

Big IT Services
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Dear Derek,

Our company is pleased to submit this report, titled *District of Taylor: Proposal for IT Services*, for the District of Taylor. It is written to propose a project to the District of Taylor's IT Services Request for Proposal issued on 2/13/2019 on the BC Bid website posted by the District of Taylor. This report was issued by Justin Tran, the CEO at Big IT Services.

This report details how our company will provide IT services as outlined in the RFP. Our company aims to update the aging technology and reduce the cost of maintaining the technological infrastructure of the District of Taylor.

Our company plans to transfer existing government data and services to an Amazon cloud server. We have made selections on what services and utilities we think would be best for Taylor, though these can be changed and adjusted to fit the needs of Taylor in the future. We will provide ongoing IT services afterwards by having a remote help desk and an on-site technician living in Taylor. Our project will approximately take nine weeks to complete and fully implement.

Please see the attached proposal for details.

Sincerely,

xxxxxxx CEO Big IT Services



District of Taylor: Proposal for IT Services

1 Executive Summary

The goal of this proposal is for our company to improve the District of Taylor's technological infrastructure by migrating and hosting the District's existing servers and devices to a cloud based service called Amazon Web Services (AWS) as well as providing additional IT services including and system security, help desk support during business hours, and maintenance of computers and network devices.

1.1 Summary Project Details

We will be replacing the District of Taylor's current legacy server with a virtual server. We will first create an Elastic Compute Cloud instance, the virtual server, and will it run on Amazon Linux 2. The virtual server will be hosted on Amazon Web Service. Next, we will implement the Elastic Compute Cloud instance by configuring all devices of the District of Taylor to be able to access the virtual server. We will install Amazon Elastic File System as the network file system to allow all devices on the District of Taylor's network to access the file system of the virtual server. After, we will transfer all the data from the District of Taylor's current legacy server to a Cloud storage using Amazon Simple Storage Service.

We will provide a remote help desk and an on-site technician to help solve issues for the District of Taylor. We will be using a web forms built on Smartsheet, a web-based information collection tool, to collect tickets. The web form can be accessed and submitted through a URL that will be provided to all employees. After an employee has submitted a ticket, an IT personnel will call the employee who submitted the ticket and will help them solve their problem. The on-site technician will be living in the District of Taylor. Both the help desk and the on-site technician will be available in and out of regular business hours (*9am to 5pm*), *weekends, and holidays*.

On-site checkups and appointments can be requested and booked through the help-desk line alongside bi-monthly visits for check-up on devices, network, and server functionality. Appointments can be booked for our 9-5, 7 days a week business hours a

week in advance. An emergency helpline will be open 24/7 for any calls outside of office hours.

We take data and server security very seriously. AWS offers a multitude of options for backup and restoration services. These include scalable file storage with the Amazon EFS system, Hybrid storage, that is covering up to 3 data types, with Amazon Glacier, EBS, and S3, and covering data transfer methods both into the aforementioned 3 service and into the cloud. AWS server security also has a number of methods and ways data is protected and partner compliance programs/providers to choose from. Network firewalls, encryption, and connectivity options are all offered, as well as compliance programs that feature globally spanning coverage.

Data transferring is also covered by a wide variety of methods that can support various data types and formats. Transfers over internet are handled by Amazon Direct Connect and S3 Transfer Acceleration and then can be stored offline through Amazon storage services. In addition, AWS Kinesis Firehose and Migration Hub offer their own special centralized features ranging from data encryption, transforming, and capturing for loading into Amazon S3, to accessing and managing the status of data migrations across multiple AWS devices and partner devices. AWS pay-as-you-go and as-you-use pricing format allows for better budget and cost management, making sure cloud performance isn't compromised while data is protected and secure.

1.2 Summary Project Schedule

The project schedule details the tasks and phases on how the Amazon Web Services will be deployed, and how the help desk will be established. The project will span a nine week period and split be into four phases. Phase one will set up the framework of the migration of data from the business server to the cloud server. A report will to be written on the requirement, based on the current state of the server being used by the District of Taylor, and will need to be approved by District of Taylor to proceed. Initial stress testing of the server will start at the beginning of phase two to prepare for migration of data from the current business server. Phase two will be maintaining server stability as data is being moved from one server to the next.

Security and Policies in phase three will be running concurrent to establishing and migrating the data from the physical server to the cloud server. All tasks during this phase will be reliant on which task is being done during the process of phase one and two. Authentication will be established for AWS account and vetting of all software and applications will be essential. Phase four will be dedicated to establish a help desk to provide IT communications. Training employees will occur at end of the phase four, which includes the nuances of using the cloud, and quick fixes for the hardware and server.

1.3 Summary Project Evaluation

Ongoing evaluations of the project will be done daily via written reports by the on-site installation team. These reports will detail the current progress of the infrastructure transition as well as the results of all infrastructure testing that day.

Issue reports will also be included if any unexpected problems occur during the installation or testing phases. These reports will include diagnostics from our technicians as well any proposed solution.

1.4 Summary Project Completion

The newly installed infrastructure will be used as the IT backbone for the District of Taylor, because of this, our standards for completion will be the successful migration of all of the District's current data. As well as the reliable uptime of the new services, this will be determined by the new infrastructure passing the entirety of our rigorous testing phase as mentioned above and detailed in the report.

1.5 Summary Budget

The upfront cost of the project will be \$106,880 CAD. Additionally, a \$8,800 monthly rate will apply for Amazon's web services as well as for our company to provide and IT help desk for the District.

1.5.1 Summary Initial Costs

Service	Costs
Initial Fee	\$25,000
Company Rate Total	\$80,000
Training Session	\$1,880
Total	\$106,880

There is a \$25,000 flat fee at the beginning of the project. This includes the proper installation of the new infrastructure, safely migrating all of the current data over to the cloud servers and rigorously testing the new infrastructure.

