



ENGINEER **3D!** TRAINING+TECHNOLOGY CONFERENCE

OCTOBER 2-3
MILWAUKEE, WI



PDM in the Cloud

Considerations, Configurations, and Costs

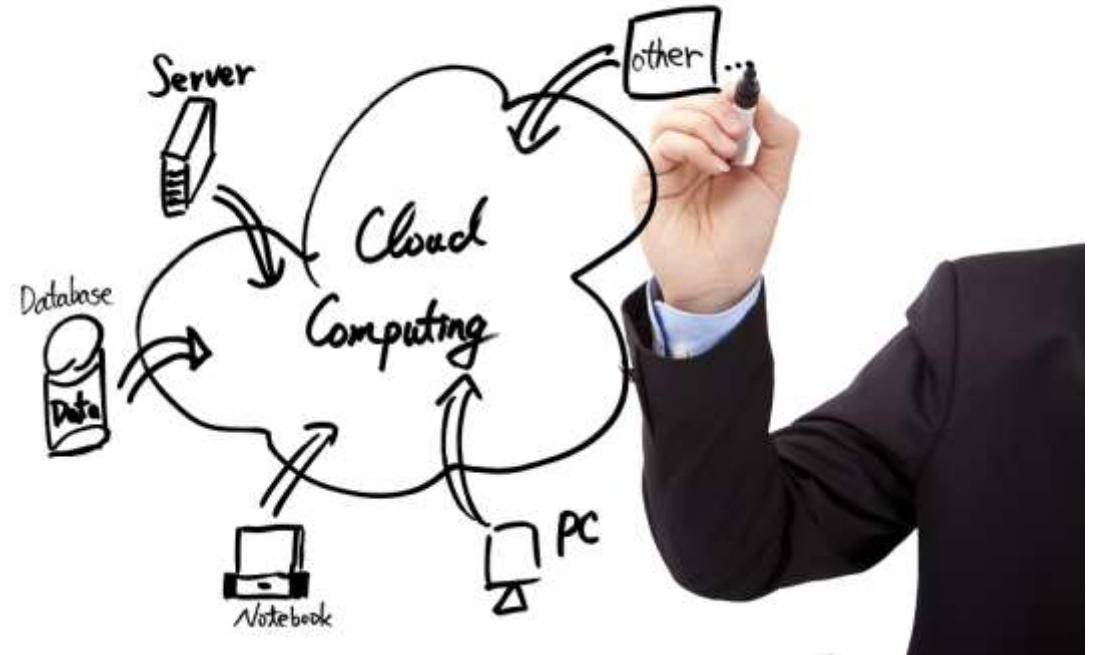
Andrew Kress, Applications Engineer, GSC

