BakBone®
Redefining Data Protection™

BakBone's NetVault. The Fort Knox of data protection.

From Apple Enterprise Backup Solutions by Michael Dhaliwal of District13 Computing with permission. P.1 The following is an excerpt from Apple Enterprise Backup Solutions by Michael Dhaliwal of District13 Computing published July, 2005. For a complete copy, please visit http://www.district13computing.com BakBone Software wishes to thank Mr. Dhaliwal for permission to publish this extract. Please note that NetVault has actively supported Mac since 2003. The "Beta" Mr. Dhaliwal tested was NetVault 7.3.1 for Mac OS X which is in beta now and expected to be generally available mid-September of 2005. Native Mac Interface is a key part of BakBone Software's ongoing commitment to Apple Mac customers.

Making the leap from the X11 window interface to Aqua is BakBone's own NetVault. Filling a vital need in the OS X community, NetVault offers many of the advanced enterprise class features that administrators desire coupled with a user interface they are accustomed to.

While some administrators will ignore a GUI upgrade as a feature of a specific software package, as the second major release for the product running on Mac OS X, the maturity of the product developments are notable.

Installing NetVault is fairly easy. You'll find that NetVault consists of two primary packages: one client installer and one server installer. The installation of the server component took practically no time on a 1.8GHz iMac G5, which means it should be incredibly fast on an Xserve. The installation does not require a restart. Before you install your NetVault server (and you will need to install your server before any client software), you'll have some planning to do. Besides the normal considerations that you'd take with any backup solution, you should be aware of the storage needs of NetVault. Upon installation of the server component to NetVault, a netvault directory is created in the /usr directory. Inside of /usr/netvault, you'll find a db directory that includes four key components: MediaDatabase, ScheduleDatabase, install and keys. Understanding what these four directories are responsible for will help you understand the server component's storage needs. Keys is the simplest directory and simply stores any NetVault product licensing, making this a very small directory. The install directory is similarly sized, and contains a binary on which modules have been installed in your solution. The ScheduleDatabase, according to BakBone, is usually under 10MB in size. This directory holds the records for all of your backup and restore jobs. The largest directory that NetVault installs on your server is the MediaDatabase. The MediaDatabase manages all the records for your media and the backup indexes for all jobs that you've performed from your NetVault server. Liken this to the catalog that other companies use for keeping these records. BakBone provides a formula for calculating the space your MediaDatabase will grow to:

Number of files & directories X Number of generations X Number of X 60 backed up per machine. to keep using Backup Life machines

Now that you've decided on a directory for your installation, go ahead and double click that installer. It's a fairly common install process.

Now its time to check out the server console. You'll find the NVAdmin application, which is the main console for NetVault, located in the Applications folder. Double click that icon and you'll be pleasantly surprised to see something very familiar staring back at you: Server Admin (of sorts). The folks at BakBone have done the Mac OS X administrators of the world a great favor. They have mimicked the GUI to Server Admin as their main console. You can add/remove servers just like Server Admin and you'll even find the status lights you've grown to rely on for instant status of your services included in your NetVault installation.

There are some "gotchas" to using the built in NVAdmin console included with this beta build. First, for NVAdmin to work from a client with your NetVault servers, the client software's version must be the same as your NetVault servers. Secondly, the NVAdmin console for OS X will only be able to Domain Manage, as BakBone refers to it, other OS X NetVault installations. On the flip side, all of the buttons in NVAdmin work as they do in Server Admin, with the results you would expect. You'll also find the same built-in Logs, Overview and other navigational buttons, installed right into the GUI, again making this almost seamless to integrate into your existing OS X Server infrastructure. The Settings button reveals a System Preferences like set of buttons to help you tune your NetVault installation.

Focusing in on some of the functionality of this area, clicking on the Jobs navigation button reveals a window that gives you the ability to view your currently running jobs, as well as the definitions that have been configured for the NetVault server. Along the bottom, you can choose to create a new backup or restore job. We'll go into more detail on job creation in a bit. Next to the Jobs button, you'll find Reports, which also has more functionality than its name

would indicate. Instead of just finding reports on your NetVault environment, you'll find a list of predefined reports that you can double-click on to run. Running a report causes NetVault to generate a dynamic web page displaying the results. You can also right-click (or ctrl-click) on any report to run and view the report, simply view the log, or delete the report all together. The same functionality can be accessed by simply selecting the report name you wish to access and choosing the appropriate action out of the Item menu. This is all found under the Definitions tab in the Reports section. You can also click over to the Current Activity tab to find out what reports are currently being run, or have been run. Before getting started with defining jobs and schedules, we'll need to add in all of your clients and storage devices. We'll assume that you installed the client software on the nodes of the network you wish to backup. BakBone's client software doesn't require any sort of configuration to announce itself to the network. To add in a client, simply go back into the NVAdmin console, under the name of your NetVault server, click on the Client Management heading. You'll then see a list of clients that have already been configured for use with this server. At the bottom of the screen, you'll see a button that says Add Client on it. Simply click that button and NetVault will auto-discover other NetVault clients on your network. If your system does not apply in the list, you can specify an IP address or a network name to add.