This project will take approximately 9 weeks and our installation team will be working 7 days a week. Our company's hourly rate is \$155. Because of this, our estimated total of our company's hourly rate will be \$80,000.

In addition, training workshops run by our engineers to help prepare the District of Taylor's employees for the new infrastructure will be \$1,880.

1.5.2 Summary Monthly Costs

Service	Costs
Server Rental	\$1,200
Storage Rental	\$600
IT Help Desk	\$7,000
Total	\$8800

The monthly rate will cover Amazon's web services cost as well as the IT help desk requested in the initial RFP. Our IT help desk solution will include both remote

assistance as well as an individual in The District of Taylor. Because of the District's remote location, we believe this solution would be the most optimal for reliably immediate technical support.

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1. Introduction

Technology is changing quickly and the world is becoming more digital. It is essential that organizations keep up-to-date and adopt new technologies and infrastructure, especially a government organization, which has a duty to its citizens to provide information and services on a timely basis. The District of Taylor's information technology infrastructure is becoming outdated and they have requested a proposal for services to improve, maintain, and replace their aging technology systems.

The goal of this proposal is for our company to improve the District of Taylor's technological infrastructure by migrating and hosting the District's existing servers and devices to a cloud based service called Amazon Web Services (AWS) as well as providing additional IT services including and system security, help desk support during business hours, and maintenance of computers and network devices.

1.1 Amazon Web Services

For a government organization that relies on taxpayer money, reducing cost is important as long as it does not interfere with performance, which is why we want to migrate data and services to an Amazon cloud server. Migrating the District's systems to a cloud-based system allows for the removal of some hardwired connection which will reduce the cost of future physical maintenance of expensive databases. A cloud-based solution also allows for easy scalability, meaning that if the District wishes to increase the data storage or the scope (e.g. increase in users/accounts) of their organization it can be done easily and hassle free through the AWS website itself. In addition, government staff will be also be able to securely access their data from virtually anywhere as long as there is an internet connection; boosting productivity. We highly recommend AWS because they boasts a 100% uptime and hassle-free/cost effective security upgrades, and despite sounding expensive, AWS is surprisingly affordable; they only charge for the services we use, unlike other services where we have to pay for a package, which may not contain things we generally want or will use.

1.2 System Security

When working with a government organization that handles and manages private personal data, data security takes top priority in our minds. Moreover, with a great deal of talk about moving data off site and on to a third-party server, system security is without a doubt a major concern. Fortunately, AWS is well known for the way they handle cloud data security by providing numerous fire walls, early intruder detection warning, and data encryption. AWS is also offer the ability to copy data across multiple data centers which increases data redundancy, meaning that in the extremely unlikely event that a data center is lost, there will be back ups saved on another data center for easy recovery.

1.3 Help Desk Support

A central help desk is essential for any organization looking to expand it technological services. By providing a platform for a help desk, our company will able to assist users with various technical problems, such as troubleshooting network connections, resetting passwords, and installing and using software. The main advantage of a help desk is the centralized nature of the technical help, meaning users know exactly where to go for technical information and calls/tickets with always be forwarded to the same department. For example, if a user has a common problem with their account or trouble with a piece software, a department will able to look up past support tickets for reference, increasing the likelihood that the problem will be resolved much more quickly.

1.4 Computer and Network Maintenance

Traditionally, equipment maintenance is categorized as preventive maintenance and corrective maintenance. Our company hopes to employ these practices in the District of Taylor ensuring that important data is always available and devices such as computers, printers, and servers are working as intended. At the moment, our company believes that the best way to employ these practices is to perform weekly network maintenance and bi-monthly hardware checkups. By doing so, we will hope to improve the district's ability

to provide a level of service that meets expectations by limiting down time of network devices. Of course we will adjust accordingly to the needs of the employees should more problems arise.

Together with AWS, we look forward to providing you with a secure, scalable, and reliable hardware/software infrastructure at an industry standard level.

2. Project Details

This project proposal is to provide a reliable and affordable solution for the District of Taylor who need information technology services while replacing their current server. We will provide constant IT services for the length of time agreed upon in the discovery phase.

2.1 Project Description

We plan to first assess the District of Taylor's legacy hardware and software. Then, we will backup data on the company's existing server in case any unexpected events occur. We will then sign the District of Taylor up for Amazon's Elastic Compute Cloud (Amazon EC2) that is a part of Amazon's Web Services (AWS) which will take 24-hours. Through the Amazon Web Service Management Console, we will configure the virtual server, which will act as the replacement server, to the company's specifications. Afterwards, the company can connect to the server through launching a secure shell (SSH) client. This means any that the District of Taylor's workstations will be able to connect virtually anywhere on site. Because the virtual server is going to be hosted on Amazon's cloud server, it will reduce hardware connections and costs.

2.1.1 Server Maintenance Overview

For the duration of time agreed upon, we will be backing up the virtual server's data every two weeks by creating snapshots of the instance volumes. In the event of an unlikely failure, we will be able to restore the instance to that point in time where the

snapshot was taken. If requested by the District of Taylor, we will create additional virtual servers to be used.

2.1.2 Help Desk

Furthermore, we will be providing help desk support and maintenance along with handling security of the data. We will implement a ticket system that will be able to receive tickets through the user submitting a web form describing their problem. The ticket will then be handled by our company where we will be contacting the employee and helping them resolve their issues.

We will be doing bi-monthly check ups on all workstations and notebooks to ensure optimal functionality and security operations.

