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Cloud Computing

Cloud Computing



Cloud Computing

- What is cloud computing?
- Shared responsibility
- Cloud models
- Capital vs operational costing

Cloud Computing

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Cloud Benefits



Benefits of the cloud



Cloud Service Types



IaaS, PaaS, and SaaS

What is Cloud Computing?



The Start of Digital Revolution – Challenge

<https://Bellainnovation.com>



Slow

Unreliable

Fast

Accessible

Do Not Crash

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Bella Innovation's website is running on outdated servers, making it slow and unreliable. With a growing customer base, they need a solution that's fast, accessible, and doesn't crash during high traffic periods.

The Start of Digital Revolution – Solution



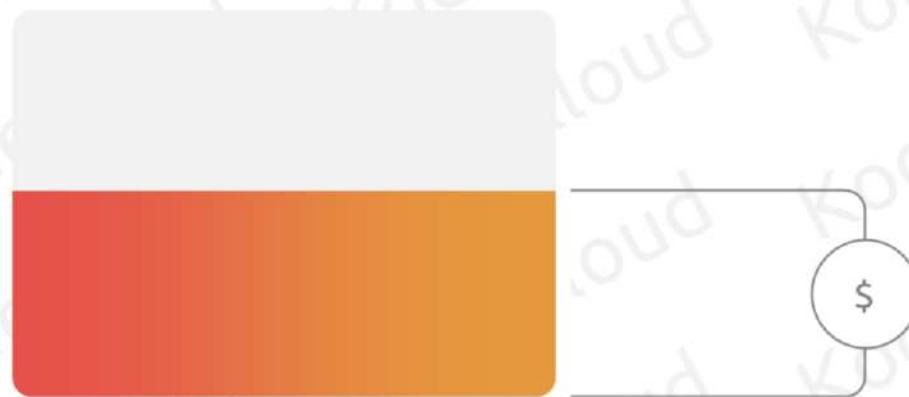
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The company is considering moving to cloud computing to address these issues.



The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing

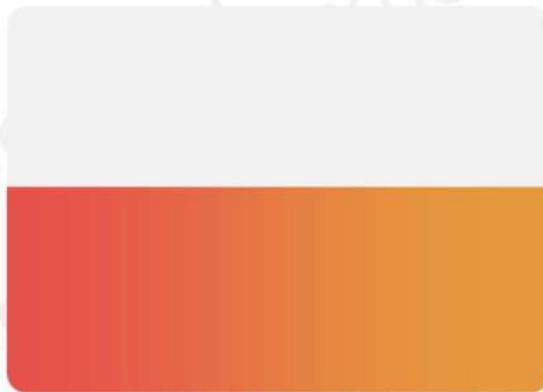


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Cloud service providers offer a consumption-based model, meaning that end-users only pay for the resources that they use, leading to better cost prediction and billing based on actual usage.

The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



Resource Optimization:
Paying Only for What You Use

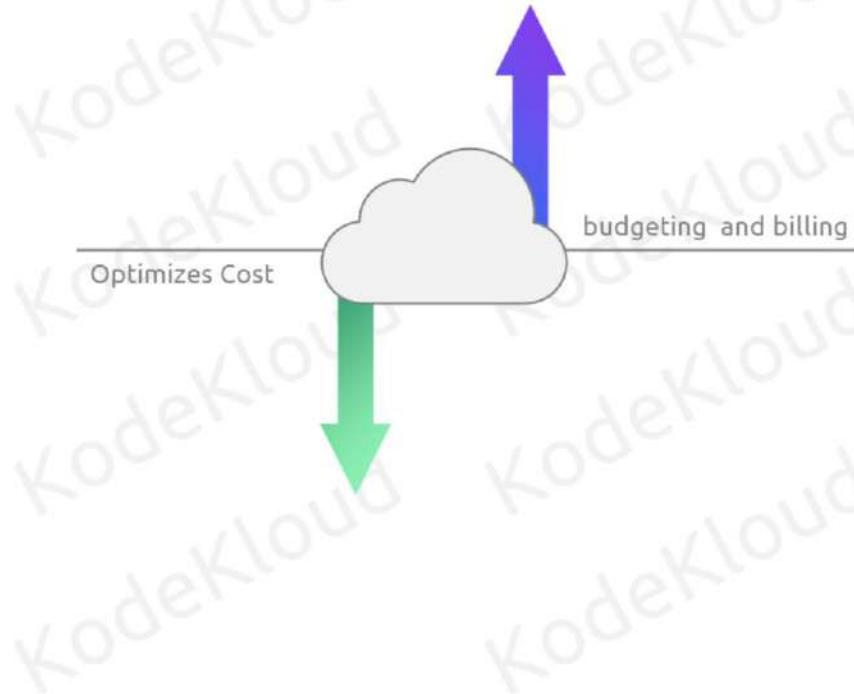
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This is a game changer because it means that end users like Bella Innovation only pay for these resources that they actually use no more, no less



The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing

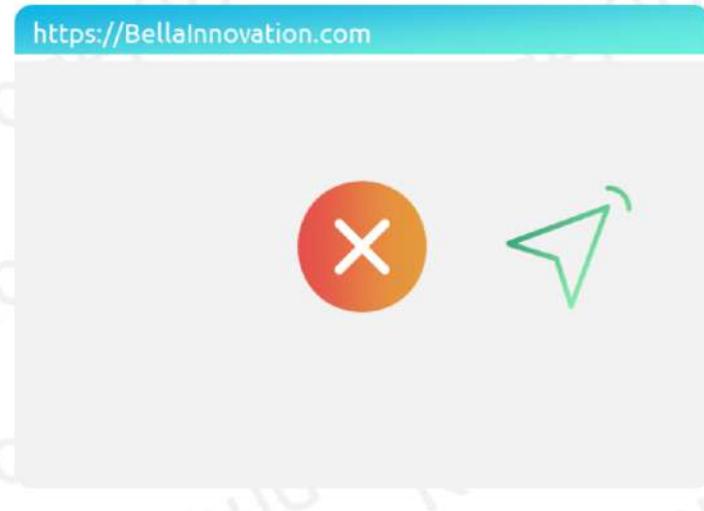


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This not only optimizes cost, but also enhances predictability in budgeting and billing based on real usage with cloud computing

The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



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Bella Innovation is looking at a future where website crashes during high traffic are a thing of the past, and scalability is just a click away

The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



IMP

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Cloud computing is not just a kick fix, it's a strategic move by IMP embracing the cloud's consumption based model

The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



Efficiency



Predictability



Scalability

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Bela innovation positions itself for efficiency and build well. Predictability and scalability are just the starters. There are other benefits of moving to the cloud, which we will see in the upcoming lessons.

The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



Resilient



Scalable



Cost - Effective

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So Bella Innovations is setting the stage for a more resilient, scalable, and costeffective digital presence

The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



Solve Issues and
Innovate



Industry Leader

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And with this move, the company is not just solving current issues, but also unlocking the potential to innovate and lead in their industry



The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



Cloud Computing is Vast and Varied

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But the journey doesn't end here The cloud is vast and varied, and choosing the right environment is very crucial



The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



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As we pivot to our next topic, we will explore cloud models from the privacy and control of a private cloud to the wide reaching resources of the public cloud and the flexibility of a hybrid cloud



The Start of Digital Revolution – Solution

Cloud providers offer usage-based billing



Cloud Models

01 | Benefits

02 | Considerations

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Each model offers unique benefits and considerations that can tailor to the specific needs of any business. So let's delve into these models and discover how to harness the full power of cloud computing for a transformative business impact.

Cloud Models





Bella Innovation's Private Space – Challenge

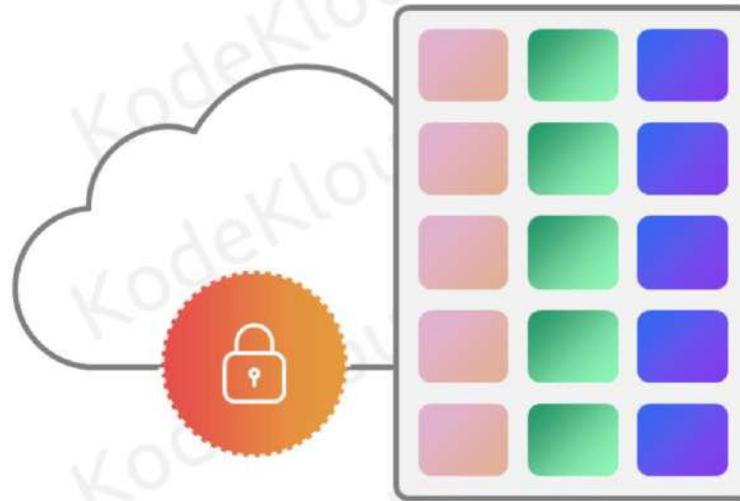


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Bella Innovation has sensitive design data that they want to keep secure and proprietary.



Bella Innovation's Private Space – Solution



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They contemplate setting up a private cloud within their own datacenter.

Bella Innovation's Private Space – Solution



Internal cloud control

Data center-based services

Secure operations

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A private cloud allows an organization to create a cloud environment in their datacenter. They are responsible for operating and securing the services they provide, without giving access to external users.



Bella Innovation's Private Space – Solution



Operate



Secure

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The company is solely responsible for operating and securing the service they provide

Bella Innovation's Private Space – Solution



Infrastructure



Software



Platform

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They manage the infrastructure, software, and platform,

Bella Innovation's Private Space – Solution



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which means they are not relying on any external providers to safeguard their critical assets



Bella Innovation's Private Space – Solution

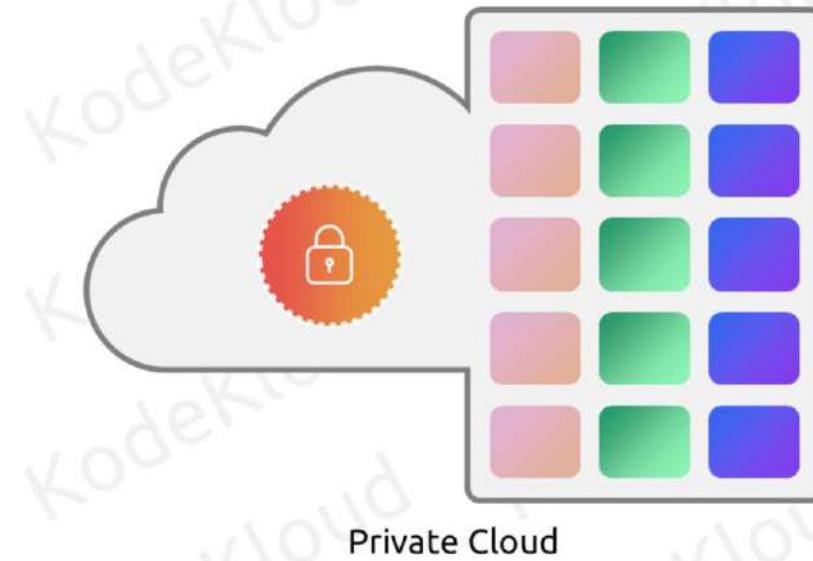


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Furthermore, this setup enables biller innovation to achieve high levels of data security and operational performance as they're not subject to public internet or shared resources that could introduce vulnerabilities



Bella Innovation's Private Space – Solution



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In summary, the private cloud is a powerful solution for businesses with stringent security requirements and a need for bespoke IT infrastructure



Bella Innovation's Private Space – Solution



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It's a choice that empowers Bella innovation to protect and manage their proprietary data with the highest standards



Bella Innovation's Private Space – Solution



Privacy & Security

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In the realm of cloud computing, the private cloud stands out for its commitment to privacy and security



The diagram illustrates the 'Bella Innovation's Private Space – Solution'. It features a central cloud icon containing a red padlock, symbolizing security. To the right of the cloud is a 'Data Centre' represented by a grid of 12 colored squares arranged in three rows of four. The colors are pink, green, and blue. The entire setup is enclosed within a dotted rectangular border labeled 'Bella Innovation' at the top left corner.

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As we have seen with Bella innovation When handling sensitive design data, a private cloud offers best security within their own data center

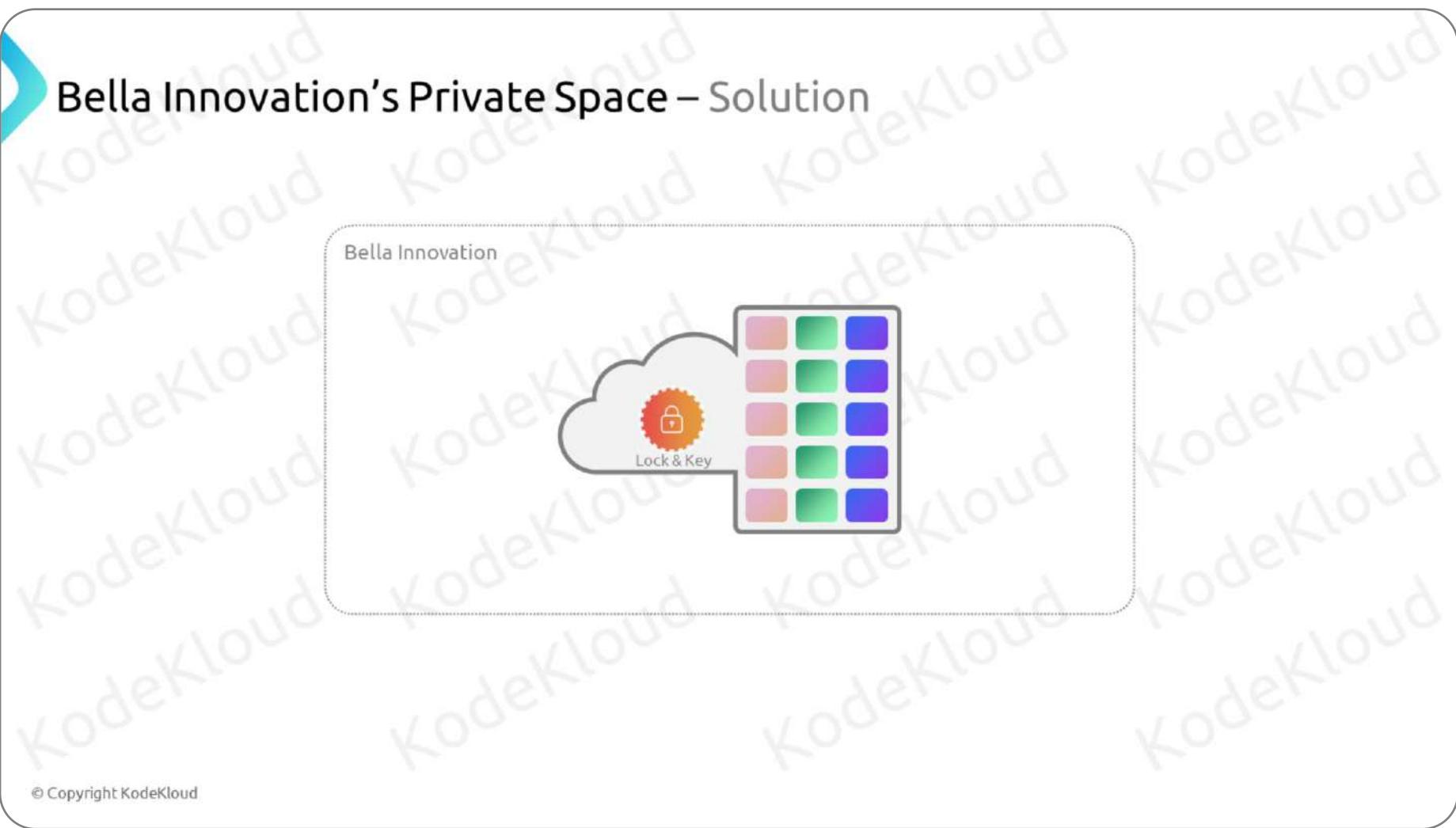


Bella Innovation's Private Space – Solution



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It's a fortress of solitude where they can operate and Secure their services autonomously



