Helpdesk FYI

By Jonathan "Mac" Edwards, CITC Helpdesk Manager

Checking your work Email via Exchange on Android

In a previous column I outlined the steps for checking work email on an Android device using IMAP. At the time everyone was running 1.6 (donut) or older versions of Android, which did not include native exchange support. Apps that included Exchange support, such as Touchdown, did exist, but at a price. With a new dessert option, éclair this time, the release of 2.0 brought native Exchange support to the Android platform. In this article I will go over the steps for setting up the Android mail client to check mail via Exchange. Note: For this article I will be going through the steps using the HTC Desire, which has a slightly different Mail application than the default Android App; the general settings will still be identical.

- Open the Mail App.

- Choose New Account

- Select: **Exchange Active Sync**

- Click: **Manual Setup**

- Email address: **first.last@unt.edu**

- Server addres: **webmail.unt.edu**

- Domain: **unt**

- Password: **Your UNT euid password.**

- Select: **This server requires an encrypted SSL connection.**

- Click: **Next**

- If asked if you want to enable Security choose *continue*.

- Choose which items you would like to enable ActiveSync for, and then click **Finish Setup**.

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IRC News

Minutes provided by Susan Richroath Recording Secretary*

The IRC -- unofficially now known as the INFORMATION TECHNOLOGY COUNCIL (ITC) -- is currently undergoing a reorganization, see the May 20, 2008 minutes for more information.**

No IRC/ITC minutes were available for publication this month.

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*For a list of IRC Regular and Ex-officio Members click here (last updated 12/12/08). Warren Burggren is now the Chair.

**DCSMT Minutes can be found here.

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RSS Matters

Research and Statistical Support
University of North Texas

Principal Components Analysis vs. Factor Analysis...and Appropriate Alternatives

Link to the last RSS article here: Categorical Variables in Regression: Implementation and Interpretation -- Ed.

By **Dr. Jon Starkweather**, Research and Statistical Support Consultant

During my academic childhood; which is a label I apply to the time when I was earning my Bachelor's degree, I was introduced to the use of Principal Components Analysis (PCA) and Factor Analysis (FA) while taking an undergraduate tests and measurement class. Later, during my academic adolescence (earning my Master's degree), I was introduced to the confusion surrounding the appropriate choice of PCA or FA under specific circumstances. During my academic young adulthood (earning my PhD), I was introduced to the use of Structural Equation Modeling for confirmatory factor analysis. Since that time, I have learned there are alternative analyses which can be used in place of traditional PCA or FA when attempting to reduce the number of variables or identify underlying structure. The purpose of this article was to hopefully clarify what are the key elements which should be considered prior to choosing between these alternatives and PCA or FA. The article also provides a brief review of two of those alternative analyses and links are provided to tutorial pages for conducting the various analyses in SPSS and the R programming language.

Principles of Measurement

In order to discuss PCA and FA, and their alternatives, we must first discuss some principles of measurement. PCA and FA grew out of early measurement and intelligence research, such as Binet and Henri (1895), Pearson (1901), and Spearman (1904) among others. The latent factor idea grew out of the combination of intelligence research, and the classical test theory of measurement (Thurston, 1947; Novak, 1966). Essentially, under classical test theory, observed score equals true score plus error. Here, true score refers to the amount of the characteristic or ability a case actually has at the time of measure. Latent simply refers to something we can not directly observe or measure. Observed variables can be measured directly, unobserved or latent variables can only be measured indirectly. Measuring a person's height is fairly direct, whether we use inches or centimeters the error associated with a measurement of a person's height is relatively low. But, when we measure characteristics or abilities which can only be measured indirectly, for instance sadness, the error associated with that measurement is likely greater than the error associated with the height measurement. Confounding the issue of direct versus indirect measurement is the issue of measurement scale.

