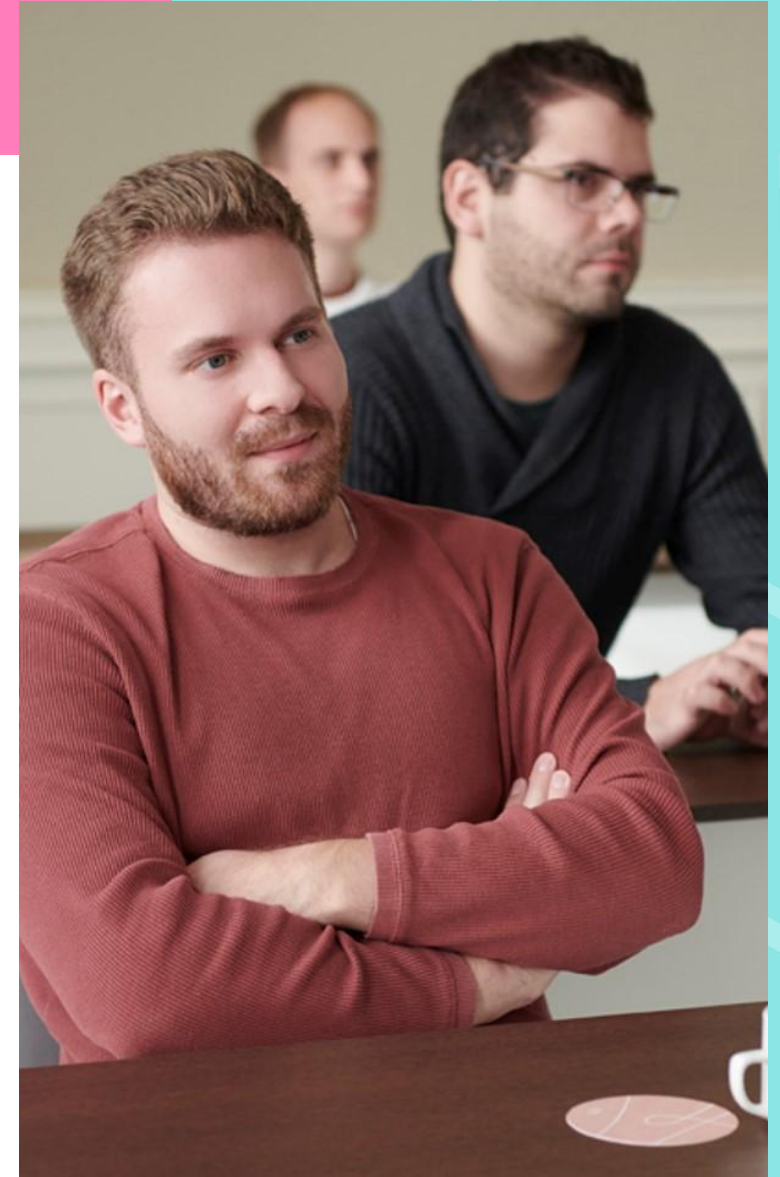




Create Your Own Cloud Infrastructure Like a Pro

Presenters: Weili Gao, Florian Stelzer

21. October 2023, VIScon 2023



Link to Slides

<https://shorturl.at/aEG01>

Your Presenter - Florian Stelzer

- Senior Consultant @ ipt
- 5x Microsoft Azure certified
- Broad experience building a secure cloud foundation with Terraform and Azure

Contact: florian.stelzer@ipt.ch



Your Presenter - Weili Gao

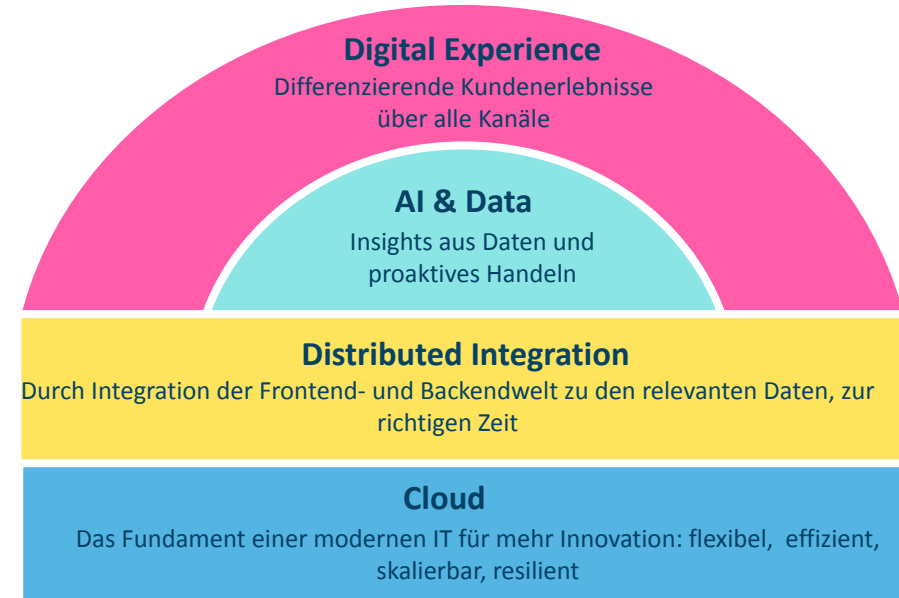
- IT Architect @ ipt
- Azure Solution Architect & DevOps Expert
- Cloud-native development & Digital Experience Projects

Contact: weili.gao@ipt.ch



Who is ipt?

- IT-Consulting with a lot of engineering
- About 200 employees
- Our target industries are in the financial service sector and public administration
- Customers in german speaking switzerland



Agenda

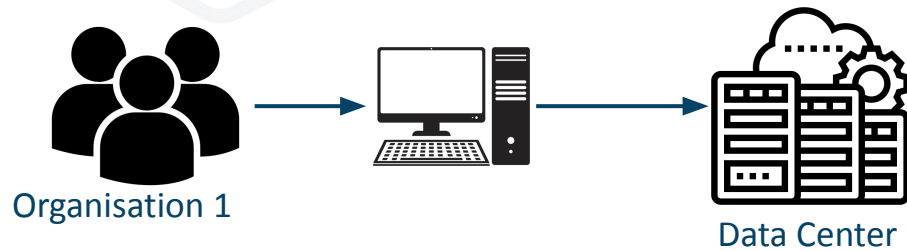
Our Objective: You know how to build a cloud infrastructure environment at scale with IaC and GitHub.