2.2 Migrating and Hosting Data

To be able to transfer data from the current physical server to the new virtual server we must:

1. Assess the District of Taylor's legacy hardware and software.
2. Create and configure a virtual server based on the District of Taylor's hardware and software needs.
3. Migrate data from the old server to a cloud storage.
4. Connect virtual server and cloud storage.
5. Configure devices that will access the server.

Note that Amazon Web Services makes their own hardware which will allow us to configure the server to mimic the District of Taylor's current server functionality.

We will be using:

- The Amazon Web Service (AWS) to host the virtual server, specifically an Elastic Compute Cloud (EC2) instance.
- The Amazon Simple Storage Service (S3) as the cloud storage.

- The Amazon Elastic File System (EFS) as the network file system to connect all devices to the server file system.
- Amazon Linux 2 as the Operating System for the Elastic Compute Cloud instance.

2.2.1 Assessing Hardware and Software Needs

First, we will be assessing what hardware the District of Taylor is using for their old server, desktops, and notebooks and what software packages they are using for their server and devices. With the information we will configure the virtual server to be compatible with the software, desktops, and notebooks. Note that Amazon Web Service creates their own hardware allowing this to be possible.

2.2.2 Creating and Configuring a Virtual Server

We will create the virtual servers using Amazon Elastic Cloud (Amazon EC2) web service as their Amazon Machine Image (AMI). These servers will be configured to run on Amazon Linux 2.

2.2.3 Implementing EC2 Instance

We will then download a key pair, which is needed to connect to the EC2 instance to all workstations that need it. After we will install a network file system (NFS) using Amazon's Elastic File System (EFS) on the EC2 instance, it will be given network access to the file system. Next, we will then connect to the EC2 instance and a device using Secure Shell (SSH) with the instance's IP address. Finally using the Amazon EFS console we will mount the file system in order for it to be usable, just like a local file system.

2.2.4 Migrating Data from Old Server to Cloud Storage

In order to migrate data from the current physical server to Amazon Simple Storage Service, we will need to install a browser on the 2003 Business Server if it does not already have one. We will do so using a terminal. Using the installed browser on the

server, we will proceed to upload the data using the S3 buckets and objects. Note that Amazon S3 accepts data in virtually any format.

2.2.5 Connecting Virtual Server and Cloud Storage

The EC2 instance will need to be able to read the data from the S3. First, we will need to use a secure workstation provided by the client. Next, we will install Java and enable it in the web browser. After, we will connect to the instance using the Java SSH from the EC2 dashboard. We will then install the AWS Command Line Interface (CLI) on the workstation first used to Java SSH to the EC2 instance. In order to use the AWS CLI, we will need to download Python 2.6.5 or higher and the awscli python module. Using the CLI, we will execute commands that will transfer the buckets of objects from the S3 to the virtual instance.

2.2.6 Configuring devices to access the server

In order for the devices to connect to the EC2 instance, we will need to install a private key file, which will be in a .pem file format, from the EC2 console onto each device. This file will provide authentication and the username will always be ec2-user since all EC2 instances, that we create, will be running on Amazon Linux 2. After, we will enable network discovery on all the devices to access the network file system.

We believe that Amazon is a reliable and secure cloud service company. They are known for their uptime (99.99% of the time) and scalability.

2.3 IT Support

We are hoping to resolve most issues through the help desk platform but will assign a onsite technician to help with emergencies and high priority problems during/after business hours.

The ticketing system for the remote helpdesk will be built using Smartsheet and will be hosted on Smartsheet's cloud server. Smartsheet is a cloud-based form collection web service that will allow us to collect the tickets. The tickets will be sent through a web form

and will be stored on a Smartsheet form where the helpdesk can access and process the tickets. We will require at least one phone and we will have two trained IT staff working at the help desk. The time required to get back to a employee and to solve the problem will depend on how busy the help desk is and the complexity of the problem at hand.

The on-site technician will be a full-time, trained IT technician and will be living in Fort Taylor to help solve issues.

2.3.1 How to Issue a Ticket

In order for clients to submit and update tickets, we will be using Smartsheet. It will allow clients to submit tickets through a web form accessible by a URL that will be provided to all employees. The web form will contain the following fields:

- Name
- Department
- Email
- Phone Number
- Brief Description of Problem
- Any Additional Information

Note that we will be able to add and remove fields as the client sees fit. After a submitting the ticket through the web form, it will update the Smartsheet. Note that the Smartsheet containing the tickets will only be accessible by us, the IT team.

2.3.2 How the Queue System Works

The Smartsheet containing the tickets will be shared amongst IT personnel and in order for an IT ticket to be claimed, an IT personnel will check off the claim field and put their name beside it. When a client has submitted the web form it will send out a notification email to IT personnel as well as update the Smartsheet. Because each submitted web form will be configured to have a time stamp, we will process problems chronologically starting with the most recent problem. To get back to an employee, our IT personnel will

call the person who submitted the web form rather than email to clarify ad-hoc questions regarding the problem and steps.

2.3.3 On-Site Technician

The On-Site Technician will be living in Taylor a week prior to 6/24/2019, the start date of this project. This will give the employee time to get comfortable with the town. The on-site technician will be able to help solve issues that may occur with, but are not limited to accessing the virtual servers and contacting the help desk.

2.3.4 Help Desk and On-Site Technician Hours

Both the help desk and the on-site technician will be available to solve problems during in and out of regular business hours (9am to 5pm), weekends, and holidays. Again, depending on the severity of the problem our technician will be able to help in emergency technical situations such as longer-than-usual network downtime.

2.4 Device Maintenance

In conjunction with our helpdesk platform, on-site physical hardware checkups and inspections will be made available on request alongside regularly scheduled in-person review of core/high traffic hardware such as printers and employee workstations. Currently, we plan for bi-monthly visits with District employees for consistent check-ups.