Joe Krupski, PDM Applications Engineer, GSC

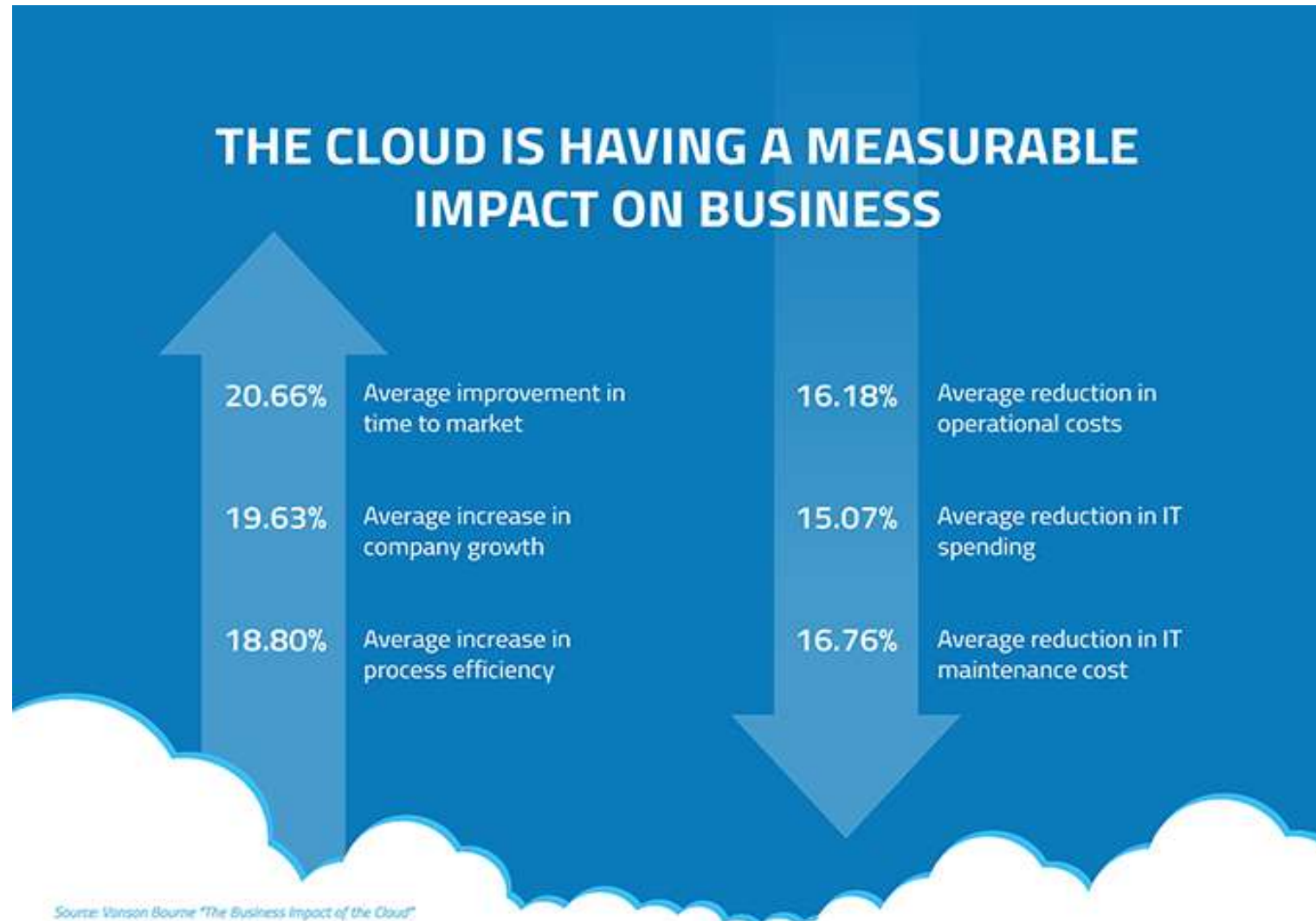


Presentation Overview

- Background Information
- Cloud Considerations
- How to (Walk-thru) and demo
- Performance
- Costs

