

Automated NetApp FSx ONTAP Setup with Ansible.

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This document guides you through the process of automating the creation of an FSx for NetApp ONTAP file system in AWS using Ansible. I'll cover everything from installing Ansible to creating the SVM and volume. This project was undertaken as a self-initiated effort to deepen my understanding of NetApp's cloud storage solutions and to demonstrate my enthusiasm for the company's innovation in automation and DevOps.

1. Prerequisites

Before we begin, ensure to have the following:

- **AWS Account:** An active AWS account with appropriate permissions to create FSx file systems, VPCs, subnets, and security groups.
- **AWS Credentials:** Configure your AWS credentials either through environment variables (`AWS_ACCESS_KEY_ID`, `AWS_SECRET_ACCESS_KEY`) or an AWS credentials file (`~/.aws/credentials`). The AWS CLI should be configured and working.
- **Python and pip:** Python and its package manager, pip, are required for Ansible.
- **Ansible:** Ansible will be used to automate the FSx creation.

2. Installing Ansible

If you don't have Ansible installed, follow these steps:

```
# For Debian/Ubuntu systems:
```

```
sudo apt update  
sudo apt install ansible
```

```
# For macOS (using Homebrew):
```

```
brew install ansible
```

```
# For other distributions, refer to the Ansible documentation:
```

```
# https://docs.ansible.com/ansible/latest/installation\_guide/intro\_installation.html
```

Verify the installation:

```
ansible --version
```

3. Installing the AWS Collection for Ansible

Ansible interacts with AWS services through collections. Install the `amazon.aws` collection:

```
ansible-galaxy collection install amazon.aws
```

4. Creating the Ansible Playbook

Create a file named `createfsx.yaml` (or any name you prefer with a `.yaml` extension) and paste the following code into it:

```
---
```

```
- name: Create FSx for NetApp ONTAP with AWS CLI

  hosts: localhost

  gather_facts: yes

  tasks:

    - name: Get Default VPC

      amazon.aws.ec2_vpc_net_info:

        filters:

          is-default: true

      register: default_vpc


    - name: Get Default Subnet

      amazon.aws.ec2_vpc_subnet_info:

        filters:

          vpc-id: "{{ default_vpc.vpcs[0].vpc_id }}"

      register: default_subnet


    - name: Create or Get Security Group
```

```
amazon.aws.ec2_security_group:

  name: "fsx-sg-ansible"

  description: "FSx Security Group"

  vpc_id: "{{ default_vpc.vpcs[0].vpc_id }}"

  rules:

    - proto: tcp

      from_port: 2049

      to_port: 2049

      group_id: "sg-0dc01264c3568dd53"

    - proto: tcp

      from_port: 445

      to_port: 445

      group_id: "sg-0dc01264c3568dd53"

    - proto: tcp

      from_port: 111

      to_port: 111

      group_id: "sg-0dc01264c3568dd53"

  rules_egress:

    - proto: "-1"

      cidr_ip: "0.0.0.0/0"

  state: present

register: fsx_sg
```

```

- name: Create FSx for NetApp ONTAP Using AWS CLI

  ansible.builtin.command: >-

    aws fsx create-file-system

    --region us-east-1

    --file-system-type ONTAP

    --storage-capacity 1024

    --subnet-ids {{ default_subnet.subnets[0].subnet_id }}

    --security-group-ids {{ fsx_sg.group_id }}

    --storage-type SSD

    --tags Key=Name,Value=fsx-ansible

    --ontap-configuration '{
      "DeploymentType": "SINGLE_AZ_1",
      "ThroughputCapacity": 512,
      "AutomaticBackupRetentionDays": 7,
      "DailyAutomaticBackupStartTime": "02:00",
      "DiskIopsConfiguration": {
        "Mode": "AUTOMATIC"
      }
    }'

    register: fsx_creation_result


- name: Extract FSx FileSystem ID

  set_fact:

    fsx_id: "{{ fsx_creation_result.stdout | regex_search('\"FileSystemId\": \"(fs-[a-z0-9]+)\"', '\1') | first }}"


- name: Wait for FSx to become available

  ansible.builtin.command: >

    aws fsx describe-file-systems --file-system-ids {{ fsx_id }}
--query 'FileSystems[0].Lifecycle'