1. Introduction
2. Start with the Public Cloud - Microsoft Azure
3. Create your Cloud Infrastructure - Three Methods
 - a. Manual Configuration **Beginner Level**
 - b. Configuration with IaC (Local Deployment) **Intermediate Level**
 - c. Configuration with IaC (Remote Deployment) **Pro Level**

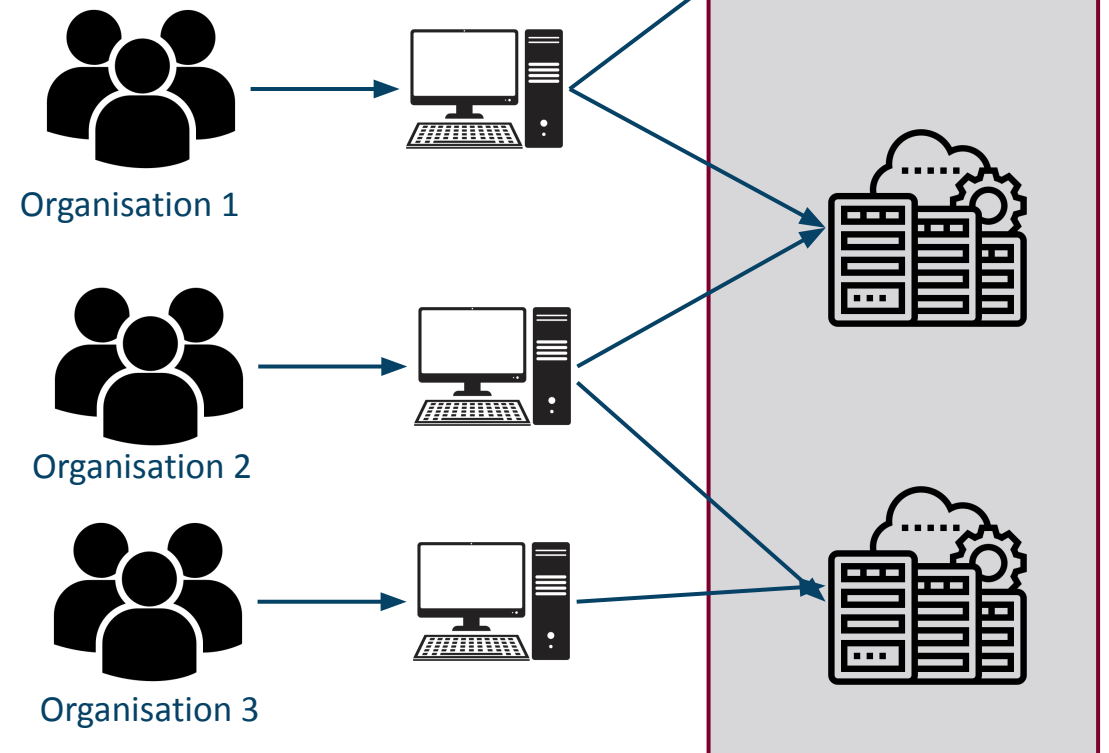


Introduction - What is Public Cloud and Microsoft Azure?

Former:



Today:



Introduction - What is Public Cloud and Microsoft Azure?

Official Definition by Microsoft [1]:

“The public cloud is defined as **computing services** offered by **third-party providers** over the **public Internet**, making them available to **anyone** who wants to use or purchase them. They may be free or sold on-demand, allowing customers to **pay only per usage** for the CPU cycles, storage, or bandwidth they consume.”

Introduction - What is Public Cloud and Microsoft Azure?

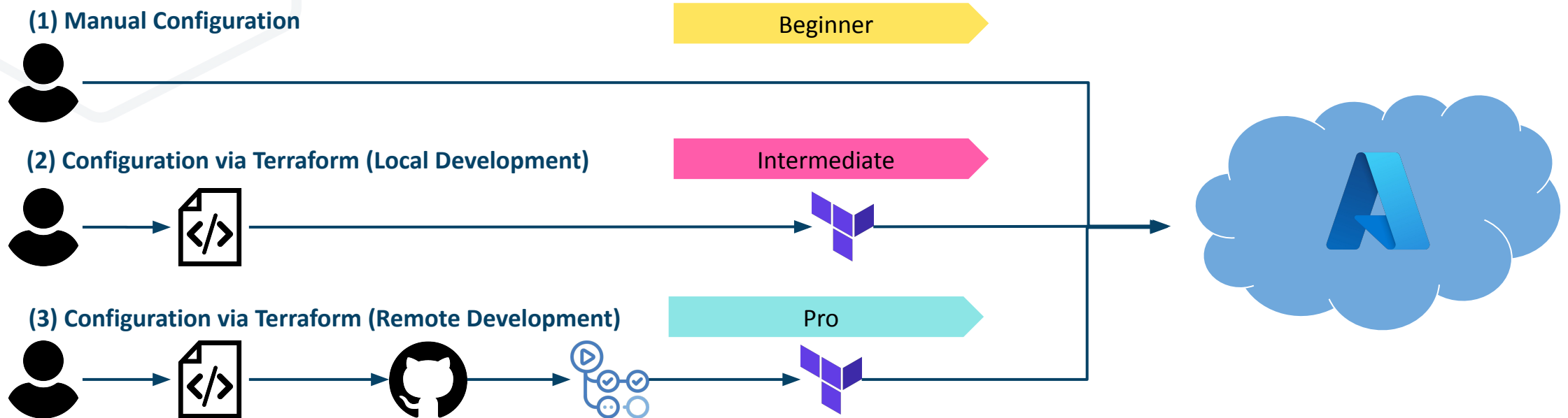
Cloud Services Control Comparison

On premises	IaaS	PaaS	SaaS
Applications	Applications	Applications	Applications
Data	Data	Data	Data
Runtime	Runtime	Runtime	Runtime
Middleware	Middleware	Middleware	Middleware
O/S	O/S	O/S	O/S
Virtualization	Virtualization	Virtualization	Virtualization
Servers	Servers	Servers	Servers
Storage	Storage	Storage	Storage
Networking	Networking	Networking	Networking
You Manage	Provider Manages		

Introduction - What is Public Cloud and Microsoft Azure?