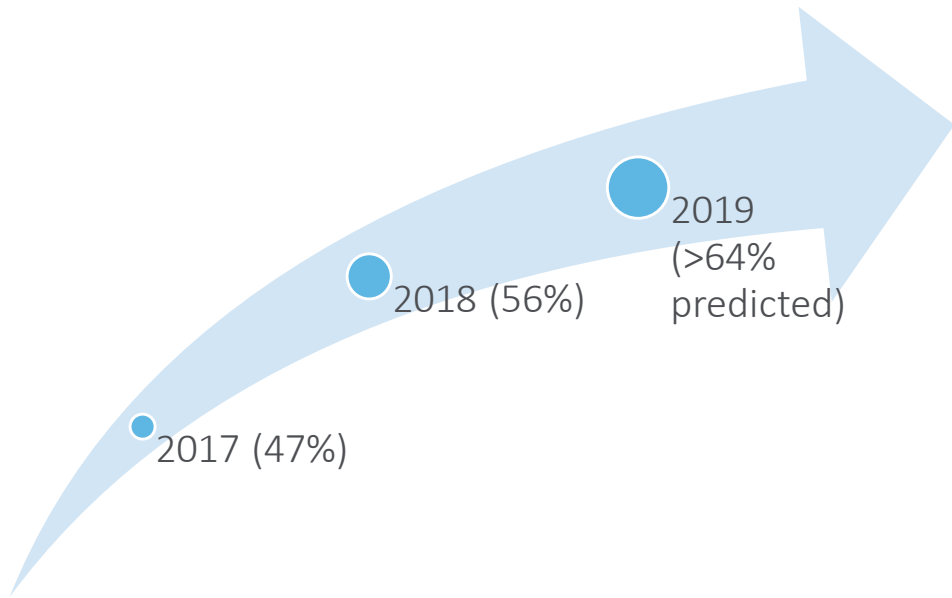


Business Impact of Cloud Computing



Business Impact of Cloud Computing

Company Data Stored in the Cloud



Source:  VansonBourne



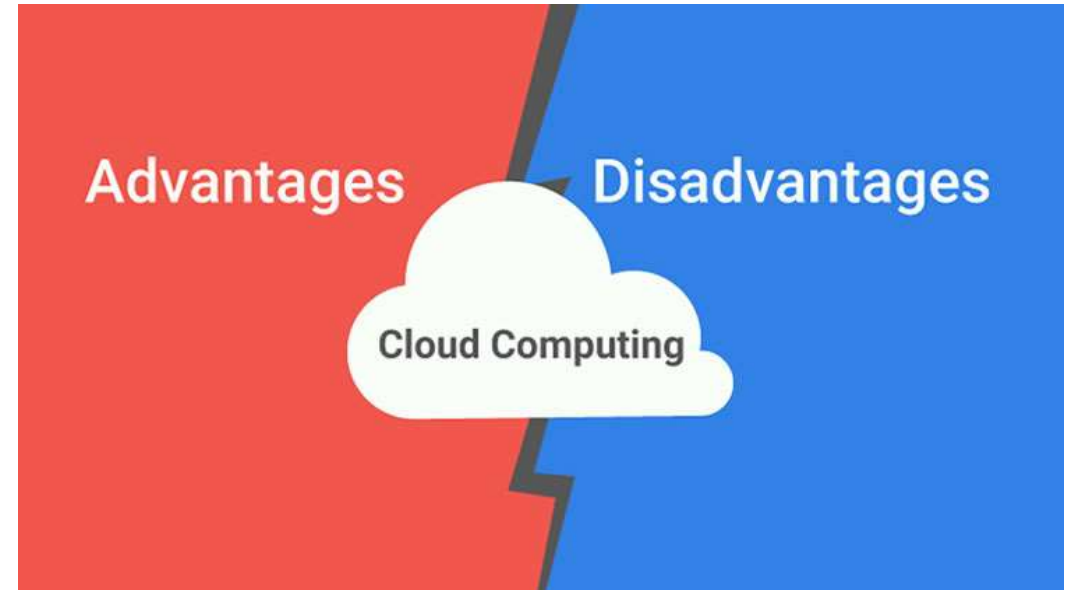
Cloud Computing

Advantages

- Rapid Implementation and Scalability
- Reliability (Uptime)
- Reduced Upfront and Overall IT Costs
- Remote PDM Administration
- Workforce Flexibility
- Internet Based (less dependent on LAN)

Disadvantages

- Potential License Server Reboot Issue
- More Complex Network Structure vs. LAN-based (especially Hybrid)
- Internet Based (more reliant on connection)



Basic Cloud Hosting Configurations

Private: On-Premise Cloud
(In-House, Self-Hosted)

Private: Managed Cloud
(Dedicated Hosting, Off-site)

Public Cloud
(Shared Resources, Large Data Centers,
Worldwide Accessibility)



Basic Cloud Hosting Configurations



The SOLIDWORKS EULA (3rd Party Hosting key take-aways)

