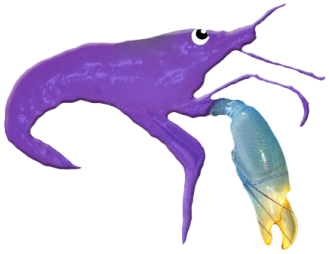
April 3rd, 2022

Data Storage Proposal

Maple Green Cannabis

ProPulse Solutions



ProPulse Solutions
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Calgary, Alberta

Maple Green Cannabis
Quadriga Appelbaum
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Denton, Alberta

April 3rd, 2022

Dear Ms. Appelbaum,

We would like to thank you for meeting with us and sharing your storage project requirements for Maple Green Cannabis. We have put together a storage solution proposal for your approval. We would be happy to provide you with any additional information regarding any questions that you may have.

Proposal for Maple Green Cannabis

Introduction

ProPulse Solutions is an IT company which develops and implements total IT solutions. We have been providing IT solutions for the past 9 years to multiple business sectors. Our company is based in Calgary, but our services are provided worldwide. Our approach is to capture our client's business requirements and develop various customized solutions to meet their business needs.

Overview

Our goal for this project is the successful migration of Maple Leaf Cannabis' current data storage setup to a brand new solution with multiple sites (one in Calgary and one in Vancouver) that will both have full backup and archive systems as well as each site having access to needed files housed on either side. (information availability). A Disaster recovery strategy will be implemented as well at the hardware, software and infrastructure levels. The total estimated cost for the completion of this project is $760,517.95. This estimate includes equipment, software, employee hours, training, warranties and site improvements.

Assumptions

For this project we have made the following assumptions:

- No equipment currently in use will be utilized in the scope of this project (all new solution)
- Max total project cost is $1,500,000
- It is acceptable to reach the limit of cost but still preferable to take all cost saving measures possible (bulk discounts, promotions etc)
- There will be a 15% YOY growth of data storage needs for 5 years
- This proposal plans to implement what is needed to sustain growth for 5 years, all at once.
- Cloud Backups/DraaS/Replica storage will be paid for 1 year at a time to lock in best reserve price in sync with data growth (Maple Green will be responsible for yearly re-subscriptions at new pricing unless they decide to contract ProPulse for that)
- DraaS means Disaster Recovery as a service
- Storage capacities are uncompressed
- Hot, warm and cold data estimates are all projected using the year 5 storage capacity (~400TB)

Project Scope

Our goal is to deliver a modern enterprise level storage solution that is fully redundant, resilient, and reliably available. This solution will deliver capacity to maintain Maple Green Cannabis' expected growth of 15% year over year for 5 years and bring online a second data site at the Vancouver office that will server as a data center as well as a disaster recovery site. The scope of the project is best explained in sections as follows:

1. **Storage**
   Currently the Calgary site holds all the storage capacity at 170TB with the Vancouver site having no data stores and little ability to access the companies data. Our solution will deliver the full 400TB of disk-based capacity needed to sustain the projected growth over the next 5 years, with 200TB at each site on premise.

2. **Availability**
   All data housed on both sites will be available to all members of the domain. Data local to either site will be available locally through the NAS/SAN sharing system and data at the other office will be available by accessing a secure VPN tunnel with Virtual Machines on both sides. All data will appear as normal file systems to the users.

3. **Data Management**
   Administrators will have the ability, through the use of remote SSH and web portals, to configure and monitor any storage device (NAS Gateways, FC Switches, Storage Arrays, etc), remotely from any point in the network or outside the network through secure VPN access and with the aid of vSphere with vCenter.

4. **Redundancy**
   Data will be redundant at multiple levels. From the drive level, data considered "hot" (needed frequently projected as 120TB) will be set up in RAID 1 allowing for an immediate copy available if important data is lost. The hot drives will be 8 groups of two 3.84TB SSDs. The rest of the data on each site will be set at RAID 5, allowing hot-swap on drive failures combined with an acceptable ratio between capacity and redundancy. These drives will be 4 RAID groups of four 12TB HDDs per group. (These groupings will be at each site equaling 200TB uncompressed usable storage at each site)

   At a hardware level redundancy is achieved through adding backups into the system. The NAS gateways, which control access to the storage and how it is configured, have backups on both sites meaning the loss of one wouldn't take the whole system down completely. One gateway could hold things together until a repair or replace is completed. This same mind set is represented at Fiber Channel Switches where the loss of one wouldn't cut-off the domain from that sites storage completely as the second has connections to the storage as well. Each NAS gateway has multiple connections to each FC switch and each FC switch multiple connections to each storage array giving redundancy at the port level as well [3] [4].