Create your Cloud Infrastructure - Three Methods



Beginner

Create your Cloud Infrastructure - (1) Manual Configuration

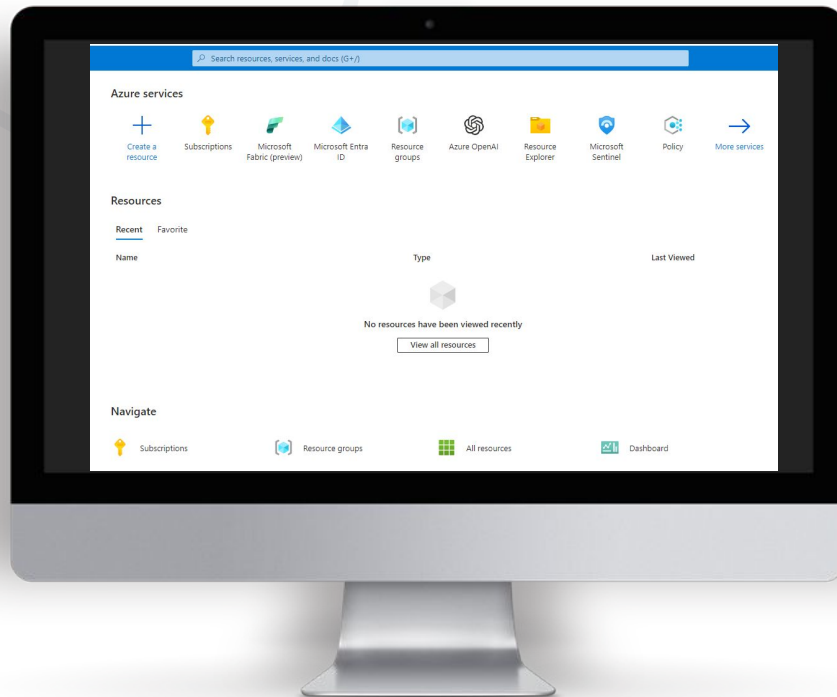
(1) Manual Configuration

Beginner



Demo -

(1) Manual Configuration

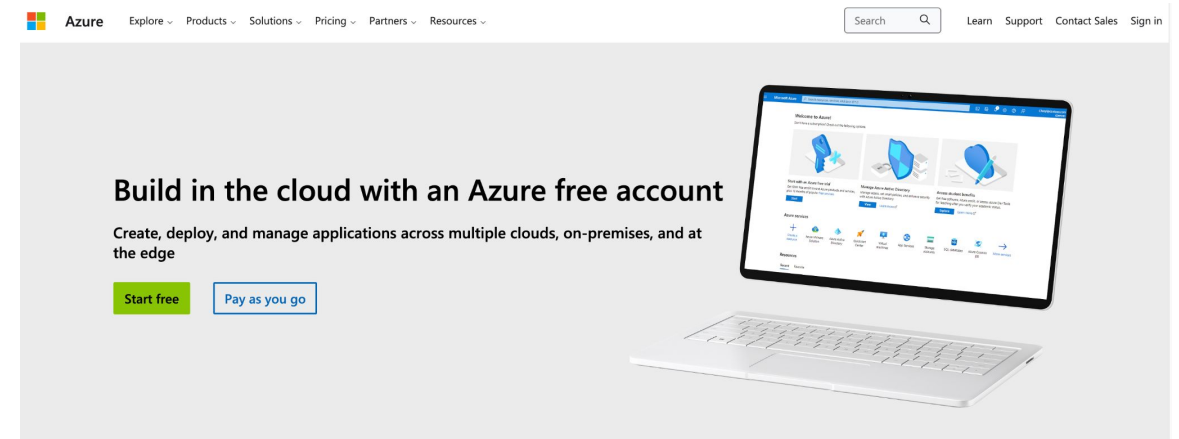


Steps:

1. Sign-In to Azure
2. Choose subscription
3. Choose resource group
4. Create a resource

Exercise - (1) Manual Configuration

Azure Free Trial: <https://azure.microsoft.com/en-us/free/>



Agreement

I understand that Microsoft may contact me about my free account.

☒ I agree to the [subscription agreement](#), [offer details](#).

☐ I would like to receive information, tips, and offers about Azure and other Microsoft products and services.

☐ I would like Microsoft to share my information with select partners so I can receive relevant information about their products and services.

[Privacy Statement](#)

[Next](#)

Identity verification by phone

Identity verification by card

[Sign up](#)

Create your Azure free account

- Popular services free for 12 months
- 55+ services always free
- USD200 credit to use in your first 30 days

No automatic charges

After your credit is over, we'll ask you if you want to continue with pay-as-you-go. If you do, you'll only pay if you use more than the free amounts of services.

Microsoft Azure					
Search resources, services, and docs (G+/)					
Home > Subscriptions >					
Subscriptions Default Directory (wellisheregmail.onmicrosoft.com)					
Add Advanced options					
Search for any fi... Subscriptions == global filter My role == all Status == all Add filter					
Subscription name ↑↓	Subscription ID ↑↓	My role ↑↓	Current cost	Secure Score ↑↓	Parent management group ↑↓
Free Trial	656558aa-9e57-426a-9df1-60ec1331c91f	Account admin	Unauthorized	-	

Exercise - (1) Manual Configuration

The screenshot shows the 'Create a resource group' page in the Microsoft Azure portal. The breadcrumb navigation is 'Home > Resource groups >'. The page title is 'Create a resource group'. There are three tabs: 'Basics' (selected), 'Tags', and 'Review + create'. A description of a resource group is provided. Under 'Project details', the 'Subscription' is set to 'Free Trial' and the 'Resource group' is an empty text box. Under 'Resource details', the 'Region' is set to '(US) East US'.