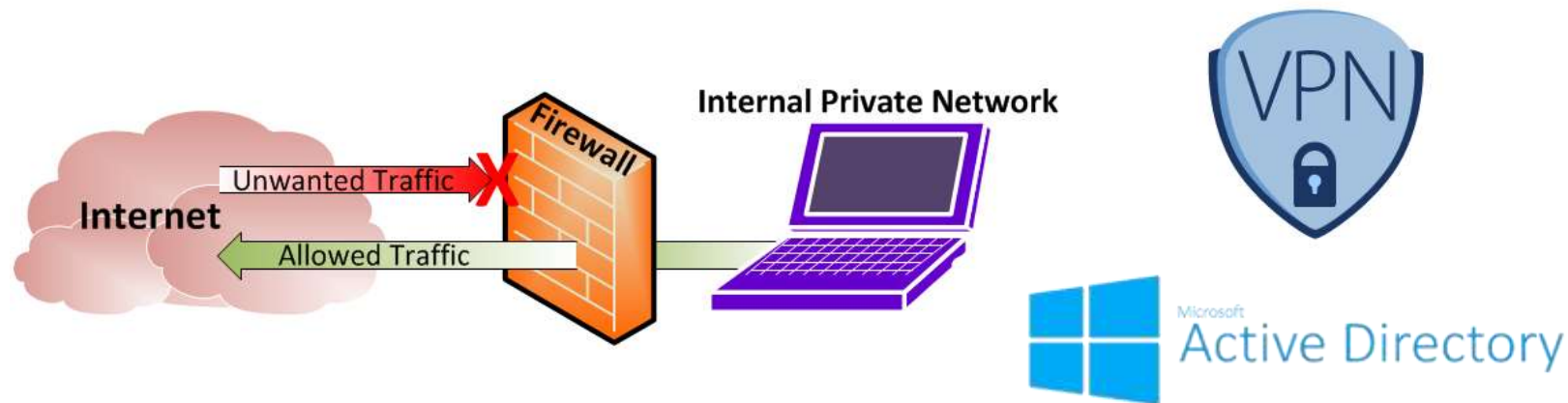
12. **Third-Party Hosting.** You are authorized to install and use one or more SNL versions of the Offering remotely on computers operated by a well-established, reputable third-party service provider, and to appoint such service provider to operate the hardware and manage the Offering solely for you and on your behalf; provided, however, (i) such authorization applies to SNL versions of the Offering only, (ii) only duly authorized users shall have the right to use the Offering, (iii) you shall enter into a written agreement with such service provider under which the service provider agrees that its access to the Offering is solely for the purpose of providing the services mentioned above to you and is otherwise subject to all of the restrictions and limitations contained in this Agreement, and (iv) such service provider is not a competitor of DS or any Affiliate. You acknowledge and agree that the service provider shall be deemed your agent. If you become aware of any actual or suspected unauthorized access, use or disclosure of the Offering, you shall immediately terminate the service provider's access to the Offering. You shall defend and indemnify DS against any claim, expense, judgment, damage or loss (including reasonable attorneys' fees) that arises out of or in any way relates to any such service provider's access to or use of the Offering.

The SQL Server Standard licenses provided with SOLIDWORKS PDM Professional and SOLIDWORKS Manage cannot be moved to a public cloud service, i.e., a computing service offered by a third-party provider over the Internet. Other special restrictions apply with respect to the deployment of SOLIDWORKS PDM Professional and SOLIDWORKS Manage on third-party servers.

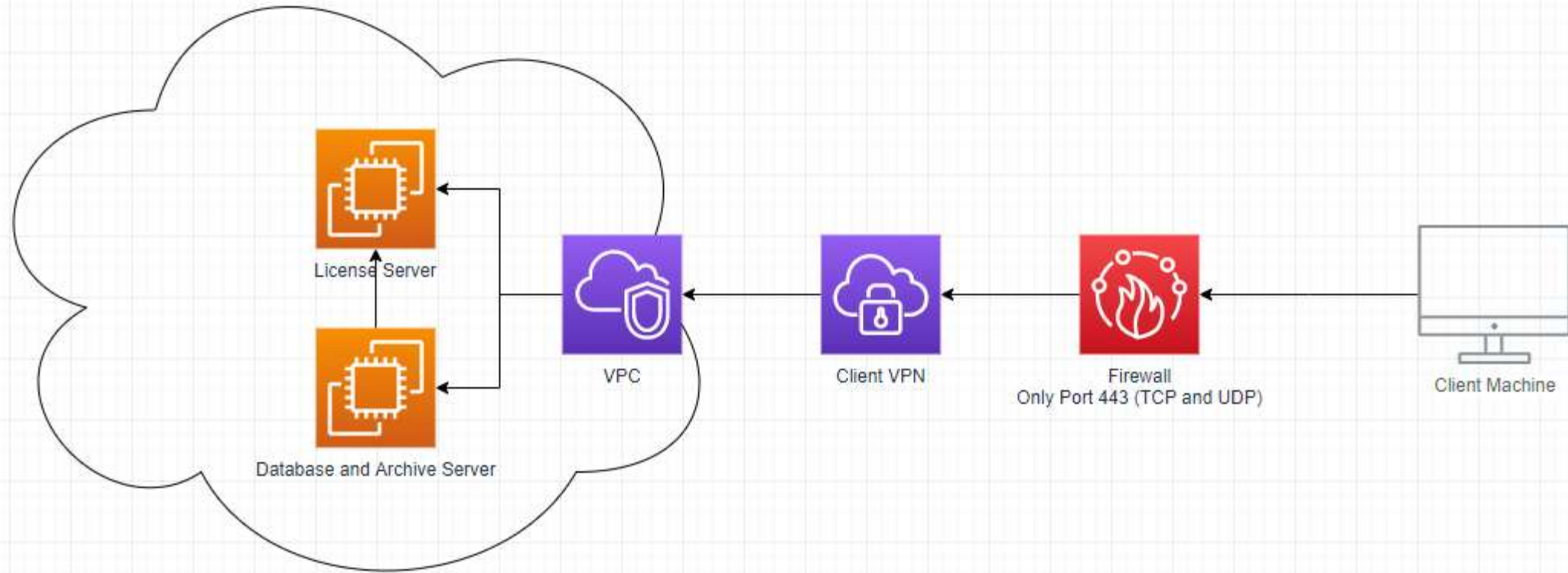
1. Reputable Service Provider
2. Must Provide Security to allow only Authorized Users
3. SQL Server Licensing (on PDM Professional)