5. **Backups**

   An expansive backup solution is necessary for Maple Green as the data set is changing and expanding regularly. Data loss or a loss of availability would be costly. On-site backups will be in the form of a backup server at each site. The backup servers will have be able to store 2/3s of the total data capacity (~134TB at each site) which is enough to house all the hot and warm data (The coldest data will be backed up off-site as its immediate availability isn't paramount). Backup drives will be arranged in RAID 10 configuration which allows for quick rebuilds combined with a good capacity to performance ratio. The arrangement for the backups is six groups of 4 HDDs [2].

   Backups won't be confined to one on-site location however. Cloud backups will be utilized to house the same data as the backup servers. Restores from backup will be possible utilizing on-site storage or cloud storage. (Backup scheduling, software needed and ideology will be covered in more detail in the Business continuity section that follows the technical requirements).

6. **Replication**

   Backups are useful for recovering from data loss but recovering the loss of settings and states on local/virtual machines can be slower. Replication allows for us to restore whole machine states from a point in time. Our replication solution will see a replication server that houses the states of all critical machines on the domain (physical server will be at Vancouver site). This server will do native replication from the Vancouver Storage Arrays as well as housing states it pulls from the cloud replica storage. Redundant replica storage will be present on-site at Vancouver and in the cloud replica repository. (Replica scheduling, software needed and ideology will be covered in more detail in the Business continuity section that follows the technical requirements). The storage of the replica server will have a capacity of 76TB arranged in RAID5 (four groups of four 3.84TB SSDs)

7. **Archives**

   At least 10% of Maple Green Cannabis' data was found to be "cold" in our analysis phase, meaning around 40TB of data is not needed regularly. This data can't be disposed of though as it is legally sensitive and may be needed in the future. Our solution will be to house the cold data both at an off-site tape archive facility, and in the cloud storage backup at a lower tier price. This allows for redundant access without premium cost associated with "hot" storage. Pricing is included in the quote following the proposal.

8. **Business Continuity**

   Our proposal is focused on maintaining timely, reliable access to the data that employees and customers of Maple Green Cannabis need. If any part of the storage system is impacted it could mean whole business units are unable to function and will impact revenue and experiences. We have calculated and formed a model for maintaining Information Availability that includes RPO/ RTO estimations, Disaster Recovery contingencies and Automated Service Fail-over plans. These will be covered in more detail in the Business Continuity Section of the Proposal.

9. **Training**
   Throughout the phases of the deployment Maple Green Cannabis staff will be shown specific features important to understanding the infrastructure and equipment. Near the end of the process a full week will be dedicated at both sites for full training on every aspect of maintaining and administering the storage system.

10. **Support**
    For 60 days following delivery ProPulse agrees to monitor and help resolve issues (4 hours to on-site or online 24/7), however we hold no responsibility for manufacturer defects or malfunctions. The Dell EMC hardware has been purchased with 5 year warranties to cover any problems and the cloud/backup services are paid for 1 year from date of delivery, after which it is up to Maple Green Cannabis to purchase further warranties and storage contracts.

Risk Analysis

There are inherent risks involved in the storage of company data, many of which are exacerbated in the transfer over to a new company wide solution. We've researched and analyzed these risks, how they could affect Maple Green Cannabis and have decided on mitigation strategies to ensure successful deployment.

- **Disk Failure**
  - Power surge, water damage, theft, manufacturing defects are all risks inherent in Disk based storage. Our mitigation strategy for this risk is based on fault tolerance and reliance on backups. The disks we will use are firstly purchased from random lots not all from one place to avoid any one lot's manufacturing defaults. Then we will configure the disks into RAID groups that correspond to the data they will house and the level of fault tolerance needed for that level of data. For example; "Hot" data will be housed in RAID 1. meaning full data redundancy between disks in the RAID group. Multiple disk mediums will be used so as to not rely on one type. SSDs will house the most important data and the rest will be 7200RPM HDDs. Data on disk wont just be housed in one spot, the storage arrays will have both redundant storage as well as backup and replica storage. All those locations will also be available from the cloud, updated through scheduled backups.

- **Cloud Unavailability**
  - Cloud centers can experience the same problems as any data center and that's why we have chosen to partner with providers that have multiple data centers and very agreeable SLAs meaning their guarantees are fairly reliable. Furthermore we have spread out our backups, storage and DraaS between multiple companies so as to not rely fully on data restoration from one entity. If the clouds are all unavailable we still have the onsite backups, onsite replication backups, and off-site cold storage for multiple redundancies in case of emergency.