```

```
register: fsx_status

until: fsx_status.stdout.find("AVAILABLE") != -1

retries: 20

delay: 60

-
- name: Create Storage Virtual Machine (SVM)

  ansible.builtin.command: >

    aws fsx create-storage-virtual-machine

    --region us-east-1

    --file-system-id {{ fsx_id }}

    --name svm_default

    --root-volume-security-style UNIX

  register: svm_creation

-
- name: Extract SVM ID

  set_fact:

    svm_id: "{{ svm_creation.stdout | regex_search('\"StorageVirtualMachineId\": \"(svm-[a-z0-9]+)\"', '\1') | first }}"

-
- name: Create Volume with Storage Efficiency and SnapLock (Fixed)

  ansible.builtin.command: >-

    aws fsx create-volume

    --region us-east-1
```

```
--name vol1

--volume-type ONTAP

--ontap-configuration '{"StorageVirtualMachineId": "{{ svm_id }}", "JunctionPath": "/vol1", "SizeInMegabytes": 500, "SnapshotPolicy": "default", "StorageEfficiencyEnabled": true, "OntapVolumeType": "RW"}'

register: fsx_volume
```

5. Running the Playbook

Navigate to the directory where you saved **createfsx.yaml** and run the playbook:

```
ansible-playbook createfsx.yaml
```

7. Verification

After the playbook completes successfully, you can verify the FSx file system creation in the AWS Management Console under the FSx service. You should see your file system, SVM, and volume listed.

FSx File systems

Amazon FSx		File systems (1)								
		<input type="text"/> Filter file systems Create file system 								
		File system name	File system ID	File system type	Status	Deployment type	Storage class	Storage capacity	Throughput capacity	Creation time
File systems		fs-0b9b3e35b498d15ab	0b9b3e35b498d15ab	ONTAP	Available	Single-AZ 1	SSD	1,024 GiB	512 MB/s	2025-01-31T18:04:59+05:00

SVM

Amazon FSx

svm_default (svm-00010eed7a519b345)

Summary

SVM ID svm-00010eed7a519b345	Creation time 2025-01-31T18:07:36+05:00	Active Directory
SVM name svm_default	Lifecycle state Created	-
UUID 66366fc1-dfd4-11ef-915e-1b8bd7ecf31c	Subtype DEFAULT	-
File system ID fs-0b9b3e35b498d15ab	-	-
Resource ARN arn:aws:fsx:us-east-1:841162702657:storage-virtual-machine/fs-0b9b3e35b498d15ab/svm-00010eed7a519b345	-	-

Endpoints | Administration | **Volumes** | Tags

Volumes (2)

Volume name	Volume ID	Status	ONTAP volume type	Size	Path	Creation time	Tiering policy
svm_default_root	fsvol-02405b98ad6766bf1	Created	RW	1.00 GiB	/	2025-01-31 18:08:01 UTC +05:00	NONE
vol1	fsvol-0792f35619ad804c	Created	RW	500.00 MiB	/vol1	2025-01-31 18:07:38 UTC +05:00	SNAPSHOT_ONLY

Volumes

Amazon FSx

Volumes (2)

Volume name	Volume ID	File system ID	SVM ID	Status	Volume type	Quota/Size	Reservation	Path	Creation time	Tiering policy
svm_default_root	fsvol-02405b98ad6766bf1	fs-0b9b3e35b498d15ab	svm-00010eed7a519b345	Created	ONTAP	1.00 GiB	-	/	2025-01-31 18:08:01 UTC +05:00	NONE
vol1	fsvol-0792f35619ad804c	fs-0b9b3e35b498d15ab	svm-00010eed7a519b345	Created	ONTAP	500.00 MiB	-	/vol1	2025-01-31 18:07:38 UTC +05:00	SNAPSHOT_ONLY

Backup

Amazon FSx

fs-0b9b3e35b498d15ab

Summary

File system ID fs-0b9b3e35b498d15ab	SSD storage capacity 1024 GiB	Update	Lustre version
Lifecycle state Available	Throughput capacity 512 MB/s	Update	Availability Zones us-east-1f
File system type ONTAP	Provisioned IOPS 5072	Update	Creation time 2025-01-31T18:04:59+05:00
Deployment type Single-AZ 1	Number of HA pairs 1	-	-

Network & security | Monitoring & performance | Administration | Storage virtual machines | Volumes | **Backups** | Updates | Tags

Settings

Daily automatic backup window
02:00 UTC

Automatic backup retention period
7 day(s)

Backups

Click here to see your volumes for this file system. You can find backups for each volume under the Backups tab in volume details.