Microsoft Azure Search resources, services, and docs (G+ /)

Home > Resource groups >

Create a resource group

Basics Tags Review + create

Resource group - A container that holds related resources for an Azure solution. The resource group can include all the resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. [Learn more](#)

Project details

Subscription * Free Trial

Resource group *

Resource details

Region * (US) East US

The screenshot shows the 'Create a storage account' page in the Microsoft Azure portal. The breadcrumb navigation is 'Home > Storage accounts >'. The page title is 'Create a storage account'. There are six tabs: 'Basics' (selected), 'Advanced', 'Networking', 'Data protection', 'Encryption', 'Tags', and 'Review'. A description of Azure Storage is provided. Under 'Project details', the 'Subscription' is set to 'Free Trial' and the 'Resource group' is set to 'Select existing item...' with a 'Create new' link. Under 'Instance details', the 'Storage account name' is an empty text box, the 'Region' is set to '(Europe) West Europe', and the 'Performance' is set to 'Standard'. The 'Redundancy' is set to 'Geo-redundant storage (GRS)' and the checkbox 'Make read access to data available in the event of regional unavailability' is checked.

Microsoft Azure Home > Storage accounts >

Create a storage account

Basics Advanced Networking Data protection Encryption Tags Review

Azure Storage is a Microsoft-managed service providing cloud storage that is highly available, secure, durable, scalable, and redundant. Azure Storage includes Azure Blobs (objects), Azure Data Lake Storage Gen2, Azure Files, Azure Queues, and Azure Tables. The cost of your storage account depends on the usage and the options you choose below. [Learn more about Azure storage accounts](#)

Project details

Select the subscription in which to create the new storage account. Choose a new or existing resource group to organize and manage your storage account together with other resources.

Subscription * Free Trial

Resource group * Select existing item... [Create new](#)

Instance details

Storage account name *

Region * (Europe) West Europe [Deploy to an edge zone](#)

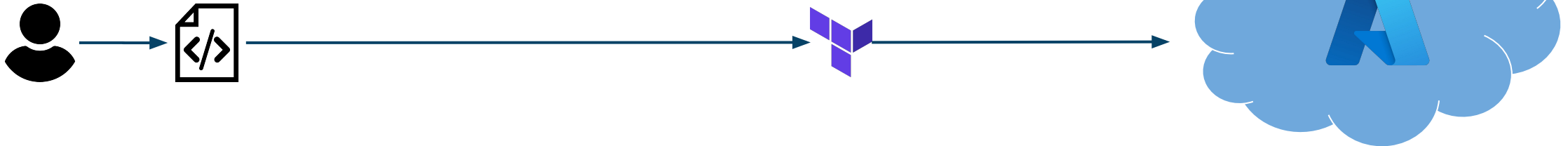
Performance * ☒ Standard: Recommended for most scenarios (general-purpose v2 account) ☐ Premium: Recommended for scenarios that require low latency.

Redundancy * Geo-redundant storage (GRS) ☒ Make read access to data available in the event of regional unavailability.

Create your Cloud Infrastructure -

(2) Configuration with IaC (Local Deployment)

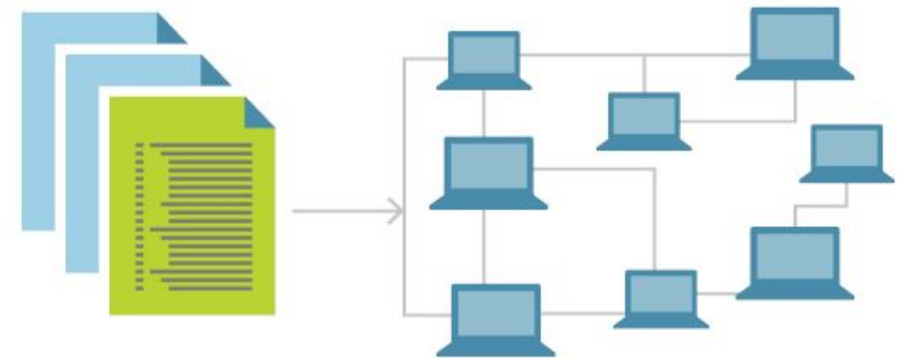
(2) Configuration via Terraform (Local Development)



Create your Cloud Infrastructure -

(2) Configuration with IaC (Local Deployment)

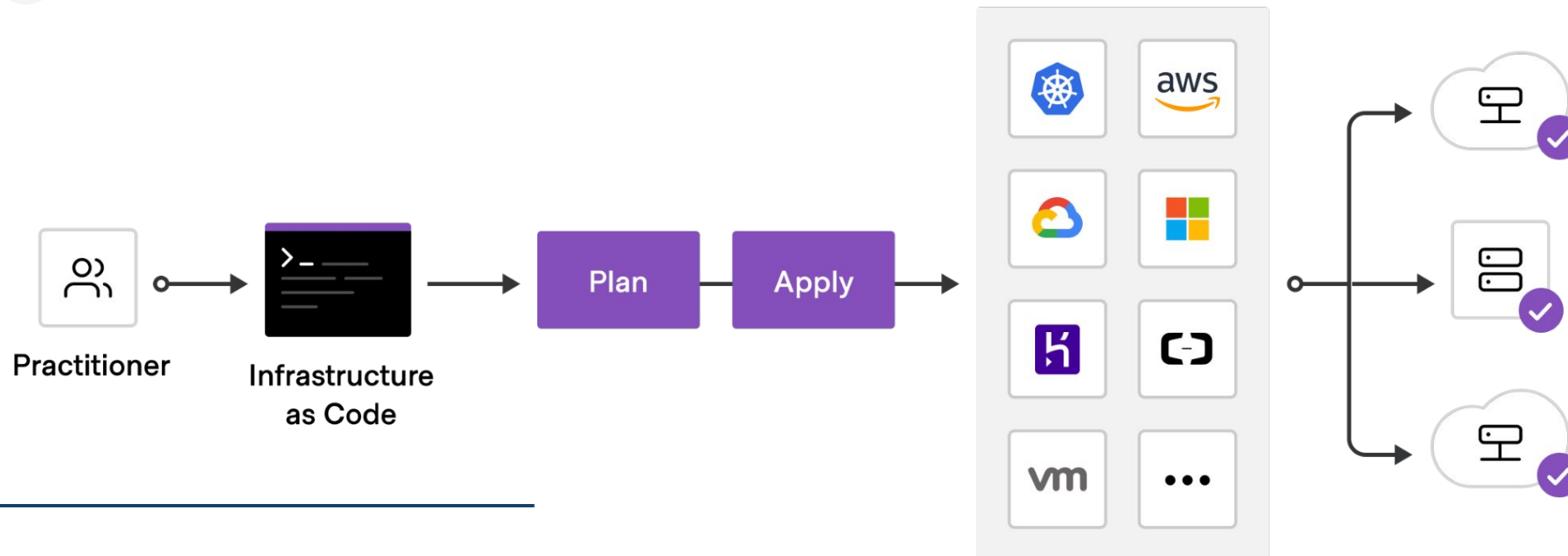
- Description of IT infrastructure such as networks, VMs, etc. via code
- Integral part of DevOps methodology
- Advantages over manual configuration
 - Consistency
 - Scalability
 - Fewer errors
 - Version control
 - Cost reduction
 - Faster deployments