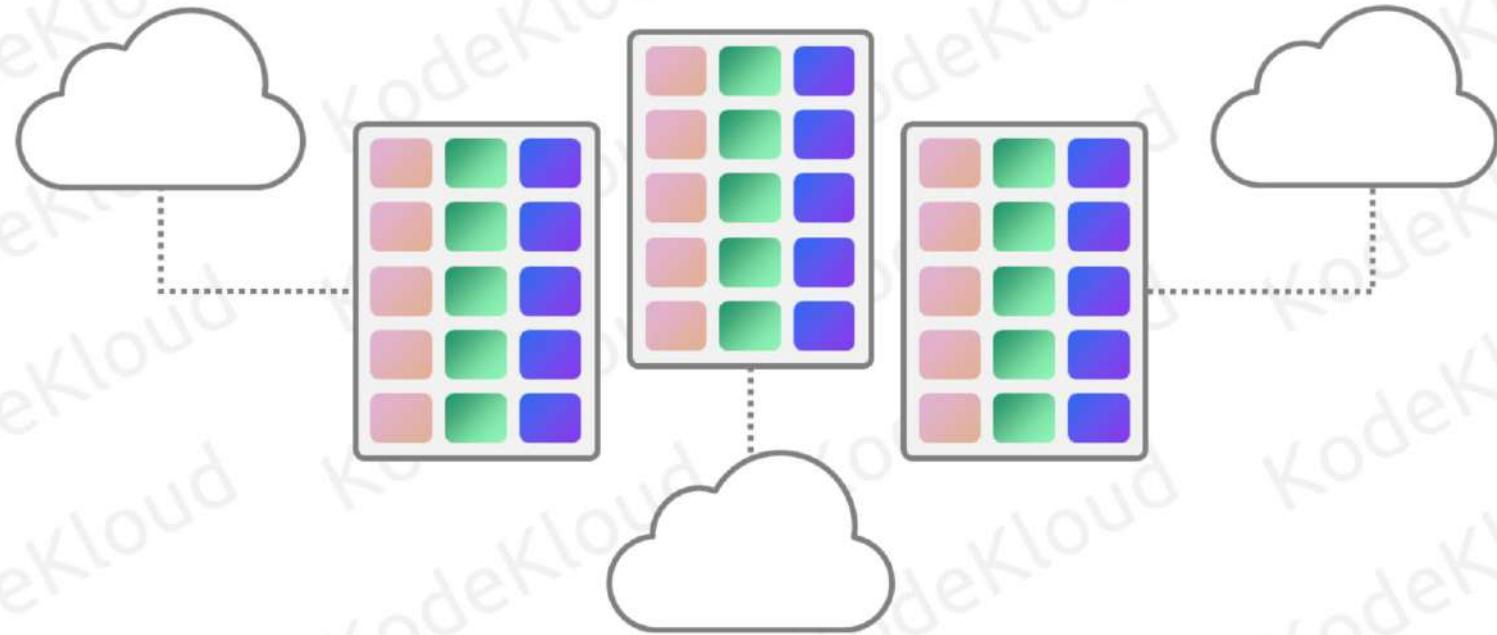
The diagram illustrates a cloud-based solution for Bella Innovation. A dotted-line box labeled "Bella Innovation" contains a white cloud icon. Inside the cloud is a red circular icon with a white padlock and the text "Lock & Key". To the right of the cloud is a 4x3 grid of colored squares, with the top-left square being orange. This visual metaphor represents how Bella Innovation's proprietary information is securely stored and managed.

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Ensuring proprietary informations remains under lock and key. Now imagine Bela innovation is ready to expand, to break new ground with the product that could change the game



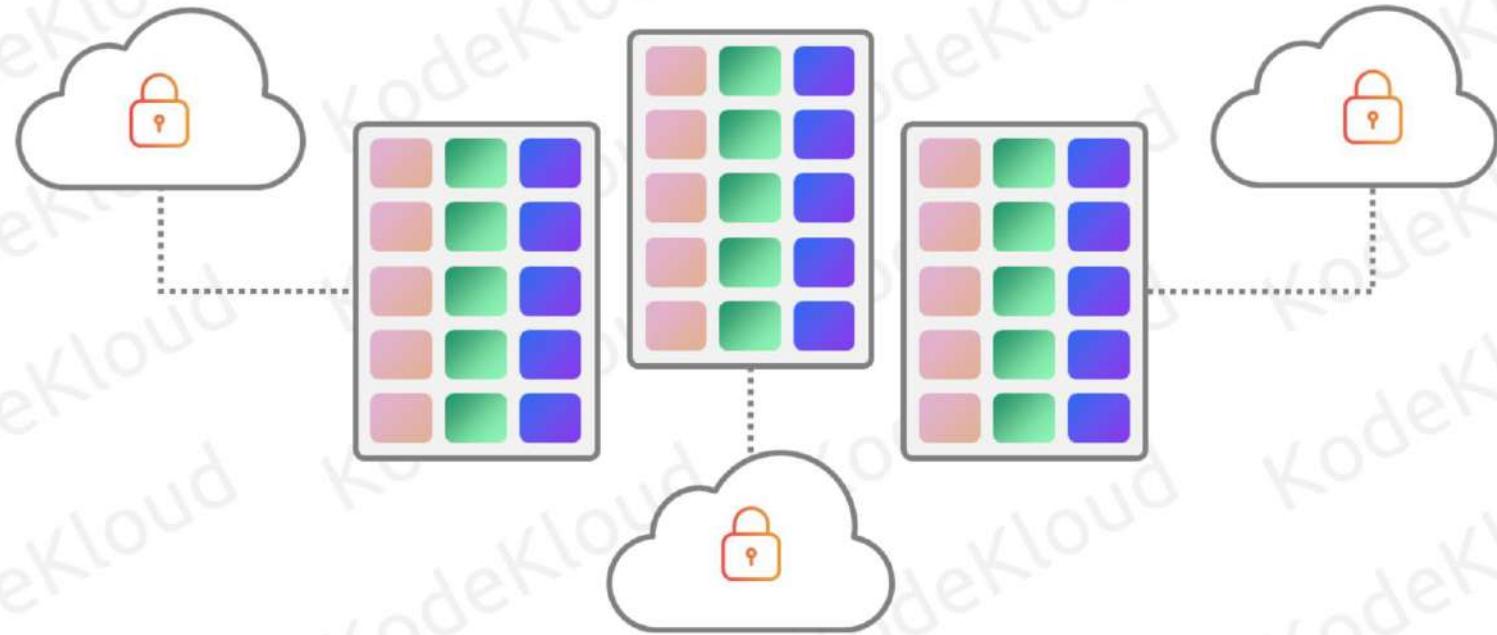
Bella Innovation's Expansion to Public Cloud – Challenge



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The company needs to scale resources quickly to launch a new product line and handle unpredictable traffic.

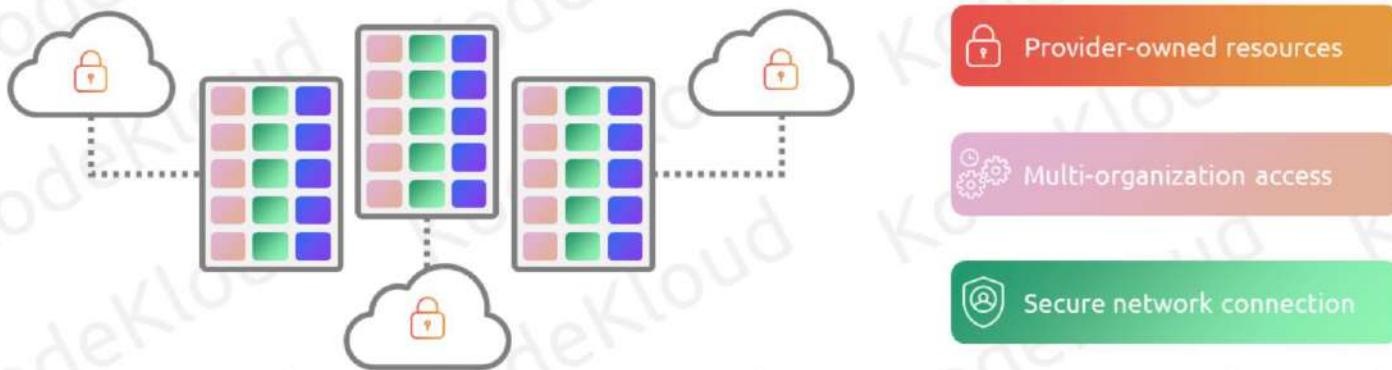
Bella Innovation's Expansion to Public Cloud – Solution



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They are considering leveraging a public cloud service.

Bella Innovation's Expansion to Public Cloud – Solution



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A public cloud is owned by a cloud services provider and offers resources and services to multiple organizations. It's accessed via a secure network connection, often over the internet.

Bella Innovation's Expansion to Public Cloud – Solution

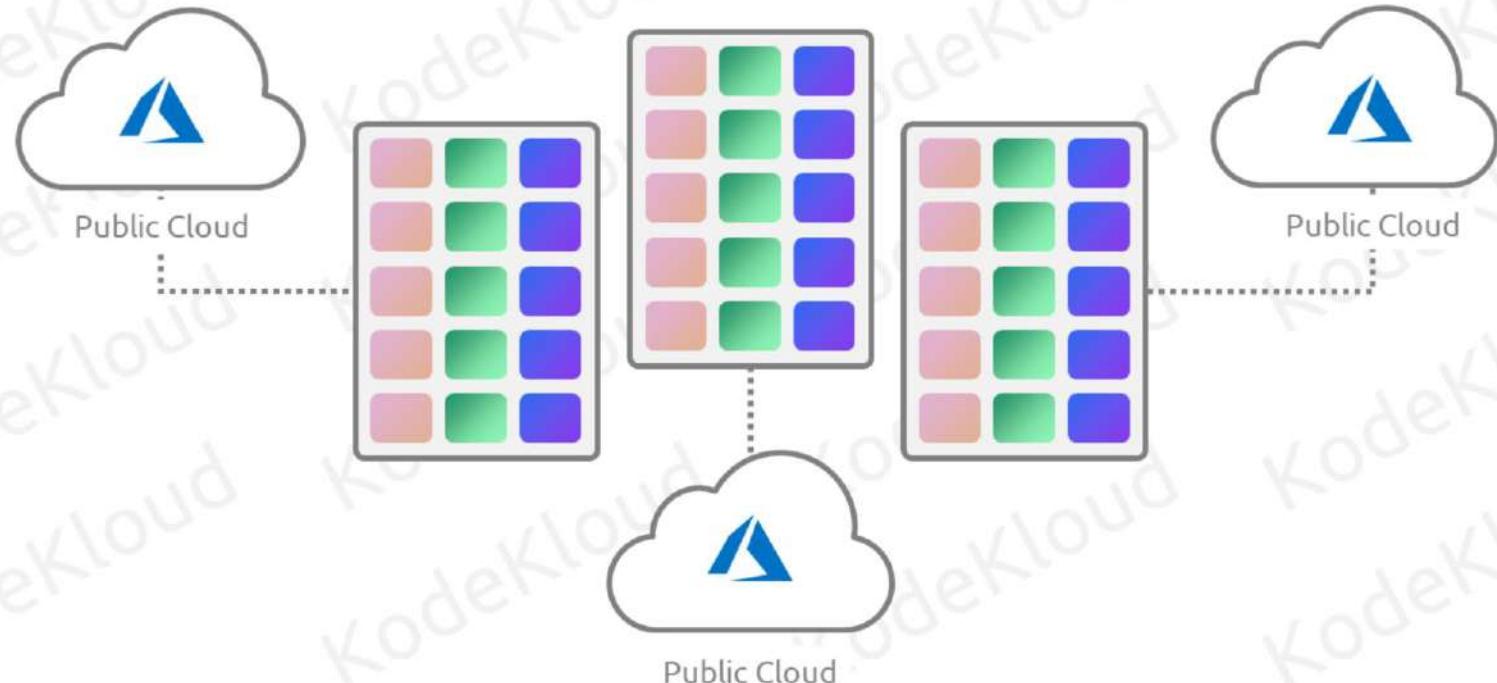


Bela Innovations Data Centers

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So earlier it was within Bela Innovations data centers, so they can simply access it because it was local

Bella Innovation's Expansion to Public Cloud – Solution



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Now this is public cloud, so they need to access this using internet like Azure portal, which you will see later is where it offers a UI experience where you can click create things, manage things from a web browser

Bella Innovation's Expansion to Public Cloud – Solution



How Public Cloud works?

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So that's how public Cloud works



Bella Innovation's Expansion to Public Cloud – Solution



Deploy



Demand



Price Optimization

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So in this shared space, they can rapidly deploy their services, scale on demand, and only pay for what they use, all while enjoying the rawest infrastructure managed by the cloud provider



Bella Innovation's Expansion to Public Cloud – Solution

Bella Innovation



Scalable



Flexible

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As we have seen, the public cloud opens up a world of possibilities for Bella innovation, offering the scalability and flexibility needed to support their growing customer base and product lines



Bella Innovation's Expansion to Public Cloud – Solution



Abundant
Resources



Endless
Opportunities

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It's the digital equivalent of bustling marketplace where resources are abundant and opportunities are endless

Combining the Best of Both Worlds – Challenge



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Bella Innovation wants both the security of a private cloud for sensitive data and the scalability of a public cloud for customer-facing services.

Combining the Best of Both Worlds – Solution



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They decide to adopt a hybrid cloud strategy.

Combining the Best of Both Worlds – Solution



↗ Public-private fusion

➤ Flexible application hosting

📍 Optimal location utilization

Hybrid cloud combines public and private clouds, allowing applications to run in the most appropriate location.

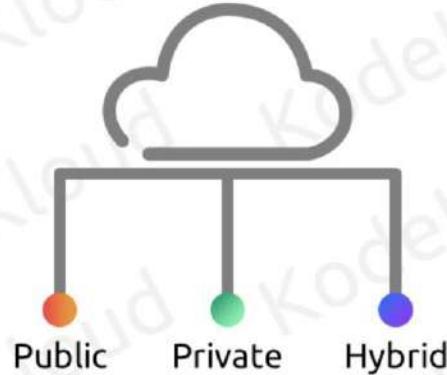
Comparison – Challenge



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Bella Innovation needs to determine which cloud model will best meet their business needs without unnecessary expenses.

Comparison – Solution



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They evaluate the characteristics and benefits of public, private, and hybrid clouds.

Comparison – Solution

Public Cloud

- Capital-free scaling
- Quick app provisioning
- Pay-as-you-go cost

Private Cloud

- Hardware costs
- Sovereign control
- Maintenance responsibility

Hybrid Cloud

- Versatile scalability
- Strategic application placement
- Organizational governance

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Public Cloud:

Scaling up doesn't require upfront capital investment.

Rapid on-demand provisioning and release of applications is possible.

Cost model is based on actual consumption - you only pay for the resources utilized.

Private Cloud:

Initial and ongoing costs are needed for hardware acquisition and upkeep.
Enterprises have sovereign control over their resources and security measures.
Responsibility for the maintenance and updating of hardware lies with the organization.

Hybrid Cloud:

Offers a versatile environment that combines scalability and security.
Businesses can strategically place their applications in the most advantageous environment.
Maintains organizational governance over security protocols, regulatory compliance, and data sovereignty.



