Google This! Using Google Apps for Collaboration and Productivity

Dan R. Herrick
Colorado State University
Engineering Network Services
Fort Collins, CO 80523-1301
970-491-3131
Dan.Herrick@Colostate.edu

ABSTRACT
In 2009, Colorado State University migrated to Google Apps for Education as an e-mail hosting solution for its students from an internal on-premise e-mail system. The additional capabilities of Google Apps, originally seen as a nonessential add-on to the e-mail solution, have boosted the collaboration and communication among CSU’s students beyond our expectations. Once the faculty and staff saw the potential for collaboration the requests to opt-in increased. This allowed collaboration between faculty and students on a scale not previously witnessed at CSU. Faculty who have made the switch to Google Apps are satisfied and enthusiastic with the service. The Google Apps for Education suite comprises Google Mail, Calendar, Talk, Docs, Sites and Video. In this paper I will provide an overview of each App as well as specific techniques on using each App. We will discuss the potential of teamwork and idea exchanges made possible by Google Apps and how they can be implemented in the academic environment. We will discuss and demonstrate interoperability between Google Apps and external applications, IT team collaboration, student employee management integration, migration techniques and more.

Categories and Subject Descriptors
H.3.5. [Information Storage and Retrieval]: On-line Information Services – commercial services, web-based Services.
H.4.1. [Information Systems Applications]: Office Automation – groupware, spreadsheets, time management (e.g. calendars, schedules), word processing.
H.4.3. [Information Systems Applications]: Communications Applications – electronic mail.
H.5.2. [Information Interfaces and Presentation (I.7)]: User Interfaces (D.2.2, H.1.2, I.3.6) – training, help, and documentation.
H.5.3. [Information Interfaces and Presentation (I.7)]: Group and Organization Interfaces – asynchronous interaction, collaborative computing, computer-supported cooperative work, synchronous interaction, web-based interaction.

K.8.1 [Personal Computing]: Application Packages – spreadsheets, word processing.

General Terms: Management, Documentation.

Keywords: Cloud Computing, Collaboration, Productivity, Software, Software-as-a-Service, Google, Personal Information Manager, E-mail, Calendar, Document Management, Office Suite.

1. INTRODUCTION
Google Apps is a suite of web-based applications from Google composed of communication and productivity tools. There are various editions of the Google Apps suite, targeted for groups such as businesses, schools and other organizations. The differences between the various editions are outlined in Table 1. The scope of this article is limited to Google Apps Education Edition, which is available at no cost to colleges and universities (it is additionally available to educationally focused groups, such as K-12 school districts). At time of this writing, Google Apps Education Edition includes the following applications: Google Mail (also known as Gmail), Google Calendar, Google Talk, Google Docs, Google Sites, and Google Video for education. Each of these applications is entirely web-based, although there are client programs that provide additional functionality. Because they are web-based, each Google App is inherently cross-platform; if the computing platform supports a modern web browser, it has full compatibility with no additional software required. Inherently Google Apps are web-based, scalable and essentially virtualized models as an example of modern cloud computing.

2. CASE STUDY: COLORADO STATE UNIVERSITY
In 2009, Colorado State University (CSU) migrated to Google Apps as an e-mail hosting solution for its undergraduate students from an internal on-premise e-mail system. CSU’s prior service offering to its students was limited to e-mail and personal web sites only. This offering was handled by one server, with total storage of 40MB per user. CSU’s desire was to replace this aging system with an outsourced e-mail and collaboration suite, driven by a need to replace obsolete hardware and the students’ desire for more services. Cost, reliability and the scope of services...
provided were the primary considerations for this decision. While other services were considered and evaluated, Google Apps was selected due to the suite achieving or exceeding the aforementioned criteria. Of paramount interest were e-mail, calendar, and personal web site services for students, while the interoperability of those was seen as welcome but nonessential, as prior similar services were self-contained. It was not until post-implementation that the additional capabilities of Google Apps dramatically enhanced collaboration and communication amongst CSU’s students, faculty and staff. Initially, the Google Apps solution was planned and implemented only for students, but CSU allowed faculty and staff to opt-in and create Google Apps accounts. Many did so to take advantage of the benefits, including storage and collaboration opportunities. (Faculty and staff currently use a campus-hosted Microsoft Exchange deployment for e-mail and calendar; this is unlikely to be replaced at this point.)

2.1 Benefits

The benefits of migrating from CSU’s self-hosted services were immediately seen in terms of storage quotas. With Google Apps, the per user storage quota is over 7GB (with other per user limitations, mostly pertaining to the number of files). In terms of personal storage alone, Google Apps yielded nearly 180 times the limitations, mostly pertaining to the number of files). In terms of per user storage quota is over 7GB (with other per user limitations, mostly pertaining to the number of files). In terms of personal storage alone, Google Apps yielded nearly 180 times the capacity of a self-hosted solution, with zero associated cost for hardware and software licensing. For those familiar with Gmail and Google’s search-related services, advertising is inherent in Google’s business model. Fortunately, Google Apps Education Edition is offered with no advertising. Google services are conveniently provided with a single sign on, which CSU was able to integrate with its current central login credentials (a CSU-specific “eID”), and allows for client branding. IT support at the university is highly decentralized, with each administrative unit, College and in many cases departments providing their own non-integrated IT support. Individual CSU IT units support a diverse mix of computing platforms, including Microsoft Windows, Macintosh OS, UNIX, Linux, Solaris and mobile devices. The solution needed to fully support every platform in use at the university. As Google Apps is entirely web-based, it fit this requirement. Finally, with a web-based suite of tools, the portability and mobility are unmatched, and the solution is truly a global one.

