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Product Review: Mendeley or Zotero: Which Should the Mobile Researcher Use?

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Mendeley Composite Score:

Zotero Composite Score:

ADVISOR REVIEWS—COMPARATIVE REVIEW Mendeley or Zotero: Which Should the Mobile Researcher Use?

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Abstract

Today's bibliographic managers provide cloud storage so that papers can be attached to citations and syncing services, in order for papers and citations to be available in multiple mediums. Mendeley and Zotero are two services that offer online storage of papers and citations, desktop applications, and tablet integration. Mendeley has an iPad application and an open API so that developers can create apps for Android tablets. Zotero is an open-source project that encourages developers to create both iPad and Android apps. Both suites can be integrated with word processing software for accurate in-text and bibliographic entries, provide full-text indexing of PDF documents, and can attach notes to citations. Choosing between them depends upon what features a mobile researcher would need and use.

Pricing Options

MENDELEY

Use of the Web site, desktop application, and the iPad app are free. Storage of PDF files is limited to 1 GB for individual users with a free account. An individual can choose to purchase 2GB (\$4.99), 5GB (\$9.99), or unlimited storage (\$14.99) for a monthly fee.

Additionally, there are academic and nonacademic licenses available. Academic licenses begin with a 5-user limitation at \$49/month. Additional users cost \$5/user/month. Nonacademic licenses begin at \$99 for 5 users with an increase of \$10/user/month.

ZOTERO

Use of the Web site and desktop application are free. Storage of files, which can include PDF, txt, rtf, JPEG, and more, is limited to 100 MB for free accounts. There are additional options for purchasing storage which are reasonable: 1GB (\$20), 5GB (\$60), 10GB (\$100), and 25GB (\$240) per year. Individuals or groups who need more space can contact Zotero.

Zotero also provides storage for educational, research, and commercial institutions at an annual cost which comes with an administrative interface for adding or removing users. Pricing information for institutional uses can be found at <http://www.zotero.org/support/institutional_storage>.

Product Description

Researchers today are looking not just for bibliographic managers that will help them cite their resources but also for ways to organize their libraries of papers and notes. With the increasing availability of full-text sources online, it is easy to find oneself with large folders of documents with nonsensical names. There is also a desire to be able to read these papers and annotate them while on the go. Two products that are trying to meet these advanced needs are Mendeley and Zotero.

MENDELEY

Mendeley <http://www.mendeley.com/> is a reference manager, PDF organizer, and a social citation engine. It invites users to not only



"At a Glance" Comparative Review Scores

The maximum number of stars in each category is 5.

	Mendeley	Zotero	
Composite	***	****	
Content	***	****	
Interface/Searchability	***	****	
Pricing	** 1/2	***	
Contract Options	N/A	N/A	

house citations and PDF files, but also to create a network of contacts that can be followed, or to create a group with whom users can share citations. As citations are added, they are also added to a larger bibliographic database that is available for anyone to search, making Mendeley a research resource as well.

Mendeley has three components: Web site, desktop application, and iPad app. An individual could use all three depending upon whether he intends to read documents on the go and whether he wants to keep notes and annotations attached to the relevant documents. A Web site account is required for individuals who wish to be able to use more than one application and keep their library synced so that it can be accessed at any time from any access point.

Mendeley uses a "Web importer" or bookmarklet to add papers and sites through an individual's browser as he researches. This importer has been tweaked to work specifically with scholarly sites, such as BioOne, JSTOR, Sage, PLOS, PubMed, and more (see http://www.mendeley.com/import/ for a full list). It will also import regular Web pages.

The desktop version can be downloaded from the Mendeley Web site and is available for both the Mac and PC. Upon installation it asks for a Web site login and password so that it can sync the relevant library. The desktop version provides additional options for adding citations. An individual can add papers manually, through syncing, by dragging and dropping PDFs, or importing them from a variety of sources, including EndNote, Zotero, BibTeX, RIS, Ovid, and text files. It is also possible to set up a watch folder so that as new PDFs are added to the computer, Mendeley will detect them and automatically add them to the library. Additionally, the desktop application contains a PDF reader so that a researcher may read and annotate the documents in his library through highlighting and adding sticky notes.