Comparison – Solution



Security
Protocol



Regulatory
Compliance



Data
Sovereignty

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So you have the flexibility and it brings in that organizational governance of our security protocols, regulatory compliance, and the data sovereignty

Comparison – Solution

Public Cloud

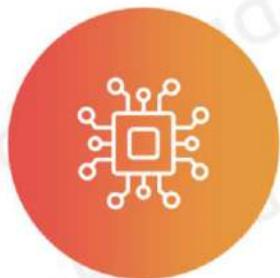


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So if you ask me how easy to set up a public cloud, it's very easy because you don't have to buy hardware, you don't have to do cabling or anything, you just need a laptop and you can connect to public cloud So setting a public cloud is very easy

Comparison – Solution

Private Cloud



Hardware



Air Conditioning



Cable



Network

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Private cloud, it's very complicated and it's very tough because you have to buy the hardware, you have to bring the air conditioning, electricity cabling, you have to bring in the networking, and a lot of complex stuff will happen

Comparison – Solution

Hybrid Cloud

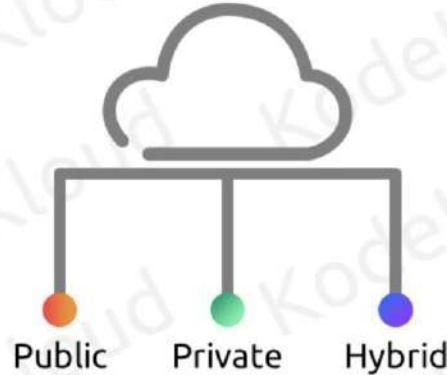


Complexity

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Hybrid cloud, since a part of that, this private cloud, you still have the complexity there

Comparison – Solution



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So that's how easy to set up these cloud models And based on the requirement you'll be choosing which one is better

Capital
Costing

vs

Operational
Costing

So you might be hearing a lot about capital investment or pay as go or operational costing Let's understand what it is

Capital vs Operational Costing





Financial Shift – Challenge

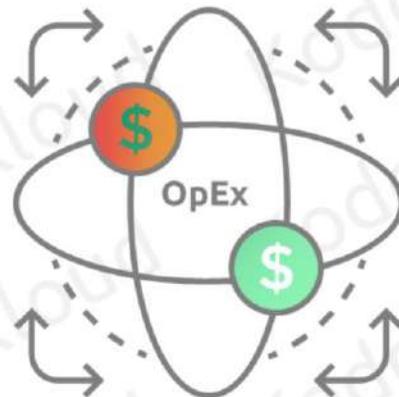


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With fluctuating seasonal demands, Bella Innovations struggles with the financial rigidity of upfront hardware investments.



Financial Shift – Solution



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They are exploring a shift to an OpEx financial model for their IT needs.

Financial Shift – Solution



Operational Expenditure (OpEx)

- Costs incurred for goods and services on an ongoing basis, with expenses aligned to usage
- Invoicing for these expenditures is immediate



Capital Expenditure (CapEx)

- Initial investment in physical assets
- The value of capital expenses diminishes over time through depreciation



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Capital expenditure (CapEx)

Initial investment in physical assets.

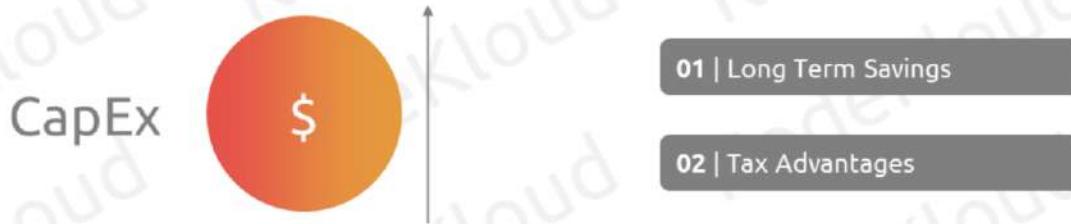
The value of capital expenses diminishes over time through depreciation.

Operational expenditure (OpEx)

Costs incurred for goods and services on an ongoing basis, with expenses aligned to usage.

Invoicing for these expenditures is immediate.

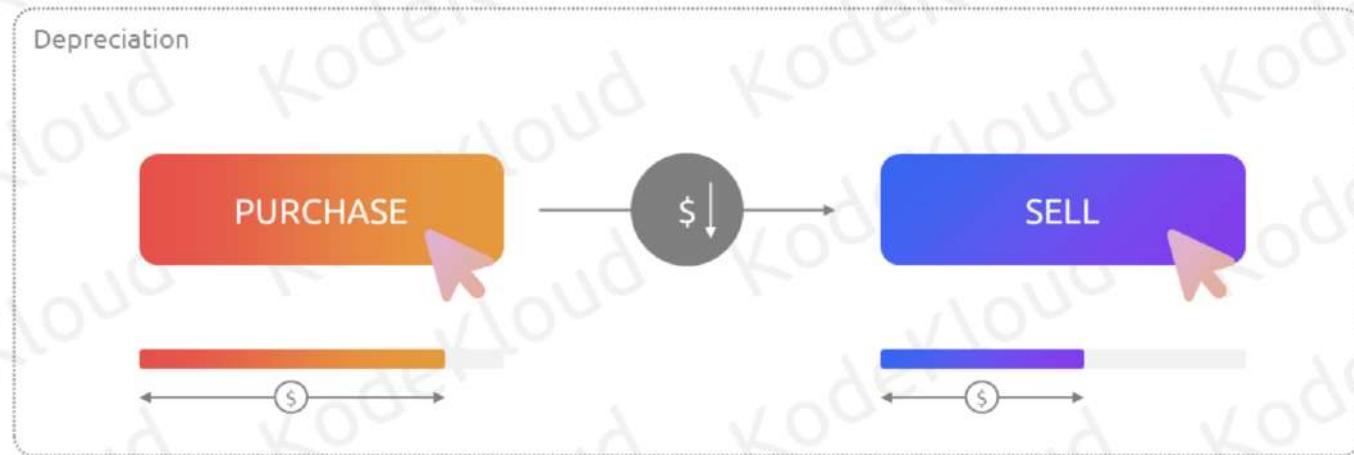
Financial Shift – Solution



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So while CapEx requires a significant upfront cost, it can lead to substantial longterm savings and tax advantages

Financial Shift – Solution



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So if I purchase a server for \$,, when I resell it off for a couple of years, the value will be depreciated because it's going to be a secondhand server or a used server So the value that I might be getting is around \$, or \$, So there is depreciation

Financial Shift – Solution



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So understanding the balance between opex and CapEx is crucial for businesses, especially when considering cloud computing models. OPEX can offer the agility needed in today's fast-paced market. While CapEx can represent long-term investment in companies' future,

Financial Shift – Solution



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the choice between opex and CapEx can significantly impact business strategy and operational flexibility



Financial Shift – Solution



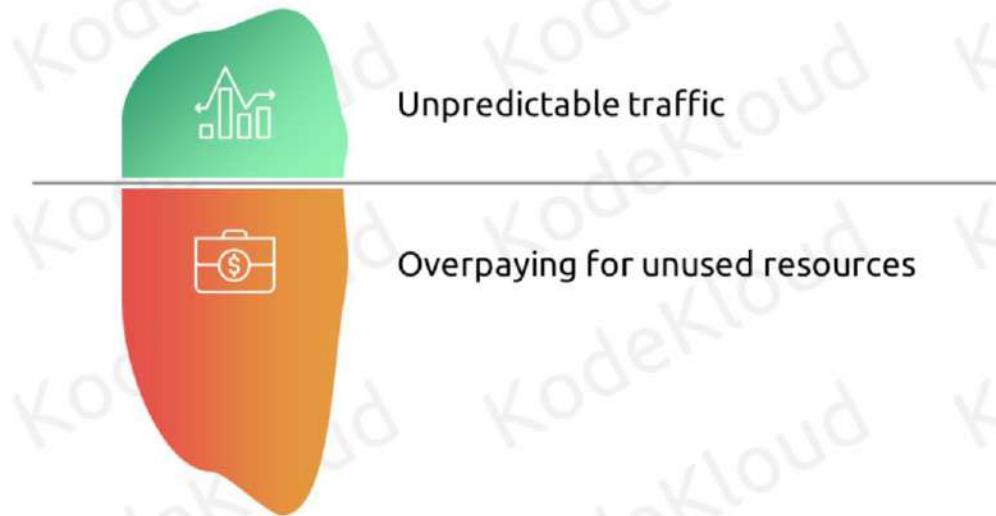
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So let's see how this concept fits into our cloud computing environment

Consumption- Based Model



Paying for What You Use – Challenge

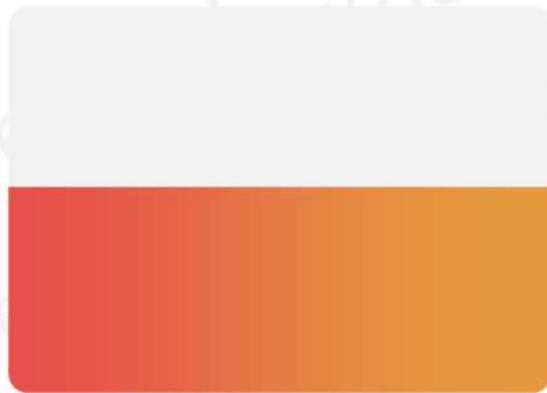


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The company's unpredictable traffic leads to either overpaying for unused resources or under-provisioning and losing sales.



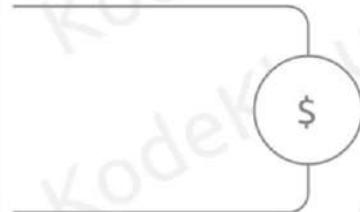
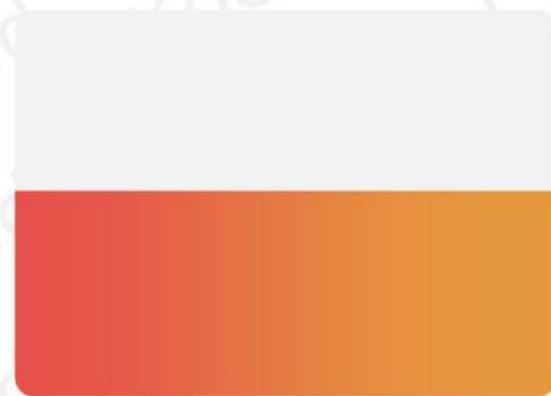
Paying for What You Use – Solution



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They choose to utilize a consumption-based model from their cloud provider.

Paying for What You Use – Solution



Pay-as-you-go billing

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Cloud service providers offer a consumption-based model, meaning that end-users only pay for the resources that they use, leading to better cost prediction and billing based on actual usage.

Paying for What You Use – Solution



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This approach is a financial game changer in the world of cloud computing

Paying for What You Use – Solution



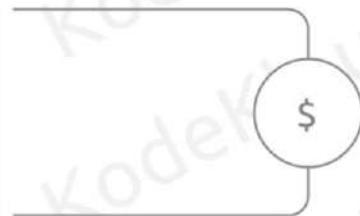
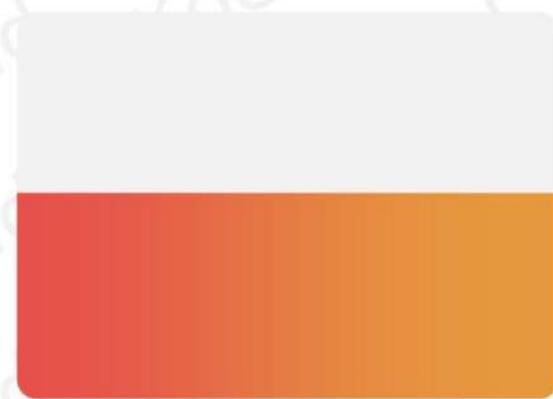
01 | Flexible resource model

02 | Pay-as-you-go billing

03 | Avoid resource lock-in

Cloud service providers have engineered a model where flexibility is key. Instead of locking in resources that may or may not be used, they offer pay for what you use system or pay as you go billing system.

Paying for What You Use – Solution

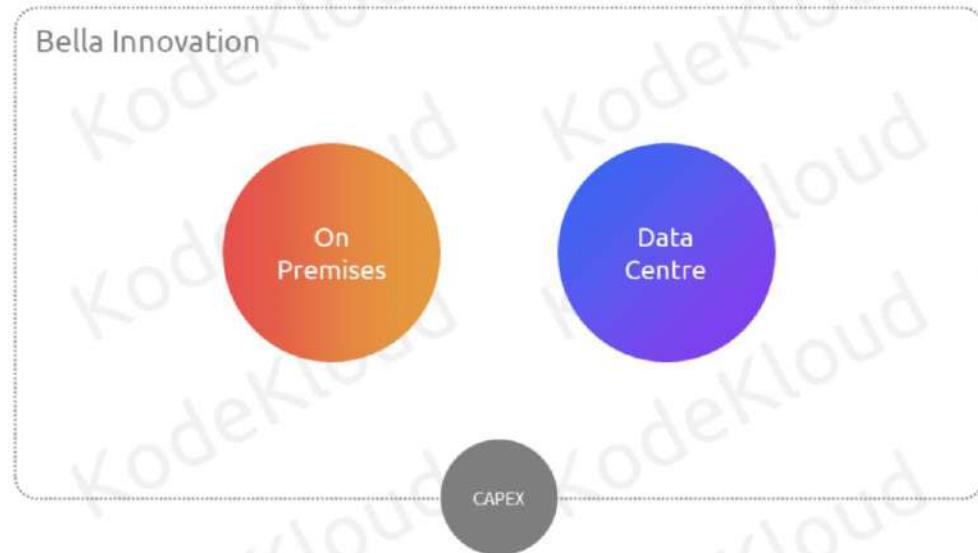


Pay-as-you-go billing

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This means that end users will only incur cost for the resources they actually consume

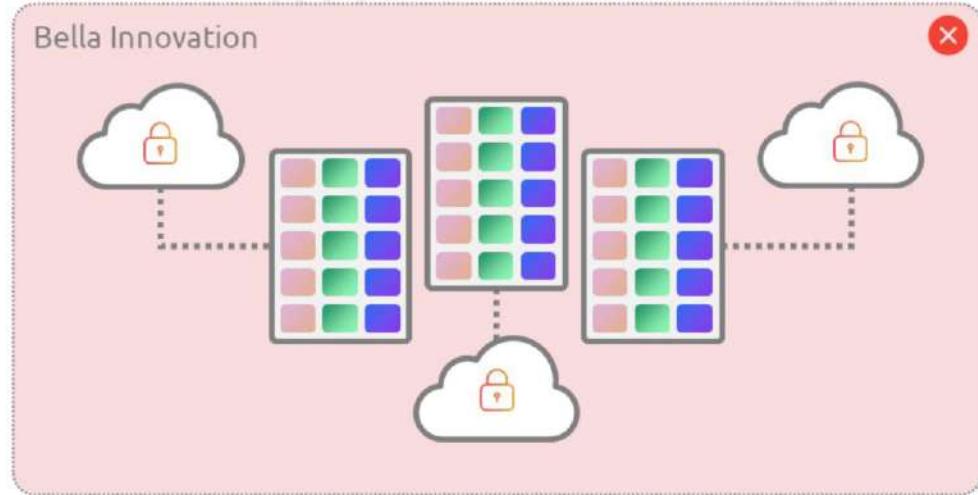
Paying for What You Use – Challenge



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So if we go back to our challenge, what we could do in Bella Innovation is if it was on premises or in their own data center, they already invested for the servers, it was a capital expenditure

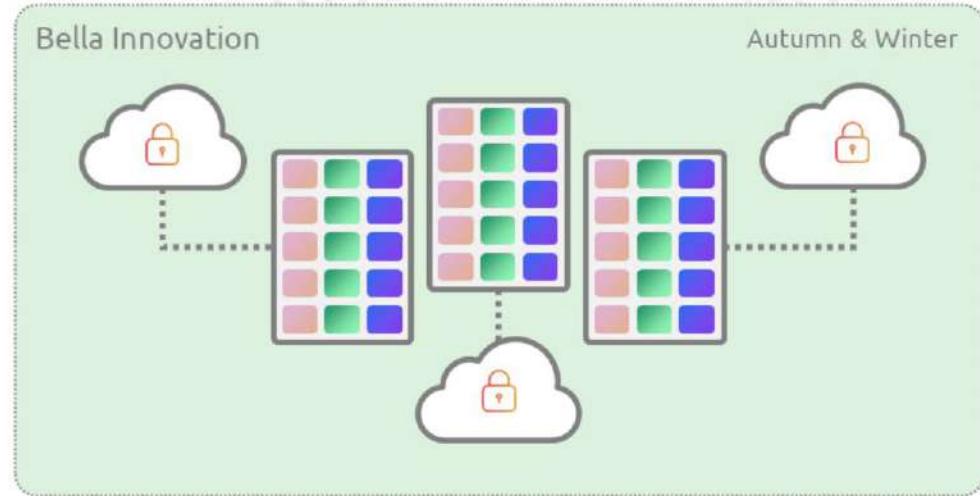
Paying for What You Use – Challenge



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So there is no way they can get rid of the servers because they already invested on it