2.1.1 Cost Comparison

According to a Forrester cost analysis [1], Google Apps costs considerably less than a Microsoft Exchange e-mail solution. Including the costs of software licensing, server hardware and staffing, the cost of a Microsoft Exchange on-premise e-mail solution is $16.29 per user per month; the cost to support 50,000 users (the number of undergraduate e-mail accounts at CSU) would be $9,774,000 per year. (This figure does not factor in educational discounts, which vary by institution per negotiated contract.) The cost of Google Apps for businesses is $50 per user per year, or with 50,000 users, $2,500,000 per year. The cost of Google Apps Education Edition, however, is $0 per year.

2.2 Transition Period

Google’s support documentation recommends a six to ten week transition period for migrating to Google Apps. In practice, all but the smallest organizations should plan on a much longer period. CSU began planning and testing in early 2008, with a pilot program initiated in March 2008. The program went live in August 2008. During the transition period (August 2008 through March 2009), students (as well as faculty and staff) were given the opportunity to migrate their e-mail accounts (and optionally, their individual e-mails) to the new hosting provider, Google. In mid-March, all remaining undergraduate students were transitioned en masse using Google’s web services. Students were able to access the old resources until May, in a read-only mode. In total, approximately 50,000 accounts were migrated to Google Apps, with about half done in the final step.

3. SETTING UP AND MIGRATING TO GOOGLE APPS

As this article is intended as a resource to complement a fully functional and complete Google Apps Education Edition service, we will very briefly discuss the setup and migration to Google Apps. Google provides self-help guides, case study examples, and

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>Free</td>
<td>50 USD / account / year</td>
</tr>
<tr>
<td>Storage</td>
<td>Same storage space as regular gmail.com accounts (over 7GB as of September 2008)</td>
<td>25 GB space for e-mail</td>
</tr>
<tr>
<td>Advertising</td>
<td>Text ads mandatory</td>
<td>Text ads optional</td>
</tr>
<tr>
<td>Users</td>
<td>Limited to 50</td>
<td>No Limit</td>
</tr>
<tr>
<td>Support</td>
<td>None</td>
<td>24/7 phone support</td>
</tr>
<tr>
<td>Other</td>
<td>Integrated Postini services Conference room/resource scheduling 99.9% e-mail uptime guarantee APIs for Single Sign On, etc. 3rd party applications and services Google Video</td>
<td>Conference room/resource scheduling 99.9% e-mail uptime guarantee APIs for Single Sign On, etc. 3rd party applications and services Google Video</td>
</tr>
</tbody>
</table>

Table 1: Differences in Editions of Google Apps
other resources on its web site. Direct support from Google is available as part of the Google Apps service. If your situation is complex, or your staff resources are not sufficient, seek support from a company that specializes in Google Apps migrations.

Best practices include extensive advance planning, thoroughly exploring the legal ramifications of outsourced e-mail and document management, developing a plan to migrate data, developing a marketing and contact campaign, training IT support staff, and extensive testing. Google allows for the use of a test domain before implementing the live domain for Google Apps. This is highly recommended.

E-mail migration can be accomplished in several ways: For entire domains, IMAP mail migration, the Email Application API (Application Programming Interface), and third party solutions are available. For individual accounts, Gmail’s Mail Fetcher and Google Email Uploader are two tools which are supported by Google and are relatively easy for users to self-manage. For more experienced individuals, IMAP drag and drop methods using third party e-mail clients are an option. The most typical migration method for entire domains is the IMAP mail migration option. This method of migration also allows administrators to migrate mail before, during, or after a user’s transition to Google Apps e-mail.

Only e-mail can be automatically migrated to Google Apps. Other forms of data, such as contacts, calendar entries, documents, and web sites must be manually migrated. Import tools in each of the Google apps make this process relatively simple in most cases. Users can be created with a bulk upload or individually.

There are a number of site administrator options which can be managed from a web-based control panel. Your Google Apps site’s appearance has some customization options. By default, advertisements are displayed, but this can easily be turned off from the domain’s control panel, where you can also add a custom logo, custom colors, and custom messages for users.

Only e-mail can be automatically migrated to Google Apps. Other forms of data, such as contacts, calendar entries, documents, and web sites must be manually migrated. Import tools in each of the Google apps make this process relatively simple in most cases. Users can be created with a bulk upload or individually.

There are a number of site administrator options which can be managed from a web-based control panel. Your Google Apps site’s appearance has some customization options. By default, advertisements are displayed, but this can easily be turned off from the domain’s control panel, where you can also add a custom logo, custom colors, and custom messages for users.

Sharing options

By default, calendars are not shared outside this domain. Select the highest level of sharing that you want to allow for your users.

- Only view busy information (hide event details)
- Share all information, but outsiders cannot change calendars
- Share all information, and outsiders can change calendars

Within this domain - default

Users will be able to change this default setting.