Security Considerations

- Firewall whitelist (AWS Security Groups)
- Proper VPN setup
- Active Directory or PDM Users
- AWS Storage Encryption Options



Setting up Cloud-based PDM





Setting up Cloud-based PDM (walk-through)

1. Set up/log in to your *AWS Account*
2. **Create Server Virtual Machine(s) and Storage**
3. Create Network Infrastructure
4. Test System

Setting up Cloud-based PDM (Instances and Volumes)

Instances

<input type="checkbox"/>	Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status
<input type="checkbox"/>	cloud pdm - presentation	i-0517c5f3e5b1d5431	t3.xlarge	us-east-2a	● running	✓ 2/2 checks passed	None 
<input type="checkbox"/>	license	i-07906b100ed11d317	t2.micro	us-east-2a	● running	✓ 2/2 checks passed	None 

Volumes

<input type="checkbox"/>	Name	Volume ID	Size	Volume Type	IOPS	Snapshot	Created	Availability Zone	State
<input checked="" type="checkbox"/>	archive-os	vol-009a379d8c8923267	30 GiB	gp2	100	snap-04436e12b8ca9ede7	September 26, 2019 at 4:02:09 PM UTC-5	us-east-2a	● in-use
<input type="checkbox"/>	secondary-data	vol-02fd3ed52b098eb7d	50 GiB	gp2	150		July 18, 2019 at 11:05:13 AM UTC-5	us-east-2a	● in-use
<input type="checkbox"/>	license-os	vol-0ad7492ed53a8a2c9	30 GiB	gp2	100	snap-00c1005e0dbe8f04b	July 18, 2019 at 11:58:58 AM UTC-5	us-east-2a	● in-use

Setting up Cloud-based PDM (walk-through)

1. Set up/log in to your *AWS Account*
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
4. Test System

Setup Security Groups

1. Set up/log in to your AWS Account
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
 - A. Setup Security Groups**
 - B. Setup Certificate Authority
 - C. Setup Certificates
 - D. Setup VPN Endpoint
 - E. Setup VPC Subnet
 - F. Configure VPN Endpoint
 - G. Setup Client VPN Software
4. Test System



Setting up Cloud-based PDM (Security Groups)

Security Groups - Inbound

Name	Group ID	Group Name	VPC ID	Owner	Description
<input type="checkbox"/>	sg-16730776	default	vpc-dd4fafb6	161584404022	default VPC security group

Security Group: sg-16730776

Description Inbound Outbound Tags

Edit

Type	Protocol	Port Range	Source	Description
All traffic	All	All	sg-16730776 (default)	
Custom UDP Rule	UDP	443	40.129.32.221/32	New GSC IP - UDP V...
HTTPS	TCP	443	40.129.32.221/32	New GSC IP - TCP V...

Setting up Cloud-based PDM (Security Groups)

Security Groups - Outbound

Filter by tags and attributes or search by keyword

Name	Group ID	Group Name	VPC ID	Owner	Description
<input type="checkbox"/>	sg-16730776	default	vpc-dd4fafb6	161584404022	default VPC security group

Security Group: sg-16730776

Description Inbound **Outbound** Tags

Edit

Type	Protocol	Port Range	Destination	Description
All traffic	All	All	0.0.0.0/0	

Setup Certificate Authority

1. Set up/log in to your AWS Account
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
 - A. Setup Security Groups
 - B. Setup Certificate Authority**
 - C. Setup Certificates
 - D. Setup VPN Endpoint
 - E. Setup VPC Subnet
 - F. Configure VPN Endpoint
 - G. Setup Client VPN Software
4. Test System



Setting up Cloud-based PDM (Certificate Authority)

Configure certificate revocation ?