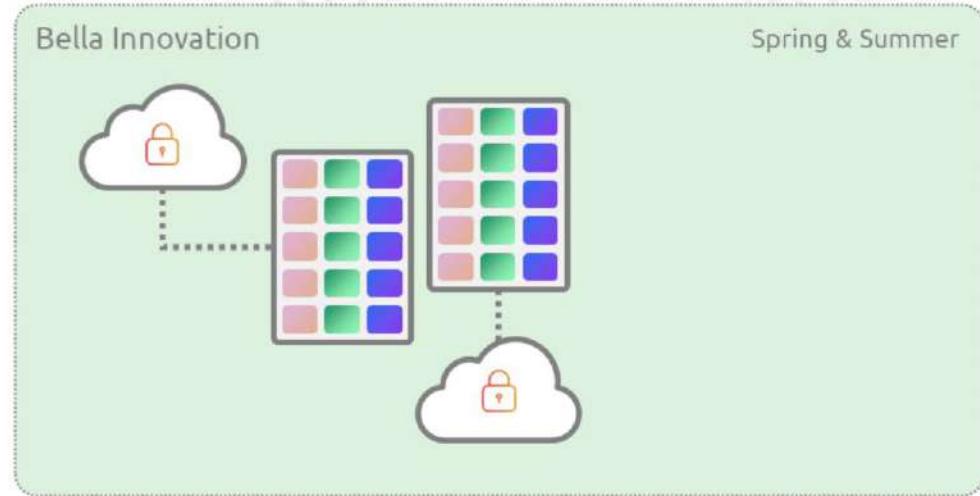
Paying for What You Use – Challenge



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But in the case of cloud, the advantage is I can shut down some servers or I can delete them servers if I'm no longer using it during autumn and winter

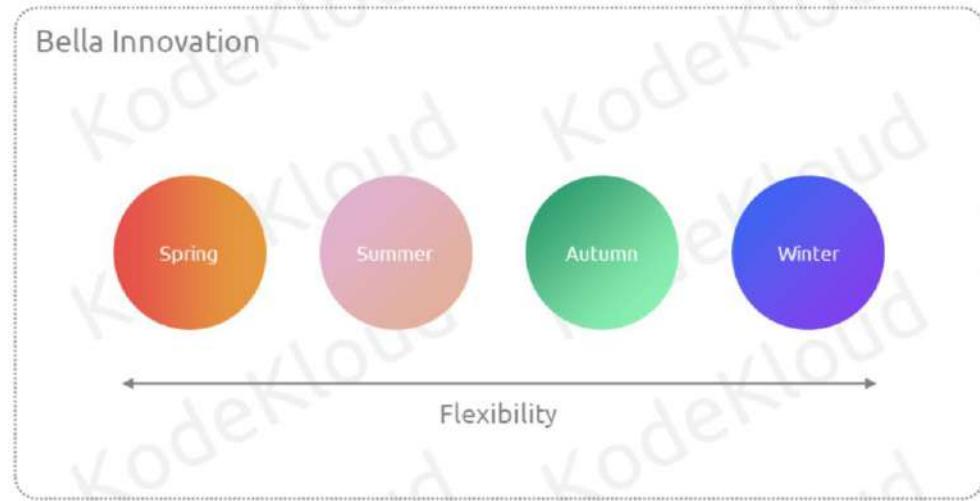
Paying for What You Use – Challenge



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But when the spring and summer comes, I can spin up additional resources and I'll only pay for those extra resources during spring and summer

Paying for What You Use – Challenge



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So in this way, I have a lot of flexibility



Paying for What You Use – Solution

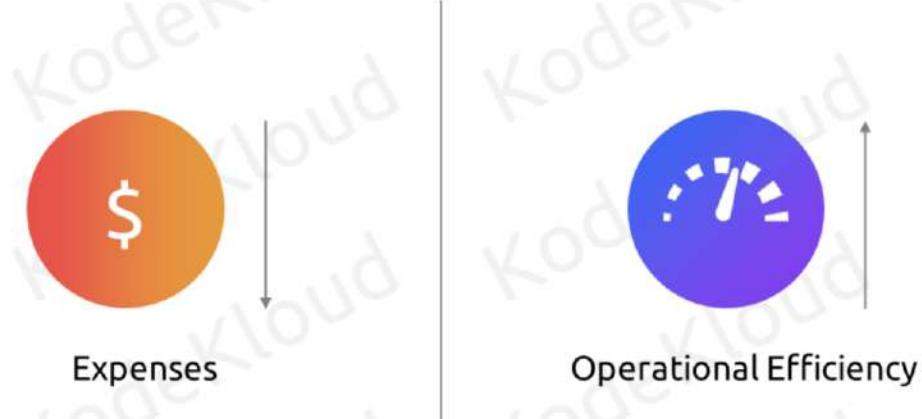


Pay-as-you-go billing

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So the current assumption based model leads to far better cost prediction and billing that reflects actual usage, extra strategic move that aligns perfectly with fluctuating demands of your application, ensuring that your company only pays for the computing power it needs, when it needs it

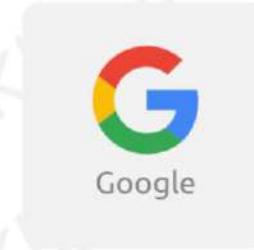
Paying for What You Use – Solution



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This not only optimizes expenses, but also boost operational efficiency So by adopting this model, businesses can say goodbye to the days of wasted resources and lost sales due to under provisioning Instead, they step into the world of a cost effective scalability and precise billing, and that is tailored to their exact requirements

Paying for What You Use – Solution



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So cloud providers like Microsoft, Amazon, Google, they follow a pay as you go model

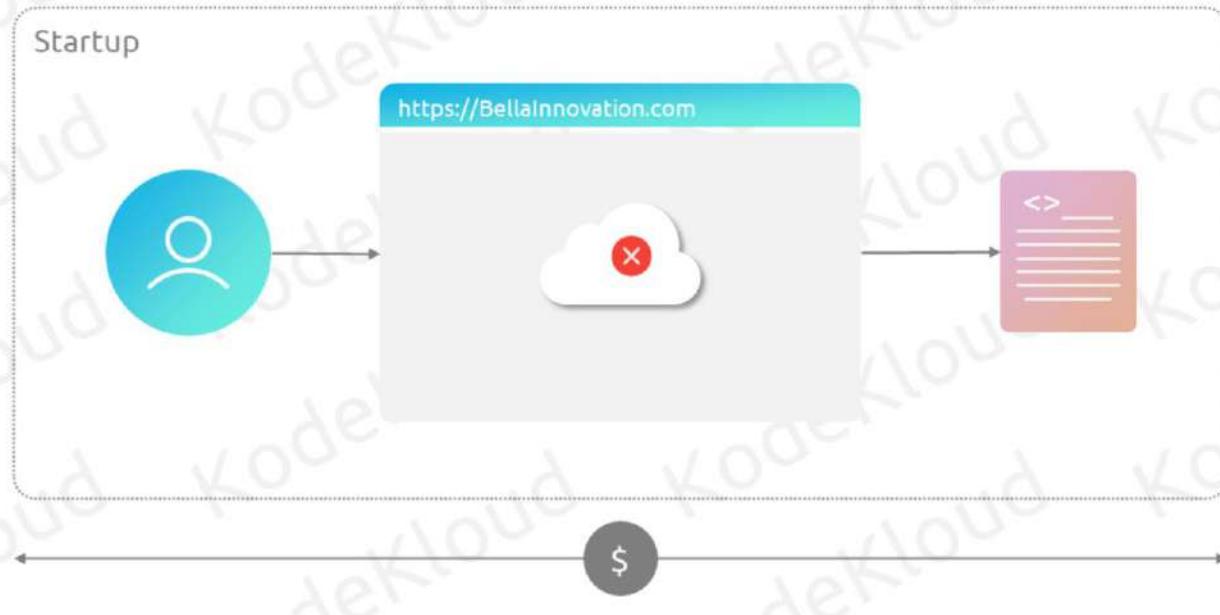
Paying for What You Use – Solution



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So if I deploy servers running for hours, I'll be only paying for that period of time. After hours, I might delete five servers and keep the remaining five. So I'll be paying for the rest of the five servers only. So that's the advantage of consumption based billing. As a name implies, you only pay for the consumption and you don't have to make any upfront investment.

Paying for What You Use – Solution



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So let's say I'm a startup I want to build my website in the cloud so I don't have to make any initial investment I just write my code for the website and I just push to the cloud after some time If I feel like, okay, I need to shut down my startup, it's easy I can easily exit from the cloud without any capital investment, I'll just pay for the time that I used

Paying for What You Use – Solution



Cost
Predictability



Flexibility

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Now that you're clear with the consumption – based model, which offers the cost prediction and the flexibility,

Paying for What You Use – Solution



Cloud Benefits

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let's take a look at the benefits of cloud

Cloud Benefits



What's in it for us?

High availability

Scalability

Predictability

Governance

Elasticity

Reliability

Security

Manageability

1 High Availability – Challenge



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Bella Innovation's digital services are critical to their business operations, requiring a robust infrastructure that remains operational even during unforeseen outages.

1 High Availability – Challenge



01 | Ensure service availability

02 | Minimize downtime

03 | Prevent revenue loss

04 | Maintain customer trust

The challenge is ensuring that customer-facing services are always available, minimizing downtime to avoid revenue loss and maintain customer trust.

1 High Availability – Solution



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Cloud platforms offer high availability through a network of geographically dispersed data centers. This setup ensures that if one data center goes offline due to a disaster or maintenance, the workload can automatically failover to another data center, keeping the services running without interruption. Techniques such as load balancing and redundancy are integral to this approach.

1 High Availability – Solution



01 | Load balancing

02 | Redundancy

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Cloud platforms offer high availability through a network of geographically dispersed data centers. This setup ensures that if one data center goes offline due to a disaster or maintenance, the workload can automatically failover to another data center, keeping the services running without interruption. Techniques such as load balancing and redundancy are integral to this approach.

2 Scalability – Challenge



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As Bella Innovation grows, its IT infrastructure must be able to handle an increasing amount of work or be able to be readily enlarged.

2 Scalability – Challenge



01 | Efficient load management

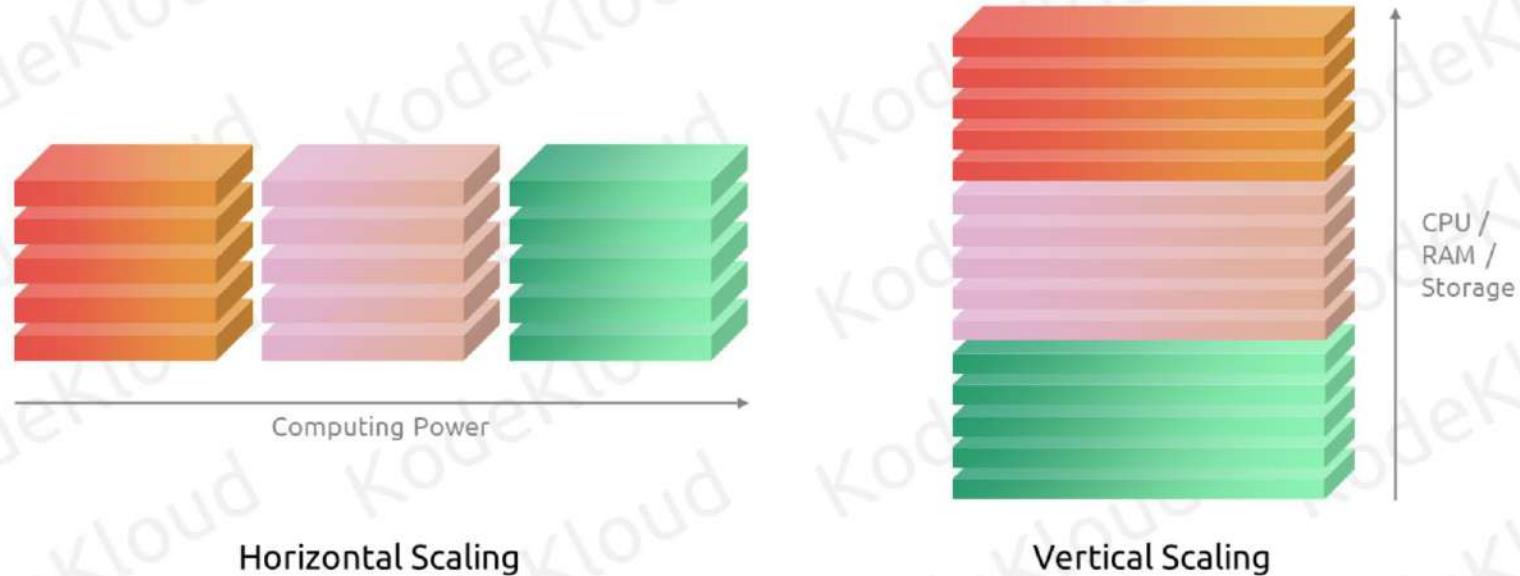
02 | Scaling for peak demand

03 | Resource optimization

04 | Handling workload increases

The primary challenge lies in the company's ability to efficiently manage varying loads - scaling up to accommodate peak demand times without wasting resources during off-peak times. This includes dealing with gradual increases in workload by adding resources to handle the larger load in a planned manner.

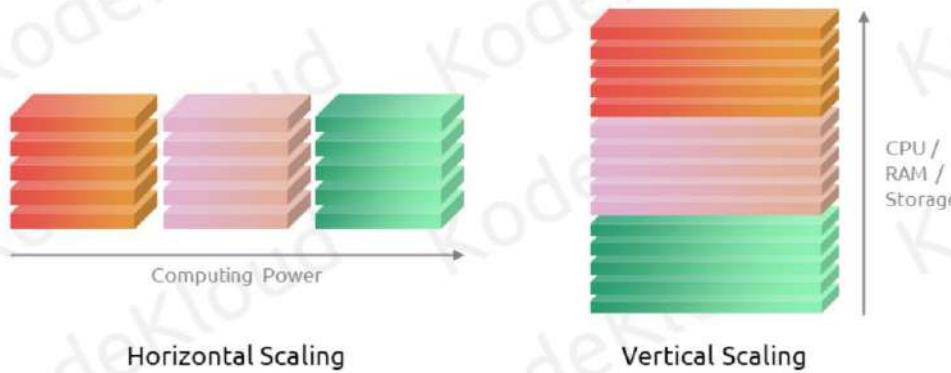
2 Scalability – Solution



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Scalability in cloud computing allows for the adjustment of resources to meet changing demands. This can be either vertical (adding more power to existing machines) or horizontal (adding more machines).

2 Scalability – Solution



01 | Cloud scalability basics

02 | Vertical and horizontal scaling

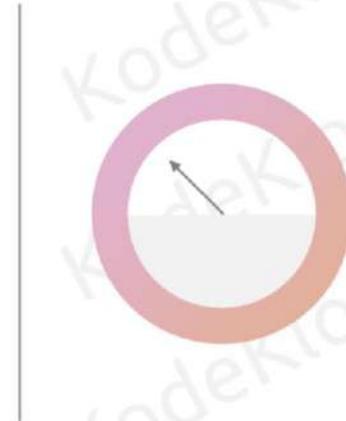
03 | Cost-effective growth

04 | Handling demand spikes

Scalable solutions ensure that Bella Innovation can accommodate growth or spikes in demand without overspending on infrastructure.

3

Predictability – Challenge

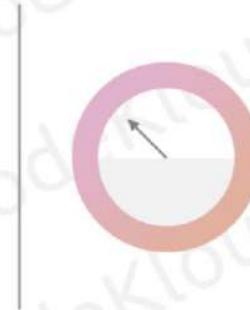


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For effective budgeting and resource planning, Bella Innovation needs predictability in its cloud spending and system performance.