- No sharing
- Only view busy information (hide event details)
- Share all information

Figure 1: Calendar Sharing Options for Domains

Apps and services may be turned on or off at the domain level. These include each of the core applications, plus Gmail Labs and Chat features. Domain-level options for many of the Apps can be set from this control panel. For example, administrators can manage calendar sharing options for all users in the domain, which will determine what users may do with their calendars (See Figure 1.)

4. GOOGLE MAIL

One of the key components to Google Apps is Google Mail, also called Gmail. There are, however, important differences between Gmail (the free, individual e-mail accounts) and Google Apps Email. The primary difference to remain mindful of is that Google Apps (GA) accounts are administered by the organization’s IT administrator; Google accounts (including Gmail accounts) are administered by Google. Some options which are normally available in Gmail may be disabled by the GA site administrator. Otherwise, Google Mail and Gmail are fundamentally the same; minor differences are explained in the relevant help entries.

4.1 Organizing E-mail

As an e-mail client, Google Mail has a very different way of presenting and managing e-mail. Most e-mail client programs use folders to organize e-mail. In place of folders, Google uses labels and conversations. Labels are similar to tags in other data management systems; labels are identifiers attached to individual messages. A message may have more than one label, and a label may be associated with one or more messages. (In addition to being more flexible, labels save storage space, because in a traditional folder organization method, a message would have to be copied into multiple folders, thus increasing the storage.) Labels can be used as sorting or searching criteria. Labels cannot, however, have sub-labels; if a user attempts to impose a folder hierarchy into the Google Mail system, they will quickly find it a one-dimensional folder tree, which is not as useful.

Google Mail also groups e-mails and their associated replies as conversations, which makes it easier to understand the context of a message (or conversation). Messages can also be “Starred”, meaning marked more prominently.

Google Mail’s renowned search capabilities are another powerful organizational tool. Rather than click through layers of folders and hunt down an individual e-mail, users can use the search feature to find what they’re looking for in seconds. This is an excellent productivity boon.

Most users, prior to using Google Mail, had to be mindful of storage limits and were in the habit of deleting all but the most important e-mails. Because of the huge storage limits Google provides, Google recommends that users do not delete any e-mail messages, but instead “Archive” them. For non-Google Apps users, Google has a vested interest in this due to its targeted advertising, but this is a moot point in GA Education Edition. A nice balance is to archive (not delete) all but the most trivial e-mail messages. The search capability can be used on the fly, or labels may be used to view messages later. Unless a user has many large e-mail attachments, it is unlikely that their quota will run out. As an example, this author’s personal Gmail account contains most of his messages for the last 8 years, and his Gmail quota stands at 971 MB (13%) as of this writing.

4.2 Filtering E-mail

Filters in Google Mail operate as they do in other e-mail clients: when certain user-defined criteria are triggered on a message, a user-defined action results. Filters coupled with labels or stars are very powerful organizational methods. Users can filter based on a single criterion of a single rule (“From: user@domain.gov”), multiple criteria of a single rule (“From: user@domain.gov OR user@school.edu”) or criteria of multiple rules (“From:domain.com OR to:domain.com”). An even quicker way to create a filter is to do so from a message, which will automatically populate a filter criteria form. Filter criteria are assigned to one or more actions, such as applying a label, starring,
deleting and even sending a canned response. Filters can be applied to previously received conversations.

4.3 Attachments
Attachments to e-mail messages are signified with a paper clip icon to the right of the subject line. When a user opens an e-mail with an attachment, the user is presented with options to handle the attachment depending upon the attachment type. For images (including PDF documents), the options are View and Download. When Download is selected, the file is downloaded to the user’s computer via the web browser. When View is selected, Google will display the contents of the attachment (without downloading it) in a new browser window. For documents, there are three options: View as HTML, Open as a Google document, and Download. When the View as HTML option is selected, Google attempts to display the file in a new browser window. For documents with complex formatting, this is often less than successful in presenting the document’s intended layout; however, it may be sufficient to determine the contents of a document. When “Open as a Google document” is selected, Google will open a new window to the Google Docs app. For audio and video file attachments, Google gives the option of playing the file or downloading it.

4.4 Security
Google’s integrated security features for e-mail include spam blocking, virus scanning and SSL encryption. Spam blocking is extremely accurate and effective. Google’s approach is to utilize user input to determine spam. Each time a user clicks the “Report spam” button, Google tracks this and builds up a spam-identifying database through its users. All e-mail attachments are scanned when the message they are attached to arrives in the user’s inbox, again when it is viewed, and when a user’s e-mail attachments are uploaded. Although Google does not enable this by default, it can be enabled in the Mail settings, under the Browser connection option (change the option to read “always use https”). SSL encryption is highly recommended.

4.5 Extending Google Mail
Google Mail can be extended in a number of ways. Google Mail Fetcher can be used to “fetch” e-mails from other POP-enabled accounts. Conversely, Google Mail can be used from third party e-mail clients, such as Thunderbird, Outlook, and Entourage. This is often useful for those users who prefer their e-mail client program’s interface to Google Mail’s. Google Mail can be configured to release its e-mail in IMAP or POP form. A Mobile version of Google Mail is available for smart phones, such as the iPhone, Blackberry or Android phones.