Measurement scales were made popular by Stevens (1946, 1951, 1957). There are four measurement scales; nominal, ordinal, interval, and ratio. Nominal scale is essentially naming things with numbers; football jersey numbers – the numbers simply identify objects. Ordinal scale has the added characteristic of sequence; finishing positions of a race – the numbers identify objects and convey sequential order. Interval scale has the additional characteristic of equal intervals between units of measure; time of day or clock time – the numbers identify objects or points, convey sequence, and there are equal intervals between the units (e.g. the interval between 1 o'clock and 2 o'clock is the same as the interval between 4 o'clock and 5 o'clock [accept on Fridays]). Ratio scale has the

additional characteristic of a true zero point; pounds of weight or Kelvin temperature – an object cannot weigh negative 120 pounds. The 'accept on Fridays' comment above is an important one because it highlights another issue in measurement; the issue of objective versus subjective measurement. The clock is an example of objective measurement while our perception tends to be much more subjective. We tend to perceive the interval between 4 o'clock and 5 o'clock as greater than the clock measures it. The clock has no variance (if it is working properly) when measuring the interval between 4 and 5 p.m. on multiple days. Our judgments of the interval between 4 and 5 p.m. on Fridays tends to be different (or vary) when compared with our judgment of the interval between 4 and 5 p.m. on other days. It is generally considered best if one measures directly, objectively, and with instruments that provide interval or ratio scaled variables. Often, practical considerations prevent this best case scenario and the data then constrains which analysis should be run. These principles of measurement should be carefully considered prior to choosing any analysis and especially when considering the choice between PCA, FA, and their alternatives.

PCA and FA

PCA is a variable reduction technique which maximizes the amount of variance accounted for in the observed variables by a smaller group of variables called *components*. As an example, consider the following situation. Let's say, we have 500 questions on a survey we designed to measure persistence. We want to reduce the number of questions so that it does not take several hours to complete the survey. It would be appropriate to use PCA to reduce the number of questions by identifying and removing redundant questions. For instance, if question 122 and question 356 are virtually identical (i.e. they ask the exact same thing but in different ways), then one of them is not necessary. The PCA process allows us to reduce the number of questions or variables down to their principal components while maximizing the amount of variance in those variables accounted for by the principal components. A key to understanding PCA is recognizing the components as groups of variables (questions, items, etc.) which were the inputs of the PCA. The components are not latent factors. PCA is not a model based technique and involves no hypothesis about the substantive meaning of or relationships between latent factors. Rotation strategies, which focus on the relationship between components, can be applied to components to aid interpretation, but these components are not the same as latent factors. PCA is occasionally, but very confusingly, called exploratory factor analysis (EFA). The use of the word *factor* in EFA is inappropriate and confusing in this context because, we are really interested in components and variable reduction, not factors. This issue is made more confusing by some software packages (e.g. PASW/SPSS & SAS) which list or use PCA under the heading factor analysis.

FA is typically used to identify or confirm the latent factor structure for a group of measured variables. Latent factors are unobserved variables which typically can not be directly measured; but, they are assumed to *cause* the scores we observe on the measured or indicator variables. FA is also used to reduce the number of variables which can reasonably measure or convey the latent factor structure. FA is a model based technique. It is concerned with modeling the relationships between measured variables, latent factors, and error. Therefore, because of the recognition of error; FA is typically more consistent across samples (i.e. the results tend to be more generalizable and replicable than PCA). The ability of FA to recognize unique item variance (sometimes referred to as item error variance) is a key in distinguishing it from PCA – which considers all variance equally and attempts to account for as much of it as possible without regard to types of variance. FA relies on assumptions of linearity, multivariate normality, and homoscedasticity.