3

Predictability – Challenge



01 | Budgeting challenges

02 | Cost spikes risk

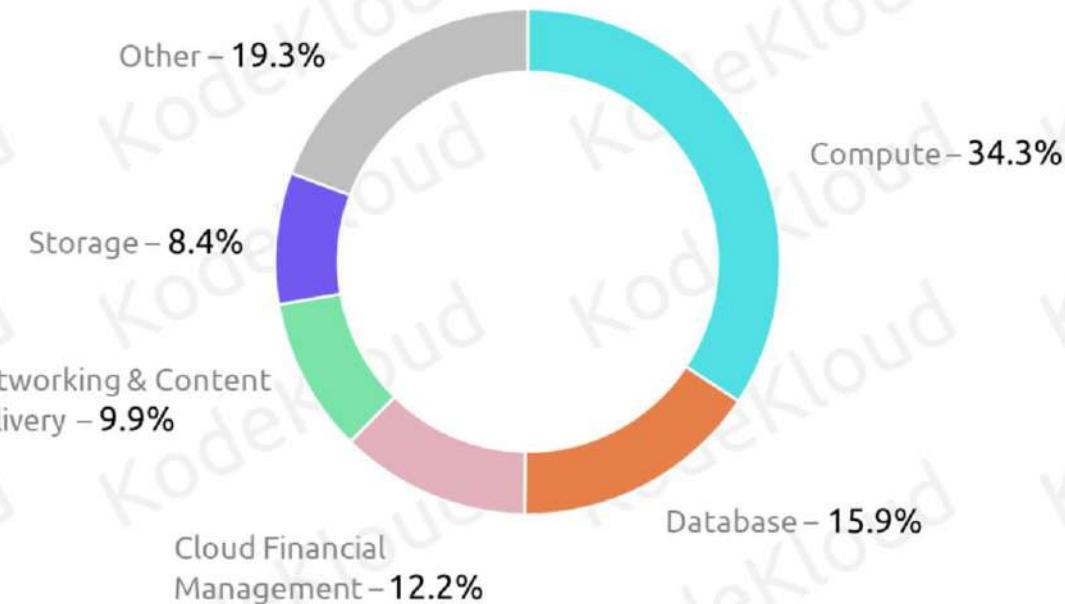
03 | Unpredictable performance impact

04 | Resource allocation issues

Unexpected spikes in costs or unpredictable system performance can severely impact their operational budgeting and resource allocation strategies.

3

Predictability – Solution

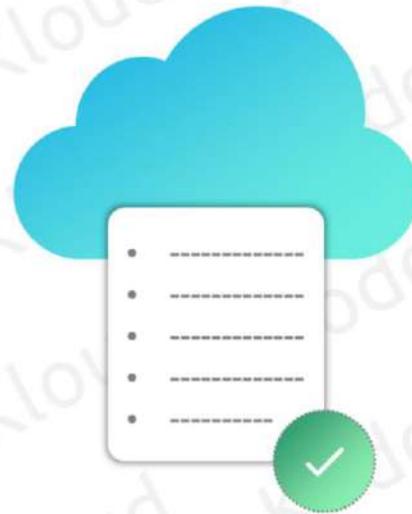


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Cloud platforms offer tools for monitoring, managing, and predicting cloud spend and performance. These tools help businesses forecast their needs, understand their spending patterns, and adjust their resources or budgets accordingly. This predictability is crucial for long-term planning and financial management.

4

Governance – Challenge



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As Bella Innovation leverages cloud services for storing data and running applications, it must adhere to various regulatory standards and internal policies.

4

Governance – Challenge



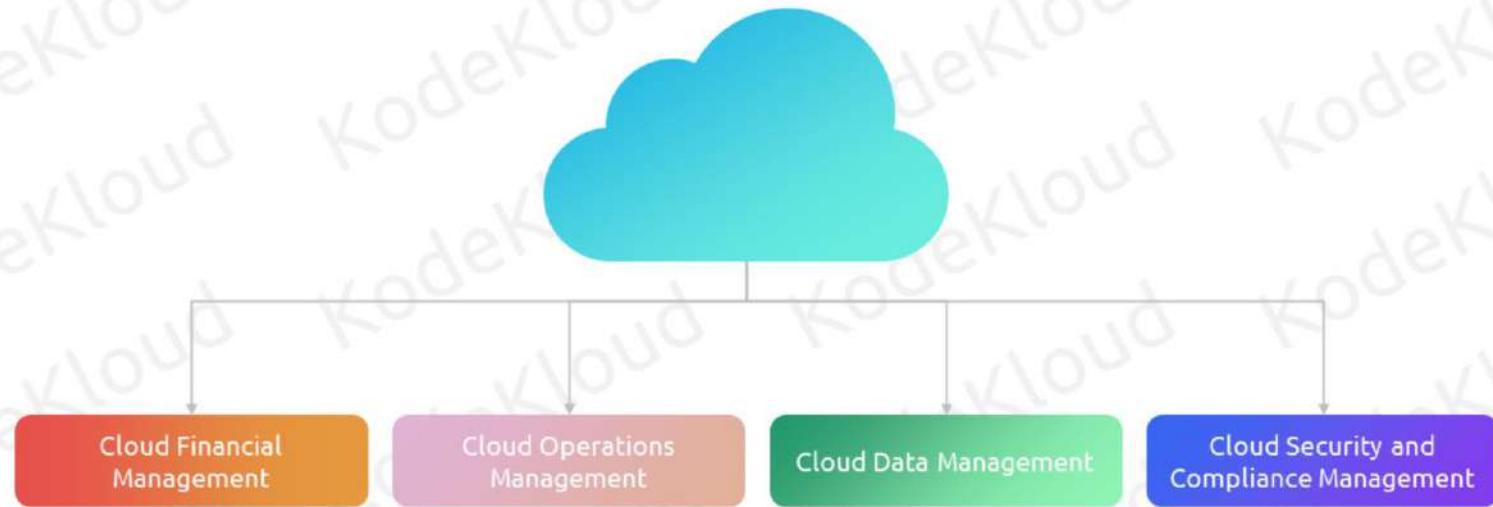
01 | Governance policy consistency

02 | Cloud environment compliance

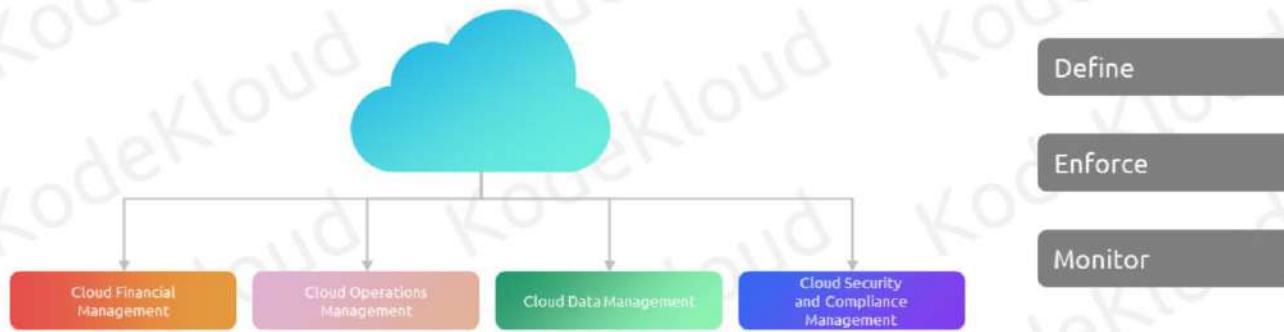
03 | Data protection assurance

04 | Operational integrity maintenance

The challenge lies in consistently applying these governance policies across the company's cloud environments to ensure compliance, data protection, and operational integrity.



Cloud providers offer governance and compliance tools that help

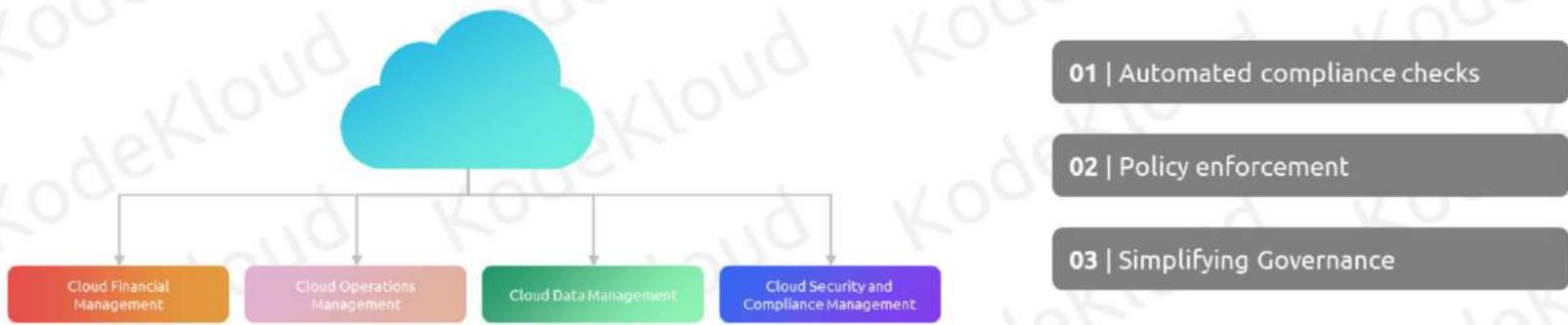


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businesses define, enforce, and monitor governance policies across their cloud environments.

4

Governance – Solution

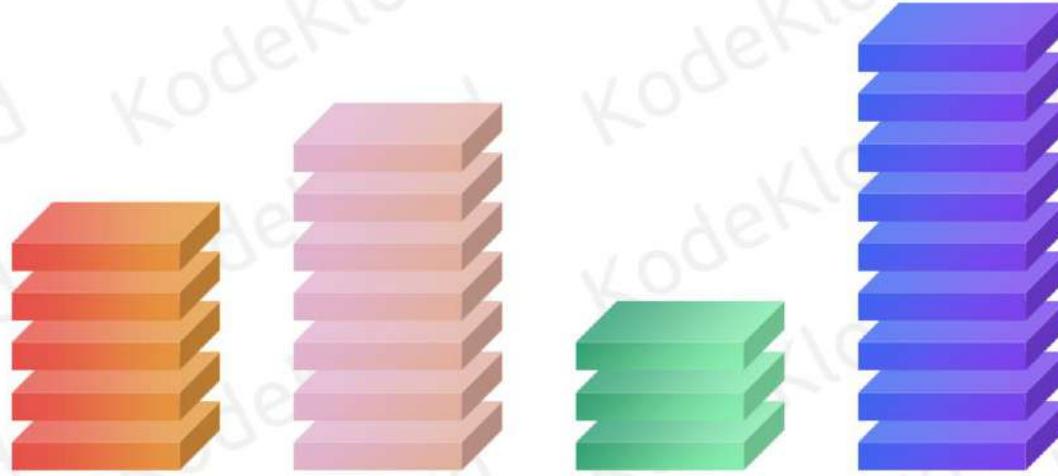


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These tools enable automated compliance checks, policy enforcement, and reporting, simplifying governance at scale.

5

Elasticity – Challenge

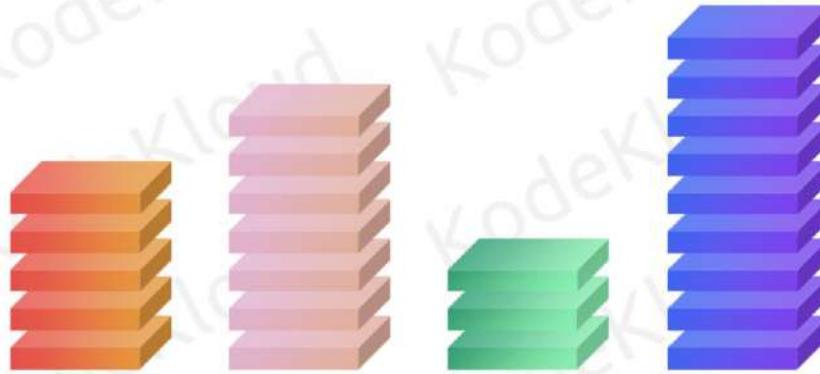


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Bella Innovation experiences unpredictable, short-term bursts of traffic that require immediate resource allocation.

5

Elasticity – Challenge



01 | Unpredictable traffic bursts

02 | Immediate resource allocation

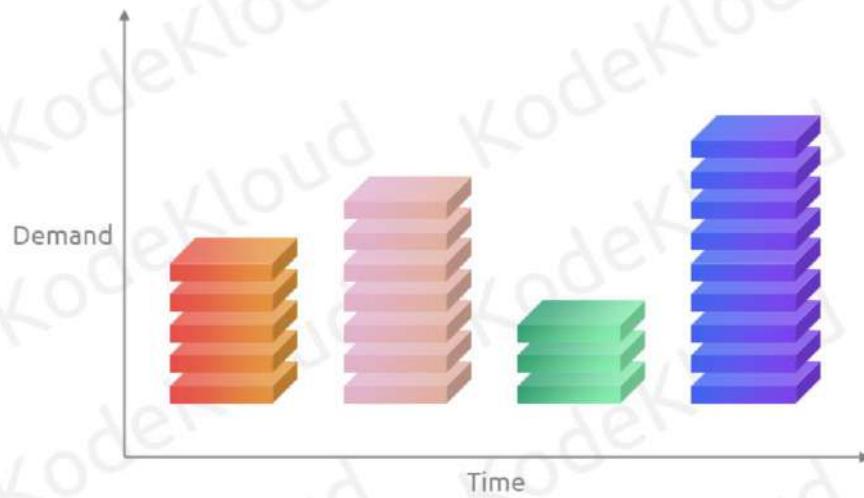
03 | Automatic scaling response

04 | Elastic resource management

The challenge is not just scaling up resources but doing so automatically and momentarily in response to sudden spikes in demand, and similarly, scaling down as the demand decreases. Elasticity is about matching resources closely to immediate demand, ensuring efficient use of computing resources and cost-effectiveness.

5

Elasticity – Solution



01 | Cloud elasticity definition

02 | Dynamic resource allocation

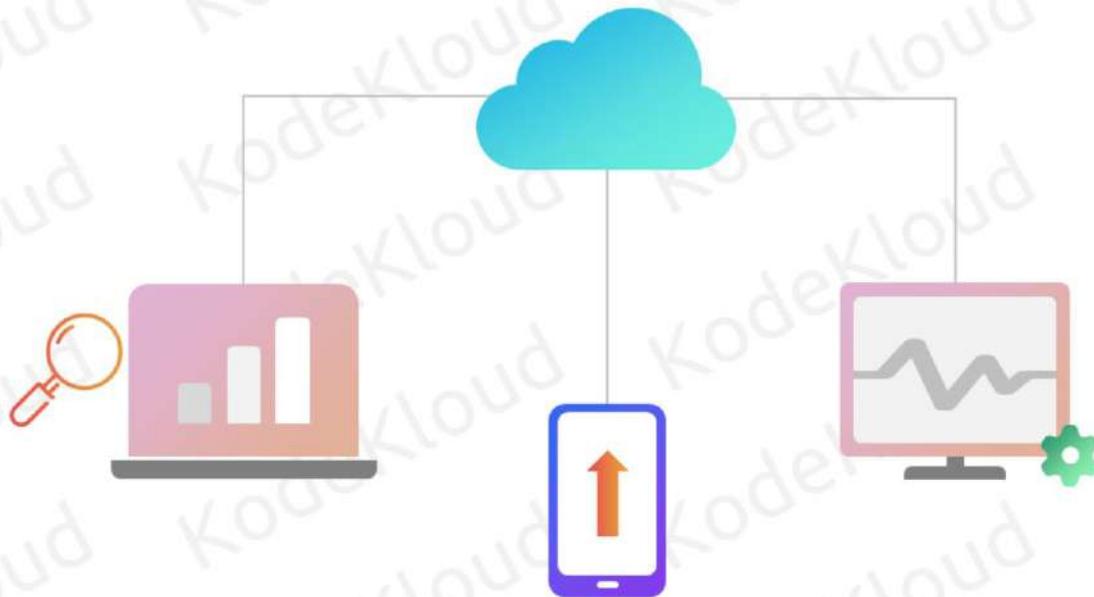
03 | Automatic scaling

04 | Cost-efficient resource usage

Elasticity refers to the ability of cloud systems to dynamically allocate and deallocate resources on-the-fly. This rapid scaling ensures that applications can handle spikes in traffic without manual intervention and without paying for idle resources.

6

Reliability – Challenge



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Reliability is critical for Bella Innovation, requiring that their applications and data are always accessible and protected against failures, data loss, or corruption.