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The Client area of NetVault allows a great deal of customization and configuration. Rightclicking on the client name reveals a contextual menu that gives you many different actions that you can take on your NetVault client node. These options include Properties, Remove, Check Address, Install License Key, Install Software, Remove Software, Set Description and Configure. Most of these are pretty straight forward, so we'll focus in on just a couple of these options. Properties offers an extremely comprehensive look at the client node on your network. This option provides your NetVault version and build information, the Machine ID (which you'll need for licensing purposes), the IP address of the node and the OS version of the node. Dig a little deeper into this sheet and you'll find the ability to list the installed NetVault plugins, including version numbers and installation dates, as well as the software that's been installed on your client for NetVault. Setting the description of the node, another feature of NetVault, allows you to add any sort of descriptive information that can help you identify a specified node on your network. This data will populate the description field in the Client Properties feature. You also can choose to configure your nodes from this console. Now, there are many software packages that allow some basic configuration. NetVault goes above and beyond and allows you to truly tune your environment. If you remember, I mentioned a System Preferences-like interface that's used to configure your NetVault server. The Configure option for your client nodes allows the same type of configuration capabilities. To begin to attempt to describe all of the configuration options you can control in this area of NetVault is best left to BakBone's own documentation, or a hands-on demo of the software. Yup, there's just that much you can configure! I will say that many features that a backup administrator might crave have been included. For example, you can specify an alert threshold to notify you when you have reached your storage, capacity based on a percentage value you decide on. NetVault also has the ability to email you notifications, which is functionality that every administrator has become accustomed to. Functionality that maybe some of us aren't used to includes the ability to specify how long NetVault should attempt to connect to the remote nodes and how much time to wait before dropping an inactive connection, as well. You also have the ability to specify in which directories NetVault will store all of its reporting, logging and statistical data. Again, this just scratches the surface of the advanced ability to tune your NetVault environment.

Ok, now that we have our clients connected and some basic configuration done, we need to move on to configure our storage and backup devices. Right under the Client Management, you'll find the Device Management heading. First, specify which NetVault node has your storage or media device attached to it. You'll then be asked to define what type of device you wish to add. You have the option of adding a single virtual disk based tape device, a virtual disk based library/media changer, a single physical tape device, or a physical tape library/media changer. When adding in a virtual device, you'll have to specify a target location to create the new device. From there, specify how you want the device configured, such as how large of a storage device you want, or how many slots to include in your virtual library and NetVault will go ahead and create your virtual device, using a process named nvdisk device. Creating a single library with four slots, totaling at 1024MB on a 1.67GHz PowerBook G4 took about 10 minutes, so keep that in mind when creating larger libraries. Once your virtual device has been created, you must add it in to your BakBone system. Simply select your newly created device and click on the Next button. You can now go into the Devices navigational menu and see your virtual device listed under the Current Status tab. You are then able to right-click on any of your virtual slots and manipulate the environment, as if it were a physical library with actual tapes. Additionally, you can label your media, create a group label, include an offsite location, and even change the format of the virtual tape. Note, this all leads us to another feature of the BakBone product. While some solutions require the storage or media library to be attached to the backup server, BakBone is able to use any client node on your network to act as a storage node as well. NetVault, by default, will also leave the device under the control of the node that created it. You can also change this behavior to allow the device to be distributed (shared) amongst the NetVault server and any of the clients you specify in a single NetVault domain. Note, that an optional SmartClient license is required to attach devices to a client node.

(Unfortunately, I don't have access to a physical tape library right now, so reviewing setting one up will have to be reserved for a later revision, maybe around the GA release of the product.)

So far so good, right? Guess what? You've already configured your back-end and you haven't even broken a sweat! Well, now its time for some

more thinking. You now have to create your backup jobs. Click back on the name of your NetVault server that you are actively configuring in the list and click on the Jobs navigational button at the bottom. Now, its time to get your server actually up and working, not just sitting and looking pretty!