Ec2 security group for mounting the vol1 volume

The screenshot shows the 'Edit inbound rules' section of the AWS EC2 Security Groups interface. A single rule is listed:

Security group rule ID	Type	Protocol	Port range	Source	Description - optional
sg-01d857ee52f112bf4	SSH	TCP	22	Custom	0.0.0.0/0

A warning message at the bottom states: "⚠ Rules with source of 0.0.0.0/0 or ::/0 allow all IP addresses to access your instance. We recommend setting security group rules to allow access from known IP addresses only." There are 'Cancel', 'Preview changes', and 'Save rules' buttons at the bottom.

Access volume vol1

From Linux instances

Prerequisites

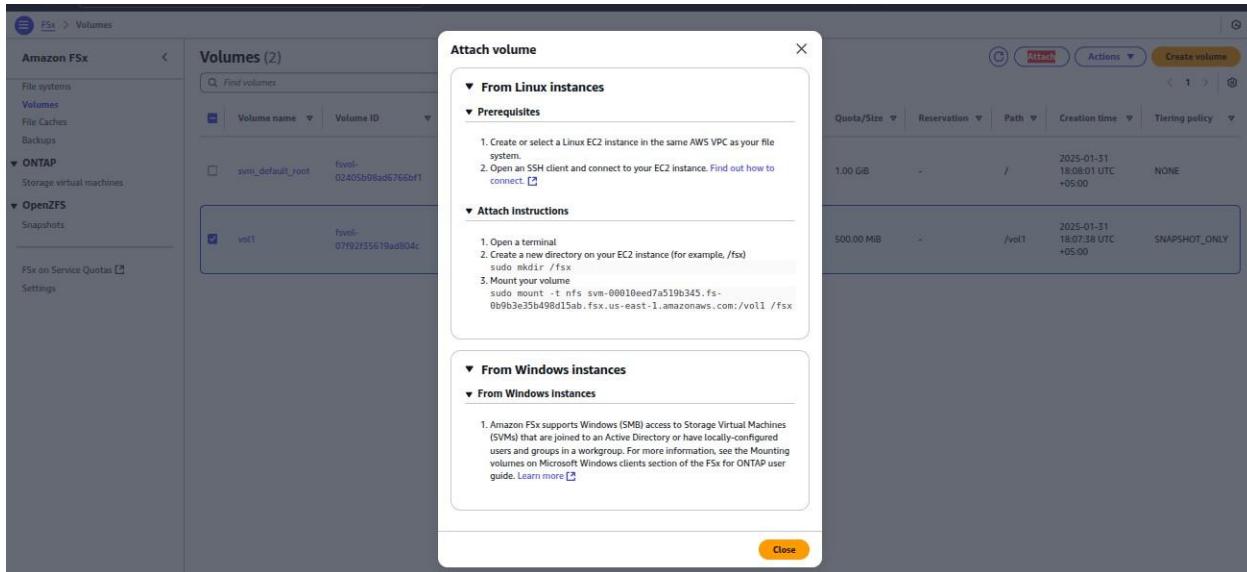
1. Create or Select a Linux EC2 instance in the same AWS VPC as the file system.
2. Open an SSH client and connect to the EC2 instance.

Note: Run the following command

sudo apt update && sudo apt install -y nfs-common

Attach instructions

1. Open a terminal
2. Create a new directory on your EC2 instance (for example, /fsx)
3. `sudo mkdir /fsx`
4. Mount your volume
5. `sudo mount -t nfs`
`svm-00010eed7a519b345.fs-0b9b3e35b498d15ab.fsx.us-east-1.amazonaws.com:/vol1 /fsx`



```
Welcome to Ubuntu 24.04.1 LTS (GNU/Linux 6.8.0-1021-aws x86_64)

 * Documentation: https://help.ubuntu.com
 * Management: https://landscape.canonical.com
 * Support: https://ubuntu.com/pro

System information as of Thu Jan 30 17:27:57 UTC 2025

System load: 0.01      Processes:          107
Usage of /: 12.4% of 13.49GB   Users logged in:    0
Memory usage: 21%        IPV4 address for enX0: 172.31.92.46
Swap usage: 0%         

Expanded Security Maintenance for Applications is not enabled.

73 updates can be applied immediately.
10 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Thu Jan 30 17:27:58 2025 from 18.206.107.28
ubuntu@ip-172-31-92-46:~$ cd /
ubuntu@ip-172-31-92-46:/$ ls
bin  bin usr-is-merged  boot  dev  etc  fsx  home  lib  lib usr-is-merged  lib64  lost+found  media  mnt  opt  proc  root  run  sbin  sbin usr-is-merged  snap  srv  sys  tmp  usr  var
ubuntu@ip-172-31-92-46:/$ cd fsx/
ubuntu@ip-172-31-92-46:/$
```