You can revoke a certificate to tell clients that they should no longer trust it. You can use certificate revocation lists (CRLs) to communicate revocation status.

Certificate revocation list (CRL) ?

Enable CRL distribution

ACM sends certificate revocation lists (CRLs) to your Amazon S3 bucket.

Create a new S3 bucket Yes

No

S3 bucket name

Select a bucket...

▸ Advanced ?

Use advanced options to provide custom DNS alias names for CRL distribution points and set the frequency for updating revocation status.

Cancel

Previous

Next

*At least one subject name is required

Setting up Cloud-based PDM (Certificate Authority)

Private CAs

Create CA

Actions ▾

CA common name	Organization	OU	Type	Status
<input checked="" type="radio"/> GSC Germantown CA	GSC	PDM	Root	Active

Status

CA certificate

Revocation configuration

Tags

Permissions

Status **Active**
Detailed status Able to issue private certificates.

Details

Type Root
ARN [arn:aws:acm:pca:us-east-2:161584404022:certificate-authority/27924011-330c-4d61-bca1-6151809fbe4d](https://console.aws.amazon.com/acm/details?arn:aws:acm:pca:us-east-2:161584404022:certificate-authority/27924011-330c-4d61-bca1-6151809fbe4d)
Key algorithm RSA 2048
Created at 2019-09-24 20:06:36UTC
Expiration Date 2029-09-24 20:06:56UTC
Organization GSC
OU PDM
State Wisconsin
Locality Germantown
CA common name GSC Germantown CA

Setup Certificate(s)

1. Set up/log in to your AWS Account
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
 - A. Setup Security Groups
 - B. Setup Certificate Authority
 - C. Setup Certificates**
 - D. Setup VPN Endpoint
 - E. Setup VPC Subnet
 - F. Configure VPN Endpoint
 - G. Setup Client VPN Software
4. Test System



Setting up Cloud-based PDM (Create Certificates)

Certificates ?

AWS Certificate Manager logs domain names from your certificates into public certificate transparency (CT) logs when renewing certificates. You can opt out of CT logging. [Learn more](#)

Request a certificate

Import a certificate

Actions ▾



« < Viewing certificates 1 to 2 > »

<input type="checkbox"/>	Name ▾	Domain name ▾	Additional names	Status ▾	Type ▾	In use? ▾	Renewal eligibility ▾
<input type="checkbox"/>	▶	client.gsc-3d.com		Issued	Private	Yes	Eligible
<input type="checkbox"/>	▶	cloud.gsc-3d.com		Issued	Private	Yes	Eligible

« < Viewing certificates 1 to 2 > »

Setup VPN Endpoint

1. Set up/log in to your AWS Account
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
 - A. Setup Security Groups
 - B. Setup Certificate Authority
 - C. Setup Certificates
 - D. Setup VPN Endpoint**
 - E. Setup VPC Subnet
 - F. Configure VPN Endpoint
 - G. Setup Client VPN Software
4. Test System



Setting up Cloud-based PDM (Create VPN Endpoint)

Create Client VPN Endpoint

Create a new Client VPN endpoint to enable clients to access networks over a TLS VPN session

Name Tag ⓘ

Description ⓘ

Other optional parameters

DNS Server 1 IP address ⓘ

DNS Server 2 IP address ⓘ

Transport Protocol TCP ⓘ
 UDP

Enable split-tunnel ⓘ

* Required

Cancel

Create Client VPN Endpoint

Connection Logging

Do you want to log the details on client connections?*

Yes ⓘ
 No

Other optional parameters

DNS Server 1 IP address ⓘ

DNS Server 2 IP address ⓘ

Setup VPC Subnet

1. Set up/log in to your AWS Account
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
 - A. Setup Security Groups
 - B. Setup Certificate Authority
 - C. Setup Certificates
 - D. Setup VPN Endpoint
 - E. Setup VPC Subnet**
 - F. Configure VPN Endpoint
 - G. Setup Client VPN Software
4. Test System



Setting up Cloud-based PDM (Create Client VPN)

Create subnet

Specify your subnet's IP address block in CIDR format; for example, 10.0.0.0/24. IPv4 block sizes must be between a /16 netmask and /28 netmask, and can be the same size as your VPC. An IPv6 CIDR block must be a /64 CIDR block.