- **Disasters**
  - Whether human, natural or other, we are prepared for immediate start to restoring any loss of data or availability. At a high level our disaster recovery strategy is to rely on the fastest available combination of backups we can utilize. We've added power redundancy in our hardware with UPS units, fire suppression at both sites will be upgraded and the Vancouver site will serve as a Disaster Recovery site if necessary as it houses a replica server and is the location connected to the off-site cold storage. Our response to a disaster will be totally based on the technique that will restore full functionality the fastest so combinations of on-site, cloud, DraaS are all available.

- **Ransomware**
  - In the event of a physical or cloud based ransomware attack where Maple Green Cannabis loses access to data, we will rely on the cloud. Since most of our storage is stored on the Azure platform, which is highly unlikely to be unavailable we can quickly provision the entirety of our system on the cloud in an emergency. Performance is likely to take a hit in this scenario and cost will be exorbitant until resolution.

- **Network problems**
  - Having the internet go down is a real possibility for business that is why we will implement multiple redundant ISP connections. Having services from multiple companies gives redundancy in internet connection and will ensure that if an outage occurs both sites will still have functional Information Availability.

- **Deployment risks**
  - A failure within the deployment phase can totally halt the process and lead to loss of data and revenue. We have built redundancy into the process by deploying in stages and by making a baseline backup in the cloud and physical realm before taking any of the other new systems online. Warranties purchased with the most important equipment ensure we can have a manufacturer provided solution to any malfunctioning hardware.

[1]

Technical Requirements

Hardware

- 4 Dell PowerVault NX3340 (NAS Gateways)
    - Performance configuration
    - Dual Intel Xeon 2.2GHz
    - 64 GB RAM
    - Intel X710 Quad Port 10GbE SFP+, rNDC
    - Premium Software included

- 4 Dell PowerVault 56F (FC Switches)
    - 16 Fiber Channel Ports
    - 1.0625-Gbps full duplex Fibre Channel port speed
    - Aggregate switch I/O bandwidth of 16 Gbps, full duplex
    - Fabric management through Simple Name Server, Alias Server, SNMP, Telnet, World Wide Web

- 1 Dell PowerVault ME5012(Storage Array)
    - Power Supply, 580W, Redundant
    - 32Gb FC Type-B 8 Port Dual Controller
        - 8x SFP, FC16, 16GB
    - 12 drive slots
    - Mix of SSD and HDD supported natively

- 5 Dell PowerVault ME5012 (Storage Arrays)
    - Power Supply, 580W, Redundant
    - 32Gb FC Type-B 8 Port Dual Controller
        - 8x SFP, FC16, 16GB
    - 24 drive slots
    - Mix of SSD and HDD supported natively

- 9 Dell PowerVault ME424 Expansion Chassis
    - 24 drive slots
    - Premium Software included
    - Mix of SSD and HDD supported natively
    - Redundant power supply

- 100 Samsung Enterprise 3.84TB SSDs
    - 2.5 inch form factor
    - Internal Data Rate : 2100 Mbps (read) / 1800 Mbps (write)
    - Interface: SAS-12gbps

- 48 Seagate Exos X16 12TB HDDs
    - 3.5 inch form factor
    - 7200RPM wih 256Mb buffer
    - Sustained Data Transfer Rate Od (max): Up To 245 (read), 233 Mbps (write)
    - Interface: SAS-12gbps

Software

- Windows Server 2016 Standard
    - Comes as standard with NAS gateways and Storage Arrays

- VMware vSphere
    - Used to control virtual machines that use our cloud and onsite data as data-stores
    - Can access, manage and transfer data throughout entire storage entity

- VMware vCenter
    - Central management of all system VMs controlled here

- Veeam Backup and Replication
    - Backup automation software that integrates with VMware vSphere
    - Storagepipe DraaS also housed within this console

Business Continuity Plan

Information Availability

One of the main drivers of the project is the Vancouver offices' difficulty in easily accessing the data stored in Calgary. Our proposal looks at information availability from the belief that any user accessing data should have the same experience from any location within the domain. This availability achieved through a combination of on-site storage, cloud storage and VPN tunneling. If any one of those sources goes down there will be automatic fail-over into another leaving the user unaware of a problem. To keep the data current and reliable we will implement a robust backup policy.

Backups

Backup storage is handled using the 3/2/1 methodology, meaning data is stored in at least 3 locations, on at least 2 mediums and at least one cloud implementation. In our case each site has its production data stored in redundant drives on-site (Hot data RAID 1 and warm data RAID 5), these production servers are backed up to a RAID60 server (one on each site) with the capacity to hold 2/3s of that sites storage (hot + warm). That same hot+warm data is also backed up to Microsoft Azure Blob storage through the use of hypervisors and VMware vSphere (managed by vCenter). Within vSphere backups are automated using the Veeam backup and replication console integration [7].