Both PCA and FA take as input a correlation or covariance matrix. Both PCA and FA can be more easily interpreted with the application of a rotation strategy (e.g. varimax or oblimin). PCA and FA tend to show similar results when performed on a single data set, but they are not interchangeable. As stated in O'Rourke, Hatcher, and Stepanski (2005):

"Both (PCA & FA) are methods that can be used to identify groups of observed variables that tend to hang together empirically. Both procedures can also be performed with the SAS FACTOR procedure and they generally tend to provide similar results. Nonetheless, there are some important conceptual differences between principal component analysis and factor analysis that should be understood at the outset. Perhaps the most important deals with the assumption of an underlying causal structure. Factor analysis assumes that the covariation in the observed variables is due to the presence of one or more latent variables (factors) that exert causal influence on these observed variables" (p. 436).

Both PCA and FA can be used as exploratory analysis. But; PCA is predominantly used in an exploratory fashion and almost never used in a confirmatory fashion; because it is primarily suited for data reduction. FA can be used in an exploratory fashion or a confirmatory fashion because; it is primarily suited for identifying and/or confirming factor structure. In both scenarios, the focus is on identifying the variables/items which load on the factors well. The choice of which is used (PCA or FA) should be driven by the goals of the analyst. If you are interested in reducing the observed variables down to their principal components while maximizing the variance accounted for in the variables by the components, then you should be using PCA. If you are concerned with modeling the latent factors which cause the scores on your observed variables, then you should be using FA.

Some Alternatives

Categorical principal components analysis (CATPCA) is appropriate for data reduction when variables are categorical (e.g. nominal or ordinal) and the researcher is concerned with identifying the underlying components of a set of

variables (items, survey questions, etc.) while maximizing the amount of variance accounted for in those items (by the principal components). The primary benefit of using CATPCA is that it derives weights from the input data that produce optimal linear relationships in the output data. CATPCA does not assume linear relationships among numeric (interval or ratio) data nor does it require assuming multivariate normal data. Furthermore, the optimal scaling used in SPSS during the CATPCA analysis allows the researcher to specify which level of measurement he or she wants to maintain (e.g. nominal, ordinal, interval/ratio, spline-nominal, & spline-ordinal) in the optimally scaled variables. The R programming language also has various packages (e.g. polycor) and functions (e.g. hetcor) which can be used to create a matrix of different types of correlations for different measurement scales for each pair of variables in a data set. Some, such as those in the aspect package, will also do optimal scaling. The resulting correlation matrix can be passed to a PCA function which will result in less biased results than simply using Pearson correlations for all types of variables. For example, the hetcor function "computes a heterogenous correlation matrix, consisting of Pearson product-moment correlations between numeric variables, polyserial correlations between numeric and ordinal variables, and polychoric correlations between ordinal variables" (Fox, 2010, p. 2). The resulting matrix from a hetcor function can then be passed to a PCA function. But, the hetcor function is not the only function which can be used to create specific types of correlations and the hetcor function does not offer an alternative for strictly nominal variables.

Correspondence Analysis is appropriate when attempting to determine the proximal relationships among two or more categorical variables. Correspondence analysis is also available in the R programming language using a variety of packages and functions (e.g. ca package contains the ca function – for correspondence analysis). Using correspondence analysis with categorical variables is analogous to using correlation analysis and principal components analysis for continuous or nearly continuous variables. They provide the researcher with insight as to the relationships among variables and the dimensions or eigenvectors underlying them. A key part of correspondence analysis is the multi-dimensional map produced as part of the output. The correspondence map allows researchers to visualize the relationships among categories by plotting them in a spatially accurate way on dimensional axes; in other words, which categories are close to other categories on empirically derived dimensions. Correspondence analysis is nonparametric and does not offer a statistical significance test because; it is not based on a distribution or distributional assumption (Garson, 2010). Comparison of different models (e.g. different variables entered/removed) should be done with categorical or logistic regression. Again, correspondence analysis requires categorical variables only. Correspondence analysis accepts nominal variables, ordinal variables, and/or discretized interval - ratio variables (e.g. quartiles), although creating discrete categories from a continuous variable is generally discouraged.

Recommendations

The choice of which analysis to use should be evaluated by the researcher with strong emphasis on what the a-priori goals of the study were, what type of data has been collected, and what properties the data displays during initial data analysis. Close attention should be paid to scatter plot matrices of all the variables (or items) with a keen eye for linearity.