↻ ⚙️ ?

Filter by tags and attributes or search by keyword |< < 1 to 4 of 4 > >|

<input type="checkbox"/>	Name	Subnet ID	State	VPC	IPv4 CIDR	Available IPv4	IPv6 CIDR	Availability Zone	Availability Zone ID	Route table
<input checked="" type="checkbox"/>	vpn subnet	subnet-0c7574c93e567a87c	available	vpc-dd4fafb6	172.31.100.0/22	1019	-	us-east-2a	use2-az1	rtb-73b51d18
<input type="checkbox"/>		subnet-2072db6c	available	vpc-dd4fafb6	172.31.32.0/20	4091	-	us-east-2c	use2-az3	rtb-73b51d18
<input type="checkbox"/>		subnet-3e5a5156	available	vpc-dd4fafb6	172.31.0.0/20	4083	-	us-east-2a	use2-az1	rtb-73b51d18
<input type="checkbox"/>		subnet-4048093a	available	vpc-dd4fafb6	172.31.16.0/20	4091	-	us-east-2b	use2-az2	rtb-73b51d18

* Required

Configure VPN Endpoint

1. Set up/log in to your AWS Account
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
 - A. Setup Security Groups
 - B. Setup Certificate Authority
 - C. Setup Certificates
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 - E. Setup VPC Subnet
 - F. Configure VPN Endpoint**
 - G. Setup Client VPN Software
4. Test System



Setting up Cloud-based PDM (Create Client VPN)

Client VPN Endpoint: cvpn-endpoint-0eb775e08a3cb4856

Summary Associations **Security Groups** Authorization Route Table Connections Tags

Apply Security Groups

Filter by attributes or search by keyword 1 to 1 of 1

<input type="checkbox"/>	VPC	Endpoint ID	Association ID	Security Groups
<input type="checkbox"/>	vpc-dd4fab6	cvpn-endpoint-0eb775e08a3cb4856	cvpn-assoc-027806ecd107d817e	sg-16730776



Setup Client VPN Software (OpenVPN)

1. Set up/log in to your AWS Account
2. Create Server Virtual Machine(s) and Storage
- 3. Create Network Infrastructure**
 - A. Setup Security Groups
 - B. Setup Certificate Authority
 - C. Setup Certificates
 - D. Setup VPN Endpoint
 - E. Setup VPC Subnet
 - F. Configure VPN Endpoint
 - G. Setup Client VPN Software**
4. Test System



Setting up Cloud-based PDM (Certificate Manager)

Export certificate

Exporting a certificate, certificate chain, and private key

CA: an

Domain name: cli

Additional names: -

Status: Iss

Identifier: e8

Serial number: de

In use?: Ye

Enter a passphrase for encrypting the private key:
**This passphrase will be required for decryption.

Enter a passphrase: [input]

Confirm passphrase: [input]

Copy the PEM-encoded certificate, certificate chain, and private key or download each to a separate file.

Certificate body

```
-----BEGIN CERTIFICATE-----
MIIBCCiAwpqRMA4GPHqEwBwYIICIAAwIBAgIQAk0w...
-----END CERTIFICATE-----
```

Export certificate body to a file

Certificate chain

```
-----BEGIN CERTIFICATE-----
MIIBCCiAwpqRMA4GPHqEwBwYIICIAAwIBAgIQAk0w...
-----END CERTIFICATE-----
```

