



IT Automation Terraform Driver 【 Practice 】

In this Document, "IT Automation" will be written as "ITA".

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1. Introduction



1. Introduction

Main Menu

- This document aims to teach the readers about the **Terraform** Menu group while giving them hands-on experience.

The screenshot displays the Exastro IT Automation dashboard. The top navigation bar includes the Exastro logo, user information (System Administrator), and buttons for 'Change password' and 'Logout'. The main content area is divided into a 'Main menu' on the left and several data widgets on the right.

Main menu: A grid of icons representing different menu groups. The 'Terraform' icon, located in the bottom row, is highlighted with a red rectangle. Other icons include Management Console, Basic Console, Export/Import, Symphony, Conductor, Create Menu, Input, Substitution value, Reference, Contrast, HostGroup management, Ansible Common, Ansible-Legacy, Ansible-Pioneer, Ansible-LegacyRole, Cobbler, and File control management.

Widgets:

- Movement:** A donut chart showing 14 total movements. The chart is divided into segments for Ansible Legacy (78.6%), Ansible Pioneer (7.1%), Ansible Legacy Role (1.1%), and Terraform (13.2%).
- Work status:** A donut chart showing 0 total work items. The chart is divided into segments for Executing, Unexecuted (schedule), and Unexecuted.
- Work result:** A donut chart showing 8 total results. The chart is divided into segments for Normal end (37.5%), Unexpected error (62.5%), and Schedule cancellation.
- Work history:** A table listing work history items.

Tables:

Movement	SUM
Ansible Legacy	11
Ansible Pioneer	1
Ansible Legacy Role	1
Terraform	1

Status	CON	SYN	SUM
Executing	0	0	0
Unexecuted (schedule)	0	0	0
Unexecuted	0	0	0

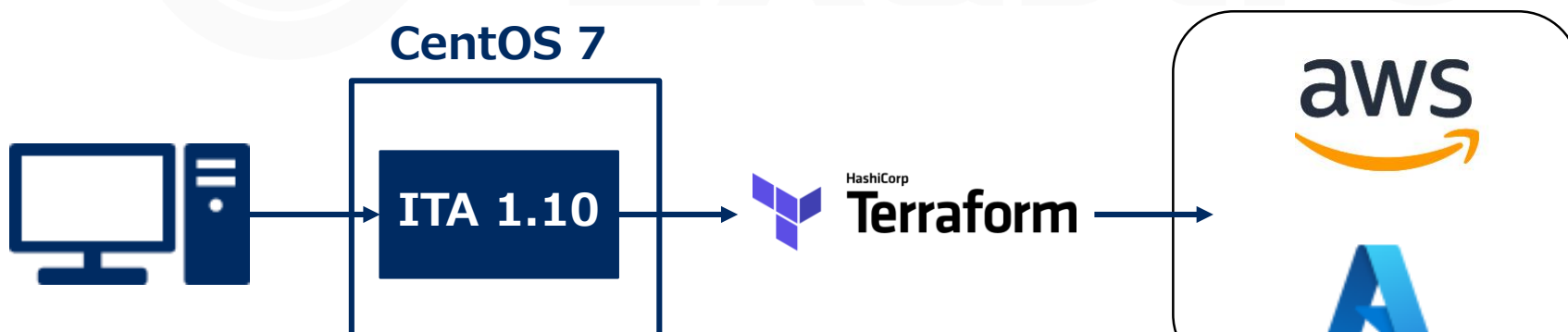
Result	CON	SYN	SUM
Normal end	3	0	3
Abnormal end	0	0	0
Unexpected error	4	1	5
Emergency stop	0	0	0
Schedule cancellation	0	0	0

1.2 Environment

Environment

- The environment used in this manual is as follows.
- In addition to an ITA Server, please prepare an AWS and Azure account and a Terraform environment (Terraform account if you are using Terraform Cloud).

ITA host server	Terraform	Target
<ul style="list-style-type: none">• CentOS7(※)• ITA ver 1.10	<ul style="list-style-type: none">• Terraform Enterprise or• Terraform Cloud	<ul style="list-style-type: none">• AWS• Microsoft Azure



*In this scenario, the host server will be running on CentOS7, but ITA can be installed on RHEL7 and RHEL8 type OS as well.

2. Terraform Driver Practice



2.1 Scenario

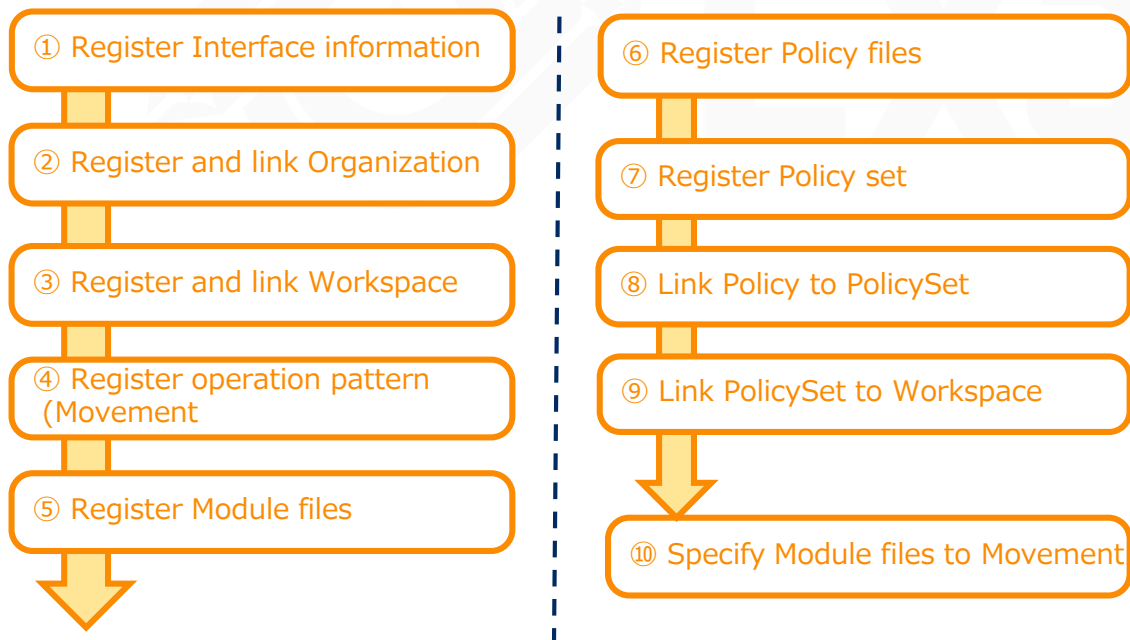
About the scenario

This scenario uses ITA's Terraform Driver to check the plan to create the VM's on Public cloud (AWS,Azure)