2.4.1 Device Hardware Checkups

On-request appointments must allow for one week of inquiry to allow for any preparations regarding equipment and travel. Our schedule is made for 9am - 5pm appointments, seven days a week barring Holidays. In the event of an emergency or time sensitive situation, adjustments to the one week buffer will be made corresponding to the circumstance, we will do our best to accommodate with over the phone and helpdesk in the meantime. We recommend our helpdesk line as the best way to get in touch for appointment scheduling. We also offer an emergency 24/7 help line, for any issues that require attention outside of office hours

2.4.2 Basic Training and Quick Fixes

We will also be providing training and overviews of our systems to local employees. Basic troubleshooting knowledge of common errors will be provided for any minor hiccups or 'quick fixes'. In addition, AWS provides a FAQ section for all customers and users of AWS related software if need be.

2.5 Security

To ensure data and information hosted on the server is safe and secure, AWS comes with a state of the art backup and restoration system. Many services that provide unmatched benefits are available with AWS, as outlined below.

2.5.1 Data Backup

AWS allows for 99.99% of backup durability through copying and uploading to Amazon server and data storages. Amazon S3 and Amazon Glacier will have copies of data created and stored on up to 3 devices. This ensures reliable backup and recovery of files and data.

The Amazon storage servers and services (such as Amazon S3, Amazon Glacier and Amazon elastic Block Storage) allow for virtually all data types to be supported. Amazon S3 and Amazon S3 Glacier provide storage capacity for object, both coming built in with their own features ranging from data transfer services to a feature called Vault Lock.

Amazon EFS provides scalable file storage. Serving as a common data source of applications and workloads, the Amazon EFS file system interface provides access of multiple EC2 instances to have access while running on Amazon EC2 instances.

Amazon Gateway provides Hybrid storage, a combination of many different data backup services that enables connection between Amazon AWS storage devices and on-premises devices. This service enables connection between Amazon S3, Amazon Glacier, and Amazon EBS, as well as transferring data into the cloud. The service

supports three different data-transfer modes so you can move *block storage volumes* into Amazon EBS, *tape* backups into Amazon S3 and Amazon Glacier, and *files* into Amazon S3 as objects.

With so many options available, a plethora of data formats and sizes can be covered.

2.5.2 Security and Compliance

AWS offers protection of data and backups designed for the most security intensive companies and organizations. A number of AWS security services are available for managing access, irregular/suspicious activity detection, and data encryption. The District of Taylor can rest easy knowing the security AWS offers is top notch.

These include:

- Network firewalls built into Amazon VPC (Virtual Private Cloud), and web application firewall capabilities in AWS WAF (Web Application Firewall) let you create private networks, and control access to your instances and applications
- Encryption in transit with TLS across all service
- Connectivity options that enable private, or dedicated, connections from your office or on-premises environment

In addition, Cloud Security Alliance (CSA) will be our choice of compliance provider. Through their CSA STAR 3 level outline, we believe they will provide the best in compatibility, cooperation, and security performance

2.5.3 Data-transfer Methods

A large amount of methods and processes are available with AWS. Many of them are able to provide a host of transferring methods. Amazon Direct Connect and S3 Transfer Acceleration both work to optimize data transfers over the internet. Offline storage services such as AWS Snowball, Snowmobile, and Snowball Edge are then able to store petabytes of transferred data, and AWS deploys AWS Storage Gateway to connect to on-site operations to AWS.

Alongside the aforementioned services, AWS Kinesis Firehose and AWS Migration Hub are other more centralized options for data-transfer and data handling. AWS Kinesis Firehose is a fully managed service that captures, transforms, encrypts, and loads streaming data into AWS for use with Amazon S3. The service requires no ongoing administration, compresses data to minimize storage requirements, and scales automatically to match the output of your data. Payment is only based off of how much data you transmit.

The AWS Migration hub on the other hand provides a single location to track the progress of application migrations across multiple AWS and partner destinations. The AWS Migration Hub allows you to use the tools that best fit your needs, and provide access to the status of migrations across your portfolio of applications. Like The Kinesis Firehose, there are no additional costs beyond the cost of the resources and individual migration tools being used.

This selection of data integration/transfer methods allow for broad coverage of data types, sizes, and other requirements or categories to be fulfilled, much like other AWS areas and services.

As for our choice of implementation, we believe that using the Hybrid Storage capability with Amazon Gateway for backing up data due to its coverage of many formats and data types that will prove to be useful. As for data transferring, going with Kinesis Firehose we trust will provide solid and secure transferring services.

Project Schedule

Project Lead: Justin Tran
 Project Start Date: 6/24/2019 (Monday)
 Today's Date: 2/15/2019 (Friday)
 Display Week: 1