If the goal was to reduce the number of variables while maximizing the total variance accounted for, then traditional PCA is appropriate. If the data is nominal or ordinal, then CATPCA is appropriate. CATPCA can be implemented using SPSS CATPCA with optimal scaling. Or, if one uses the R programming language, there are several packages available (e.g. aspect, homals, polycor) which contain functions for optimally scaling and/or correlating differently scaled variables. Each can produce an appropriate correlation matrix on which to conduct the PCA in R.

If the goal was to document or confirm latent factor structure, while accounting for measurement error when the data are interval or ratio, homoscedastic, and multivariate normal; then FA is appropriate. If those assumptions are not met, then a variety of alternatives are available. One can use the hetcor function (or some other function) in R to do the FA. Or, one could conduct multiple correspondence analysis in SPSS or in the R programming language (using the ca package). Or, one could conduct a joint correspondence analysis in R (using the ca package). There are likely other options available, especially in the R programming language. But the general message of this article is that the researcher should not feel constrained to one analysis without considering alternatives which may be better suited to the data.

Until next time, *I get by with a little help from my friends.*

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Short Courses

The RSS staff decided to take a break from teaching short courses this summer. Also, **A MAJOR change has taken place WRT SPSS and SAS courses; they are now offered _online_ only.** RSS staff will be still be available for consultation on those topics, however. Another class available online is *Introduction to R*. The RSS Instructional Services page is the *Benchmarks Online* "Link of the Month" this month.

Surf over to the Short Courses page to see instructions for accessing the SPSS and SAS online learning and other training that is available to you.

Special classes can always be arranged with the RSS staff. See "Customized Short Courses" below for further information. Also, you can *always* contact the RSS staff for one-on-one consultation. **Please read the FAQ before requesting an appointment though.**

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 (they have a new comprehensive training curriculum), and the Center for Learning Enhancement, Assessment, and Redesign. Additionally, the Center for Achievement and Lifelong Learning offers a variety of courses, usually for a small fee.

EIS training is available. Questions or comments relating to EIS training should be sent to EISTCA@unt.edu.

Microsoft E-Learning

Microsoft E-Learning courses are now available for *faculty and staff* via our UNT-Microsoft Campus Agreement. Please contact Claudia Lynch at lynch@unt.edu for instructions on accessing this training.

Microsoft Outlook Training and more

The Messaging Systems Group has all sorts of useful information on their website, including training information.

Central Web Support

Consult Central Web Support for assistance in acquiring "Internet services and support." As described on their website:

CWS provides Internet services and support to UNT faculty, staff and students. Services include allocating and assisting departments, campus organizations and faculty with web space and associated applications. Additionally, CWS assists web developers with databases and associated web applications, troubleshooting problems, support and service.

CLEAR (was Center for Distributed Learning)

CLEAR offers courses especially for Faculty Members. A list of topics and further information can be found here.

The center also offers a "Brown Bag" series which meets for lunch the first Thursday of each month at Noon in Chilton 245. 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 CLEAR Website.

UNT Mini-Courses

There 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.unt.edu/minicourses/

Information Security Awareness

The UNT Information Security team has been offering Information Security Awareness courses to all UNT faculty and staff. Topics to be covered will include workstation security, sensitive data handling, copyright infringement issues, identity theft, email security, and more.

For more information, or if you would like to request a customized course to be taught for your department, contact Gabe Marshall at x4062, or at security@unt.edu.

Also, Information Security Training is now available through Blackboard Vista (formerly known as WebCT).