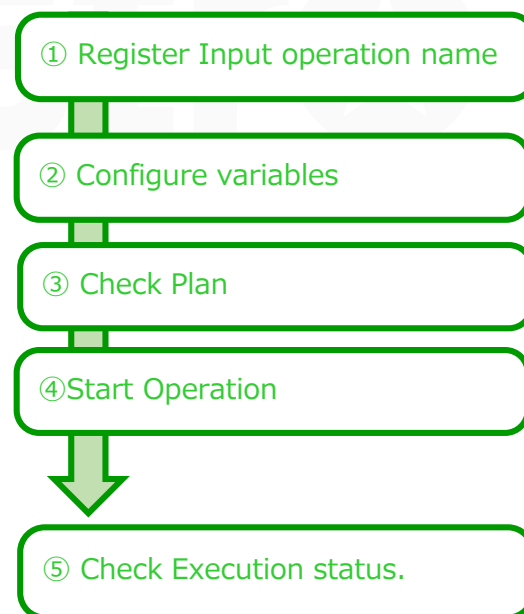
After that, it will use the **defined policies** to create the VM on the different cloud environments.

Once you have followed the "Preparation" part of this document and have linked/registered all the necessary parts, you can repeat the "Execution" part of the scenario and reconfigure/re-register target machines. **(Automation)**

【Preparation】



【Execution】



2.2 Preparation (1/7)

Create Module①

- Here, we will create the 4 modules that will be used in this scenario

【 Attention 】 Make sure that the character code is "UTF-8", the Line feed code is LF and the file extension is ".tf".

```
variable "aws_info" {
  type = object({
    access_key = string
    secret_key = string
    region = string
  })
}
variable "ami" {}
variable "key_name" {}
variable "security_group" {}
variable "tags_name" {}
variable "hello_tf_instance_count" {
  default = 2
}
variable "hello_tf_instance_type" {
  default = "t2.micro"
}
```

File name:

aws_create_instance_variables.tf

This file defines variables for creating AWS Instances.

A concrete value variable will be assigned to the variable

2.2 Preparation (2/7)

Create Module②

```
provider "aws" {
  access_key = var.aws_info.access_key
  secret_key = var.aws_info.secret_key
  region = var.aws_info.region
}

resource "aws_instance" "hello-tf-instance" {
  ami          = var.ami
  key_name     = var.key_name
  security_groups = [var.security_group]
  tags = {
    Name = "${var.tags_name}-${count.index+1}"
  }
  count = var.hello_tf_instance_count
  instance_type = var.hello_tf_instance_type
}
```

File name:

aws_create_instance.tf

This file defines variables for creating AWS Instances.

Create Security groups and key pairs in AWS in advance.

2.2 Preparation (3/7)

Create Module③

File name: azure_create_instance_variables.tf

This file defines variables for creating Azure instances.
A concrete value variable will be assigned to the variable

```
variable "azure_info" {
  type = object({
    subscription_id = string
    tenant_id       = string
    client_id       = string
    client_secret   = string
  })
}
variable "resource_group_name" {}
variable "security_group" {}
variable "location" {}
variable "Vnet_name" {}
variable "Vnet_address_space" {}
variable "subnet_name" {}
variable "address_prefixes" {}
variable "public_ip_name" {}
variable "allocation_method" {}
variable "domain_name_label" {}
variable "network_interface_name" {}
```

```
variable "NIC_name" {}
variable "VM_name" {}
variable "VM_size" {}
variable "publisher" {}
variable "offer" {}
variable "sku" {}
variable "source_image_version" {}
variable "admin_username" {}
variable "ssh_public_key" {}
variable "os_disk_name" {}
variable "caching" {}
variable "storage_account_type" {}
variable "VM_count" {}
```

2.2 Preparation (4/7)

■ Create Module④

File name:


azure_create_instance.tf (1/3)

Resources for creating Azure instance
Definition file.

This file creates resource groups, as well
as their network security group and virtual
networks.

It will also create the a virtual machine,
disk and network interface for each VM.

```
provider "azurerm" {  
  features {}  
  subscription_id = var. azure_info.subscription_id  
  client_id       = var. azure_info.client_id  
  client_secret   = var. azure_info.client_secret  
  tenant_id      = var. azure_info.tenant_id  
}  
  
resource "azurerm_resource_group" "hoge" {  
  name = var.resource_group_name  
  location = var.location  
}
```



```
resource "azurerm_network_security_group" "hoge" {  
  name = var.security_group  
  location = azurerm_resource_group.hoge.location  
  resource_group_name = azurerm_resource_group.hoge.name  
  
  security_rule {  
    name           = "SSH"  
    priority       = 1001  
    direction     = "Inbound"  
    access        = "Allow"  
    protocol      = "Tcp"  
    source_port_range = "*"   
    destination_port_range = "22"  
    source_address_prefix = "*"   
    destination_address_prefix = "*"   
  }  
  
  security_rule {  
    name           = "HTTP"  
    priority       = 1002  
    direction     = "Inbound"  
    access        = "Allow"  
    protocol      = "Tcp"  
    source_port_range = "*"   
    destination_port_range = "80"  
    source_address_prefix = "*"   
    destination_address_prefix = "*"   
  }  
}
```