WBS	Task	Duration	Start	End	Week 1 6/24/19	Week 2 7/1/19	Week 3 7/8/19	Week 4 7/15/19	Week 5 7/22/19	Week 6 7/29/19	Week 7 8/5/19	Week 8 8/12/19	Week 9 8/19/19
1	AWS	22	Mon 6/24/19	Sun 7/14/19									
1.1	Gauge Requirements	5	Mon 6/24/19	Fri 6/28/19									
1.2	Evaluate Hardware	3	Fri 6/28/19	Sun 6/30/19									
1.3	Finalize Preparations	5	Mon 7/01/19	Fri 7/05/19									
1.4	Establish Amazon EC2 Service	2	Sat 7/06/19	Sun 7/07/19									
1.5	AWS Configuration and Installation	7	Mon 7/08/19	Sun 7/14/19									
2	Maintenance	35	Mon 7/15/19	Sun 8/18/19									
2.1	Migration of Data to Cloud Storage	7	Mon 7/15/19	Sun 7/21/19									
2.2	Data Approval and Server Test	5	Mon 7/22/19	Fri 7/26/19									
2.3	Stabilize Connection with Storage and Server	4	Sat 7/27/19	Tue 7/30/19									
2.4	Test Server with Migration of Data to New Server	14	Wed 7/31/19	Tue 8/13/19									
2.5	Configuration of Hardware	5	Wed 8/14/19	Sun 8/18/19									
3	Security	49	Mon 7/01/19	Sun 8/18/19									
3.1	Delegation of Account and Authentication	7	Mon 7/01/19	Sun 7/07/19									
3.2	Verifying software and applications	7	Mon 7/08/19	Sun 7/14/19									
3.3	Establish Migration Policies	7	Mon 7/08/19	Sun 7/14/19									
3.4	Data Back Up	28	Mon 7/15/19	Sun 8/11/19									
3.5	Audit Process	49	Mon 7/01/19	Sun 8/18/19									
4	Help desk	63	Mon 6/24/19	Sun 8/25/19									
4.1	Initialize Help Desk	7	Mon 6/24/19	Sun 6/30/19									
4.2	Help Desk Services	56	Mon 7/01/19	Sun 8/25/19									
4.3	Employee Training	14	Mon 8/12/19	Sun 8/25/19									

Figure 1.1

3. Project Schedule

The project schedule, figure 1.1, details the tasks and phases on how the Amazon Web Service will be deployed, and how the help desk will be established. The project will span a nine week period and split be into four phases. The first two phases are dependent on one other, having the previous task be completed before the next one can be started. Phase three runs concurrent to phase one and two, and each task is initiated based on the completed task in the former mentioned phases. Phases four is an ongoing phase and will run independently from the three prior phases and will establish IT communication support and training.

3.1 Phase 1: AWS (Amazon Web Service)

Phase Duration: Approximately 22 Days

Phase one will set up the framework of the migration of data from the business server to the cloud server. A report will to be written on the requirement, based on the current state of the server being used by the District of Taylor, and will need to be approved by District of Taylor to proceed. Our IT professionals will then proceed to work on getting the cloud server ready, which includes the creation of the account and the installation of software, applications and interface.

3.1.1 Gauge Requirements

Task Duration: Approximately 5 Days

Our IT professionals wil gauge the network bandwidth, storage and database capacity the company will be consuming with the server and other technology. Using software tools such as Solarwinds Bandwidth Gauge, information gathered from these tools will be documented for further processing. The goal of this task is to determine the the size of the data gathered from the current server and understand the requirements needed to migrate to the new server.

3.1.2 Evaluate Hardware

Task Duration: Approximately 4 Days

The hardware technology currently established at the District of Taylor will need to be evaluated to determine if upgrading is essential to the implementation of the servers. Any hardware needing upgrades will be documented for further processing.

3.1.3 Finalize Preparations

Task Duration: Approximately 5 Days

A report will be written on the findings documented in task 1.1 and 1.2. Information gathered in the report will be used to finalize optional upgrades, cost, and scheduling. This task will include an approval period in which the report will need to fit the needs of the District of Taylor before moving on to establishing the cloud server. The District of Taylor will be shown their current system in comparison to the newer system being initialized.

3.1.4 Establish Amazon EC2 Service

Task Duration: Approximately 2 Days

A contract with Amazon will be established to set up an account for the Amazon EC2 services. All account configuration will be managed by our IT professional. The setup will require client information to link the server to their business.

3.1.5 AWS Configuration and Installation

Task Duration: Approximately 7 Days

The virtual servers, Amazon Elastic Cloud (Amazon EC2) web service will be initialized . These servers will be configured to run on Amazon Linux 2. A key pair which is needed will be downloaded to connect to the EC2 instance to all devices that need it. Using the

Amazon EFS console the file system will be mounted to be usable just like a local file system.

3.2 Phase 2: AWS - Maintenance

Phase Duration: Approximately 35 Days

Initial stress testing of the server will start at the beginning of phase two to prepare for migration of data from the current business server. Phase two will be maintaining server stability as data is being moved from one server to the next. Current, and if applicable-new computers, will be set up to the cloud server. Tests will be running simultaneously to test server capacity as computers are setting up.

3.2.1 Migration of Data to Cloud Storage

Task Duration: Approximately 7 Days

This task will begin to migrate data from the current physical server to Amazon Simple Storage Service. Using a browser installed on the business server, data will be uploaded using the S3 buckets and objects.

3.2.2 Data Approval and Server Test

Task Duration: Approximately 5 Days

There will be an approval period for the data being migrated to determine which data are stale and which data are essential to the functionality of the business. All essential data will be vetted and set to the bitbucket. All data set to the bitbucket will be organized for smooth accessibility. Data access will be made available for essential employees and our IT professionals working with the data. As data is being sorted and approved, a stress test on the server will be done to test stability of the server while taking loads of instances of applications and software.

3.2.3 Stabilize Connection with Storage and Server

Task Duration: Approximately 4 Days

A test with the EC2 instance (server) will need to be done so it is able to read the data from the S3 (storage). An interface will be established in order to use the AWS CLI. Python 2.6.5 or higher and the awscli python module will need to be downloaded to be used by the CLI. The AWS CLI will execute commands that will transfer the buckets of objects from the S3 to the virtual instance.

3.2.4 Test Server with Migration of Data to New Server

Task Duration: Approximately 14 Days

The goal of this task is to determine whether the new infrastructure can operate with minimal downtime. The testing phase will include load tests being run constantly over the course of couple weeks during Phase 2. With the acceptable expectation being that the connections would not fail at any point. To provide the test some substance, the server will be feed large amounts of data to determine the stability of the server. Throughout this phase, we will also be conducting shock tests on the infrastructure. These tests will simulate random and instant peak traffic loads, allowing us to ensure the District's connection line to Amazon will be able to handle sudden influx of users at once.