Create your Cloud Infrastructure -

(2) Configuration with IaC (Local Deployment)

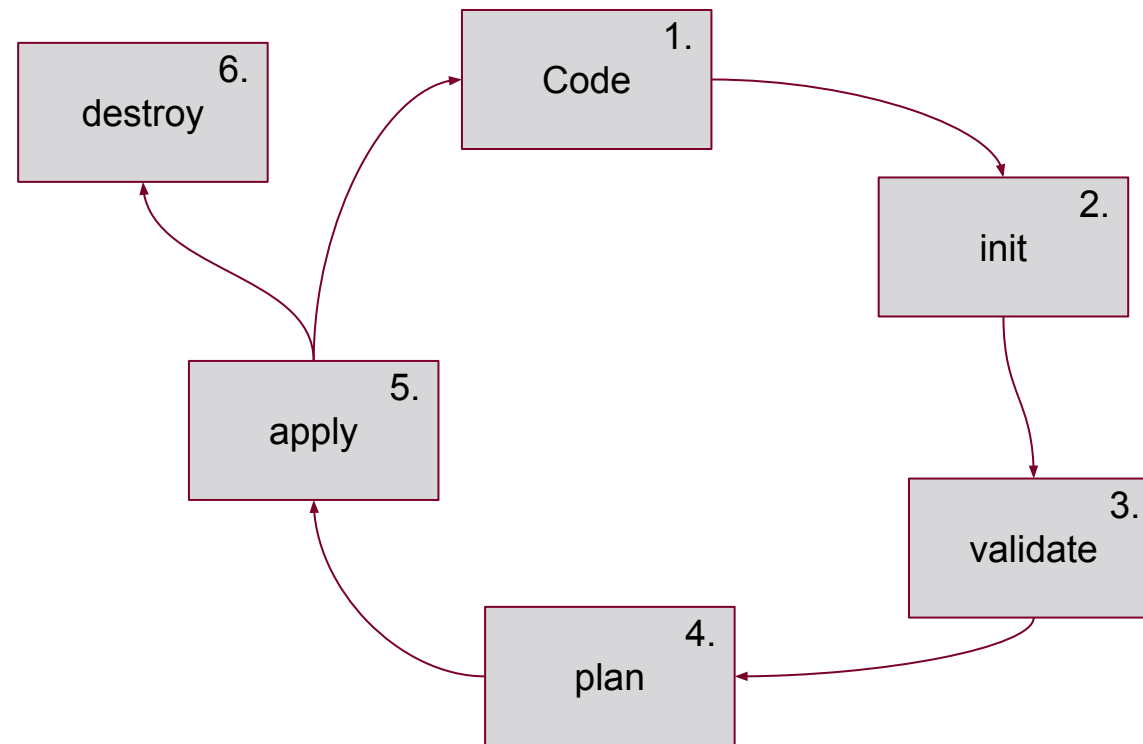
- Open-source tool for Infrastructure as Code (IaC) automation
- Cloud-agnostic → can be applied to various cloud platforms



Create your Cloud Infrastructure -

(2) Configuration with IaC (Local Deployment)