Ansible_admin_vm

We create test2 file in Ansible_admin_vm ec2 ubuntu vm

```

system information as of Thu Jan 30 17:09:13 UTC 2025
System load: 0.0          Processes:      106
Usage of /: 25.4% of 13.49GB  Users logged in:     0
Memory usage: 21%          IPv4 address for enx0: 172.31.87.153
Swap usage:  0%

Expanded Security Maintenance for Applications is not enabled.

67 updates can be applied immediately.
13 of these updates are standard security updates.
To see these additional updates run: apt list --upgradable

Enable ESM Apps to receive additional future security updates.
See https://ubuntu.com/esm or run: sudo pro status

Last login: Thu Jan 30 17:09:14 2025 from 18.286.187.27
ubuntu@ip-172-31-87-153:~$ sudo su
root@ip-172-31-87-153:/home/ubuntu# sudo mount -t nfs svm-00010eed7a519b345.fs-0b9b3e35b498d15ab.fsx.us-east-1.amazonaws.com:/vol1 /fsx
root@ip-172-31-87-153:/home/ubuntu# ls
ansible aws ansiblelive.zip
root@ip-172-31-87-153:/home/ubuntu# cd /fsx#
root@ip-172-31-87-153:/fsx# ls
test
root@ip-172-31-87-153:/fsx# nano test2
root@ip-172-31-87-153:/fsx# |||
```

100% [====] 200h Ansible_admin_vm

Ansible_admin_vm_2

We can see the test file in ec2

```

ubuntu@ip-172-31-92-46:~$ cd /
ubuntu@ip-172-31-92-46:/$ ls
bin bin usr-is-merged boot dev etc fsx home lib lib usr-is-merged lib64 lost+found media mnt opt proc root run sbin sbin usr-is-merged snap srv sys usr var
ubuntu@ip-172-31-92-46:/$ cd fsx/
ubuntu@ip-172-31-92-46:/fsx$ ls
ubuntu@ip-172-31-92-46:/fsx$ sudo mount -t nfs svm-00010eed7a519b345.fs-0b9b3e35b498d15ab.fsx.us-east-1.amazonaws.com:/vol1 /fsx
ubuntu@ip-172-31-92-46:/fsx$ ls
ubuntu@ip-172-31-92-46:/fsx$ test
ubuntu@ip-172-31-92-46:/fsx$ ls
ubuntu@ip-172-31-92-46:/fsx$ vi test
ubuntu@ip-172-31-92-46:/fsx$ vi test
ubuntu@ip-172-31-92-46:/fsx$ nano test
ubuntu@ip-172-31-92-46:/fsx$ cd ..
ubuntu@ip-172-31-92-46:/$ ls
bin bin usr-is-merged boot dev etc fsx home lib lib usr-is-merged lib64 lost+found media mnt opt proc root run sbin sbin usr-is-merged snap srv sys usr var
ubuntu@ip-172-31-92-46:/$ sudo mount -t nfs svm-00010eed7a519b345.fs-0b9b3e35b498d15ab.fsx.us-east-1.amazonaws.com:/vol1 /fsx
ubuntu@ip-172-31-92-46:/$ cd /fsx/
ubuntu@ip-172-31-92-46:/fsx$ sudo su
root@ip-172-31-92-46:/fsx$ cd /fsx/sudo mount -t nfs svm-00010eed7a519b345.fs-0b9b3e35b498d15ab.fsx.us-east-1.amazonaws.com:/vol1 /fsx
bash: cd: too many arguments
root@ip-172-31-92-46:/fsx$ cd /fsx/sudo mount -t nfs svm-00010eed7a519b345.fs-0b9b3e35b498d15ab.fsx.us-east-1.amazonaws.com:/vol1 /fsx
root@ip-172-31-92-46:/fsx$ vi test
root@ip-172-31-92-46:/fsx$ ls
test test2
root@ip-172-31-92-46:/fsx# |||
```

100% [====] 200h Ansible_admin_vm

This document provides a complete guide to creating an FSx for NetApp ONTAP file system using Ansible.

Special Thanks

I would like to express my sincere gratitude to HR manager, Camille and the HR team at NetApp for this exciting opportunity. I truly appreciate the time and consideration given to my application and the chance to engage with NetApp's innovative cloud and automation solutions. This process has only strengthened my enthusiasm for the company, and I look forward to the next steps in the interview journey.