You can start creating a new backup job by clicking the appropriately labeled New Backup Job button. This reveals all of your currently configured nodes on your network, under the Selection tab. Expanding a node reveals something that you might not expect. You'd expect to see a hierarchical view of the node, but instead you are presented with five options to dig further into: Consolidate Incremental Backups, Data Copy, File System, NetVault Databases and Raw Devices.

Expanding the File System subheading will reveal the hierarchical view that you are used to when configuring backup and restore jobs. You also have the ability to checkbox your way to a full backup job and submit it right away for completion. This works as expected and I was able to complete a backup to a remote node to disk quite quickly in my test. Before submitting your job, you can continue with the tabs across the top to set up your job, just the way you like. Clicking on the Backup Options tab allows you to decide what type of backup you wish to perform. Your choices are to choose a full or an incremental backup. You may immediately wonder, how can you perform a differential backup instead? NetVault doesn't appear to use the term "differential", instead, BakBone supports two types of incremental backups; data changed since the last full backup and data changed since the last backup, regardless of type. You are also able to select the option to backup data through an NFS mount and to check your files for modifications as you write your backup, two features that should be very popular with backup administrators.

The next tab over allows you to set the schedule for your configured backup job. Your options include immediate, once, repeating and triggered. Three of those four are pretty straight forward and function as their names would indicate, and allow for finite definitions of when to run the job. Triggered is an interesting concept. When you choose the triggered option, you are asked to supply a name for the trigger. What this does is it allows you to call a specific backup job, or operation, from an external script that you write. For example, you could use a script to dump out your Open Directory vitals and create a trigger called ODBackup that backs up those directories. In your script, you can call the nvtrigger command, which is located in /usr/netvault/util, and supply it the ODBackup name, which corresponds to the trigger you've assigned to schedule this job. When you make that call, your NetVault system will begin to execute the job you defined with that ODBackup trigger name. This is great functionality and could prove to be invaluable to many administrators, not just those who are into scripting.

Under the Target tab, you have the option to set up specifics on your output devices and media for this backup job. You can specify a particular device to backup to, such as the virtual library we set up earlier. You are also able to specify what media to use for the back up job. This is where the group label may come in handy, since you can specify a specific group of media to write to and even specify if and how the job can reuse your media. The general options allow you to specify how much space must be on the media before you begin to write to it and also allows you to lock the media from future writes after the job is complete. You can also specify that this particular job be placed as the first backup job on the media.

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The Advanced Options tab allows you to include your own pre and post backup scripts, as well as specify any sort of duplication you wish to complete. You can elect to verify the integrity of your backup and use network compression. Another extremely helpful feature of NetVault is the ability to actually assign a life span for your backup. Not only can you set a length of time to keep this backup for, you can also specify when to compress and offline the index for it. These two options are vital in helping you control the amount of disk storage consumed by the media database mentioned earlier. Compressing the backup index saves disk space but requires a little extra time to decompress when opening a backup index for a restore; if you set a time period for moving the index to an offline state, all space used by the index will be freed, but a media scan will be automatically triggered to rebuild the index prior to making restore selections. You can even base your backup lifetime on how many full backups for this job have been completed after this backup has finished.

So what's with the other subheadings? Do they do anything? Sure do!

If you read the section on Atempo's fine product, you'll know that a strength that product has is a Synthetic Full backup. Their Time Navigator product is able to take your last full backup and your differential backups, to create a new full backup, that's up to date. BakBone works much in the same way. NetVault is able to take your most recent full backup and the most recent incremental backup(s) associated with that original full job, and consolidate them into a new full backup. This is done using BakBone's Consolidation Incremental Backups Plugin that was installed originally on your system. Note, the plugin doesn't actually backup any data, meaning there is no impact on your production servers. Its main purpose is to merge your full and incrementalstogether to generate the new, consolidated full backup image. Also note, you must use a full and an incremental to accomplish this. Two fulls don't make a consolidated full and it kinda defeats the purpose of the consolidated full, anyway.