2.2 Preparation (5/7)

Create Module④

File name:
azure_create_instance.tf (2/3)

```
resource "azurerm_virtual_network" "hoge hoge" {
  name = var.Vnet_name
  address_space = [var.Vnet_address_space]
  location = azurerm_resource_group.hoge hoge.location
  resource_group_name = azurerm_resource_group.hoge hoge.name
}

resource "azurerm_subnet" "hoge hoge" {
  name = var.subnet_name
  resource_group_name = azurerm_resource_group.hoge hoge.name
  virtual_network_name = azurerm_virtual_network.hoge hoge.name
  address_prefixes = [var.address_prefixes]
}

resource "azurerm_public_ip" "hoge hoge" {
  count = var.VM_count
  name = "${var.public_ip_name}-${count.index}"
  location = azurerm_resource_group.hoge hoge.location
  resource_group_name = azurerm_resource_group.hoge hoge.name
  allocation_method = var.allocation_method
  domain_name_label = "${var.domain_name_label}-${count.index}"
}

resource "azurerm_network_interface" "hoge hoge" {
  count = var.VM_count
  name = "${var.network_interface_name}-${count.index}"
  location = azurerm_resource_group.hoge hoge.location
  resource_group_name = azurerm_resource_group.hoge hoge.name

  ip_configuration {
    name = var.NIC_name
    subnet_id = azurerm_subnet.hoge hoge.id
    private_ip_address_allocation = var.allocation_method
    public_ip_address_id = azurerm_public_ip.hoge hoge[count.index].id
  }
}
```

2.2 Preparation (6/7)

■ Create Module④

File name:
azure_create_instance.tf (3/3)



```
resource "azurerm_network_interface_security_group_association" "hoge hoge" {
  count = var.VM_count
  network_interface_id = azurerm_network_interface.hoge hoge[count.index].id
  network_security_group_id = azurerm_network_security_group.hoge hoge.id
}

resource "azurerm_linux_virtual_machine" "hoge hoge" {
  count = var.VM_count
  name = "${var.VM_name}-${count.index}"
  resource_group_name = azurerm_resource_group.hoge hoge.name
  location = azurerm_resource_group.hoge hoge.location
  size = var.VM_size
  admin_username = var.admin_username
  network_interface_ids = [azurerm_network_interface.hoge hoge[count.index].id]

  admin_ssh_key {
    username = var.admin_username
    public_key = var.ssh_public_key
  }

  os_disk {
    name = "${var.os_disk_name}-${count.index}"
    caching = var.caching
    storage_account_type = var.storage_account_type
  }

  source_image_reference {
    publisher = var.publisher
    offer = var.offer
    sku = var.sku
    version = var.source_image_version
  }
}
```

2.2 Preparation (7/7)

Create Policy

File name : limit-proposed-monthly-cost.sentinel

This policy limits the monthly cost.

The Terraform will not apply if the monthly cost exceeds 50\$.

It will also output an estimate of the monthly cost.

This can be used for both AWS and Azure.

```
import "tfrun"
import "decimal"

limit = decimal.new(50)

cost_limit_by_workspace = func() {
  if tfrun.cost_estimate else null is null {
    print("no cost estimates available")
    return false
  }

  workspace_name = tfrun.workspace.name

  proposed_cost = decimal.new(tfrun.cost_estimate.proposed_monthly_cost)

  if proposed_cost.less_than(limit) {
    print("Proposed monthly cost", proposed_cost.string,
      "of workspace", workspace_name,
      "is under the limit: $", limit)
    return true
  }

  if proposed_cost.greater_than(limit) {
    print("Proposed monthly cost", proposed_cost.string,
      "of workspace", workspace_name,
      "is over the limit: $", limit)
    return false
  }
}

cost_validated = cost_limit_by_workspace()

main = rule {
  cost_validated
}
```