One disadvantage of a purely web-based e-mail client is that offline composition of e-mails is not possible. This has been addressed in Google Mail with the Offline feature. The Offline feature must be enabled from the Labs settings section (see below). Once enabled, Offline allows a user limited access to their e-mail while not connected to a network. Offline downloads a local cache of the user’s e-mail, and automatically synchronizes that cache with Google’s servers when a network connection is reestablished by the user’s computer. Not all e-mails are downloaded in the local cache; Google determines which according to its own algorithm. Known limitations to the Offline feature include the inability to send messages with attachments, no access to the Contact Manager, incomplete search results, and no access to some Labs features.

New features are introduced via the Labs experimental features, which are accessible from the Settings menu of Google Mail. It’s worthwhile to peruse the Labs options once a user has become comfortable with Google Mail. Some recommended Labs features are Superstars, Fixed width font, Canned [Auto] responses, Custom label colors, Send & Archive, Undo Send, and Title Tweaks. Always try out one Labs feature at a time until you determine that it is stable. This recommendation comes with a strong caveat: the Labs features may disappear, change or break at any time.

5. GOOGLE CALENDAR
In its most basic form, Google Calendar is much like many other calendaring applications, and all of the basic functionality users have come to expect is found within it. Key differences are the ability to create and manipulate different calendars for different purposes or resources, and the versatility of reminders.

5.1 Managing Calendars
Terminology can be confusing: Google refers to this app as “Calendar,” but a user can have multiple “calendars.” For example, a user can create a separate calendar for class schedules, exam schedules, work schedule, seminars, free ice cream events in the student center plaza, and more. A user’s primary calendar (e.g., the default one that is created along with the user’s Google Calendar account) is a special case: It cannot be deleted, and synchronization utilities will only function on this calendar. Calendars can be assigned unique names, color-coded, and overlaid in the application display, so that users can easily see which events belong to which calendar, and can toggle whether to view each calendar. This is especially useful for scheduling multiple people or resources.

Calendars may also be searched, like e-mail. Users may search their own or public calendars for specific events or details of an event. Administrators can make use of Google APIs to integrate with in-house systems; for example, CSU imports students’ course schedules into their Google Calendar from a Banner course registration system.

5.2 Sharing Calendars
A calendar may be shared with any individual or Google group. If an invitation to share a user’s calendar is received by a user without a Google account, the invitee will be asked to create one. There are four levels of sharing calendars with specific people (some of these may be limited by the site administrator): “See only free/busy (hide details)”, “See all event details”, “Make changes to events”, and “Make changes AND manage sharing”. Each level includes the capabilities of the previous level. The lowest level, “See only free/busy”, is useful for an individual to publish their schedule semi-publicly. For example, a student may want to show times when they are available for group meetings, but may not wish to publish details of their personal life. The lowest two levels give read-only access to a calendar. The “Make changes to events” level is useful for cooperative scheduling of a group resource such as a meeting room. The uppermost level essentially allows for multiple “administrators” of a calendar resource.
Calendars may also be shared with everyone in your domain, or to
the general public. Public calendars are published in HTML,
XML and iCalendar format, making it useful for embedding a live
public calendar in a web page or publishing to external
applications.

Some public calendars may be browsed to or searched for. Users
may request to view a calendar of another individual; that
individual must approve the request, and once approved, the
calendar will appear in the user’s list of viewable calendars.

5.3 Using Calendars
Each discrete item in a calendar is an “event”. Creating events is
very versatile and allows for varied user work flows. Users may
attach information to the event such as location (which, if enough
geographic or address information is added, becomes handily
looked up with Google Maps), recurrence, description, and a
document attachment. Users may choose which calendar the event
is associated with, and invite attendees. Google Calendar keeps
track of which attendees accept the invitation, so the event
organizer can track responses and send e-mails to attendees as a
group. Attendees may also initiate or participate in a discussion
about an event, through Calendar. When inviting attendees, a user
may check guest and resource availability using a graphical tool,
which substantially aids the process of scheduling multiple
attendees based on their availability. The “check guest and
resource availability” is only available to Google Apps
Premier/Education users, not personal Google Calendar account
users.

Resources may be scheduled with Calendar. A “resource” is
anything that can be reserved for an event: a classroom, a meeting
room, a portable media cart, a classroom helper or a projector are
all possibilities. Resources are only available to Google Apps
Premier/Education users and must be created by the domain
administrator. Once a resource is scheduled by a user, another
user cannot schedule the resource nor modify the original user’s
reservation.

Reminders may be set on events. Reminders can be in the form of
application pop-ups, e-mails, or SMS messages (see Section
11.3). Unlike most other calendar applications, multiple reminders
may be set for an event. For example, a user may choose an e-
mail notification four hours before the event, plus an application
pop-up ten minutes before the event.

Events may be added directly from an e-mail message. When a
user receives an e-mail that Google perceives to have event
information in it, an “Add to calendar” hypertext link in the e-
mail message is available, which integrates seamlessly to the
user’s Calendar.

Google attempts to make use of plain English directives within
Calendar. Using the Quick Add option, a user may type “History
101 exam 9/10 noon-2:30” or “Marching band practice every
Saturday at 2pm”. Calendar will interpret those items correctly
and add them to the user’s calendar at the appropriate dates and
times.

6. GOOGLE TALK
Google Talk is the instant messaging (IM) component of Google
Apps. IM is useful for immediate, limited conversation with a
colleague in a remote location.