Actually performing a Consolidated backup is pretty simple to do, as well. You'll want to go back into the Jobs area and click on New Backup Job. When you see your client nodes, expand the client in question and expand Consolidate Incremental backups. You'll have two options, Backup Jobs and Backup Sets. While Backup Jobs is pretty straight forward, you might be wonder-

ing what Backup Sets are. NetVault understands that many different jobs share common backup selections. What you can do is create a Backup Selection Set and keep those selections available for future use, simply loading those selections by set name into a future job. We'll continue to work with a single job, for now. Simply select the incremental backup job you wish to use to create your consolidation, enter a name for the job and submit it. There are no specific backup options that you can select for this task, though you can use the other tabs to choose a target device and media, or schedule when this task should take place. Performing this with a set, instead of a job, runs pretty much the same way. The only real differences being that you would expand the sets folder, instead of jobs, and that you'll select the set that contains your incremental data in it. The rest stays the same. One point to call out is that NetVault will display this new consolidated backup as a standard full backup. If you wish to be able to identify this as a consolidated backup, you should consider that when naming the job, before submission.

The Data Copy section allows you to create multiple copies of previously completed backup tasks. This is a great way to achieve redundancy of your data and is a big feature in shops concerned with high availability. For example, you could use this plugin to allow you to keep one media set on disk, onsite, but also to copy that same backup to tape, for offsite disaster recovery. Much like the previously talked about data consolidation, you have the option of copying data from a single backup job or from a set. The rest of the procedure is much like the consolidation process, which helps reduce the learning curve of this software, by keeping task set up uniform across many services. Use of the Data Copy option of the Duplication option that is executed as the second step of a backup job is desirable when backup windows must be kept to a minimum.

The next topic, and plugin, we'll discuss is the NetVault Databases plugin. This plugin specifically deals with the database that keeps track of all your critical NetVault data. Needless to say, this is a critical part of your NetVault server. If you were ever in need of restoring your NetVault server, this information will be invaluable to you, so it is highly recommended that you be sure to back this database up as often as you deem appropriate in your environment. The procedure for backing up the database works much like all other jobs in NetVault, however, you want to be sure that this job is the only job running, when you perform the backup. This is vital to getting a clean backup of the database. A good practice is to schedule this job at the end of each days backup window to be sure the most recent information is included. Simply select the database out of the list of NetVault Server nodes available and submit the job. There will be no specific backup options available for this task, though you can schedule your task for later completion, or repetitive completion and pick out what target to use, etc.

The final plugin in this list is the Raw Device plugin. This plugin allows you to perform a physical block level backup, or restoration, of physical disk or partitions. The Raw Device plugin exhibits higher performance, hence shorter backups, then a File System plugin backing up the same set of data because the file system overhead associated with opening and closing individual files is eliminated. One drawback is that individual files are not able to be recovered from a raw backup. Instead, you must recover a physical disk or partition in its entirety. This plugin typically has two primary uses in practice: as part of a disaster recovery to restore your disks to a baseline image after a damaged server has been replaced and reconfigured, for example; or when needing to backup a very large number of relatively small files quickly and the ability to restore those files individually is not a paramount concern.

My overall impression of BakBone's NetVault is a good one. The product feels very mature and has many features for power hungry administrators. Beyond simply touting an extensive feature set, NetVault delivers impressive functionality and exceptional ease of use. There is ample documentation for the NetVault product available and all of the folks who I spoke with at BakBone were exceptionally well versed in the product and helpful; two traits that you'll appreciated, if you ever need support for your installation. Without a doubt, the NetVault GUI is the most refined out of all the solutions that run on OS X. If you use the Mac OS X Server tools regularly, you'll truly feel right at home in the NetVault environment. Some features of this release are still reliant on an X11 window system, but this is still a beta release. I'll also note that I didn't run into an instances where I needed X11 windowing during my time using NetVault. NetVault crosses many lines in the grid of Mac OS X backup solutions. The price will make it exceptionally attractive to most any SMB's and the scalability and features will make it viable in the enterprise.

…… BakBone's NetVault runs the gauntlet in Mac OS X backup solutions. NetVault can truly fit into almost any environment. The GUI is the most refined, even in this beta release and BakBone packed a lot of substance behind NetVault's good looks. NetVault won't be found in places where BRU might be overkill, but it will be found in any environment that would like more granular control over their backup solution than BRU can offer, without breaking the bank. Seeing as this product seems to have matured so quickly, you cannot question the dedication that BakBone has shown to the Mac OS X platform. This product could very easily make backup one of the most enjoyable parts of your day.

ABOUT THE AUTHOR

Michael Dhaliwal is a certified expert in Apple solutions, based out of the Chicago area and runs District13 Computing. A Mac user most of his life, Michael is also well versed in mixed platform environments. While primarily working with Xserve, Xserve RAID and Mac OS X Server solutions, Michael does enjoy working on all types of projects.