3.2.5 Configuration of Hardware

Task Duration: Approximately 5 Days

The last stretch of phase 2 will be configuring all current and new hardware to be able to connect to the established server. All hardware changes are to be finalize during this phase as accounts instances will be set per computer and all network devices will need to be routed.

3.3 Phase 3: Security and Policies

Phase Duration: Approximately 49 Days

Security and Policies will be running concurrent to establishing and migrating the data from the physical server to the cloud server. All tasks during this phase will be reliant on which task is being done during the process of phase one and two. Authentication will be established for AWS account and vetting of all software and applications will be essential. Policies will need to be put down to secure data transfer and data access. Throughout the course of phase three, any and all data will be backed up involving the action of transforming data.

3.3.1 Delegation of Account and Authentication

Task Duration: Approximately 7 Days

The task of delegating the account will run concurrent to 1.4 when establishing the Amazon EC2 service. The delegation of who is allowed to access the account will be restricted to essential employees and our IT professional who have the ability to manipulate the data and server. Authentication will be setup to allow the selected personnel access of the District of Taylor to access the Amazon EC2 Service account.

3.3.2 Vetting Software and Applications

Task Duration: Approximately 7 Days

Our IT professionals who have background in cyber security will do a vetting process of all software and applications from the physical business server currently establish at the District of Taylor.. Running concurrent to task 1.5, this task will filter any liable programs that may put the new server at risk and provide alternatives to any applications that did not make the cut.

3.3.3 Establish Migration Policies

Task Duration: Approximately 7 Days

This task will establish policies to make sure data is going to the right place and ensure that data is being protected once migrated. These policies will be established by our IT professionals which will be automated to make the destination data even more secure than the source. Rules will be set up to re-permission the data during the migration.

3.3.4 Data Backup

Task Duration: Approximately 28 Days

This task will concurrent to all of tasks being processed in phase two. Any data that is being transformed will be backed up to ensure no loss of data. A full data clean-up will be done before migration. Once the data is migrated, it will stay in its current state until the next migration. Migrated data will be checked and vetted to preserving data integrity. All data being transformed will have a copy made in a separate cloud storage.

3.3.5 Audit Process

Task Duration: Approximately 49 Days

This task is essential to the overall project. All tasks, processes and overall development of the project will be documented and recorded for future reference. Everything will be computed and printed into a hard copy format.

3.4 Phase 4: Help Desk

Phase Duration: Approximately 63 Days

This phase will be dedicated to establish a help desk to provide IT communications. Training employees will occur at end of the phase, which includes the nuances of using

the cloud and the programming. Employees will establish the following skills during training: cloud concepts, security and technology with programs and services.

3.4.1 Initialize Help Desk

Task Duration: Approximately 7 Days

A team to work on the help desk will be provided by IT professionals. This task will focus on providing a platform for which our company will be able to assist users with various technological services, such as troubleshooting network connections, resetting passwords, and installing and using software.

3.4.2 Help Desk Services

Task Duration: Approximately 53 Days

This task will run through the entire process of the project. A business hour will be set (from 9am to 5pm), where there will be an IT manager organizing employees on which tickets to take and providing additional assistance. A line will be initialized by our support staff to handle emergency situations that are prompted by the server.

3.4.3 Employee Training

Task Duration: Approximately 14 Days

This task will be dedicated to training employees the nuances of using the cloud and the programming. Employees will learn the fundamentals of the AWS cloud and build their cloud skills. Employees will establish the following skills during training: cloud concepts, security, technology with programs and services and quick fixes for the established server.

4. Evaluations

4.1.1 Daily Reports

Daily reports based on the implementation team's progress will be sent at the end of the day to cover the completed progress of the project. These reports will also detail the implementation team's planned schedule for the next day. Additionally, to ensure the replacement of Taylor's aging infrastructure with Amazon's Web Service is installed and operating properly for the entirety of the District; comprehensive tests will be done as detailed in 3.2.4.

4.1.2 Issue Reports

In the case of delays or unexpected issues during implementation or testing, additional issue reports will be sent with the daily reports. These issue reports will detail the implementation team's diagnosis of the cause as well as the proposed solution. If these delays are expected to delay the schedule of the infrastructure change, the District will be notified immediately and a revised schedule will be implemented.

However because the District of Taylor has modern network lines in place by local internet service providers, schedule delays should not be common.

4.2 Standards for Completion

Our expectations for the new infrastructure being complete involves all current infrastructure being migrated successfully and reliable uptime for the new infrastructure. All of the current District's data and services will be successfully moved to Amazon's web services. This also includes network devices, such as printers and security systems operating properly.

Additionally, all tests done on the new infrastructure shall pass without crashing or slowdowns. This includes maximum traffic scenarios, as the new infrastructure is

designed to not only handle the District's current needs, but also its needs as it grows. The expectation is that District employees will be able to access files at anytime from any part of Taylor without issue.

5. Personnel & Qualifications

CEO & Implementation Manager:

Justin Tran is an experienced business system analyst for large companies. Graduating from BCIT's CIT program, Justin has worked on numerous projects requiring the implementation of IT services, systems and support for numerous companies. Justin's positions and experience in these projects have ranged from an integrator to team leader.

Implementation Engineers:

Jason S has worked as a software developer for financial institutions after graduating from BCIT with a Bachelor of Technologies. Jason worked on network topology designs for these institutions as well as data migration from older network solutions to modern ones.

Derek N specializes data management and redundancy for large database systems. His experience also extends to infrastructure stability testing, having worked for several companies installing mission critical infrastructure.

Support Staff:

Zach D is a IT support services agent with experience in network management for large metropolitan Districts. After finishing BCIT's CIT program, Zach worked for the city of Burnaby, maintaining and servicing the city's network infrastructure.