Cold data is stored in a similar fashion but at a lower pricing tier meaning its availability is at a lower level. Cold data is also stored in an off-site tape repository provisioned through the StoragePipe DraaS service.

For our solution after analysis of the company we found for the hottest data as well as the VM and local machine states an RTO of immediate was required. Less than 8 hours for hot data was acceptable to minimize business affect. For the warm data that went up to an RTO of less than 24 hours. For cold data the business would weather an RTO if up to a week. The associated RPO for the hottest data was a target of zero data loss, and for hot data that target was less than 8 hours of data loss. In order to reach these targets, we implement a combination of high availability, redundant replication, backups and aggressive backup scheduling [5].

Backup Scheduling/Replication

Backups are automated using the Veeam software in vSphere. Incremental storage backups are handled everyday, twice a day with full backups every Sunday night. Replicas are updated fully twice a week for business critical machines and once a week for the rest. Cold storage data is backed up once a week on Friday nights. Replicas are stored on the Vancouver replica server as well as in the Azure storage [6] [9].

Disaster Recovery

At the infrastructure level, our proposal would add two main features for Disaster Recovery improvement; CO_2 fire suppression and backup power supplies for business critical equipment. The Vancouver site has purposefully been setup as a warm site meaning that an interruption in Calgary can be restored completely from Vancouver. Further contingencies are in place also. With hot data and replicas aggressively backed up through automation, Maple Green Cannabis would be able to run full automated from the cloud for a period if necessary. This is made possible through the use of cloud VMs accessible through vSphere and vCenter web portal [8]

In the case of disaster though it will not be up to the staff at Maple Green to initiate and monitor these fail-overs. Included in the proposal is access to StoragePipe's disaster recovery as a service. This service fully integrates with the Veeam backup automation as well as the Azure cloud storage to recover within the RPO timelines. This service can utilize the Vancouver warm site as well as cloud storage to achieve recovery and can allow remote management of the total system if sites are inaccessible [10].

Project Timeline

The project will take approximately 9 weeks, from the date of confirmation.
The timeline and process steps are listed below:

First Step: Week 1

Analysis

Since the country-wide legalization of cannabis in 2018, Maple Green Cannabis has gone from 30 to 500 employees. Company data needs include databases, product photos, graphic design projects and many other data sets. The current storage capacity of Maple Green is 170TB all housed within two servers at the Calgary office. The storage solution being utilized is a Direct Attached Storage method with no backups configured, no Disaster Recovery Plan and little room for expansion. Based on the research Maple Green Cannabis has an expected growth of 15% year over year for the next 5 years. Here are the estimates for needed capacity after 5 years:

Time	Capacity Required
Start	170TB
After 1 Year	195.5TB
2 Years	224.825TB
3 Years	258.549TB
4 Years	297.331TB
5 Years	**341.931TB**