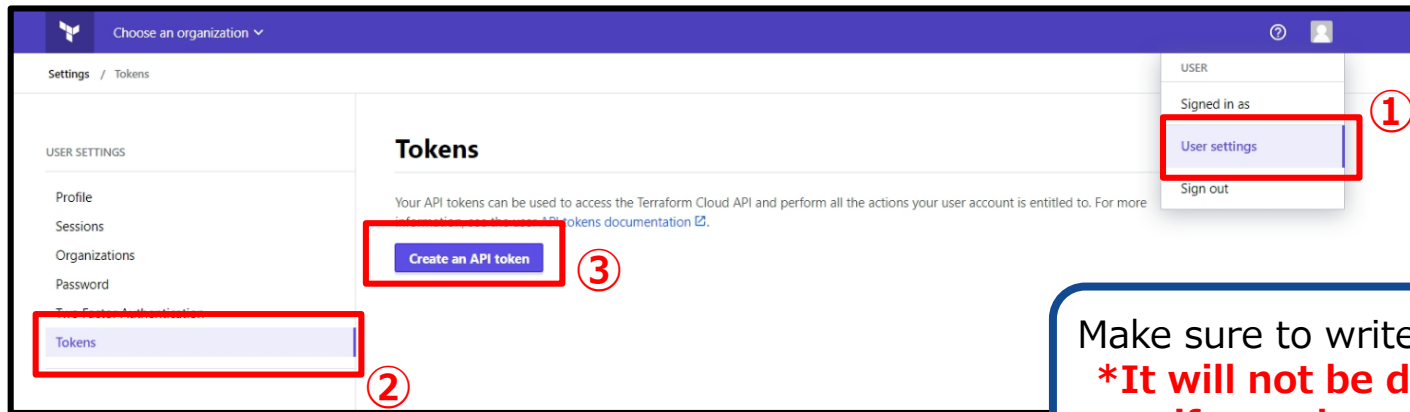
3. Preparation



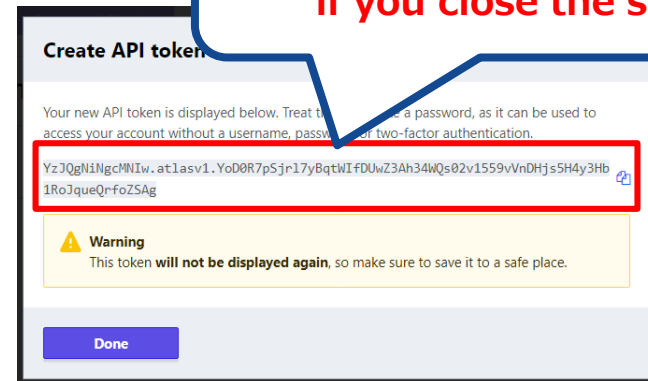
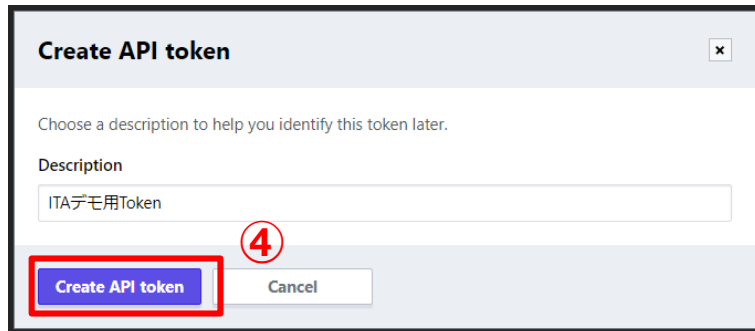
3.1 Register Interface Information(1/2)

Create User Token

- In order to link Terraform Driver with Terraform, we will need to create a User Token from Terraform
- Log in to Terraform from your browser and go to [User Setting]→[Tokens]→[Create an API token]



Make sure to write down the token
***It will not be displayed again if you close the screen.**



3.1 Registration of interface information(2/2)

Interface information

- Input the Terraform Hostname and the created UserToken

*Since only one Terraform can be linked to ITA, you need to update the item that is already there.

Menu: Terraform> Interface Information

- ① Open the list and press the item's update button.
- ② Enter the following information and press "Register".

The screenshot shows the ITA interface. On the left, the 'Interface information' menu item is highlighted with a red box. The main area displays a table with the following columns: No., Hostname, User Token, Proxy (Address, Port), Status monitoring cycle (milliseconds), and Number of rows. The 'Update' button in the bottom left of the table is also highlighted with a red box.

Hostname	User Token
app.terraform.io	(Input User Token)

3.2 Register and Link Organization(1/2)

Register Organization

In this step, we will create an Organization.

Menu: **Terraform > Organizations list**

- ① Click Register> Start Registration.
- ② Enter the following information and press "Register".

Organization ID	Organization Name*	Email address*	Access permission	
			Setting	Role to allow access
Auto-input	<input type="text" value="ITAllearn_org"/>	<input type="text"/>	<input type="button" value="Setting"/>	

※*is a required item.

Organization Name	Email address
ITAllearn_org	(Input Mail Address)

3.2 Register and Link Organization(2/2)

Link Organization

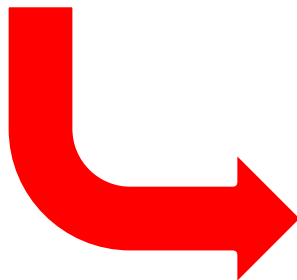
- After creating the Organization item from Organization Management You can check if the Organization has been added to the target Terraform by clicking the [Linkage status check].
- If it says "Not registered", you can press the register button to create an Organization in Terraform.

List/Update

History	Update	Discard	Organization ID	Organization Name	Email address	Terraform association				
						Status check	Association status	Register		
History	Update	Discard	3	LearnTest1	ita-exastro@sample.com	Association status check	No registration	Register	update	Delete

Filter result count: 1

Output Excel



USER SETTINGS

Profile
Organizations
Password
Two Factor Authentication
Tokens

Organizations

You are a member of the following organizations:

LearnTest1 OWNER

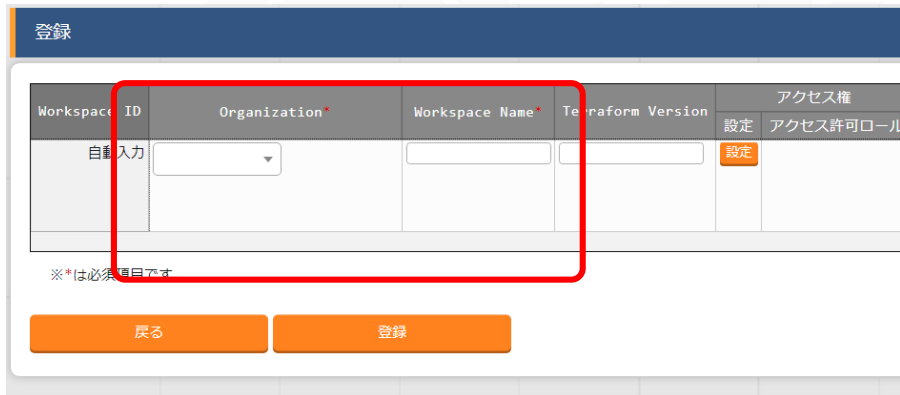
3.3 Register and Link Workspace(1/2)

Register Workspace

In this section, we will create a Workspace.

Menu : **Terraform > Workspaces list**

- ① Click Register > Start Registration.
- ② Enter the following information and press "Register".