Normally an instant messaging client program is used. However,
Google Talk capability is integrated with Google Mail, so that
whenever a user has Google Mail open in their web browser, they
may send and receive instant messages. (Naturally, this capability
may optionally be disabled.) Google Talk can be used to transfer
files, make voice and video calls, and send and receive voice mail
messages. Talk further integrates with a user’s Google Mail
account by sharing contacts, saving chat history as e-mail
messages, and retrieving voice mail messages.

6.1 Client Program Versus Web Application
The web component integrated with Google Mail is called Google
Chat. A separate desktop program called Google Talk is available.
Google Chat uses the Google Talk network, and is a minimal
web-based client of the full program. Google Talk is only
available for the Windows platform, but other platforms,
including Mac and Linux, can use Google Chat. The Google Talk
network is also available, via open standards, in other IM
programs, such as iChat and Pidgin. By default, chat sessions will
be within the Google Mail web page, but Google Chat has the
ability to “pop out” of that page into its own web browser
window. A third method of utilizing the Google Talk network is
the Google Talk gadget (see section 6.3).

The Google Talk program is an exception to the cross-platform,
web-based paradigm that other Google Apps operate within. The
Windows program has extra features, including the ability to
notify the logged-in user of new Google Mail messages, to open
e-mail links using Google Mail (rather than an e-mail program
installed on the machine), and a shortcut to send an e-mail
directly to a contact.

6.2 Audio and Video
Google Talk has the ability to send and receive audio and video,
which allows for voice calls, voice mail, and video conferencing.
These features can be used from Google Chat (within the web
browser) and Google Talk. Both the web app and the client
program utilize the host machine’s audio and video hardware
drivers, making the setup very simple.

6.3 Google Talk Gadget
The Google Talk gadget is a stripped-down version of the Google
Talk client, and is not the same as Google Chat. The gadget can
be fully incorporated into a web page, for use on a public
computer that doesn’t have the program installed, for example.
This does require Adobe Flash Player to be installed on the
computer. Some limitations are inherent when using the gadget:
transferring files and making voice calls are not possible with the
gadget.

With Google Talk “chatback badges”, users can create an
interface on their own web page so that visitors to the page can
chat with them using Google Talk, even if the visitor does not
have a Google account. This is useful for IT support groups.

Chatting with groups of people is possible only with the Google
Talk gadget. Users may also show videos and slide shows from
within the chat window of the gadget. This feature is highly
useful for group meetings or even classes.

7. CONTACTS
The Contacts app in Google Apps is also called the “address
book” in other e-mail applications. One of the most fundamental
aspects of a “personal information management”, or PIM, software application is in the way it handles contacts. A contact, in the context of e-mail, is someone with whom you are in communication with. A common metaphor for a contact list is an electronic Rolodex. A recent study from IBM determined that the average e-mail contact was valued at $948 in revenue [2], making this too important an aspect to overlook.

Within Google Apps, the same contact list is used for e-mail communications, instant messaging, calendar interaction, and document sharing and collaboration - in short, nearly every service Google Apps offers. Normally, contacts are directly managed from within Google Mail, but are referenced from other Google Apps. (Optionally, a domain administrator setting allows users access to a separate Contacts application.) Other contact information than e-mail may be stored with contacts, such as telephone numbers, addresses, companies, and photos. The default behavior (requiring no interaction on the part of the user) is that contacts are automatically added to a user’s Contacts list based on e-mail interactions, but contacts may also be added manually.

7.1 Groups
Contacts may be organized into groups, and a single contact may be in several groups. Interacting with a group of contacts is often as simple as interacting with a single contact -- for example, when e-mailing a group or sharing a document with a group. Groups may be created and managed at the individual user level (in which case they are only available to that user), or at the domain level.

When creating domain-level groups, permissions can be applied to the group or roles applied to individual accounts within the domain, to control actions such as administration and sending e-mails to the group. A group can contain other groups, allowing groups to be used as building blocks for communication with large amounts of users.

7.2 Site-Wide Contact Sharing
Through a Google API, domain administrators can designate public contacts, available to anyone in their Google Apps domain. This is useful for general organizational contacts such as “Admissions”, “President’s Office”, “Student Government”, etc.

A commonly used technique at an organization is to create a global address list for e-mail, which contains directory information for the entire organization (and may include external entities.) Google Apps allows this through “contact sharing” options in the domain administration settings. Google Apps does not use mailing lists; instead, a group is created, with an associated e-mail alias. (Users may create their own individual groups in their Contacts, but cannot share these groups with others.)

8. GOOGLE DOCS
Google Docs is an office suite, including word processing, spreadsheet, and slideshow presentation applications. The mobility of Google Apps is a key feature. All documents are stored on Google’s servers, and are accessible anywhere there is an internet connection. This model serves users who are exceedingly mobile (such as students) as well as users who are not. Google Docs also allow for real-time collaboration on documents, so that team members can edit a document at the same time.

8.1 Managing Documents
Documents are organized into folders. By default, a document is not assigned a folder. Users may create folders, which may contain documents and other folders. Stars may also be assigned to flag important files.

To add a document, users may create a new document from within Docs, upload a document created in another application (individually or in bulk), or even e-mail a document to Google Docs. Documents may also be exported (downloaded) for use in other applications.

RSS feeds may be used to subscribe to documents, so users can be alerted to new content appearing in a document.