The most important part of any reference manager is its ability to create and export citations. Mendeley desktop can be integrated with Word, OpenOffice, and LibreOffice for that purpose. Using built-in toolbar buttons, it will create in-text citations in the chosen style as well as bibliographic entries. Mendeley advertises that it supports over 1,180 citation styles, including the most popular on college campuses, such as APA, MLA, Chicago, and Harvard, as well as more obscure styles required by specific publications like Acta Medica.

The iPad application is the newest part of the Mendeley research suite and is free from the iTunes store. As with the desktop application, the app syncs to the Web site and includes a PDF reader. Documents are automatically loaded into "All Documents." Opening the citation gives the citation details, a link to the file, and any other data that may have been added. Clicking on the file opens it within the app for reading. Additionally, the app will link to the Mendeley Web site to give citation information in APA, MLA, Harvard, Chicago, Nature, and Science formats.

As a research source, Mendeley's Web site contains a growing crowdsourced bibliographic database. Search results show article titles, authors, dates, journal titles, and abstracts that may be drawn from the papers directly. The search screen allows an individual to save a particular reference to his own library, as well as displaying the number of readers for that document. Search options allow a user to do a general keyword search or narrow a search to title, authors, abstract, or MESH headings. Its scope does not rival the breadth of Google Scholar, but it does provide another point of access to relevant data.

ZOTERO

Zotero <http://www.zotero.org/> is a bibliographic manager that allows the creation of personal and shared libraries. Unlike other biblio graphic managers, Zotero allows the researcher to organize and store more than just PDF files. It can also capture images, audio files, Web site snapshots, video, and text files. It also indexes the full-text of your library making it fully searchable.

Zotero was developed by the Roy Rosenzweig Center for History and New Media at George Mason University as a plug-in for the Firefox browser in 2006. Within the past year, Zotero has added a desktop application which works well with Chrome and Safari as well as Firefox, making it more appealing to a broader audience. A Web site account is required if an individual intends to use both and would like the ability to sync his library.

The Zotero bookmarklet or "Web translator" is also available for the Chrome and Safari browsers and makes adding citations to the database extremely easy. The Zotero bookmarklet uses icons within the address bar of the browser to indicate the type of bibliographic item it has identified. For pages with multiple bibliographic instances, like a Google Scholar search, the icon will show a folder that allows a user to save selected results. This bookmarklet works well across subscription databases like EBSCOhost and JSTOR as well as with regular Web search engines.

The desktop version of Zotero can be downloaded from the Web site and is available for both the PC and Mac. It is designed to sync with the Web site. The Zotero desktop provides additional methods for adding bibliographic entries by using ISBN, DOI, or PubMed ID, importing in RDF, Mods, BibTeX, or RIS format, dragging and dropping PDF files, or by hand.

Zotero desktop can be integrated with Word, OpenOffice, LibreOffice, and NeoOffice to create both in-text and bibliographic entries while writing. Zotero supports 2,723 different citation styles with the most common (APA, MLA, Chicago, Turabian) being included with the installation. Other styles can be downloaded and installed from their Web site http://www.zotero.org/styles/>.

Zotero does not currently have an iPad app. However, because it is an open source product, developers have created both iPad and Android applications for it. These applications are listed on the Zotero site <http://www.zotero.org/support/mobile>; the one that stands out for iPad use is Zotfile. Zotfile is an extension that is installed in Zotero desktop that gives the desktop the ability to watch folders for the addition of new files or for updates to files. New files are automatically added to the Zotero library. Files that have been updated with annotations or highlighting can have those notes extracted and attached to the proper citation within the Zotero library. This allows the mobile researcher to use an app he may already have installed on his iPad, such as Goodreader or iAnnotate, with his Zotero library.

Critical Evaluation

With the explosion in mobile technologies, more researchers are taking their work on the road with them. Can these bibliographic utilities meet the needs of these mobile researchers? The answer is yes and no, depending upon the features that a researcher would want. Both Mendeley and Zotero are bibliographic managers. Both provide free accounts and some free online storage for papers. Mendeley provides a greater amount of storage but limits the researcher in the types of materials that can be stored to PDFs and Web site snapshots. Zotero gives the researcher less free storage but allows a wider variety of materials (video, audio, image, text, PDF, rtf) to be stored on their site. This gives the researcher, depending upon their area of research, a greater ability to share relevant material of any type with a group easily.