Workspace ID	Organization*	Workspace Name*	Terraform Version	アクセス権
自動入力	<input type="text"/>	<input type="text"/>	<input type="text"/>	設定 アクセス許可ロール

※*は必須項目です

Organization	Workspace Name
ITAllearn_org	ITA-demo-AWS
ITAllearn_org	ITA-demo-Azure

3.3 Register and Link Workspace(2/2)

Link Workspace

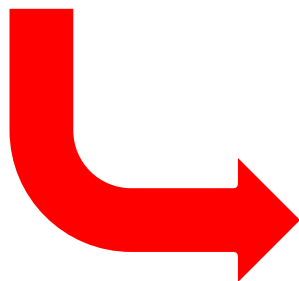
- After creating a Workspace item in Workspaces list, You can check if the Workspace has been added to the target Terraform by clicking the “Association status check” button
 - If it says “Not registered”, you can press the “Register” button to create a Workspace on the target Terraform
- * As a Workspace is created inside an Organization, make sure to create an Organization first.**

List/Update

History	Update	Discard	Workspace ID	Organization	Workspace Name	Terraform Version	Terraform association				
							Status check	Association status	Register	update	Delete
History	Update	Discard	1	LearnTest1	ITA-LearnTest		Association status check	No registration	Register	update	Delete

Filter result count: 1

Output Excel



LearnTest1 Workspaces Modules Settings

LearnTest1 / Workspaces

Workspaces 1 total [+ New workspace](#)

All 1 Success 0 Error 0 Needs Attention 0 Running 0

WORKSPACE NAME	RUN STATUS	RUN	REPO	LATEST CHANGE
ITA-LearnTest				a few seconds ago

3.4 Register Operation pattern(Movement)

Create Movement

In this section, we will register a Movement that we can link to the playbook we created earlier.

Menu: **Terraform > Movement list**

- ① Click Register > Start Registration.
- ② Select or enter the following and press "Register".

Movement ID	Movement Name*	Delay timer	Terraform integration
			Organization:Workspace*
Auto-input	<input type="text"/>	<input type="text"/>	<input type="text"/>

※* is a required item.

Movement name

**Terraform User information
Organization: Workspace**

CreateVM(AWS)

ITA-demo-AWS

CreateVM(Azure)

ITA-demo-Azure

3.5 Register Module files

Register Module

In this section, we will register our Modules to ITA.

Menu: **Terraform > Module Files**

- ① Click Register > Start Registration.
- ② Press "Browse" and select your playbook and press "Upload in advance".
- ③ Follow the table below and press "Register"

The screenshot shows a web interface titled "Register". It features a table with three columns: "Module file ID", "Module file name*", and "Module file*". The first row has "Auto-input" in the first column. The "Module file name*" column contains an empty text input field. The "Module file*" column contains a "Choose File" button, the text "No file chosen", an orange "Upload in advance" button, and the text "Upload status:". A red rectangular box highlights the "Module file name*" and "Module file*" columns.

Module file name	Module file
aws_create_instance_variables	aws_create_instance_variables.tf
aws_create_instance_body	aws_create_instance.tf
azure_create_instance_variables	azure_create_instance_variables.tf
azure_create_instance_body	azure_create_instance.tf

3.6 Register Policy file

Register Policy file

In this section, we will register the policy file we created.

Menu : **Terraform > Policies list**

- ① Click Register > Start Registration.
- ② Select the policy you want to upload and press "Upload in advance".
- ③ Follow the table below and press "Register"

Policy ID	Policy名*	Policy素材*	アクセス権
自動入力	<input type="text"/>	ファイルの選択 ファイルが選択されていません <input type="button" value="事前アップロード"/> アップロード状況:	設定 アクセス許可ロール

※*は必須項目です。

Policy name	Policy file
limit-proposed-monthly-cost	limit-proposed-monthly-cost.sentinel

3.7 Register Policy Set

Register Policy Set

In this section, we will register a Policy set.

Menu : **Terraform > Policy Sets list**

- ① Click Register > Start Registration.
- ② Follow the table below and press "Register"



PolicySet ID	PolicySet名*	アクセス権	
		設定	アクセス許可ロール
自動入力	<input type="text"/>	<input type="button" value="設定"/>	

※*は必須項目です。

PolicySet name

PolicySet_demo

3.8 Link Policy Set and Policy

Link Policy Set and Policy

In this section, we will link the previously created Policy Set and Policy file.

Menu : **Terraform > PolicySet-Policy link list**

- ① Click Register > Start Registration.
- ② Follow the table below and press "Register"

The screenshot shows a registration form titled "登録" (Registration). The form has a table with three columns: "PolicySet-Policy紐付ID" (PolicySet-Policy Link ID), "Policy Set*", and "Policy*". The "Policy Set*" and "Policy*" columns contain dropdown menus. A red box highlights these two dropdown menus. To the right of the table, there are two buttons: "設定" (Settings) and "登録" (Register). Below the table, there is a note: "※*は必須項目です。" (※* is a required item). At the bottom of the form, there are two buttons: "戻る" (Back) and "登録" (Register).

Policy Set	Policy
1:PolicySet_demo	1:limit-proposed-monthly-cost

3.9 Link Policy Set and Workspace

Link Policy Set and Workspace

In this section, we will link the Policy Set and the Workspace.

Menu : **Terraform > PolicySet-Workspace link list**

- ① Click Register > Start Registration.
- ② Follow the table below and press "Register"

登録

PolicySet-Workspace紐付ID	Policy Set*	Organization:Workspace*
自動入力	<input type="text"/>	<input type="text"/>

※*は必須項目です。

Policy Set	Organization:Workspace
1:PolicySet_demo	ITAllearn_org:ITA-demo-AWS
1:PolicySet_demo	ITAllearn_org:ITA-demo-Azure

3.10 Specify Module file to Movement

Link Module to Movement

In this section, we will link our Movement and Module file

Menu: Terraform > **Movement-Module Link**

- ① Click Register > Start Registration.
- ② Select or enter the following and press "Register".

The screenshot shows a web form titled "Register". It has a table with three columns: "Associated item number", "Movement*", and "Module file*". The "Associated item number" column contains the text "Auto-input". The "Movement*" and "Module file*" columns each contain a dropdown menu. A red rectangular box highlights these two dropdown menus. Below the table, there is a note: "※*is a required item." At the bottom of the form, there are two orange buttons: "Back" and "Register".