Documents may be shared with individuals both within the Google Apps domain and external to the domain. If a document is shared with an individual outside the Google Apps domain as a collaborator (someone who may edit the document), that individual must use or create a Google account to access the document. A Google account is not required to merely view the document, however.

8.2 Documents
Documents are very simple to work with in Google Docs; in most cases, simply begin typing, adding formatting options as you go, and Docs even automatically saves your document as you type without any interaction on your part. The interface is simple and includes common UI features such as a “File, Edit, View...” menu and a formatting toolbar. Docs’ simplicity is both its major draw and its downfall. Despite all the things Docs does well (accessibility, sharing, storage, searching), it cannot compare to a full-featured desktop word processing application such as Microsoft Word or OpenOffice. Formatting options are limited, and integrated word processing tools such as mail merge, macros and embedding spreadsheets in a document are limited or not available in Docs. Some features, such as document commenting and citations, exist in both Docs and desktop applications but are not interchangeable.

However, copy and paste features are nearly interchangeable between Docs (and Spreadsheets) and corresponding desktop applications such as Microsoft Word and Excel. The direct HTML editing feature in Docs is very handy for mitigating some formatting inconsistencies, though more labor intensive.

Google Docs is not intended to replace a full-featured desktop word processing application, but can be used to supplement one. Docs is a very efficient simple document editor and can be used to complement a full office suite. For most simple office publication and communication purposes, the formatting and tool features available in Docs will be sufficient. More complex purposes such as desktop publishing or scientific journal formatting are more likely to be accomplished with a specialized desktop application. Best practice with Docs is likely to involve creating simple documents quickly, and drafting documents with Docs, then putting the finishing formatting touches using a desktop application.

8.3 Spreadsheets
Spreadsheets have all the expected basic functionality: entering data; cell, row, column and sheet manipulation; multiple sheets; formatting text and cells, including formatting rules; merging cells; auto-fill; summing and other functions; sorting; and charts. In addition, some specific Google-related functions are particularly
useful. The GoogleLookup function, for example, retrieves information from the Web directly into a spreadsheet, and the GoogleFinance function publishes stock market quotes and other financial information into a spreadsheet. Google gadgets (mini-programs inserted into Web pages), such as an interactive time series chart, can be integrated with spreadsheets to display and manipulate data. Forms can be created from any spreadsheet and others invited to fill them out.

Spreadsheets do not support advanced features, and lack some features that may be considered standard, such as macros or the ability to import graphs from other spreadsheet programs, such as Microsoft Excel.

8.4 Presentations

Slideshow presentations are very simple to use and, similar to documents, are best used in simple case scenarios as they do not have the advanced features of similar desktop applications. Google Docs presentations lack features such as animations and transitions. One exceptional feature of Google presentations is that they may be presented over the Web in Google Docs, with no need to set up a Web conference, giving users the ability to chat online about the slides during the presentation. As a minimal portable tool, a presentation created in a desktop application can be uploaded to Google Docs and presented in that manner (with some functional limitations as described). Like similar desktop applications, presentations can be printed in order to give copies to an audience.

In order to view a presentation, the presentation must be published. The presentation may be published as a dedicated interactive Web page or embedded into a static Web page. (The presentation may, of course, be exported for use in a desktop presentation application as well.) When published interactively, the published presentation may be shared. During the presentation, viewers can click through slides at their own pace or follow the presenter, and they may chat within the Web page. Any collaborator of the document may take control of the presentation at any time.

8.5 Collaboration

Where Google Docs really shines is its ease of collaboration. Multiple editors (up to 10) can make changes to the same document in real time. Physical proximity and platform and application version compatibility are no longer limiting factors. For example, a student working at a public terminal in the school library using Windows, a student working from home using a Macintosh, and a professor traveling in China with a Linux laptop can all work on the same document at the same time.

Revision history is simple yet powerful: Users can see every change made and when it happened, compare versions of a document, as well as revert to previous versions of a document with ease. A document can be “forked” into two versions of the document using the revisions feature.

While two or more collaborators are actively working with a document, they can chat (using instant messenger features) directly within the document, to discuss the document.

The owner (generally, the creator) of the document determines sharing rights. Other users may be invited in the role of either “viewer” or “collaborator”. Collaborators may edit the document and invite others to share it. If the owner of the document decides to discontinue association with the document, they may designate one of the other document’s collaborators as the new owner, delete the document, or simply remove it from their list of documents. Documents may also be made public (viewable or editable) within the Google Apps domain. Invitations to view or edit a document may be sent to a mailing list, in which case anyone on the mailing list can use the invitation.

Documents may also be easily inserted as e-mail attachments, published with a unique URL as a web page, or published as a blog post.

9. GOOGLE SITES

Google Sites is very similar to Docs, in that users (primarily, teams of users) create content and share with each other. Sites, however, are intended from the start to be published on the Web (publicly or privately) and interacted with in that manner. A published Site can be viewed (depending on the privacy settings assigned to it) without a Google account, from any web browser. A Site is similar to a small-scale wiki or content management system (CMS). A Site is a collection of group documents interactively published on the Web.

Sites can contain rich content such as Google Documents, video, photo slide shows, and Google gadgets. A Site can be a repository for file uploads for group projects. As with other Google productivity tools, permissions and privacy controls are built in to the model. Access can be granted for public viewing, viewing within the Google Apps domain, or editing within the Google Apps domain.