Joey G recently graduated from BCIT's CIT program with distinction as well as completing a recent co-op; working in IT support services for remote clientele. After graduating, Joey further extended his experience, by joining a large-multinational engineering company as a remote server administrator.

6. Budget

Initial startup cost will be \$106,880, covering initial implementation of the new servers, data migration and load tests. Additionally, monthly costs that cover the server upkeep, storage rental and IT support services will total to \$8,800 a month.

6.1 Initial Cost

The initial cost of the project will be \$106,880 CAD. This includes the proper installation of the infrastructure, our company's hourly rate as well as workshops for District employees.

Initial Cost

Service	Costs
Initial Fee	\$25,000
Company Rate Total	\$80,000
Training Session	\$1,880
Total	\$106,880

6.1.1 Initial Fee

Service	Costs
Server Implementation	\$10,000
Data Migration	\$5,000
Infrastructure Testing	\$10,000
Total	\$25,000

The initial fee for this project will be \$25,000. This covers the upfront cost of the implementation of the new infrastructure, safe migration of the Districts data and finally, testing the infrastructure.

Testing is especially critical as it will allow us to gauge if any unexpected portions of the current infrastructure are incompatible with Amazon's servers and need replacement. This includes the current topology of the District of Taylor's network lines and any internal wiring of individual buildings. As stated in 4.2, our company's standards for this project is entirely focused on the new cloud platform operating consistently and reliably.

6.1.2 Company Rate Total

Our company's hourly rate is \$155, for this project, this will cover a multitude of services. In addition to the proper replacement of the aging infrastructure, this rate will cover the creation of daily reports as well as the temporary help desk.

As noted in 3.4.2, a temporary help desk will be setup during the length of the project to ensure that transitioning between infrastructures will be as seamlessly as possible for the employees of the District of Taylor.

As this project will take about 9 weeks for completion and our company will be working on the project all 7 days of the week, the estimated total is \$80,000.

6.1.3 Training Session

Training Session Breakdown

Materials	Costs
Training Session	\$680
Reference Guides	\$1,200
Total	\$1,880

Training of current staff of the District of Taylor will be required to ensure that all users of the new IT infrastructure can properly navigate and access their critical and non-critical files. This will include workshops led by our engineers for all staff as well as training sessions for any network administrators and IT staff employed by the District. Booklets and reference guides will also be written and printed for staff to refer to on their own.

6.2 Monthly Services

Monthly payments for our company's IT Services package and Amazon's cloud services are required for the infrastructure. This will be \$8,800 a month and total to \$105,600 a year.

Monthly Services

Service	Costs
Server Rental	\$1,200
Storage Rental	\$600
IT Help Desk	\$7,000
Total Monthly	\$8,800
Total Yearly	\$105,600

6.2.1 Server Rental

Monthly costs for Amazon Servers can vary depending on the intended use-case, our recommendation based on our experience working with municipalities is the basic Amazon EC2 services at \$1,200 a month.

Our company's recommendation is based on the District of Taylor's primary economic source, its growing manufacturing industry. The District will most likely need a server

focused on data storage and ease of access for permits and records, not high computing performance.

While the monthly cost of the cloud server seems initially high compared to buying a physical server. It is important to note that our solution is purely back-end and accessible through ssh, an open source standard that has existed for decades. While a physical solution may face compatibility issues with the District. This can include either the topology of the District or the network interfaces of all the District's hardware, including computers and printers. This is because a physical solution may require a more proprietary, less-proven interface for access.

Amazon's cloud services are easily accessible through any semi-modern device that can connect to the internet. Devices that cannot directly connect to networks, like older scanners and printers, can be connected to computers that have been connected to Amazon's clouds. Making them accessible remotely without issue.

6.2.2 Storage Rental

Amazon's monthly storage cost will vary depending on the storage needs of the District. It's important to note that \$600 will acquire close to 10 terabytes. Microsoft documents are limited to 32mb - 2gb. Allowing for 50,000 to 160,000 documents without compression. If older documents are compressed for storage and archiving, this can increase to up to 480,000.

These documents will be stored permanently online and can be quickly accessed anywhere with a stable internet connection. These files will also be indexed and be easily sortable, allowing for this proper archival and retrieval of files that may be several years old.

6.2.3 IT Help Desk

As per the RFP outlined, an IT help-desk package will also be offered by our company. This cost will be a flat \$7,000 that will cover remote assistance as well as a technician working in the District itself as an IT help desk. While this redundant IT package may

seem excessive compared to the RFP's original request for a basic solution. Our company believes this is the best choice as the District of Taylor is in the far interior of BC.

Because the District of Taylor's remote location, a remote technician and a technician placed in the District is our recommendation for IT services. While a remote technician may be able to provide broad technical assistance, if connection issues occur, it may lead to difficulty for the District to even contact this technician. A full-time technician living and working in the District as an IT help desk will allow for on-site diagnosis, device checkups and provide immediate technical solutions.

6.2.3.1 Emergency Scenarios

In case of extreme weather causing network issues, it may take days for a trained technician to travel from the Lower Mainland to the District. Timely support cannot be guaranteed because of this. For all these reasons, it is strongly recommended for the District to have a full-time technician in conjunction with remote assistance to serve as the IT help desk.

Both, remote assistance and the in-person technician will be available throughout the month including weekends and holidays. This also includes outside standard business hours should there be critical issues, such as, once again, extreme weather damaging the network lines.

It is our firm recommendation that this redundant help-desk package is used by the District. Not only for its immediate flexibility, but in case of emergencies that could affect the District and in extension, local businesses.