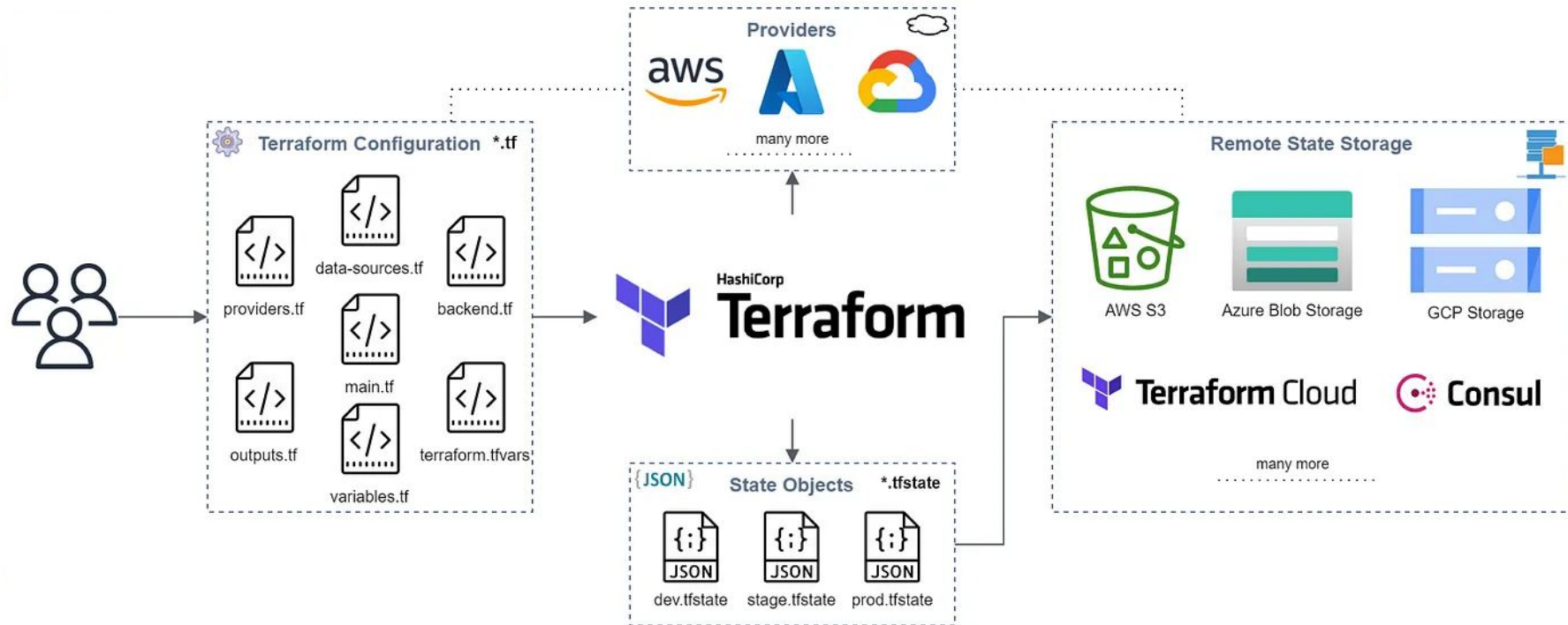
- Workflow Lifecycle



Create your Cloud Infrastructure -

(2) Configuration with IaC (Local Deployment)

- Terraform state holds the consistency and versioning



Demo -

(2) Configuration with IaC (Local Deployment)

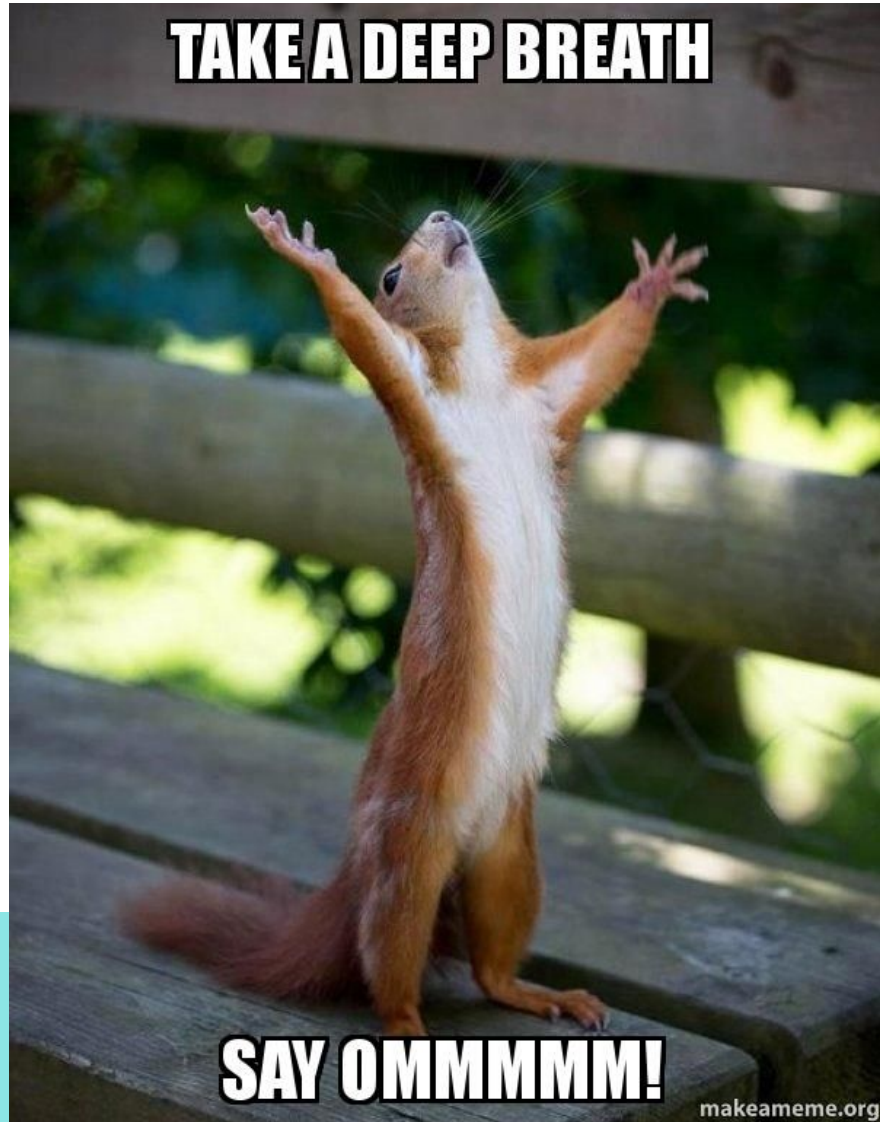


Steps:

- Create Code describing your Infrastructure
- Set details for provider to connect to Azure
- Deploy with Terraform commands

Exercise - (2) Configuration with IaC (Local Deployment)

1. Install Terraform: <https://developer.hashicorp.com/terraform/tutorials/azure-get-started/install-cli>
2. Install Azure CLI (skip step about creating service principal):
<https://developer.hashicorp.com/terraform/tutorials/azure-get-started/azure-build>
3. Clone the GitHub repo: <https://github.com/weiligao/terraform-github-demo>
4. Run in following order: terraform init, terraform plan, terraform apply
5. Stepwise uncomment the cloned terraform code and run above commands again, and check the results in Azure



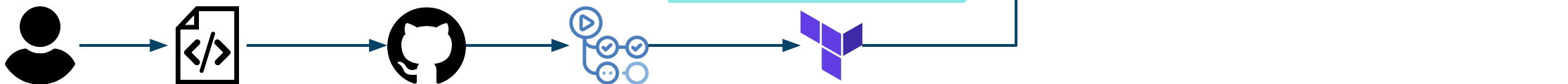
Break

20 minutes

Create your Cloud Infrastructure -

(3) Configuration with IaC (Remote Deployment)

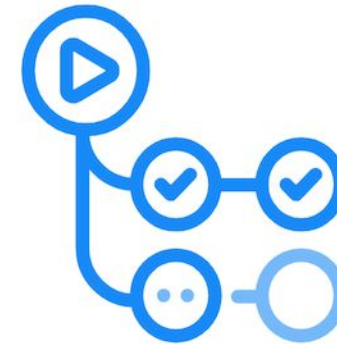
(3) Configuration via Terraform (Remote Development)



Create your Cloud Infrastructure -

(3) Configuration with IaC (Remote Deployment)

- What is **GitHub**?
 - Platform for code management and teamwork
- What is **GitHub Actions**?
 - Automation of development processes
 - Rapid testing and deployments



GitHub Actions

Create your Cloud Infrastructure -

(3) Configuration with IaC (Remote Deployment)

- **Advantages:**

- Accelerates development.
- Enhances code quality.
- Facilitates rapid deployment.