Alternate Forms of Training

Many of the General Access Labs around campus have tutorials installed on their computers. See http://www.gal.unt.edu/ for a list of labs and their locations. The Willis Library, for example, has a list of Tutorials and Software Support. The Library Instructional Unit also offers workshops and training, including "tech skills" training. Visit their websites for more information: http://www.library.unt.edu/library-instruction

The Training Website has all sorts of information about alternate forms of training. Computer Based Training (CBT) and Web-based training are some of the alternatives offered, although due to the rising costs of training, shrinking budgets and changing technology, computer-based training at UNT is in a state of transition. For up-to-date information on CBT at UNT, see the CBT website.

Gartner Research Services

Way back in 2006 we announced *Gartner Core Research Services Now Available to the UNT Community*. Our subscription for Gartner services has always included **all** UNT faculty, students, and staff. All you need to do to access the subscription is to log into the UNT Gartner portal page at https://gartner.unt.edu/. Gartner is now offering "Webinar Wednesdays." To view all the offerings see: http://my.gartner.com/portal/server.pt?tbb=webinarcalendar You can also listen to Gartner podcasts here: http://www.gartner.com/it/products/podcasting/asset_137461_2616.jsp.

State of Texas Department of Information Resources

Another possible source of training for staff and, perhaps, faculty members is the Texas Department of Information Resources. A look at their Education and Training website reveals some interesting possibilities.

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New Employees:

- **Briona Patterson**, CSS Tech, Classroom Support Services (part-time).

- **Christopher Mlynski**, CSS Tech, Classroom Support Services (part-time).

- **Taylor Manning**, CSS Tech, Classroom Support Services (part-time).

- **Daphne Glasgow**, CSS Tech, Classroom Support Services (part-time).

- **Stephen Eisenhauer**, IT Specialist, Facilities Support, Administrative Desktop Support.

- **Iqan Kamal**, IT Manager, AIS Tools and User Services.

- **Monica Salazar-Miranda**, Student Assistant Data Communications (part-time).

- **Travis Fraser**, Student Assistant Data Communications (part-time).

No longer working in the Computing and Information Technology Center:

- **Timothy Hinz**, CSS Tech, Classroom Support Services (part-time).

- **Brieva Oswald**, CSS Tech, Classroom Support Services (part-time).

- **Chris Lewton**, MMS Tech, Microcomputer Maintenance Shop (part-time).

- **Christie Jones**, CSS Tech, Classroom Support Services (part-time).

- **Daphne Fernander**, Business Analyst, Finance and Admin. Business Analyst Team (AIS)

- **Rudolph Bracey**, IT Specialist, Data Communications Serviecs.

- **Niranjan Reddy Boodidha**, IT Programmer Analyst, Financial Aid & Scholarships Systems (AIS).

Changes, Awards, Recognition, Publications, etc.

In case you can't find them ...

- **David Franklin** has moved from his position in Computer Operations to Data Communications, where he is an IT Specialist.

- **Wade Anthony** has moved from his position in EIS Contributor Relations to EIS Security Administration, where he is an IT Specialist.

Service to UNT

The June 24 issue of *InHouse* recognized **Trent Geerdes**, IT Specialist, Research Computing Support, Academic Computing and User Services, for his **10 years** of service to UNT. Also recognized, for **5 years** of service, was **Lynne Sinclair**, IT Programmer Analyst, EIS Application Infrastructure Management (AIS). Congratulations!

Wedding Bells!

- **Gabe Marshall**, Information Security Analyst, was very busy last month. He got married, went on a honeymoon to France and Italy, and then moved to a new house in Grapevine. His wife, Jennifer, is a 1st grade teacher in Lewisville ISD. Gabe says that he and Jennifer are both proud UNT alums. Congratulations!

Fun Fact Winners

- Continuing the CITC tradition, we have some more *InHouse* prize winners. Congratulations to **Sandra Holler**, Administrative Coordinator, Budget & Employee Services. She was a winner in the July 12 *InHouse* prize giveaway. Sandra also won last month! Congratulations are also in order for **Lauren Buchanan**, IT Manager, Finance & Admin. Systems (AIS). She was also a winner in the July 12 *InHouse* prize giveaway.

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Site last updated on April 22, 2016