6.3 Cost Comparison to an On-Site Server

Our infrastructure installation along with technical support with Amazon's EC2 is not only the more convenient and scalable solution. But will also be financially cheaper long term for the District of Taylor compared to a physical solution installed locally.

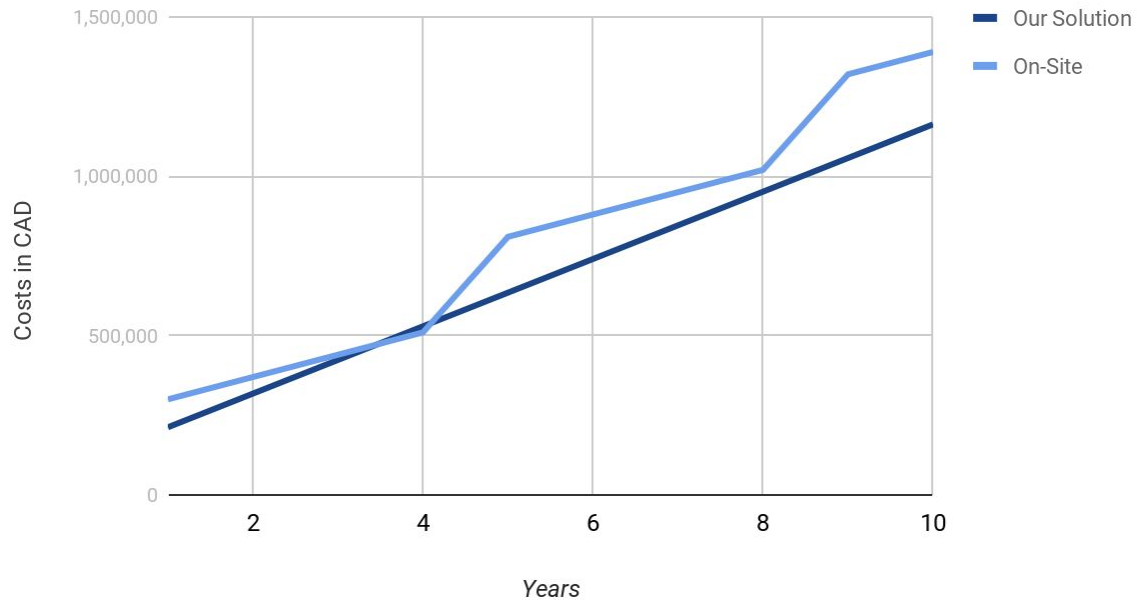
6.3.1 On-Location Server Costs Upfront

Service	Optional Costs
Servers	\$180,000
Hardware and Software Upgrades	\$50,000
On-Site IT Help Desk	\$70,000
Total	\$300,000

An on-location server solution, will initially cost about \$300,000 for its initial year. This cost will cover the server, a secondary redundant backup as industry-standard and the installation process. Hardware and software upgrades required for compatibility with this new platform is accounted for as well. And an IT help-desk salary is also included, which has to be paid yearly.

6.3.2 Cloud and On-Location Comparison

Cloud Vs On-Site Cost Comparison



It's also important to note, that the on-site servers will require replacement as they will be running 24/7 non-stop. Degradation of hardware is a realistic concern and regular replacements will be required to ensure the servers are operating at optimal levels and no data is corrupted or lost.

There is also concern that Taylor will out scale its current needs because of the growing amount of industrial manufacturing in the District. An onsite server solution will require upgrades overtime to match this growth. Our company's estimation of this required upgrade cycle is every 4 to 5 years. Because of this, we estimate that the District of Taylor would have to reinvest the \$300,000 an additional two times before the end of 2029.

Cloud Solution Costs after 10 years:	On-Site Solution Costs after 10 years:
\$1,162,000	\$1,390,000
District of Taylor Savings With a Cloud Solution: \$227,200	

Over the course of 10 years, our expectations are that the District will save \$227,200 with our IT Package and Amazon's platform.

6.3.3 Long-Term Maintenance and Scalability

Because of the scalability of cloud services, our company's proposed cloud solution will be a long-term investment. On-site physical solutions have to be replaced entirely over time because of deterioration or out-scaling needs, cloud solutions will not require this.

Amazon will also deal with the maintenance, repairs and upkeep of the servers long-term. Additionally, increased storage-needs can be simply addressed by contacting Amazon and increasing the monthly plan to a larger one for only several more dollars a month.

It's also important to note that replacing an on-site solution would require several weeks to ensure the replacement would be compatible with the District. The time and work required for these regular replacements would be similar in scope to this proposed project. Contacting Amazon to upgrade our proposed cloud solution would require zero down-time. Leading to the Districts and its industries from having to deal with any possible loss revenue because of downtime.

7. Conclusion

By migrating existing government data and services to an Amazon cloud server, our company aims to update the aging technology and reduce the cost of maintaining the technological infrastructure of the District of Taylor. Consequently, this will dramatically improve the speed of service that government staff will be able to provide to its citizens, as we believe that it is important to respond to requests in a reasonable timeframe. We also aim to provide exceptional help desk support, regularly scheduled computer and network maintenance, and excellent system security as indicated in the original request for proposal. The migration of services and data to the cloud is estimated to take nine weeks to complete. Please contact us at your earliest convenience to set up a consultation so our company can get started analyzing the finer details of your infrastructure and adjust the schedule if necessary.

Together with Amazon Web Services, we look forward to providing the District of Taylor with a secure, scalable, and reliable hardware/software infrastructure at an industry standard level.

8. Recommendations

We recommend that district employees start to back up essential data prior to our initial analysis as this will enable our company to quickly start the process of migrating data and services. This will also ensure we retain important data in the *extremely* unlikely event of an unexpected migration error. Please take these steps so we are able to start phase one of our implementation immediately.

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