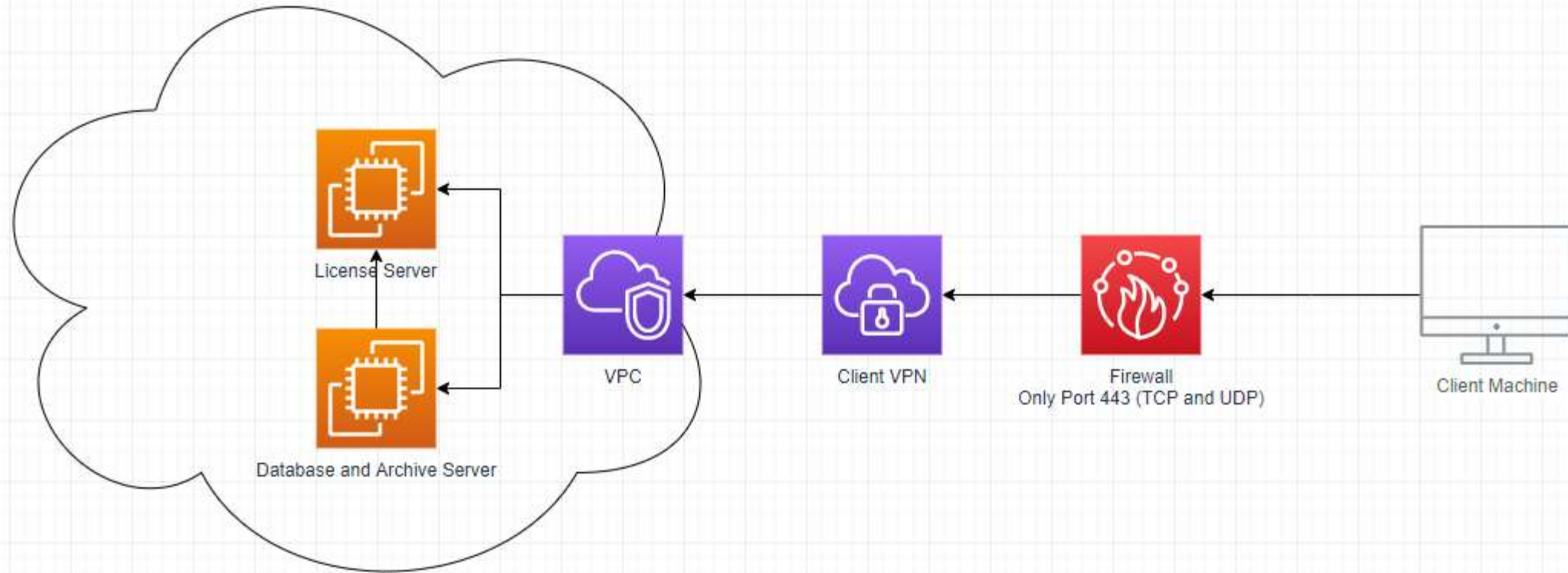
Export certificate chain to a file

Certificate private key

```
-----BEGIN ENCRYPTED PRIVATE KEY-----
MIIBCCiAwpqRMA4GPHqEwBwYIICIAAwIBAgIQAk0w...
-----END ENCRYPTED PRIVATE KEY-----
```

Export certificate private key to a file

Setting up Cloud-based PDM (Completed Setup)



Performance

- Compute Resources (Server CPU, Memory, and Storage) can be Rapidly changed to accommodate load changes
- Depends primarily on your Internet connection speed, local Internet traffic, and local network set up

Costs/Considerations

- AWS Charges by hour – Monthly prices based on 720 hour month
- EC2 Compute Resources
 - License server (t2.micro) – \$11.66 (\$0.0162/hour)
 - Combined archive/SQL Server (t3.xlarge) – \$172.80 (\$0.24/hour)
- EBS Storage Resources (\$0.10/GB/month)
 - License server 30 GB OS drive – \$3.00
 - Combined archive/SQL Server 30 GB OS drive + 50 GB data drive – \$8.00
- Certificate Costs (1 time, can be done outside of AWS)
 - Private Certificate Authority \$400 – first 30 days free, can shutdown after certificates are generated
 - \$0.75 per private certificate generated

Costs/Considerations

- Traffic Costs
 - Inbound traffic is free
 - Outbound traffic is \$0.10/GB
- VPN Costs
 - Client VPN Connections (\$0.10/hour + \$0.05/hour/connection) – \$72+
 - Site-to-Site VPN Connections (\$0.05/hour) – \$36
 - Direct Connect (1GB dedicated \$0.30/hour + \$0.02/GB outbound data) – \$216
- Backup Costs
 - Drive snapshots can be saved to AWS S3 (99.9999999999% durable) \$0.023/GB

Costs/Considerations

- Total Cost Estimate – 100 GB vault, 10 users, 10 GB traffic each
 - \$11.62 License server
 - \$172.80 Database and Archive server
 - \$16.00 Disk storage
 - \$36.00 VPN access
 - \$10.00 Traffic
 - \$23.00 Backups
 - **\$270.00 Total per Month**
- Ways to reduce price
 - Don't run servers 24/7
 - Use reserved instances 1yr (-40%), 3yr (-60%)

Live Demo of Cloud-based PDM (time permitting)



Thank you for Attending!

Please remember to fill out your survey form



Questions?