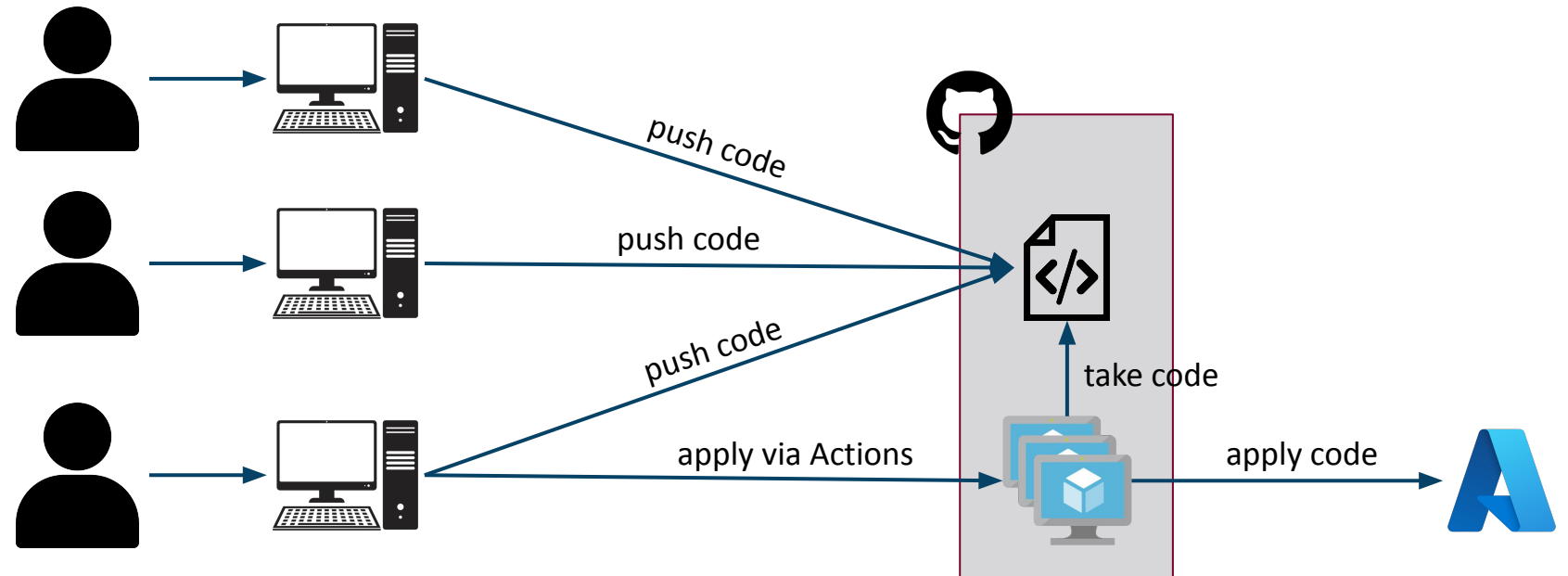
- **Use Cases:**

- Automated testing (CI)
- Instant deployment (CD)
- Customizable workflows

Create your Cloud Infrastructure -

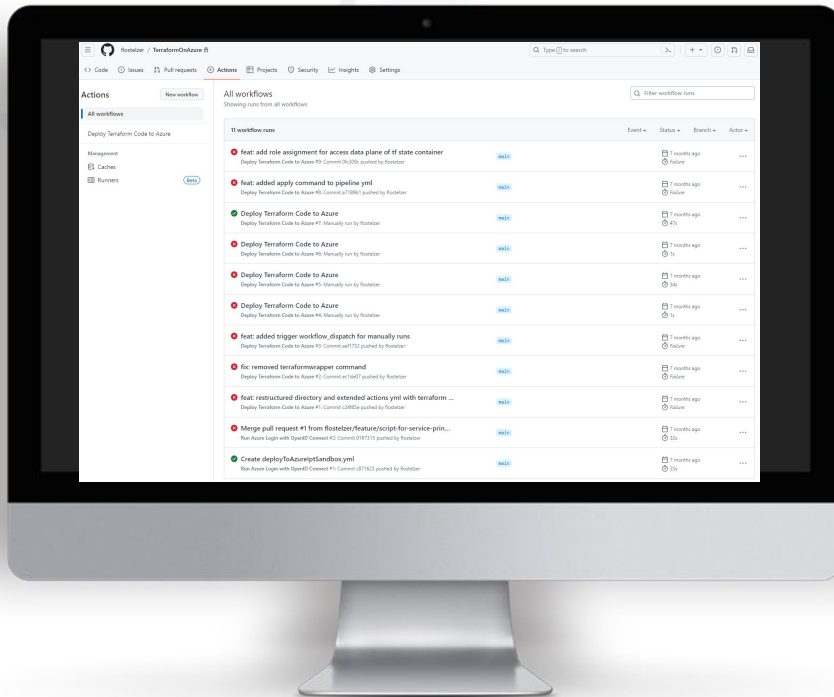
(3) Configuration with IaC (Remote Deployment)

- Development flow with GitHub:



Demo -

(3) Configuration with IaC (Remote Deployment)



Steps:

- Adjust code for deployment via GitHub Actions
- Upload Code
- Create Pipeline with YAML-File
- Deployment via GitHub Actions