Movement	Module file
Create VM (AWS)	aws_create_instance_variables
Create VM (AWS)	aws_create_instance_body
Create VM (Azure)	azure_create_instance_variables
Create VM (Azure)	azure_create_instance_body

4. Execution

4.1 Operation registration

Register new Operation

In this section, we will create an Operation

Menu: **Basic Console > Input Operation List**

- ① Click Register> Start Registration.
- ② Enter the following information and press "Register".

No.	Operation ID	Operation name*	Scheduled date for execution*
Auto-input	Auto-input	<input type="text"/>	<input type="text"/>

※*is a required item.

Operation name	Scheduled implementation date and time
Terraform_demo	(Free field)

* (Scheduled implementation date and time) is an item for management. The operation will not be automatically executed when the scheduled date passes .

4.2 Variable value setting (1/4)

Configure values to Variables.

In this section, we will configure specific values to the Module variables

Menu: **Terraform** > **Substitution value list**

- ① Click Register > Start Registration.
- ② Select or enter the following and press "Register".

Item number	Operation*	Movement*	Variable name*	HCL setting*	Sensitive setting*
Auto-input	<input type="text"/>	<input type="text"/>	Please select a Movement	OFF <input type="text"/>	OFF <input type="text"/>

※* is a required item.

※The upcoming slides will explain Specific setting values.

4.2 Variable value setting (2/4)

Configure values to Variables(1/3)

Please refer to the table below and register substitute values.

Operation	Movement	Variable name	Member variable	Specific value
Terraform_demo	CreateVM(AWS)	security_group		ita-demo-sg *
Terraform_demo	CreateVM(AWS)	key_name		ita-demo-key *
Terraform_demo	CreateVM(AWS)	aws_info	access_key	(AWS access key)
Terraform_demo	CreateVM(AWS)	aws_info	secret_key	(AWS secret key)
Terraform_demo	CreateVM(AWS)	aws_info	Region	(Any region)
Terraform_demo	CreateVM(AWS)	tags_name		ita-demo-instance
Terraform_demo	CreateVM(AWS)	hello_tf_instance_type		t2.large
Terraform_demo	CreateVM(AWS)	hello_tf_instance_count		3
Terraform_demo	CreateVM(AWS)	AMI		(Any AMI)

- Security groups and key pairs must be created in advance.
- Since "access_key, secret_key, region" are written in "aws_create_instance_variables.tf" in object form, the following "member variables" are selected for "Variable name:aws_info"

4.2 Variable value setting (3/4)

Configure values to Variables(2/3)

Please refer to the table below and register substitute values.

Operation	Movement	Variable name	Member Variable	Specific value
Terraform_demo	CreateVM(Azure)	azure_info	subscription_id	(Azure Authentication information)
Terraform_demo	CreateVM(Azure)	azure_info	tenant_id	
Terraform_demo	CreateVM(Azure)	azure_info	client_id	
Terraform_demo	CreateVM(Azure)	azure_info	client_secret	
Terraform_demo	CreateVM(Azure)	resource_group_name		ita-demo-rg
Terraform_demo	CreateVM(Azure)	location		(Input desired Azure location)
Terraform_demo	CreateVM(Azure)	security_group		ita-demo-security-group
Terraform_demo	CreateVM(Azure)	Vnet_name		ita-demo-vnet
Terraform_demo	CreateVM(Azure)	Vnet_address_space		10.0.0.0/16
Terraform_demo	CreateVM(Azure)	subnet_name		ita-demo-subnet
Terraform_demo	CreateVM(Azure)	address_prefixes		10.0.2.0/24
Terraform_demo	CreateVM(Azure)	public_ip_name		ita-demo-public-ip
Terraform_demo	CreateVM(Azure)	allocation_method		Dynamic
Terraform_demo	CreateVM(Azure)	domain_name_label		(Global domain name)

*Since " subscription_id, tenant_id, client_id, client_secret " are written in "azure_create_instance_variables.tf" in object form, the following "member variables" are selected for "Variable name:azure_info"

4.2 Setting variable values(4/4)

Configure values to Variables(3/3)

Please refer to the table below and register substitute values.

Operation	Movement	Variable name	Specific value
Terraform_demo	CreateVM(Azure)	network_interface_name	ita-demo-nwif
Terraform_demo	CreateVM(Azure)	NIC_name	ita-demo-NIC
Terraform_demo	CreateVM(Azure)	VM_name	ita-demo-web-azure
Terraform_demo	CreateVM(Azure)	publisher	OpenLogic
Terraform_demo	CreateVM(Azure)	offer	CentOS
Terraform_demo	CreateVM(Azure)	sku	8_2
Terraform_demo	CreateVM(Azure)	source_image_version	latest
Terraform_demo	CreateVM(Azure)	os_disk_name	ita-demo-os-disk
Terraform_demo	CreateVM(Azure)	storage_account_type	Standard_LRS
Terraform_demo	CreateVM(Azure)	caching	ReadWrite
Terraform_demo	CreateVM(Azure)	admin_username	ita-demo
Terraform_demo	CreateVM(Azure)	ssh_public_key	(Public SSH key)※
Terraform_demo	CreateVM(Azure)	VM_size	Standard_B2MS
Terraform_demo	CreateVM(Azure)	VM_count	3

※Use the SSH key that you prepared. The Specific value is the text of the key, "ssh-rsa xxxxxxxx~"

4.3 Check Plan

Check Plan

In the previous section, we have created the Movement and registered the substitute values.

In the next section, we are going to check that the module follows the policy.

Menu : **Terraform > Execution**

The screenshot shows the Terraform Execution interface with three numbered callouts:

- 1** Select the movement you want to check. A red box highlights the first two rows of the Movement list table.
- 2** Select Operation. A red box highlights the first row of the Operation list table.
- 3** Press "Plan check". A red box highlights the "Plan確認" button.