Both Mendeley and Zotero use bookmarklets to facilitate the addition of materials to a library. In both cases, the bookmarklet works with a variety of browsers. The Mendeley bookmarklet has been engineered to work with a variety of scholarly publishers, while Zotero has been engineered to work more generally. In tests this reviewer ran to import papers from EBSCOhost databases and Web sites, the Zotero bookmarklet was better able to identify the proper citation data as well as download the actual papers. Mendeley's bookmarklet incorrectly identified EbscoHost as a Web site and was unable to download PDFs. It is also interesting to note that Zotero's bookmarklet will work with the desktop version of Zotero without requiring an individual to log in to the Web site. However, the Mendeley bookmarklet will only work with the Web site.

To decide between them, the researcher must compare each component of Mendeley and Zotero to find which will suit his needs best. Mendeley's Web site is very clean and easy to read. (FIGURE 1) The user's library is shown with all of the pertinent bibliographic data in

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FIGURE 1 Mendeley User Library

an easy-to-read format. There are options on the left-hand side to show recent additions, citations that need review, my publications, and more. If Mendeley desktop is detected, the user is given the option to read papers within the desktop version. Zotero's Web site is not as appealingly laid out. Like Mendeley, Zotero will open the user's library showing all documents. However, it provides limited bibliographic information, showing only title, author, and date added. Additional fields can be displayed, but they are displayed as separate columns and not as a cohesive unit. (FIGURE 2) Zotero allows a user to sort on any field that is displayed. So, it is possible to sort by date added so that the most recent additions are shown first. Both Web sites allow the user to edit ci-

tations and add tags to them. An individual can also organize his citations into folders/collections to keep like documents together.

Both Zotero and Mendeley allow users to create groups to share citations and documents. These groups can be private or public. Group libraries are kept separately from the individual's library and are accessed through a Groups tab. Mendeley makes it very easy to add documents to the group library by selecting it within the personal library and then copying it. Zotero does not provide an easy way to add papers to the group library in their Web site. However, it is possible to drag and drop citations from a personal library to a group library using the desktop. The Zotero philosophy seems to be that if a group library is intended then all documents should be placed and updated only within the group library because syncing across libraries is not supported at this time. While Mendeley makes it easier to add documents to a group library initially, it also doesn't support syncing across libraries.

> The feature that makes Mendeley's Web site stand out is its search. Mendelev gives the user the ability to search his own library or the collective library created by all of Mendeley's users. Search results show article titles, authors, dates, and journal titles, as well as abstracts that may be drawn from the papers directly. The search screen allows a researcher to save a particular reference to his own library, as well as showing the number of readers for that document. "Readers" here refers to the number of Mendeley users who have added that document to their own library. Search options allow a person to search everywhere, within title, within authors, within abstract, or within MESH headings. Searches can

FIGURE 3 Mendeley Desktop

be limited by publication type and date and within discipline. There is, however, no Boolean NOT searching, so a person cannot exclude anything, nor does the site provide phrase searching.

Zotero's search engine is context aware. It changes the search depending upon the tab that is open. If a user is in My Library, it will search only that area. There is no way to search across every library that is housed on Zotero's Web site. Unlike Mendeley, Zotero does not provide that option. This makes it hard to use to find additional research materials. However, within settings, Zotero does provide an option to "Publish Entire Library" so that anyone visiting Zotero can see an individual's library. Additionally, a researcher can choose to either "Publish Notes" so notes are viewable by anyone or "Hide from Search Engines." However, it is neces-

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sary to know someone's identity to find their library. It is also possible to search groups to find public libraries, but there is no Boolean searching.

What sets Zotero's Web site apart from Mendeley's is that it will import and store any annotations that are created in the desktop application. This makes the notes available from anywhere. Notes are accessed when a user opens the full citation information and can be read, added to, or deleted within the Web site. Any changes are automatically synced back to the desktop application. This feature works with both the group and individual libraries.