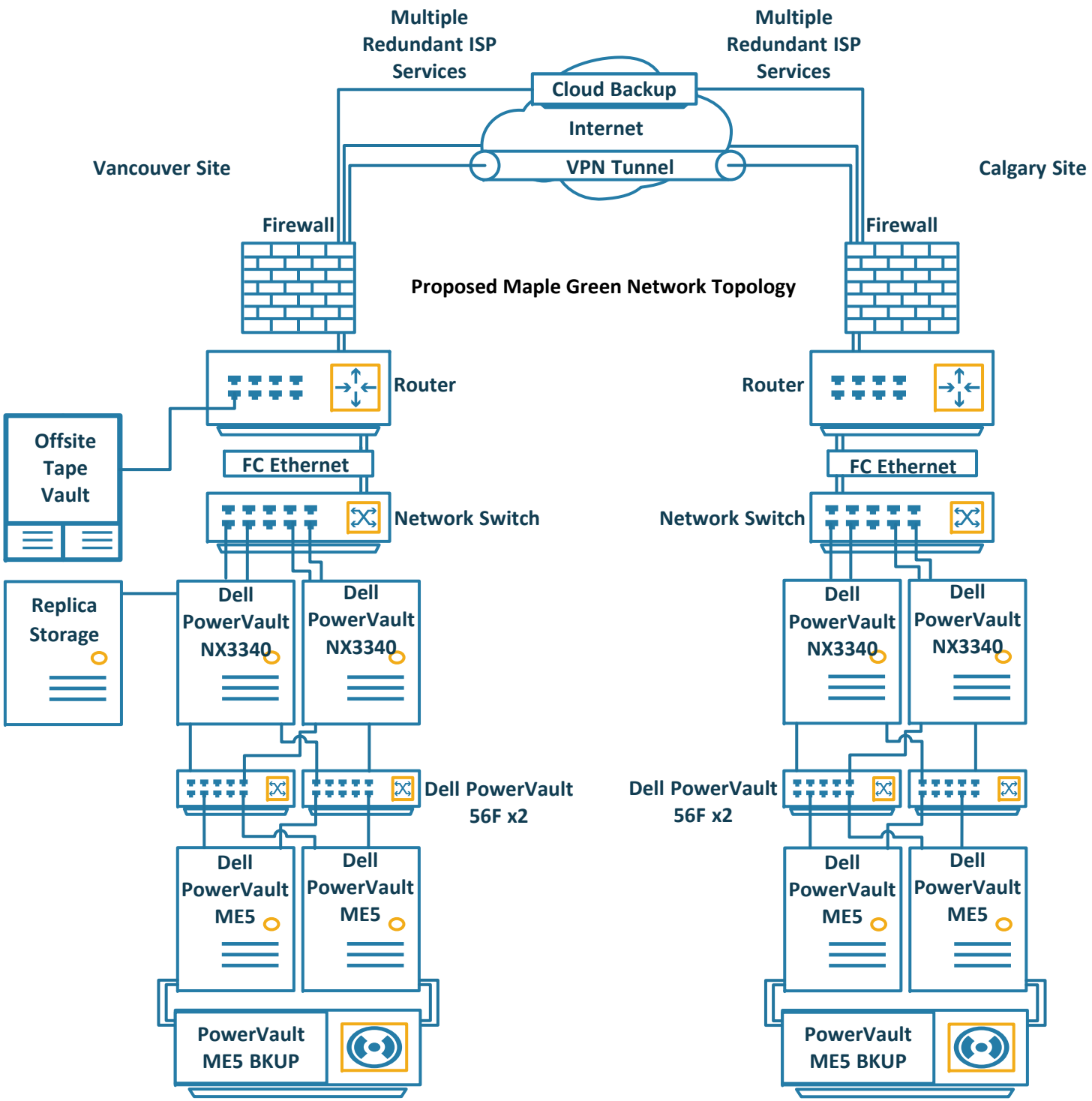
The current system has no capacity to handle the businesses trajectory and has no systems in place for data loss recovery (backups and replication). Furthermore there is no infrastructure to maintain Business Continuity and Information availability. The need for a second storage site has been made clear by management.

Second Step: Week 2

Demonstration

Our proposed system will contain the following topology:

- A combination of NAS and SAN by way of redundant NAS gateways fed into redundant FC switches that are attached to RAID configured storage arrays
- Backup servers will be present at both sites with capacity to backup 2/3s of all data at each site.
- Cloud storage will be utilized to backup both hot/warm/cold data
- VPN tunneling will be utilized to give each site access to Data housed across the company
- vCenter will be the central management for all VMs company-wide
- Integrations with Azure blob for datastore, Veeam backup & recovery for automated backups and StoragePipe DraaS will all be manageable from vCenter
- Off-site Cold tape storage will be utilized
- Administration of Data will be possible at any point in the Network through remote/SSH into the corresponding devices or through vCenter web portal
- Backups will be automated daily, weekly and more to ensure data is available to be restored or accessed
- Connections between Routers, switches and servers will all be fiber channel to achieve highest speed and reliability possible


Multiple
Redundant ISP
Services
Multiple
Redundant ISP
Services
Cloud Backup
Internet
VPN Tunnel
Vancouver Site
Calgary Site
Firewall
Firewall
Proposed Maple Green Network Topology
Router
Router
Offsite
Tape
Vault
FC Ethernet
FC Ethernet
Network Switch
Network Switch
Replica
Storage
Dell
PowerVault
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Third Step: Weeks 3-5

Build

At this point installation of the proposed solution can begin. Our solution involves as little production downtime as possible so the running infrastructure will be left in place during this stage. The timeline of this stage is as follows:

- Installation of infrastructure upgrades including: fire suppression, new cooling, changes to the floors (air flow) and upgrades to the power generation, regulation and backup
- Installation of infrastructure backbone cabling not already provided (Cat6, Fiber, Power delivery)
- Installation of Server racks and grounding to house hardware with no space capacity currently available
- Put all rack mounted hardware into place
- Install drives into servers making sure to randomize drive placement based on lot numbers (to avoid localized failures)
- Source and arrange for off-site archiving
- Setup cloud storage accounts (separate account tiers for hot and cold storage)
- Short powered tests to ensure enough energy is supplied and no immediate failures are evident (during off-business hours as much as possible)
- Initiate base backups for data both in the cloud and on disk to transfer easily into new servers