Tip "Plan Check" runs the operation and stops after the Plan/PolicyCheck.

選択	Movement ID	Movement名	オーケストラータ	遅延タイマー	Terraform利用情報	アクセス権	備考	最終更新日時	最終更新者
<input checked="" type="radio"/>	1	VM作成(AWS)	Terraform		ITAllearn_org:ITA-demo-AWS	アクセス許可ロール		2021/07/20 15:18:26	システム管理者
<input type="radio"/>	2	VM作成(Azure)	Terraform		ITAllearn_org:ITA-demo-Azure			2021/07/20 15:32:42	システム管理者

選択	No.	オペレーションID	オペレーション名	実施予定日時	最終実行日時	アクセス権	備考	最終更新日時	最終更新者
<input checked="" type="radio"/>	1	1	Terraform_demo	2021/07/22 15:36		アクセス許可ロール		2021/07/20 15:36:52	システム管理者

MovementID 1
Movement名 VM作成(AWS)

Plan確認 実行

4.4 Check PolicyCheck log

Check PolicyCheck log

Checking the PolicyCheck log will move the user to the screen below and tell that an error has occurred. Scroll down to see the PolicyCheck log.

説明		
対象作業		
項目	値	
作業No.	61	
実行種別	Plan確認	
ステータス	完了(異常)	
呼出元Symphony		
呼出元Conductor		
実行ユーザ	システム管理者	
Movement	ID	1
	名称	VM作成(AWS)
	遅延タイム(分)	
Terraform利用情報	Organization:Workspace	ITAllearn_org:ITA-demo-AWS
	RUN-ID	run-GJFbJfkkFREKwDb
オペレーション	No.	1
	名称	Terraform_demo
	ID	1
代入値	確認	
入力データ	投入データ	InputData_0000000061.zip
出力データ	結果データ	ResultData_0000000061.zip
作業状況	予約日時	
	開始日時	2021/09/06 07:51:09
	終了日時	2021/09/06 07:51:41

進行状況(PolicyCheckログ)

フィルタ: 該当行のみ表示

```
Sentinel Result: false
Sentinel evaluated to false because one or more Sentinel policies evaluated to false. This false was not due to an undefined value or runtime error.
1 policies evaluated.
## Policy 1: limit-proposed-monthly-cost (hard-mandatory)
Result: false
Print messages:
Proposed monthly cost 200.448 of workspace ITA-demo-AWS is over the limit: $ {"coefficient": "50", "exponent": 0,
FALSE - limit-proposed-monthly-cost.sentinel:34:1 - Rule "main"
```



We can see that the proposed cost will exceed 50\$

4.5 Change the VM size

Change the size of the VM and re-run the operation.

Lastly, we will change the size of the VM and run the operation again.

Go to Terraform > Substitute list and use the table below to change the values.
Then check the plan like we did in Chapter 4.3

Before

Operation	Movement	Variable name	Specific value
Terraform_demo	CreateVM(AWS)	hello_tf_instance_type	t2.large
Terraform_demo	CreateVM(Azure)	VM_size	Standard_B2MS



Instance size
AWS: **t2.large** → **t2.micro**
Azure: **Standard_B2MS** → **Standard_B1LS**

After

Operation	Movement	Variable name	Specific value
Terraform_demo	CreateVM (AWS)	hello_tf_instance_type	t2.micro
Terraform_demo	CreateVM(Azure)	VM_size	Standard_B1LS

Tips

4.6 Confirm PolicyCheck log

Confirm PolicyCheck log

Now if check the PolicyCheck log, we can see that it has finished successfully. After checking the log, we can go to the next step and run the Movement.

説明		
対象作業		
項目	値	
作業No.	65	
実行種別	Plan確認	
ステータス	完了	
呼出元Symphony		
呼出元Conductor		
実行ユーザ	システム管理者	
Movement	ID	1
	名称	VM作成(AWS)
	遅延タイム(分)	
Terraform利用情報	Organization:Workspace	ITAllearn_org:ITA-demo-AWS
	RUN-ID	run-vdyP2TiJP2xvgSFT
オペレーション	No.	1
	名称	Terraform_demo
代入値	ID	1
		確認
入力データ	投入データ	InputData_000000065.zip
出力データ	結果データ	ResultData_000000065.zip
作業状況	予約日時	
	開始日時	2021/09/06 08:31:07
	終了日時	2021/09/06 08:31:43

```
進行状況(PolicyCheckログ)

フィルタ:   該当行のみ表示

Sentinel Result: true
This result means that Sentinel policies returned true and the protected behavior is allowed by Sentinel policies.
1 policies evaluated.
## Policy 1: limit-proposed-monthly-cost (hard-mandatory)
Result: true
Print messages:
proposed monthly cost 25.056 of workspace ITA-demo-AWS is under the limit: $ {"coefficient": "50", "exponent": 0, "flo
TRUE - limit-proposed-monthly-cost.sentinel:34:1 - Rule "main"
```

Tips

We can now see that the proposed cost is below 50%

Execute Movement

We have now finished creating the Movements and registering the Substitute values we are going to use.

Lastly, we will execute the Movement and check the result in the target host.

Menu: **Terraform > Execution**

The screenshot shows the Terraform Execution interface. It includes a sidebar menu on the left with options like 'Menu', 'Main menu', 'Interface Information', 'Organizations list', 'Workspaces list', 'Movement list', 'Module files', 'Policies list', 'Policy Sets list', 'PolicySet-Policy link list', 'PolicySet-Workspace link list', 'Movement module link', 'Substitution value auto-registration setting', and 'Substitution value list'. The main content area is divided into sections: 'Description' (with a 'Scheduling' sub-section for specifying a date/time), 'Movement [Filter]', 'Movement [List]', 'Operation [Filter]', and 'Operation [List]'. The 'Movement [List]' table has two rows: '21 createVM(AWS)' and '22 createVM(Azure)'. The 'Operation [List]' table has one row: '25 Terraform_demo'. At the bottom, there are buttons for 'Plan check' and 'Execute'. A 'Tips' box on the right states: 'After execution, the user will automatically be moved to the "check operation status" screen.'