While not as customizable as a true Web site, a Google Site has options for customization including themes, graphics, and navigation elements. The advantage of a Google Site over a traditional web site is that the Google Site does not require as much setup, maintenance nor technical knowledge. An open repository of public Sites is available to Google Apps domain users.

10. GOOGLE VIDEO

Google Video, a relatively new offering, is a video hosting and sharing service for Google Apps customers. It is similar to a private, internal version of YouTube that is only available in certain locations (the United States is one). This is not the same service as “Google Videos”, which contains publicly hosted and shared videos. Videos hosted on the domain are only viewable by users at the same Google Apps domain. Sharing options are limited: Videos can be shared with either individual users, or the entire GA domain. Users may also share ownership rights of videos with other users. Site administrators have access to every video hosted on the domain.

Included is a system for verifying videos belonging to copyright holders, called the Content Identification Tool. This is an attempt to ensure copyright infringement does not occur.

Users can rate, tag and leave comments on videos, and videos are searchable (by metadata associated with the video) across the domain. Captions or subtitles may be added to videos. Videos may be embedded in Sites and other web pages.

At this time, Google imposes a quota per domain of 10 GB for Google Video. In addition, each domain is limited to 100 accounts that can upload videos, and those accounts must be a faculty or staff
member. This service bears watching as it matures, but for now, the limitations make it unattractive to all but smaller domains.

11. INTEROPERABILITY
Google Apps sets the standard for cloud computing interoperability. Each App was designed to interoperate with the suite of Google’s offerings.

11.1 Among Google Applications
The tight integration of E-mail, calendar, contacts and chat capabilities is a key feature in Google Apps. Being able to add a calendar entry directly from an e-mail, the automatic addition of contacts based on e-mail interactions, and the ability to quickly communicate with a contact (by e-mail, instant message, voice or video) allows for very seamless real-time interactions. The way that contacts are integrated throughout all the Google Apps products presents a productivity boon.

The Google Docs package (Documents, Spreadsheets and Presentations) allow workflow to proceed seamlessly among different types of documents. Documents can be linked to one another and in some cases, displayed within other documents interactively.

Other Google products not included in the Google Apps suite (for example, Picasa image hosting, blog hosting, and RSS reader) are not necessarily easy to integrate with a Google Apps account. Google seems to consider a Google Apps account separately and in some cases it is not simple or even possible to use one of the additional Google products with a Google Apps account.

11.2 With External Applications
Microsoft Exchange is often cited as the primary comparative suite of communications tools to Google Apps. Conveniently, Google includes tools which can allow Google Apps and Microsoft Exchange systems to interoperate. For communication and personal information management, users may use both Google Apps and Microsoft Exchange or a combination of each. It is worth mentioning that due to Google Apps low (zero, excluding personnel support) cost for educational customers, Google Apps can be used as a complementary or supplementary service wherever another service is currently in use. At CSU, for example, Exchange is used for business purposes (for faculty and staff), while Google Apps is provided for student use (and opt-in use by faculty and staff).

The Calendar application has the ability to synchronize its data with other calendar programs, such as Microsoft Outlook. This functionality requires an external program called Google Calendar Sync. The Calendar can import other programs’ calendars, provided those programs can export into iCal (Apple) or CSV (Outlook or Yahoo Calendar) format. Likewise, Calendar can export its data for use with other programs, or as a PDF document.

Documents in Google Docs may be exported to common word processing formats, such as Microsoft Word, Excel or PowerPoint, OpenOffice, PDF, Rich Text Format (RTF), CSV (spreadsheets only), HTML, or plain text. Formatting differences may occur depending on the document format used. These documents may then be opened or edited with the associated software application, and subsequently imported back into Google Docs. Other third-party software, such as Dragon Naturally Speaking, work cooperatively with Google Docs.

11.3 With Mobile Devices
A mobile version of most Google Apps is available for mobile devices, such as a PDA or Smart Phone. The mobile version, which is also web-based, tends to be less feature-intensive but optimized for the small screen size, low bandwidth and other factors of the mobile device. A desktop synchronization program can usually be used to synchronize calendar, contacts and e-mail with a mobile device.

Even cellular phones can be used with Google Apps. For example, users can interact with their Calendar with text messaging using the SMS protocol. Users can receive SMS notifications of Calendar events, view their agenda, and even create them by sending a text message to Google. For example, sending a text message to the phone number supplied by Google with the text “Lunch with dan.herrick@colostate.edu Monday noon” would create a calendar entry for the first Monday after today at 12:00 p.m., and also invite the named individual to the event.

12. OPPORTUNITIES & CHALLENGES
The product offerings in Google Apps center on the communication, collaboration and productivity enhancements afforded by the suite. The more productivity-focused applications are Docs and Calendar. Mail and Talk are communication-focused, while Sites and Video provide both communication and productivity resources. Collaboration is inherent in each of the Apps and ties them all together into a coherent suite of applications.

Increasingly, students and new, younger workers (including both staff and faculty) thrive on a mobile computing workflow. Laptops and smartphones were only the beginning of this trend. The absolute portability of Google Apps capitalizes on this aspect of the changing workforce and user base and results in near-universal platform independent access. Collaboration is made possible on the fly, controlled by the users, without administrator-level guidance. Both the portability and user-drive collaborative aspects result in less day-to-day oversight, freeing IT resources for other projects.