In both cases, it seems that the Web site is intended to provide a ready backup of material and allow quick access to a library from anywhere. It is the desktop applications that are intended to be the full-featured bibliographic utilities. The layouts of the desktop applications are very similar to the Web site versions. Mendeley's desktop (FIGURE 3) shows formatted citations, while Zotero will display as much bibliographic information as desired in a columnar layout. The columnar format, however, allows a user to sort by any piece of data. Both bibliographic managers use a right-hand column to display detailed information about the citation, which can be edited, as well as notes that are attached to the citation.

Both Zotero and Mendeley desktop applications make it easy to add citations. An individual can import citations from a variety of applications, add them manually, or drag and drop files. Adding citations manually is slightly easier in Zotero, as Zotero provides an icon for doing that within the application window. It is possible to do in Mendeley as well, but a person must go through the file menus to locate that option. Both applications attempt to extract bibliographic information from PDF files that are dragged into them. Mendeley will automatically launch a Google Scholar search to verify the bibliographic data, while Zotero will need to be prompted to do the search. Limited testing suggests that Mendeley does a better job at identifying the appropriate citation data. For those documents it cannot cite, Mendeley flags them with "These details need reviewing..." It is interesting to note that Mendeley does not search against its own database for citation metadata. Zotero differs from Mendeley in that it allows an individual to specify other databases for verification other than Google Scholar. Another way to import files to Mendeley is through a "watch" folder. As PDF files are added to "watch" folders, Mendeley automatically identifies them and adds them to the library. Zotero does not have this ability built-in, but it is available as part of a plug-in called Zotfile. (TABLE 1)

Mendeley desktop also includes a PDF reader. Using the reader gives the researcher the option to highlight text and add "sticky notes." Annotations are extracted and stored within the Mendeley desktop application and are not synced to the Web site. Highlighted text is also not extracted. Failing to extract highlighted text is a serious omission, as often a researcher will highlight something that he may want to use as a quote in his own writing. Since a researcher can read PDFs in Mendeley, it seems strange that there is no printing from within the desktop application. To read a hard copy of a PDF with notes, a user must first select "export with annotations" from the file menu and then open and print the document from within another program, such as the Adobe Reader.

Zotero does not include a PDF reader within the standalone application; it will instead launch applications native to the platform the researcher is on, such as Preview for Mac users or the Adobe Reader on PC. Using one of these tools, a person can annotate the file. These annotations can then be added to the Zotero desktop through the Zotfile plug-in. The Zotfile plug-in correctly identifies both "sticky" notes and highlighted information and creates notes with page numbers to add to the citation. (FIGURE 4) It is also possible to add notes directly to the citation data within the application. An advantage that Zotero has over Mendeley is that all notes are synced to and available through the Web site.

A useful feature of both applications is the ability to "Check for Duplicates." However, a researcher needs to be careful in reviewing duplicates, because Mendeley will not recognize that an article issued

TABLE 1	Desktop	Features
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Feature	Mendeley	Zotero
Adding documents		
Bookmarklet	Х	\checkmark
Import	\checkmark	\checkmark
Drag and drop	\checkmark	\checkmark
Watch folder	\checkmark	Requires Zotfile
PDF citation extraction		
Google scholar		
Other libraries	Х	\checkmark
Built-in PDF reader	\checkmark	Х
Note taking		
Extract annotations	\checkmark	Requires Zotfile
Extract highlighted text	Х	Requires Zotfile
Sync notes to Web site	Х	\checkmark
Searching		
Boolean AND	\checkmark	\checkmark
Boolean OR	\checkmark	X
Boolean NOT	Х	Х
Rename files		Requires Zotfile

in two parts (Part 1 and Part 2) is not a duplicate. Additionally, neither application correctly identifies different editions of a title as separate items. Both Mendeley and Zotero provide a search feature within the desktop applications. This search is, of course, limited to the desktop application libraries. Zotero provides a quick search box within the desktop interface that will search all fields; title, creator, and year; or everything. An "everything" search includes all fields, tags, text

www.charlestonco.com	9
www.enuriestoneo.com	

in notes, and PDFs. Zotero also provides an advanced search where a user can limit searches by collections. Mendeley also provides a quick search box within the desktop. The default search covers all fields, including notes and PDF documents. There are drop-down searches within the search box for author, title, notes, etc. Both use Boolean AND searching, but only Mendeley provides an OR search. Neither use Boolean NOT searching.