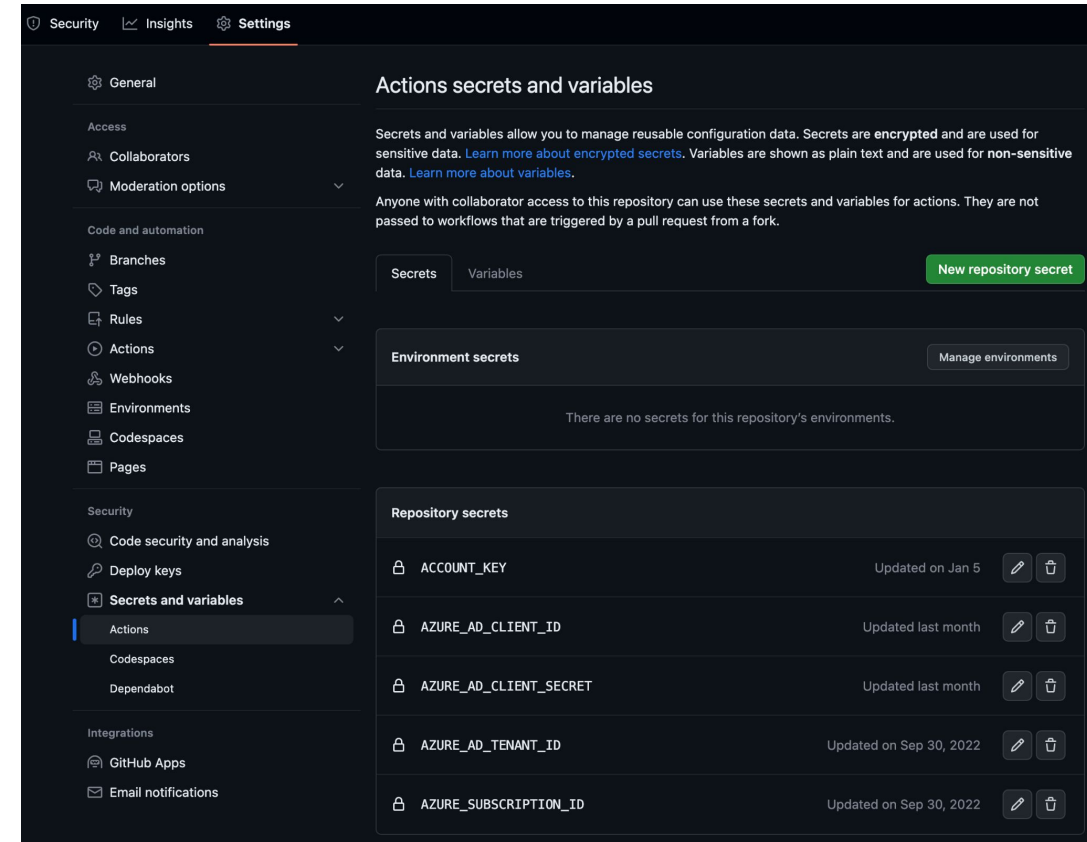
Exercise - (3) Configuration with IaC (Remote Deployment)

1. Create Service Principal:
<https://developer.hashicorp.com/terraform/tutorials/azure-get-started/azure-build#create-a-service-principal>
2. Create remote backend (storage account in Azure), save its access key somewhere (you'll need it in the next step) and uncomment code for remote backend in main.tf:
<https://learn.microsoft.com/en-us/azure/developer/terraform/store-state-in-azure-storage?tabs=azure-cli>

Exercise -

(3) Configuration with IaC (Remote Deployment)

3. Create a new GitHub repo and configure Action secrets
4. Commit and push your code into the new repo:
<https://docs.github.com/en/migrations/importing-source-code/using-the-command-line-to-import-source-code/adding-locally-hosted-code-to-github>



Beginner

Intermediate

Pro

Create your Cloud Infrastructure - Three Methods

(1) Manual Configuration

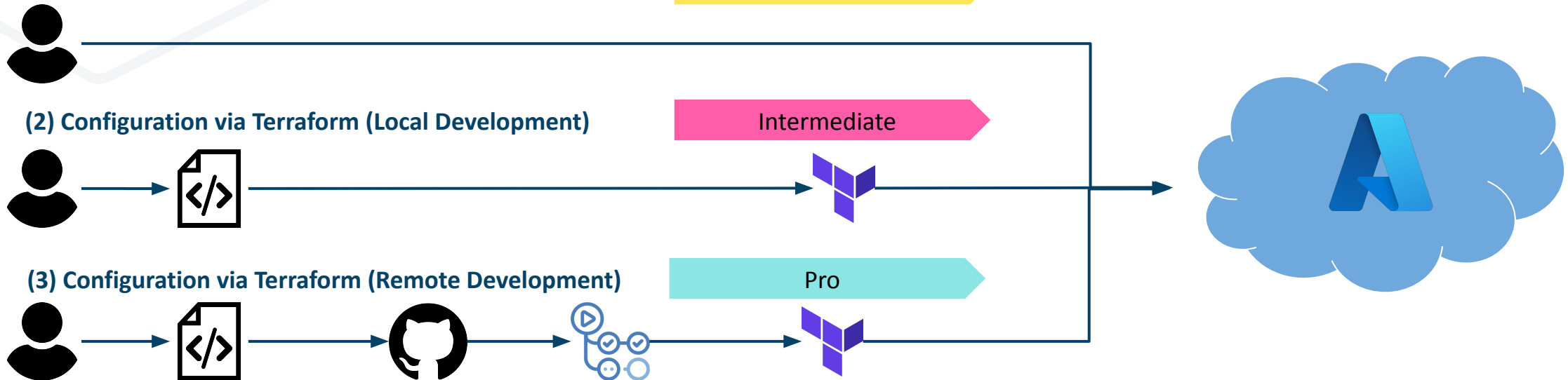
Beginner

(2) Configuration via Terraform (Local Development)

Intermediate

(3) Configuration via Terraform (Remote Development)

Pro



Summary

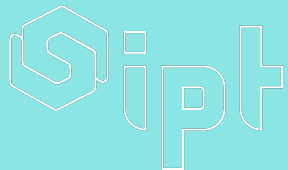
- **Take-aways:**
 - In enterprise and real-world context use always the **Pro Level** for configuration of your infrastructure
 - **Every** serious enterprise is using this approach in a modern software development environment
 - **Almost mandatory** - not just best practice.

Questions

- What do you want to know?

Thank you!

For participation, listening and engagement.



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Sources

- <https://dev.to/artemkobilinskiy/cloud-service-models-saas-paas-iaas-which-is-better-for-business-574k>
- [1] <https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-a-public-cloud>