Fourth Step: Weeks 5-7

Training

Throughout the process of staging for deployment we will include the Maple Green Cannabis IT staff as much as possible to show specific features and choices in installation that will ensure their success in using the fully realized solution. Once the build stage is finished the full training will begin with the following itinerary:

- In weeks five and six we will take the IT staff through a full run through of the physical system, how hardware works, troubleshooting hardware, replacing drives etc. Software administration will be taught as well, including remote admin, monitoring and using the VMs through the cloud
- In week seven we will run site safety with the disaster recovery plan. Throughout this process we will be glad to answer any questions from the staff as well as continue monitoring for issues with the installation.

Fifth Step: Weeks 7-8

Deployment

To deploy the system we will wait until Maple Green Cannabis is at an off peak period preferably end of day on a Friday to have the weekend, which is usually a slower time, to turn systems on one by one. With the cloud backups already in place we will make the transition server-by-server so only a few services have downtime. All during the deployment we will be monitoring equipment, VMs and services looking for anomalies or data loss. Once every new system is online and in sync we will test functionality of all VMs, domain machines etc.

When the deployment is working completely as expected we will move and store the old equipment as requested on site. With everything in place we will monitor for the rest of the week for SLA compliance levels as well as to make sure the scheduled backups are progressing as planned with minimal data loss.

Sixth Step: Week 9

Support

In order to facilitate a smooth and successful transition to the new data storage solution we have formulated plans to meet Information Availability needs as well as Disaster Recovery Precautions/contingencies. These plans were covered in detail earlier in the proposal but here we will detail issues specific to the deployment process and how our plans will mitigate such issues.

Firstly loss of data is a worry when transferring drives already in use from the Direct Attached storage configuration into the new solution we've provided. In order to mitigate this we will first backup all company data to the cloud service agreed upon. Once the integrity of that data is verified in the cloud we will move to duplicating the states of all virtual machines and servers from the production servers onto the newly installed Dell PowerVault ME5012 storage array replica server. If a disaster occurs during the deployment process we will be able to recover quickly to the original state.

Another issue planned for is the possibility of equipment failing out of the box or shortly after integration. We have included redundant major components in our proposal so that if there is a dead-on -arrival component, a backup is already in production that can hold things together until repair is complete. The FC Switches, NAS gateways, and production storage servers are all redundant with multiple connections to each component they serve meaning the system can weather the loss of a component or the loss of a connection.

We have covered the possibility of drives failing out of the box in a few ways, firstly all drives are in some version of a RAID configuration (specifics covered in the Business Continuity Plan Section), meaning redundancy in data storage. Also we have categorized the drives based on their manufacturing lot numbers and made sure to have no lot mated drives be in RAID groups together. If a specific lot group has a deficiency from the manufacturer and is replicating from each other it could lead to a data loss much more difficult to recover from. Arranging the drives to avoid this will greatly reduce that danger.

To further compartmentalize the risk vectors of the deployment in weeks 7-8, we will put systems online in stages and confirm functionality before moving onto the next system, this allows for the least effect on production quality and ensures if a system fails during deployment that we can restore the original while we fix the problem and business can continue seamlessly. Overall we want to support the seamless, timely migration to the proposed solution and have planned for many contingencies.

The backups systems will be automated to the cloud as well as to the replica server and onsite backup servers as mentioned in the Business Continuity section of this report.

For 60 days after successful deployment we will provide support as required (on-site within 4 hours, online/phone 24/7), free of charge.

Data Storage Comparison (Current vs Proposal)

Attributes	Current (Direct Attached Storage)	ProPulse Solution
Storage Capacity	170TB uncompressed, all stored in Calgary	200TB uncompressed at Calgary 200TB uncompressed at Vancouver
Backup Capacity	None	~134TB uncompressed, fault tolerant storage capacity at each site
Backup Solution	None	Automated daily/weekly/monthly backups to cloud and backup servers
Replication	None	Automated scheduled replication of all VMs, domain machines
Redundancies	Small RAID deployed	Redundancies at hardware, disk, cloud and infrastructure levels
DR Plan	None	DraaS provider on contract for immediate response to restore data, redundancies with storage/backups provide the ability to run company from DR site (Vancouver) or from the cloud
Infrastructure Contingencies	Antiquated fire suppression	CO_2 fire suppression, backup power supplies with critical hardware
Data Tiering	none	Critical data stored on higher performing media for quick recovery, Backup schedule prioritizes hot over cold data, cold storage offsite and in cloud at reduced prices

The current solution is a DAS network with only one site in Calgary holding all the data, there is no provisions for any of the modern data storage standards. In comparison the ProPulse solution is a progressive fault tolerant data storage network. Utilizing NAS controllers over a FC SAN we have intuitive controls rested upon an extremely fast storage intranet. If any of the servers failed in the current setup Maple Green could suffer considerable non-recoverable losses in data, and money. Our solution focuses on removing single points of failure and provides multiple full realized avenues for disaster recovery and restoring data availability within the standards set out in the Business Continuity requirements.