6

Reliability – Challenge



01 | Reliability importance

02 | Continuous accessibility

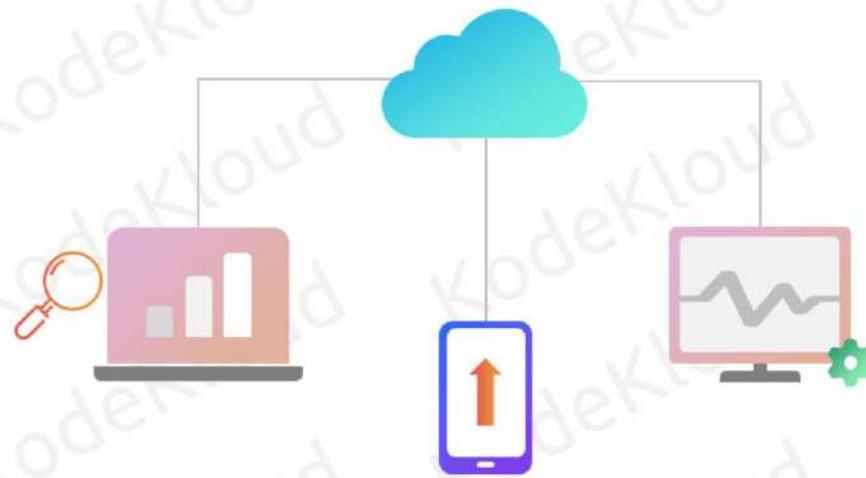
03 | Data protection priority

04 | Fast incident recovery

The challenge is designing an IT infrastructure that can recover quickly from any incident without data loss or significant downtime.

6

Reliability – Solution



01 | Disaster recovery options

02 | Data integrity assurance

03 | Service continuity measures

04 | Minimize downtime and loss

Cloud platforms provide robust disaster recovery and backup solutions to ensure data integrity and service continuity. These solutions include data replication, regular backups, and automated failover processes to minimize downtime and data loss in the event of an incident.



Protecting sensitive data and ensuring the security of its IT infrastructure is paramount for Bella Innovation.

Security – Challenges



01 | Security threats overview

02 | Data breach risks

03 | Unauthorized access concern

04 | Customer trust protection

The company faces numerous security threats, including data breaches, unauthorized access, and other cyber attacks, which could jeopardize customer trust and company reputation.

Security – Solution



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Cloud services offer advanced security features designed to protect against a wide range of cyber threats.

7

Security – Solution



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These include network security, data encryption, identity and access management, and threat detection and response capabilities. Implementing these security measures helps safeguard data and applications in the cloud.

8 Manageability – Challenges



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As Bella Innovation's cloud infrastructure grows in complexity, managing and monitoring this environment becomes increasingly challenging.

8 Manageability – Challenges



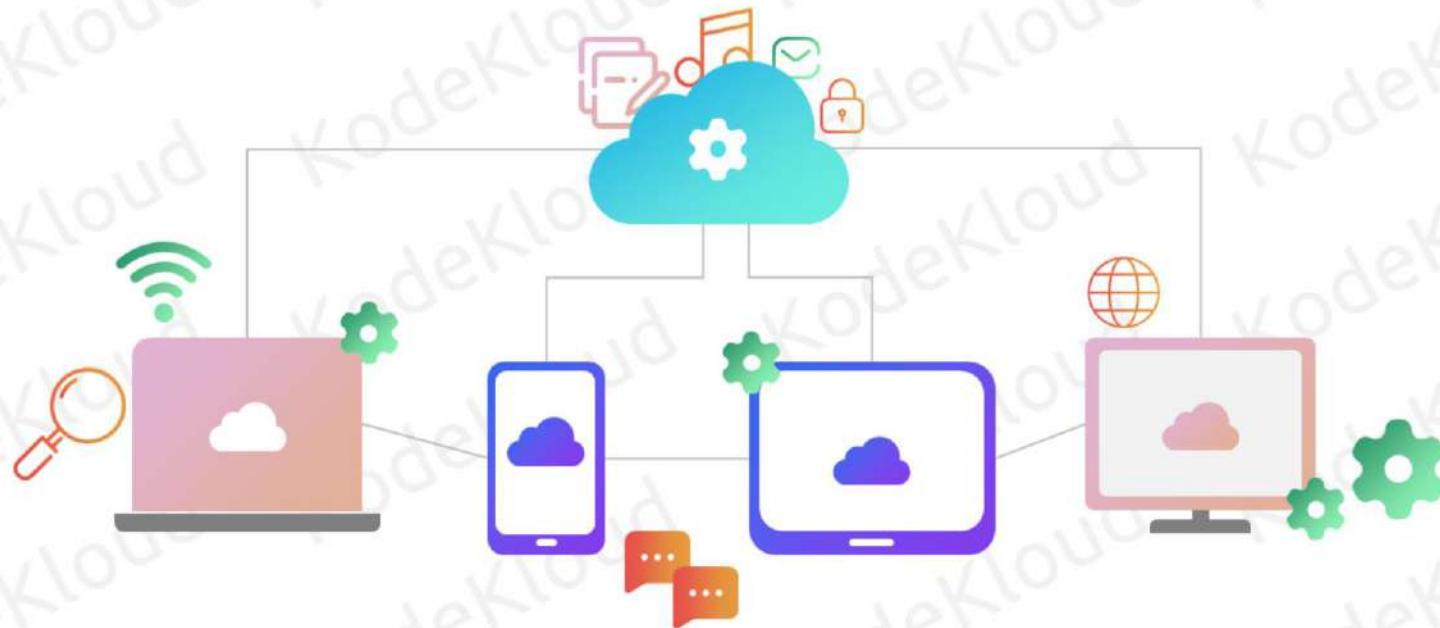
01 | Operational efficiency

02 | Performance optimization

03 | Cost management

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The company needs to ensure operational efficiency, performance optimization, and cost management across its cloud resources.



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Cloud platforms offer management and automation tools that simplify the administration of cloud resources.

8

Manageability – Solution



01 | Centralized monitoring

02 | Automated tuning

03 | Resource optimization

These tools provide centralized monitoring, automated performance tuning, and resource optimization recommendations, helping businesses maintain an efficient and cost-effective cloud environment.

Cloud Service Types



How to Move Forward



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Bella Innovation has developed an invoicing application in Python that is crucial for their business operations, particularly for invoicing clients efficiently and accurately.

How to Move Forward



01 | Reliability

02 | Scalability

03 | Management

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The company is now looking to leverage cloud computing to enhance the application's reliability, scalability, and overall management.

How to Move Forward



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As they explore their options, they consider the three main types of cloud services: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).

1

Infrastructure as a Service

Plot of Land

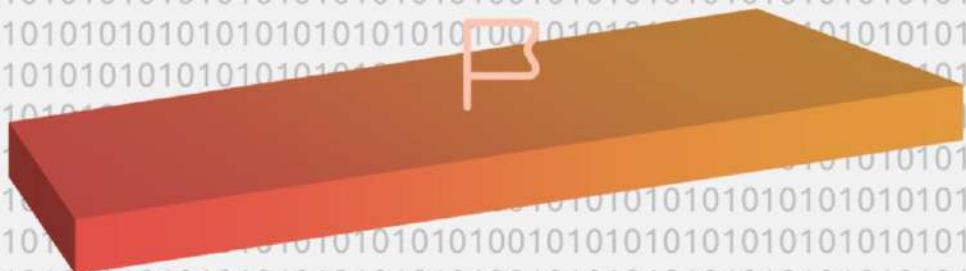


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Imagine renting a plot of land where you can build anything from scratch.

1 Infrastructure as a Service

Land in a Digital World



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IaaS is like that land, but in the digital world.

Infrastructure as a Service

Land in a Digital World



© Copyright KodeKloud

It provides you with the raw infrastructure on the cloud—servers, storage, and networking—giving you complete control over your environment.

1 Infrastructure as a Service



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You're responsible for managing everything from the operating system up to the application you're running, like Bella's invoicing application.

1

Infrastructure as a Service



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By choosing IaaS, Bella Innovation can migrate their invoicing application to the cloud without altering the application's code.

1

Infrastructure as a Service



01 | Flexible option

02 | Scalability benefits

03 | Reliable cloud features

They rent the virtual servers, storage, and network needed to run the application, while maintaining control over the operating systems and the application itself. This option offers flexibility and is ideal if they want to keep the existing infrastructure but benefit from the scalability and reliability of the cloud.

1

Infrastructure as a Service



1
Choose the operating system
 

2
Install your application and publish your service

3
The end users will be able to consume it in Azure.

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With IaaS, businesses can enjoy a greater reliability without the responsibility of routine maintenance and upgrades. So the data center networking servers. These are given to you. All you have to do is you have to choose the operating system, be it windows or Linux. Then you install your application and publish your service. The end users will be able to consume it in Azure.



Azure Virtual Machine

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To give you an example, Azure virtual machine is infrastructure as a service. You will see more about virtual machines or Azure virtual machine in later lessons. So to start with Azure vms or Azure virtual machines is an example of infrastructure as a service. Now that you know what is is, let's see what is PaaS or platform as a service.

2

Platform as a Service

Pre-Furnished Apartment



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PaaS is like leasing a pre-furnished apartment where the infrastructure—plumbing, electricity, furniture—is already set up for you.



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For developers, PaaS provides a platform with tools to create and deploy applications over the internet. The cloud provider manages the underlying infrastructure, and you focus on the deployment and management of your applications.

2 Platform as a Service



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Moving Bella's invoicing application to a PaaS means Bella Innovation doesn't have to worry about the underlying servers, storage, or network. They can directly deploy their Python application onto the cloud platform, which is already equipped with the necessary environments to run Python applications.

2 Platform as a Service

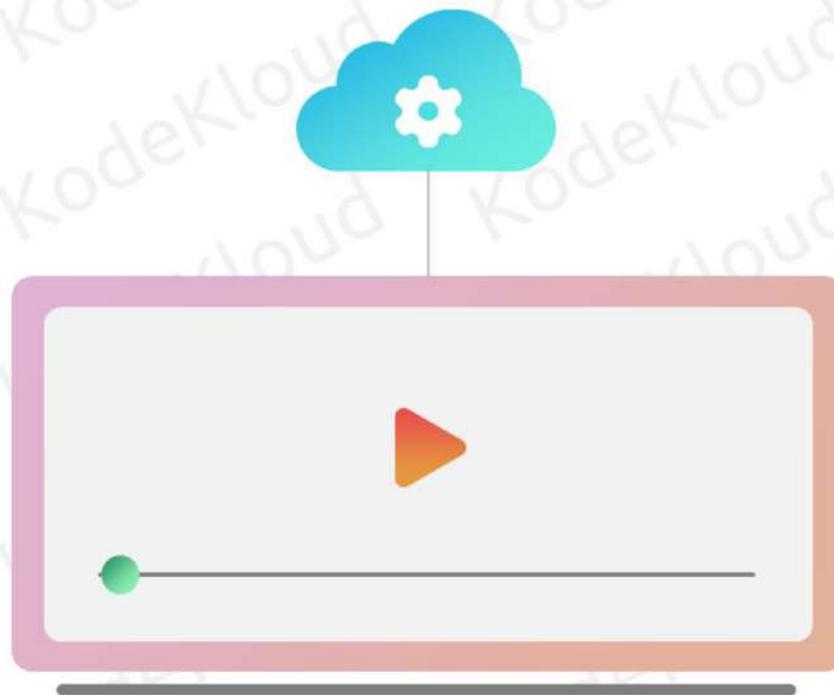


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PaaS allows them to focus on improving the application itself, without the hassle of managing the infrastructure..

3

Software as a Service

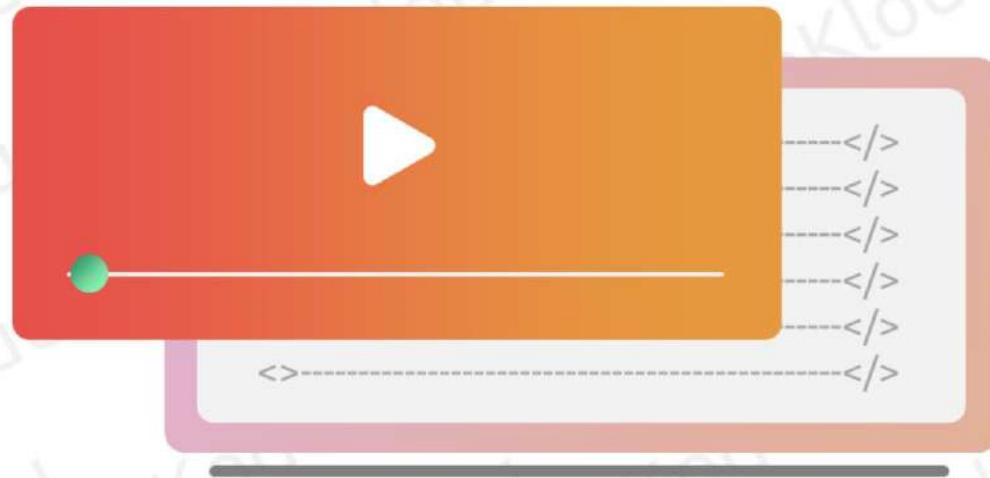


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SaaS is like subscribing to a streaming service where you can watch movies or shows without worrying about broadcasting or storage. It's a way to use software over the internet, with the software being managed and hosted by the service provider.

3

Software as a Service



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You don't manage anything; you just use the software.

3

Software as a Service

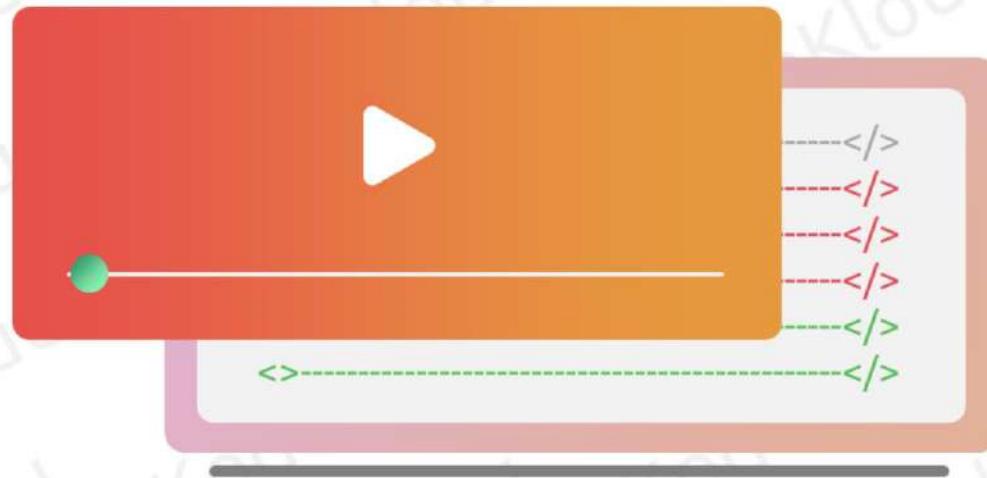


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For Bella Innovation decides to use a SaaS solution for their invoicing needs, they would subscribe to a cloud service that offers invoicing software.

3

Software as a Service



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This means they would not use their custom Python application but instead utilize a ready-made software solution that is maintained and updated by the provider.

Software as a Service



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This option reduces the effort in software maintenance and infrastructure management, but it also means relying on external software that might not meet all their custom needs.

3

Software as a Service



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PaaS was more about getting operating system and tools managed by the cloud provider. So I asked, I had to install the operating system, I had to install the python, then I had to run my code and expose my application. It was very hard and the management task was too much. But when it comes to PaaS, it, it offers more relaxation where the operating system and the developer tools will be taken care by the cloud provider. So all I have to do is write my code, push it, and I can expose my application.

3

Software as a Service



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But when it comes to SAS, I don't do anything, I just subscribe to the service and I start using it. So think of it more like you go to Hotmail or Gmail where you don't worry about how many servers Microsoft is running or Google is running. All I do is I click on email, I read my email and I just log out or think about Netflix. I don't care how many servers Netflix are using, where they are storing the files, nothing. I go to Netflix, I select my profile, I watch the videos that I need and I will close. So that's software as a service. So everything will be provided by the cloud provider. So for Bella innovation, they will not write code anymore, but they will purchase a software or they will subscribe to a software that has the capabilities that they are looking

for. Some other examples of software as a service is Outlook, your Microsoft 365 services. Then you have Gmail, Hotmail, everything is software as a service where you as a customer doesn't need to worry about where is this hosted, what is the patch version? They are running. What operating system? What is the code? Nothing. So that's software as a service. Now that you know IaaS, PaaS and SaaS, let's understand the shared responsibility model and the comparison between these types of.