Some of the very features that make Google Apps attractive to many are the ones that give IT administrators headaches. Many IT policies are still catching up with mobile computing technologies like smart phones, USB drives and even laptops. Many IT departments feel they are not equipped to manage these challenges. The higher education environment is typically more flexible and trend-setting than the corporate one, which reveals itself in fewer restrictions (such as web filters). The prevailing wisdom is that if the IT administration does not deny or restrict it, it will be used and eventually will have a support request for it. Most of the applications associated with Google Apps are available as personal accounts; incorporating Google Apps as a supported, planned model will be easier in the long run to support.

Google Apps is not a perfect solution by any means. It is best viewed as one of a suite of tools that campus IT can provide to its users. Because of the low (essentially no) cost factor, Google Apps can be used as a supplementary technology, and if results warrant, as the primary technology for any or all of its applications.
12.1 Case Study Revisited: Colorado State University

Some specific challenges that CSU faced in implementing Google Apps included communication, migration techniques, Google’s documentation, Google’s upgrade methods, and our own institutional complexity.

CSU waged a large contact campaign when determining how best to implement Google Apps. Focus groups were consulted, the affected users and departmental IT administrators were notified directly several times, and campus media outlets published articles. The communication was mostly targeted to the affected users (undergraduate students.) Faculty and staff were only peripherally targeted in the information campaign, as it was determined that this migration would have little impact on this particular group, due to their accounts not being migrated. As it turns out, this group communicates and collaborates with students to a large degree. During the last two months of the pre-migration phase, e-mail communications were sent to affected account holders every week.

The affected users themselves frequently claimed ignorance of the new system, admittedly a behavior not unusual for this group. Communication to students must be short and give a sense of urgency, and must provide a web link to a Frequently Asked Questions and further resources. Communication should begin as early as possible, and be frequent to the point of annoyance so that every affected individual will have full knowledge of the transition. Departmental mailing list contacts and those who manage shared communications resources such as listservs should be separately notified how the new e-mail system will affect their systems. Overall, migration to Google Apps was a straightforward process and the technical implementation went well. Documentation and support for common e-mail migrations and Microsoft Exchange integration is thorough. However, with the scale of affected users in the tens of thousands, no process is “easy”. The biggest challenge was in the mass migration at the end of the opt-in period. About 25,000 accounts were migrated using Google web services, and while the setup was simple, the amount of time it took (7 seconds per account) was surprisingly long. As a result, it’s recommended to create the accounts ahead of time, before the migration process is initiated. CSU’s original transition date to Google Apps was December; however, the move was delayed to March after certain issues came to light. Although the delay had several factors (including communication and technical), mainly it was due to the complexity of CSU’s own environment, including identity management and provisioning of accounts. It was a challenge to fit CSU’s institutional complexity into the Google model.

Google’s support documentation, both for administrators and end users, is clearly organized and well written. Sometimes, though, Google technology changes so rapidly that the most up-to-date documentation is not available. Community support can fill in the gaps for end user documentation, but documentation for administrators can be limited – the documentation may explain how to accomplish tasks, but not how Google works, forcing the systems administrators to make intuitive guesses or find undocumented features. In addition, some end user documentation is not relevant for the correct domains (as in the case of Google online help referencing Gmail-specific servers when Google Apps Mail servers are different, confusing end users) or editions of the Google product. Many times, administrating or using Google services involves experimentation. It is helpful to have a test domain to work with.

As a software-as-a-service (SaaS) model, Google does not have traditional discrete version releases of its applications. Google’s perpetual “beta” logo on its applications and the perception of an unfinished product are considerations. As of July 2009, Google Calendar Sync stands at version 0.9.3.5 and Google just removed the “beta” designation from Gmail (which it’s borne since April 2004.) Google does have impressive innovation, though. Applications are continually being upgraded. This is a double-edged sword: Users receive the newest innovations immediately, but administrators have little opportunity to plan and test these new innovations in their environments. Keeping up with new features, applications, and APIs is challenging to site administrators. In practical terms, plan on a site administration team that can devote time to quickly evaluating and implementing new Google offerings -- your users will ask for it soon enough.

13. Conclusion

As a goal of replacing an on-premise e-mail hosting solution with an outsourced hosting solution for students, the transition to Google Apps has been very successful. In general, users are very satisfied with the variety and consistency of service offerings. While the e-mail interface of Google Mail is substantially different than traditional e-mail programs, this is only a small obstacle as users have the ability to use a traditional e-mail client program with POP and IMAP protocols to access their Google Mail. Many users were already familiar with Gmail and for those that were not, Google’s documentation and community support offerings have been successful in acclimating the users to the new product. The integration of other Google Apps services, such as Calendar, Talk, Docs and Sites, have been a great boon to Google Apps users’ collaboration and productivity.

The cost savings of implementing Google Apps in place of a student e-mail server and a traditional desktop office suite are tremendous. Even for a business entity, the cost is extremely competitive. The zero cost of licensing and equipment coupled with the small cost of personnel support should fit any academic entity’s budget. Compared to over $9 million per year for competitors’ similar products, Google Apps is a clear choice.

Google Apps is considered a success at Colorado State University and is recommended as a complement to or a replacement for existing communication and collaboration systems which may already be in place.

14. References