1 Select the Movement you want to Execute.

2 Select an operation.

3 Click [Execute].

Tips After execution, the user will automatically be moved to the "check operation status" screen.

4.8 Checking Operation status

Check the detailed results of the Movement

After executing, the user will be moved to a screen where they can see the Execution status and Execution logs.

It is also possible to see the input and output data.

The screenshot displays a web application interface with a sidebar menu on the left and a main content area. The sidebar menu includes items like 'Main menu', 'Interface information', 'Organizations list', 'Workspaces list', 'Movement list', 'Module files', 'Policies list', 'Policy Sets list', 'PolicySet-Policy link list', 'PolicySet-Workspace link list', 'Movement module link', 'Substitution value auto-registration setting', 'Substitution value list', and 'Execution'. The main content area is titled 'Check operation status' and shows a table of execution details. The table has columns for 'Item' and 'Value'. The 'Status' is 'Completed (error)'. There are buttons for 'CreateVM(AWS)', 'Confirm', and 'Download' (implied by the tip). Below the table, there is a 'Progress status(Plan log)' window showing a JSON-like log output. A red box highlights the 'InputData' and 'ResultData' links in the table. Two blue callout boxes with the word 'Tips' provide additional instructions.

Item	Value
Execution No.	2
Execution type	Normal
Status	Completed (error)
Caller Symphony	
Caller conductor	
Executing user	System Administrator
ID	21
Name	CreateVM(AWS)
Delay timer (minutes)	
Terraform Dedicated information	Organization:Workspace LearnTest1:ITA-demo-AWS RUN-ID run-FTRUJdQAbnKscj8e
No.	25
Name	Terraform_demo
ID	25
Variable	Confirm
Input data	Populated data InputData_000000002.zip
Output data	Result data ResultData_000000002.zip
Scheduled date/time	
Start date/time	08/20 15:14:26
End date/time	08/20 15:14:40

```
Filter:   Display only corresponding lines

+ device_index = (known after apply)
+ network_interface_id = (known after apply)
}

+ root_block_device {
+ delete_on_termination = (known after apply)
+ device_name = (known after apply)
+ encrypted = (known after apply)
+ fsps = (known after apply)
+ iops = (known after apply)
+ kms_key_id = (known after apply)
+ tags = (known after apply)
+ throughput = (known after apply)
+ volume_id = (known after apply)
+ volume_size = (known after apply)
+ volume_type = (known after apply)
}

Plan: 3 to add, 0 to change, 0 to destroy.
```

Tips

Users can download a zip file which contains the input data and the result data.

Tips

For the results, please access the Azure account and check that all of the 3 VM has been created.

4.9 Change the value and execute again(1/2)

Change the number of instances and execute again.

Finally, change the number of instances to deploy and repeat.

From **Terraform> Substitution Value Management**, refer to the table below and change the specific values and do the same as we did in chapter 4.3

Before

Operation	Movement	Variable name	Specific value
Terraform_demo	CreateVM(AWS)	hello_tf_instance_count	3
Terraform_demo	CreateVM(Azure)	VM_count	3



Change the Deploy instances:
AWS: **Increased** from 3 to 5
Azure: **Decreased** from 3 to 1

After

Operation	Movement	Variable name	Specific value
Terraform_demo	CreateVM(AWS)	hello_tf_instance_count	5
Terraform_demo	CreateVM(Azure)	VM_count	1

Tips

4.9 Change the value and execute again(2/2)

Check that the instances has been reduced.

Access AWS · Azure from your browser and check that the VM instances has been reduced.

AWS

<input type="checkbox"/>	Name	インスタンス ID	イン
<input type="checkbox"/>	ita-demo-instance-1	i-01ce909628624f4fc	✔
<input type="checkbox"/>	ita-demo-instance-3	i-0a9937555aca7be96	✔
<input type="checkbox"/>	ita-demo-instance-2	i-0d34ba73c42144d54	✔



<input type="checkbox"/>	Name	インスタンス ID	イン
<input type="checkbox"/>	ita-demo-instance-1	i-01ce909628624f4fc	✔
<input type="checkbox"/>	ita-demo-instance-3	i-0a9937555aca7be96	✔
<input type="checkbox"/>	ita-demo-instance-2	i-0d34ba73c42144d54	✔
<input type="checkbox"/>	ita-demo-instance-5	i-004f22d98cf7f6303	✔
<input type="checkbox"/>	ita-demo-instance-4	i-0f42e3212f538c8d2	✔

Azure

<input type="checkbox"/>	名前 ↑↓
<input type="checkbox"/>	ita-demo-nwif-0
<input type="checkbox"/>	ita-demo-nwif-1
<input type="checkbox"/>	ita-demo-nwif-2
<input type="checkbox"/>	ita-demo-os-disk-0
<input type="checkbox"/>	ita-demo-os-disk-1
<input type="checkbox"/>	ita-demo-os-disk-2
<input type="checkbox"/>	ita-demo-public-ip-0
<input type="checkbox"/>	ita-demo-public-ip-1
<input type="checkbox"/>	ita-demo-public-ip-2
<input type="checkbox"/>	ita-demo-security-group
<input type="checkbox"/>	ita-demo-vnet
<input type="checkbox"/>	ita-demo-web-azure-0
<input type="checkbox"/>	ita-demo-web-azure-1
<input type="checkbox"/>	ita-demo-web-azure-2



<input type="checkbox"/>	名前 ↑↓
<input type="checkbox"/>	ita-demo-nwif-0
<input type="checkbox"/>	ita-demo-os-disk-0
<input type="checkbox"/>	ita-demo-public-ip-0
<input type="checkbox"/>	ita-demo-security-group
<input type="checkbox"/>	ita-demo-vnet
<input type="checkbox"/>	ita-demo-web-azure-0



Exastro