A truly nice feature of Mendeley is the ability to rename attached files and move them into different folders. This allows for streamlined organization and creates a file structure that is easily read and recognized. Files can be renamed, for example, as author, article title, and year. Again, this is another feature that is not native to Zotero but can be added as part of the Zotfile plug-in.

Both Mendeley's and Zotero's desktop applications can be integrated with Word, OpenOffice, and LibreOffice to allow easy citing and references. Integration in both cases is provided through adding a new toolbar to the writing application. Using the toolbar, the researcher can create in-text citations in the preferred style and add bibliographic entries as well. The toolbars and citing integration work seamlessly in both cases.

Mendeley does offer a free iPad application that is available through iTunes. It requires an online account and can be set to auto-sync on load. If an individual is using Mendeley's online storage, the documents will sync as well and can be read using the in-app PDF viewer. If a person is using Dropbox for storage, documents can be loaded from the Dropbox app into the Mendeley app. It is done by opening the PDF within the Dropbox app and then selecting Mendeley as the viewer. Documents are loaded into All Documents. Opening the citation gives the citation details, a link to the file, and any other data that may have been added. (FIGURE 5) Clicking on the file opens it within the app for reading. A drawback to the app is that it is not possible to highlight or annotate the text of the document within the app. Instead, an individual must export the document into another reader, like GoodReader, which will allow annotating and writing

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	Bryce et al.	•	Manga and Anime: Fluidity and Hybridity in G.	. 20	EJCJS El	4/13/12 9:		
Group Libraries	Cavallaro		The animé art of Hayao Miyazaki	20		4/14/12 8:		
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on the document. Unfortunately, annotations created within another app cannot be imported back into the Mendeley app. Another problem with the iPad app is that deleted documents remain within the Trash folder. Limited testing determined that there is nothing native to the app that will empty the Trash folder and that emptying the Trash folder on the Web site and desktop will not empty it on the app after syncing. Therefore, the app will continue to eat space on the iPad that cannot be recovered. Mendeley's response to this "bug" is to delete the app and reinstall, which is not very user friendly.

Zotero does not provide an iPad app that is the equivalent to Mendeley's, but since Zotero is open source, developers have been creating apps for iPads and Android tablets. The apps differ widely in their usefulness. There are current-

FIGURE 4 Zotero Desktop Showing Notes



FIGURE 5 Mendeley iPad App

ly two apps specifically designed for the iPad: ZotPad and BibUp. Neither is perfect. ZotPad allows a researcher to view his library and read attachments but does not provide annotation tools though they are planned for in a future update. The most recent update to ZotPad allows a researcher to export a document into another app for annotating. The annotated document can then be exported back into ZotPad which will sync with the Zotero library. BibUp will scan ISBNs and retrieve bibliographic information that it stores on the Centre NTE Web site. A person is then required to go to the site to retrieve the information for import into Zotero. That is not a user-friendly model.

Fortunately, the Zotfile extension does make it possible to integrate a Zotero library with reading and annotating on an iPad. The Zotfile extension, used with either Firefox or Zotero desktop, allows a person to specify where files are hosted and how they are synced with an iPad. If a researcher is going to use this model, it is better to store documents using a cloud storage system like Dropbox instead of Zotero's storage. Zotero's free storage is limited to 100 MB, but a person can get up to 2 GB of storage for free using Dropbox. Additionally, Dropbox's storage can be easily integrated with iAnnotate or GoodReader for the iPad while Zotero's own storage cannot. Using the Zotfile extension, a researcher can set up a "watch" folder. Zotfile then has the ability to rename a new document, and move it to a directory that syncs with the tablet device. It will then watch the file in the new folder to see if it changes. When it detects changes, Zotfile will automatically extract annotations and highlighted information and attach it to the proper Zotero citation. Zotfile cannot yet extract handwritten notes, but the fact that it will extract highlighted information is a huge plus.