Pricing

Our fee for the whole project from the first step to the last one will be **$760,517.95**
The breakdown is provided below:

HARDWARE	$450,964.76
SOFTWARE & SERVICES	$154,538.05
LAUNCH AND SUPPORT	$37800
TRAINING	$6000
INFRASTRUCTURE IMPROVEMENTS	$75000

More detailed breakdown found in the attached quote.

Cost Justification

In a short amount of time Maple Green Cannabis has increased employee numbers by 400%. It has grown from a fledgling dispensary to a full on corporate entity, with retail locations, multiple offices and complicated logistics Maple Green is quickly becoming a powerhouse in the Canadian cannabis space. One area that hasn't kept up with the company growth is the data storage solution. In a company employing 500 people, if there is only 170TB in total, that averages to 340GB per person. That may seem like a lot but when you look at from a department standpoint the picture becomes more dire. Products need to be photographed using high quality (high file-size) formats. The website needs to store its logos and graphics and everything needs to be backed up to mitigate data loss risks. Having a storage capacity that fits the companies needs is vital to continued smooth operation. Having redundant access to company data means the company can weather disasters and outages that would have crippled them previously. Next we will justify cost in more segmented sections:

1. **Software/Services**
   On the software side we need to get enough licenses to fully utilize all our servers. vSphere requires licenses on a per CPU basis so in order to run VMs on our servers we will need the corresponding numbers of licenses. One of the most important needs for our solution was identifies as the need for backups and DR. Veeam backup and recovery is a vSphere and Azure integrated solution that will allow Maple Green Cannabis full control over the automation and management of backups. StoragePipe DraaS is service that will act swiftly in the event of a disaster to bring the company back into full production within the specified RTO/RPO levels. These are vital in the aim for full redundancy and resilient availability.

   The Azure Blob storage is another high cost but important to the system. With the ability to integrate that storage into all our systems (DR, backups and VMs) and the peace of mind that the Azure platform brings to the data security question we believe the cost is fully reasonable. We have only purchased single year subscriptions to these services so Maple Green can make the move to other services if the desire or maybe get more favorable pricing when available.

2. **Hardware**

   With the hardware the largest costs were the SSDs. SSDs allow us to have the quickest possible data writing and reading for the hot data, as well as in the RAID groups to we have redundant access to the data. Mirroring the hot data allows us an instant copy of the most important data so the best performing drives are required. The storage arrays were the next highest cost for hardware and to achieve a redundant storage capacity that can sustain growth for 5 years we went with industry leading technology. By adding the highest speed fiber channel ports we ensured the SAN could transfer data at the speeds the company needs to function efficiently. Included in the price for the storage arrays (as well as switches and NAS gateways) were 5 year warranties. This ensures the manufacturer will replace or repair equipment quickly and certainly is worth the price as most manufacturing problems arise in the first year of operation.

   To add redundancy to the topology we added in multiples of the most important equipment, this doubles the price for those pieces but gives safety in numbers because we have a hot backup to take control in one goes down. By adding NAS gateways to act as heads above the SAN arrays we were able to combine the high performance (yet high cost) of the SAN with the lower cost (yet easy to manage and integrate) NAS topology. We believe the extra cost of a NAS controller is justified as it brings native replication and ease of access/administration and with the addition of fiber channel ports and the performance package (Dual Intel Xeon 2.2GHz and 64 GB of RAM) allow the transfer speed necessary for high availability.

3. **Fire Suppression Upgrades**

   Being able to temper the effects of a fire disaster saves money in the long run. If data can be saved on-site it means less reliance on the lower performance cloud and means quicker repairs and restoration to the data center infrastructure and equipment.

In 2021 the average revenue of companies with 100 to 499 employees was $40,775,00 USD. Even an hour of downtime can cost the company many thousands of dollars. If no plan is in place to stop this bleed, the company could potentially even collapse irrevocably. Implementing an enterprise level redundant storage solution, disaster recovery plan and business continuity targets mitigate these immense risks and are a necessity within the space of large business. We believe out solution as laid out in the proposal is robust enough to sustain Maple Green Cannabis' tremendous growth and expansion. Taking care of your data and the seeing Maple Green utilize out solution is our upmost goal [11] [12].