The Best Choice – Shared Responsibility Model

Responsibility	SaaS	PaaS	IaaS	On-Premises
Information & data	●	●	●	●
Devices (Mobile & PCs)	●	●	●	●
Accounts & identities	●	●	●	●
Identity & directory infrastructure	●	●	●	●
Applications	●	●	●	●
Network controls	●	●	●	●
Operating system	●	●	●	●
Physical hosts	●	●	●	●
Physical network	●	●	●	●
Physical data center	●	●	●	●

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● Shared ● Bella Innovation ● Microsoft

For Bella Innovation, the choice between IaaS, PaaS, and SaaS depends on their specific needs for control, flexibility, and ease of use. IaaS offers maximum control with more responsibility, PaaS provides a balance between control and convenience, and SaaS offers ease of use with the least control. The decision will be based on how much they value customization versus convenience.

The Best Choice

IaaS	PaaS	SaaS
Flexibility at its core	Dedicated to application development	Pay-as-you-go convenience
Configuration and hardware management done by end user	Cloud provider manages the platform, freeing user from administrative burdens	Subscription-based payment for software usage, aligning costs with usage levels
Virtual Machine, Virtual Machine Scale set	App Service, Container Apps	Microsoft 365, Hotmail

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For Bella Innovation, the choice between IaaS, PaaS, and SaaS depends on their specific needs for control, flexibility, and ease of use. IaaS offers maximum control with more responsibility, PaaS provides a balance between control and convenience, and SaaS offers ease of use with the least control. The decision will be based on how much they value customization versus convenience.

Azure Architecture and Services

Course Introduction

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Azure Architectural Components

- Regions and Availability Zones
- Subscriptions and Resource Groups



Compute and Networking

- Compute Types
- Application Hosting
- Virtual Networking

Course Introduction



Storage

- Storage Services
- Redundancy Options
- File Management and Migration



Identity, Access, and Security

- Directory Services
- Authentication Methods
- Security Models

Azure Architectural Components

Azure Architectural Components



Regions and Availability Zones

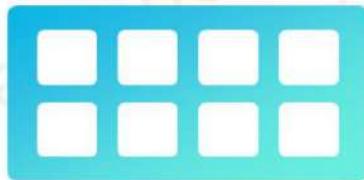


Subscriptions and Resource Groups

Regions and Availability Zones



Global Applications – Challenge



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Bella Innovation wants to expand their business globally by deploying applications closer to their customers.

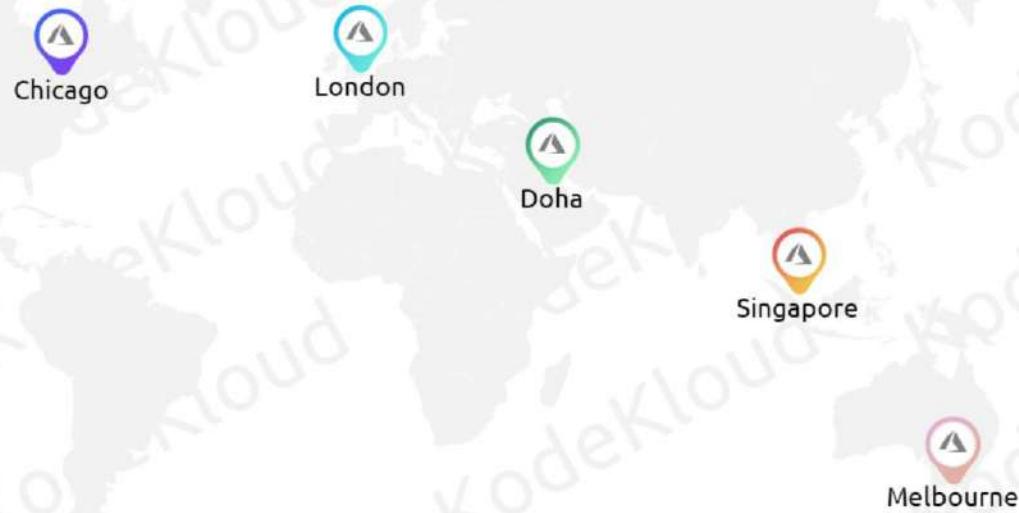
Global Applications – Challenge



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Currently the office is in London, but soon they will have customers in Singapore, Melbourne, Chicago, and Doha.

Global Applications – Solution



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Leverage Azure Regions and deploy their applications in multiple locations closer to their customers

Regions and Data Centers

- Regions encompass multiple data centers.
- These offer scalability and flexibility.

60+ Regions worldwide

140 Available in 140 countries



Data Residency and User Proximity

- Regions uphold data residency requirements.
- Choose regions based on proximity to users for optimal performance.

60+ Regions worldwide

140 Available in 140 countries



Deployment Considerations

- Check region availability for deployment.
- Some services are globally available, independent of regions.

60+ Regions worldwide

140 Available in 140 countries



Data Residency – Challenge



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Bella Innovation handles critical user information that they cannot store outside Australia region due to data residency requirements. How can they ensure that they have high availability within the region?

Data Residency – Challenge



High availability

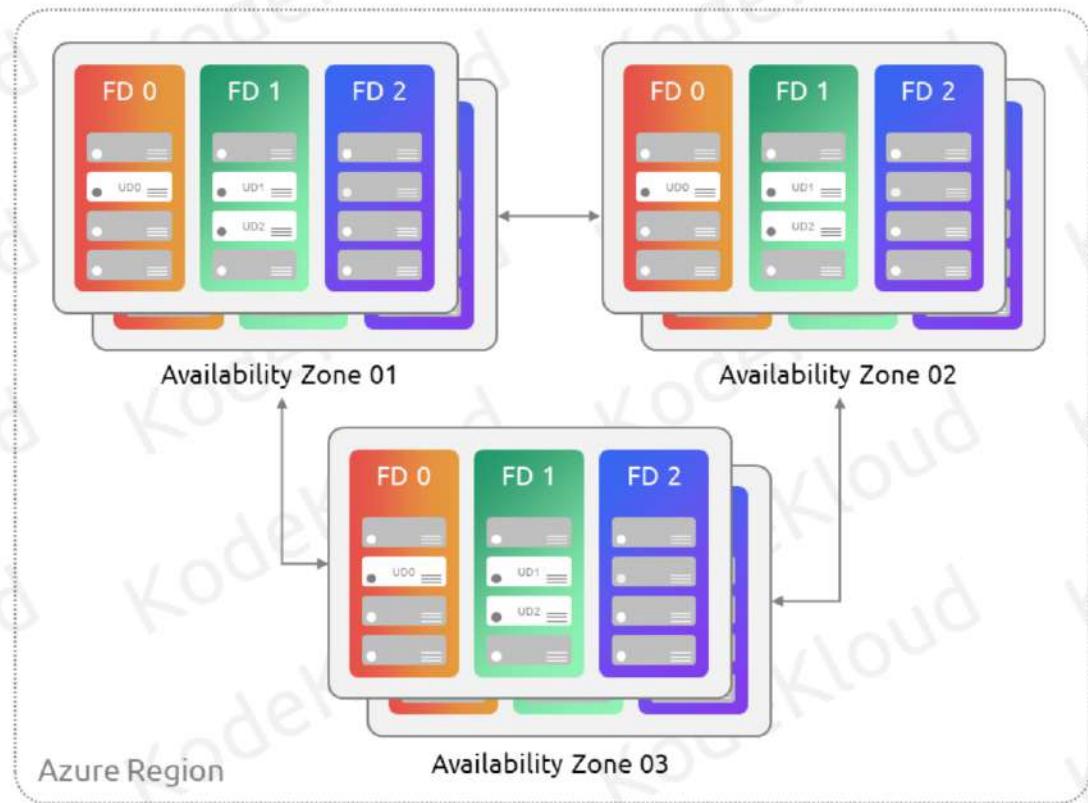


Australia

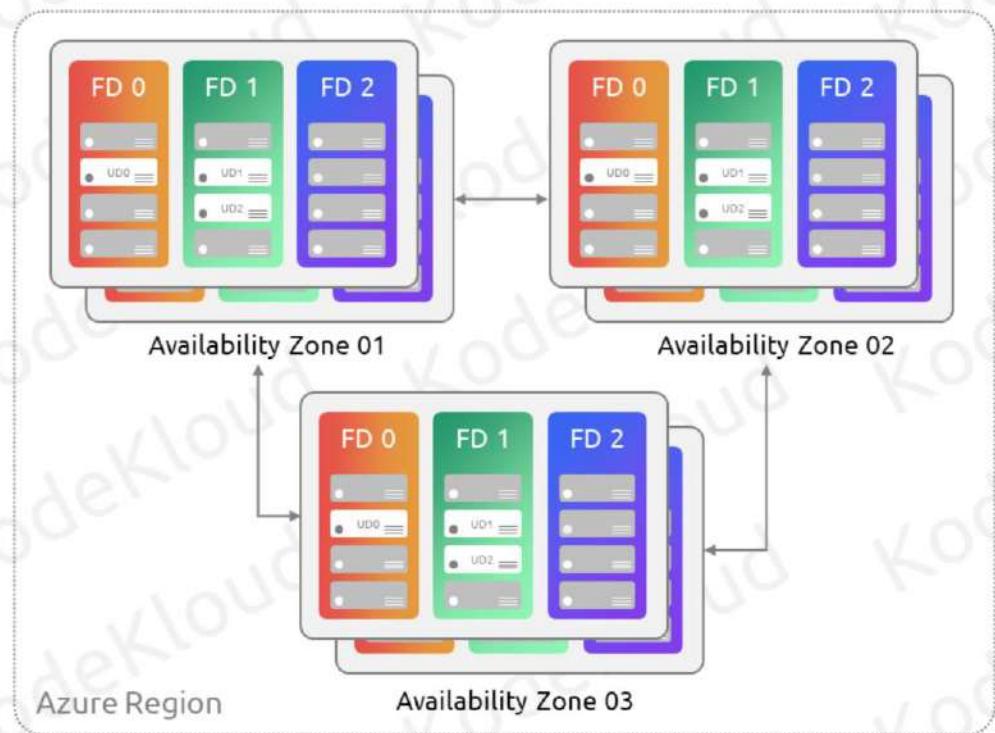
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Bella Innovation handles critical user information that they cannot store outside Australia region due to data residency requirements. How can they ensure that they have high availability within the region?

Data Residency – Solution

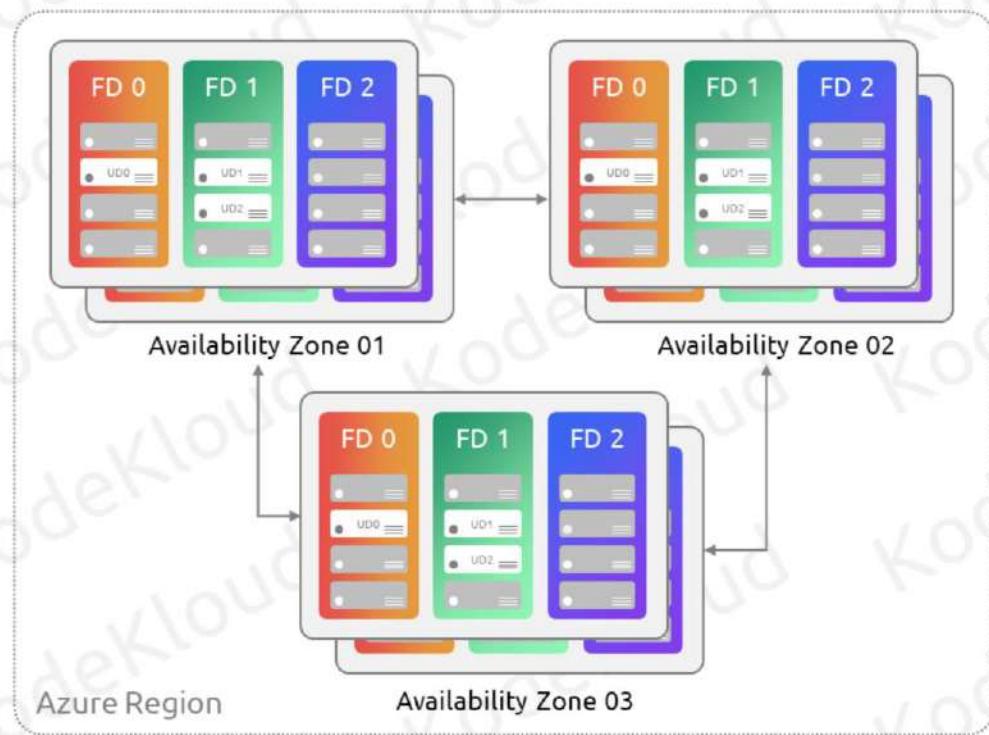


Data Residency – Solution



Leverage availability zones in Azure

Availability Zones



Mitigating downtime risks

Physical separation and redundancy

Robust connectivity

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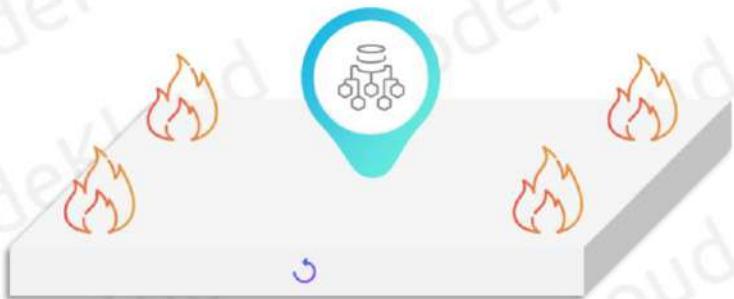
Mitigating Downtime Risks:
Safeguard against downtime caused by datacenter failures.

Physical Separation and Redundancy:
Datacenters in a region are physically distinct.
Each datacenter operates with its own power, cooling, and networking systems.

Robust Connectivity:

Interconnected via private fiber-optic networks.
Ensuring reliable communication and redundancy

Disaster Recovery – Challenge



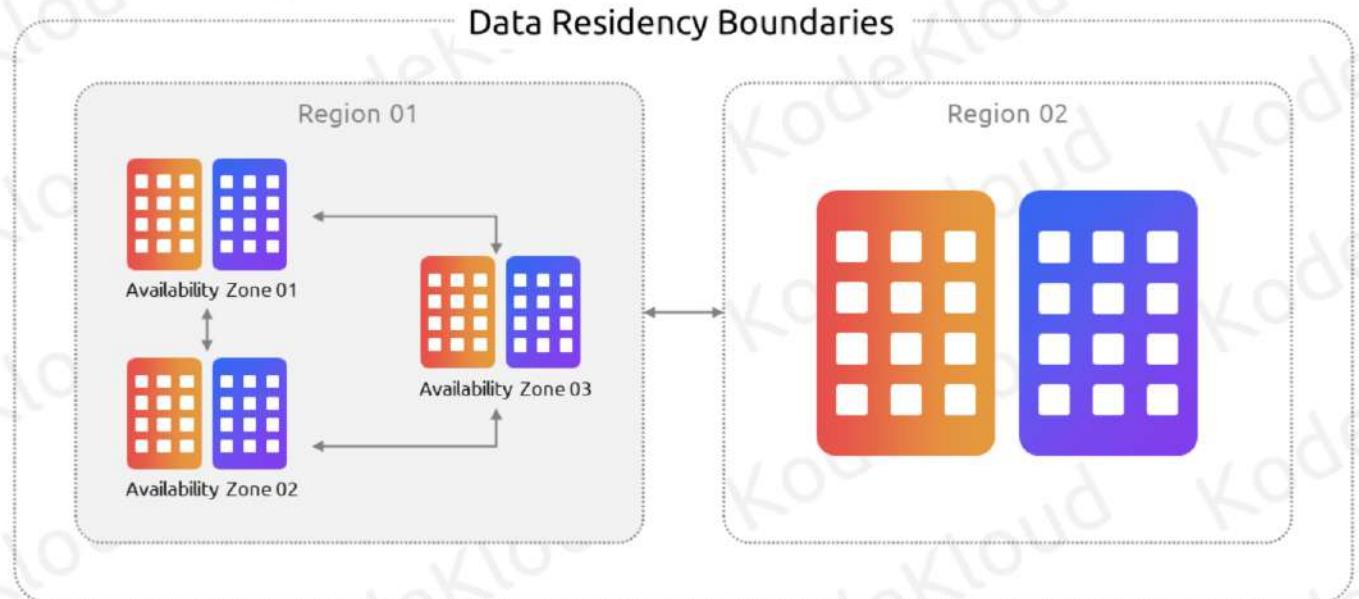
Data residency requirements

Robust disaster recovery capabilities

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Bella Innovation operates in regions with specific data residency requirements, such as Australia, while also seeking to ensure robust disaster recovery capabilities. How can they achieve both objectives effectively?