Mendeley and Zotero provide similar features and abilities on both their Web sites and their desktop applications. For researchers who haven't explored other cloud storage options, integrating it with a bibliographic manager can make sense. However, Mendeley does limit the types of files that can be stored while Zotero is much more flexible. For the researcher who wants to integrate his cloud storage with how he reads PDF files, then Mendeley with its associated iPad app could meet that need. Even so, for the individual who wants the ability to read and annotate on his tablet device, Zotero with the Zotfile extension is the clear winner. For the individual who wants access to all of his notes and annotations from wherever he may be, Zotero is again the winner. Mendeley's interface may be better looking, but for overall usability in a more mobile environment, Zotero comes out ahead.

Both Mendeley and Zotero provide institutional subscriptions that libraries can consider for their patrons. However, these types of bibliographic citation databases are best used by doctoral students and faculty. The complexity of the programs make them more than undergraduate students need who can easily share bibliographies and notes in programs like Noodlebib. At those higher levels, researchers need to find what works for them individually. Libraries need to be aware of all the options so that they can recommend solutions, but for now, it is cheaper and more sustainable for an individual to have a private account.

Contract Provisions

Zotero's terms of use are very simple. It asks users to "abide by the principles of copyright" and accept its privacy practices. Zotero stores only the data that a person voluntarily provides, such as e-mail and account name, and does not share that data with any third parties. Mendeley's terms of service are a little more complicated but encapsulate the same principles. Users should abide by copyright and their data will not be shared. Mendeley's terms of use also states that users are giving Mendeley permission to collect the bibliographic data that is entered to add to their research service.

Authentication

Both Mendeley and Zotero require a person to have an online account. The required account information includes a valid e-mail address and a password. Zotero allows individuals to use either their email address or a user name to log in with the password

Author's References

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Contact Information

Mendeley

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Zotero

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Mendeley Review Scores Composite: $\star \star \star$

The maximum number of stars in each category is 5.

Content:

Mendeley is trying to create a resource that people can use not only to store their documents and citations, but also to use to locate further resources. It is limited to what bibliographic information users have saved on their servers and cannot match the depth or breadth of Google Scholar. It is also constricted in what types of documents can be stored and does not provide Web site storage of annotations.

User Interface/Searchability: $\star\star\star$

The interface is pleasing to the eye and easy to use no matter whether a person is using the Web site, desktop application, or iPad app. The Web site can be used to search an individual library or the collective library created by all users. The desktop search is limited to an individual's library. The integration between the different products could be better and the iPad app needs additional development.

Pricing:

 $\star \star 1/2$

The Web site, desktop application, and iPad app are free to download and use. Individuals can purchase online storage for a reasonable cost but are limited in what can be stored.

Contract Options: N/A

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About the Author

Laura Pope Robbins is an Associate Professor/Reference Librarian at Dowling College. She holds an MBA in Information Systems Management from Dowling College and an MLS from the University of Washington. She is currently Web Master at Dowling College Library. Her research interests include anime, usability, Web design, Web 2.0, and copyright. During her free time, she spends time learning and practicing bookbinding.

Zotero Review Scores Composite: $\star \star \star \star$

The maximum number of stars in each category is 5.

Content:

Zotero provides both a Web site and a desktop application to manage citations, notes, and documents. Because it is open source, it has relied upon the user community to create iPad and Android apps which has worked in its favor. Its developers are responsive and have created a product that works well for the mobile researcher. Researchers have access to their library and their notes from everywhere.

User Interface/Searchability: ****

Though the interface of both the Web site and desktop application are bare bones, Zotero conveys the information the researcher needs where he needs it. Searching is limited to a default Boolean AND but is comprehensive across a user's library searching citations, notes, and documents. Mobile use is enhanced through extensions and allows researchers to use tools they might already have at their fingertips.

Pricing:

 $\star\star\star$

The Web site and desktop application are free to use, as is the Zotfile extension. Individuals can purchase online storage, but there are cheaper options that are readily available.

Contract Options:

N/A