Warranty & Limitation of Liability

We provide a 60 days warranty, from the date of acceptance of our IT proposal. During this time, if the solution malfunctions in any way then we take the necessary steps to fix the issue and ensure that the solution operates according to the specifications. However, our services remain at your disposal for any future needs.

Contact us

You can contact us with any of the following ways:

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Fax: 403-827-5483
Website: propulse.ca

We look forward to hearing from you.

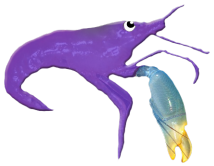
Regards,
ProPulse Solutions

ProPulse Solutions

[6792 Excelsior Park Place, Calgary, Alberta, T3B 4M5]
[zac@propulse.ca]
403-827-5484

QUOTE

ProPulse Solutions



BILL TO

Quadriga Appelbaum
Maple Green Cannabis
555 Upper Mid Drive, Denton, Alberta, X7Q W9P
403-774-4523, qappelbaum@mgc.ca

SHIP TO

Randy Bobandy/ IT Department
Maple Green Cannabis
555 Upper Mid Drive, Denton Alberta
403-774-4525

Quote No: #INV00069
Date: 03/04/22
Valid For: 14 days

DESCRIPTION	QTY	UNIT PRICE	TOTAL
Dell PowerVault NX3340 NAS Gateway	4	10064.60	40258.40
Dell PowerVault 56F Fiber Channel Switch	4	14551.67	58206.68
Dell PowerVault ME5024 Storage Array	6	18488.06	110928.36
Dell PowerVault ME424 Expansion Chassis	9	5931.73	53385.57
Seagate Exos X16 12TB 7200RPM HDD	48	567.93	27260.64
Samsung Enterprise 3.83TB SSD	100	1413.52	141352.00
Dell PowerVault ME5012 Storage Array	1	19573.11	19573.11
Deployment (billable hours by ProPulse staff)	945	40.00	37800.00
Training (billable hours by ProPulse Staff)	150	40.00	6000.00
1 year Total Backup Solution from Veeam (Includes storage and software)	1	7000.00	7000.00
1 Year Draas from StoragePipe (+ Tape Archiving)	1	50000.00	50000.00
1 Year Microsoft Azure Blob Reserved price for 200TB Tiered Data storage	1	48468.00	48468.00
VMware Vsphere Enterprise licenses	7	5628.69	39400.83
C02 Fire Supression Upgrades for both sites	1	75000.00	75000.00
VMware vCenter license for central management of VMs	1	9669.22	9669.22

Thank you for your business!

229538.05

SUBTOTAL	724302.81
DISCOUNT	0.00
SUBTOTAL LESS DISCOUNT	724302.81
TAX RATE	5.00%
TOTAL TAX	36215.14
SHIPPING/HANDLING	0.00
Quote Total	**$ 760,517.95**

Notes & Terms

Payment accepted by Cheque, Credit and Debit (For jobs exceeding $100,000, a 10% deposit is required)
Warranty provided by manufacturer, ProPulse holds no liability for defective equipment
Projected completion in 9 weeks from deposit received

References (non -pricing related)

[1] https://www.cioreview.com/news/risks-related-to-data-storage-and-importance-of-its-management-nid-18522-cid-141.html (Risks)

[2] https://community.spiceworks.com/topic/2195575-best-raid-configuration-for-a-backup-server (RAID for Backup)

[3] https://www.gigacalculator.com/calculators/raid-calculator.php (RAID estimates)

[4] https://www.cru-inc.com/table-raid-levels/ (RAID levels)

[5] https://www.veeam.com/blog/rto-rpo-definitions-values-common-practice.html (RTO/RPO)

[6] https://www.techtarget.com/searchdatabackup/tip/Backup-scheduling-best-practices-to-ensure-availability (Backup Scheduling practices)

[7] https://backupschedule.net/enterprise-backup.html (Backup info)

[8] https://helpcenter.veeam.com/docs/backup/vsphere/overview.html?ver=110 (Veeam + vsphere)

[9] https://helpcenter.veeam.com/docs/backup/vsphere/overview.html?ver=110 (Veeam Backups)

[10] https://storagepipe.com/disaster-recovery-as-a-service-draas/veeam-replication-disaster-recovery-draas/ (StoragePipe DraaS)

[11] https://invenioit.com/continuity/disaster-recovery-statistics/ (disaster recovery statistics)

[12] https://www.fundera.com/resources/small-business-revenue-statistics (business revenue statistics)