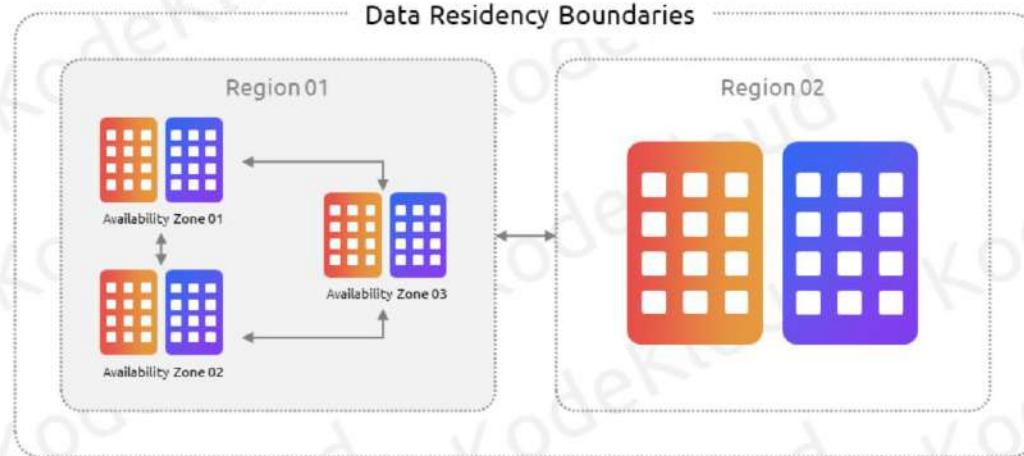
Disaster Recovery – Solution



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Utilize Azure's Regional Pairs feature, which establishes geographically separated pairs of regions.

Disaster Recovery – Solution



01 | Azure's regional pairs

02 | Data residency compliance

03 | Resilience against failures

04 | High availability assurance

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This ensures data residency compliance while also providing resilience against regional failures. By pairing Qatar with another region, Bella Innovation can maintain high availability and data integrity, meeting both regulatory requirements and business continuity needs.

Regional Pairs – Geographical Separation



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Regions are spaced at least 300 miles apart for redundancy.

Regional Pairs – Automated Replication



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Certain services feature automatic replication.

Regional Pairs – Prioritized Recovery



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Regions prioritize recovery during outages for seamless service.

Regional Pairs – Sequential Updates



Sovereign Regulations – Challenge



China



Australia

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Bella Innovation operates globally, now they are planning to extend their business to China. However, they face regulatory constraints that require certain data to be stored within specific sovereign boundaries. How can they navigate these regulations while maintaining operational efficiency and security?



Sovereign Regulations – Challenge



China



Australia

01 | Regulatory constraints overview

02 | Sovereign data storage

03 | Operational efficiency balance

04 | Security measures implementation

Bella Innovation operates globally, now they are planning to extend their business to China. However, they face regulatory constraints that require certain data to be stored within specific sovereign boundaries. How can they navigate these regulations while maintaining operational efficiency and security?

Sovereign Regulations – Solution



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Bella Innovation can leverage Azure's Sovereign Cloud offerings, such as Azure China.



Sovereign Regulations – Solution



01 | Azure dedicated environments

02 | Regulatory compliance assurance

03 | Data sovereignty adherence

04 | Robust cloud services

By utilizing Azure's dedicated cloud environments tailored to each country's regulatory requirements, Bella Innovation can ensure compliance with data sovereignty laws while still benefiting from Azure's robust cloud services.

Sovereign Regions – Azure Government



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Addresses the security and compliance requirements of federal agencies, as well as state and local governments, along with their solution providers.

Sovereign Regions – Azure Government



01 | Segregated Azure instance

02 | Physically separate

03 | Authorized personnel access

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- Separate instance of Azure
- Physically segregated from non-US government deployments.
- Accessible solely to screened and authorized personnel.



Sovereign Regions – Azure China



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Microsoft stands as China's first foreign public cloud service provider, fully aligned with governmental regulations.

- An independent instance of Azure cloud services, managed by 21Vianet, is established to ensure physical segregation.
- All data remains within China, guaranteeing compliance with regulations.

Sovereign Regions – Azure China



01 | 21Vianet-managed Azure

02 | Physical segregation ensured

03 | Data kept in China

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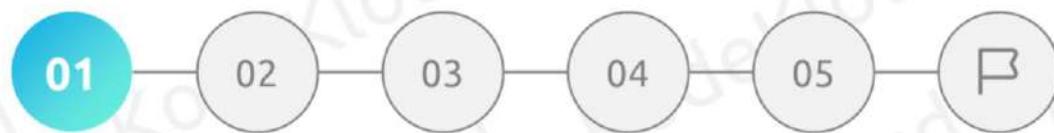
- An independent instance of Azure cloud services, managed by 21Vianet, is established to ensure physical segregation.
- All data remains within China, guaranteeing compliance with regulations.

Subscriptions and Resource Groups





Ready to Start – Challenge

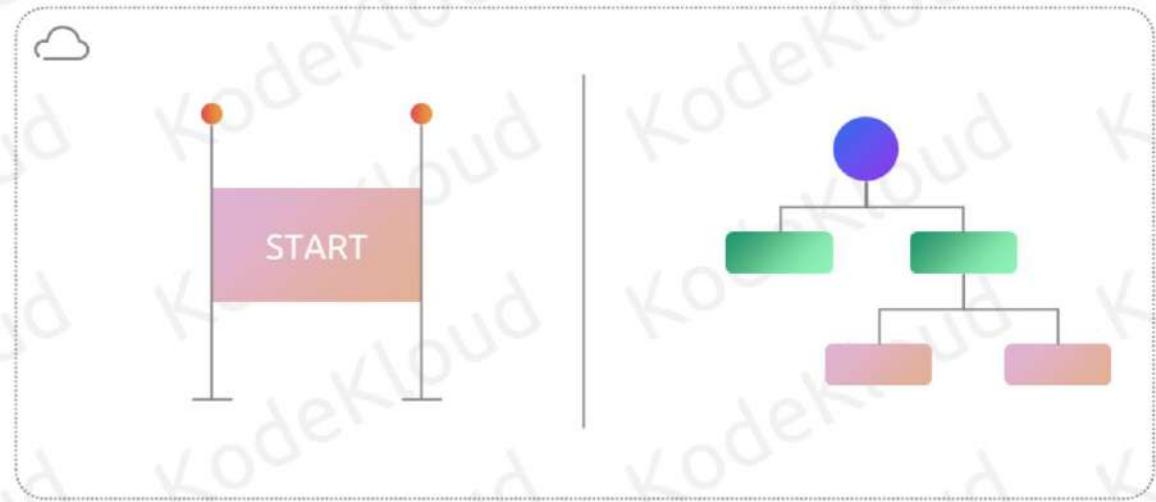


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Bella Innovation is at the initial stage of planning to transition their operations to the cloud.



Ready to Start – Challenge



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They are facing the challenge of understanding where to start and how to establish a structured hierarchy within the cloud environment.

Ready to Start – Challenge



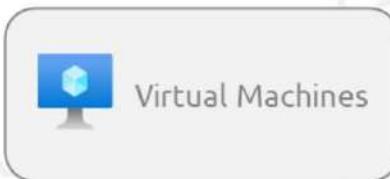
01 | Risk confusion

02 | Inefficiency

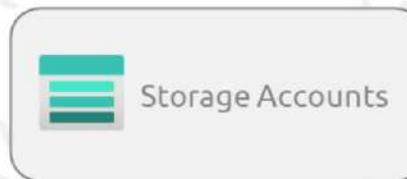
03 | Potential setback

Without clarity on the fundamentals of cloud management, they risk confusion, inefficiencies, and potential setbacks in their migration journey.

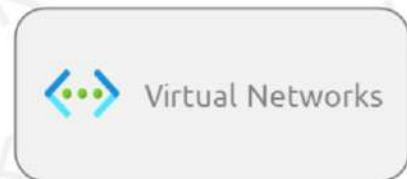
Azure Resources



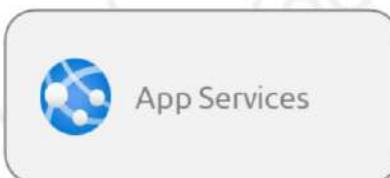
Virtual Machines



Storage Accounts



Virtual Networks



App Services



SQL Databases

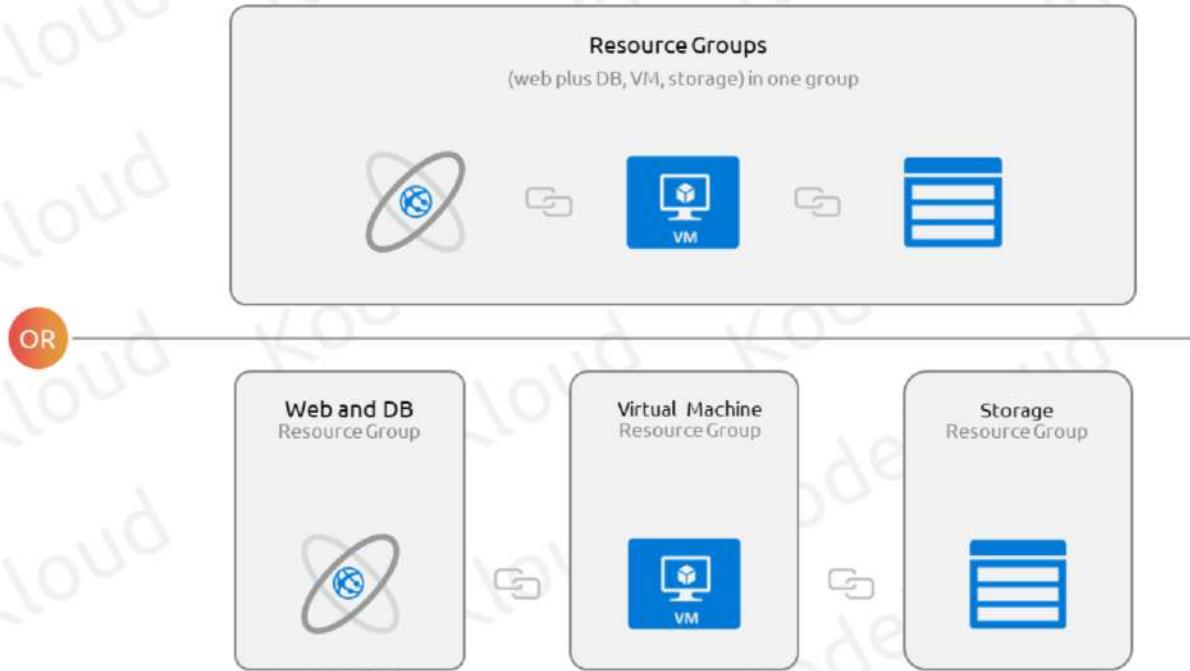


Functions

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Azure resources consist of elements like storage, virtual machines, and networks, which are utilized in the creation of cloud solutions.

Azure Resource Groups



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Resource groups facilitate the management and aggregation of resources within a single unit.



Azure Resource Groups



01 | Placement

02 | Region

03 | Migration

04 | Flexibility

OR



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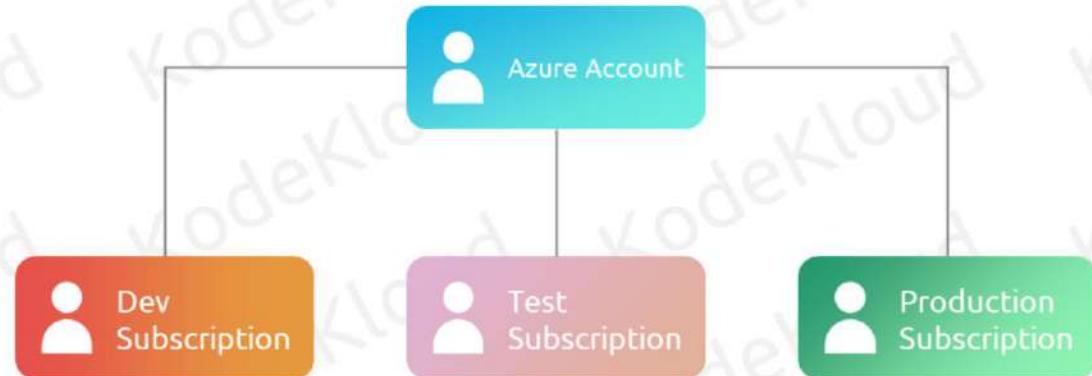
Placement: Each resource resides exclusively within one resource group.

Region: Resources can span across various regions, offering flexibility in deployment.

Migration: Resources are movable across different resource groups, enabling seamless organization adjustments.

Flexibility: Applications can leverage multiple resource groups, enhancing scalability and management efficiency.

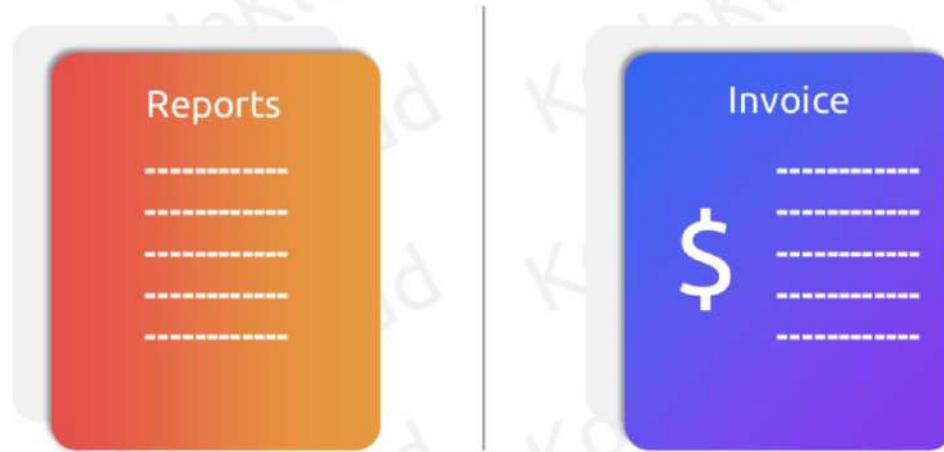
Subscriptions



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Your Azure subscription grants authenticated and authorized access to Azure accounts.

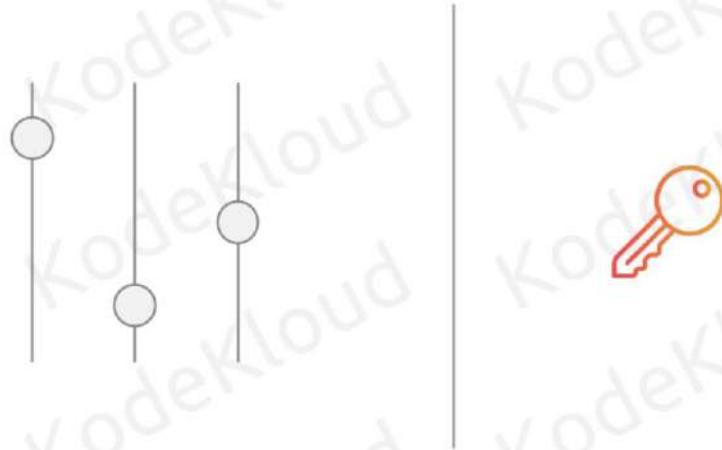
Subscriptions – Billing Boundary



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Billing Boundary: Each subscription establishes distinct billing reports and invoices for transparent financial management.

Subscriptions – Access Control Boundary



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Access Control Boundary: Exercise precise control over resource access for users provisioning resources under specific subscriptions.

Subscriptions – Access Control Boundary



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So subscriptions are also where you control access. They allow you to specify who can do what by setting permissions for users provisioning resources. For instance, you might have a dev subscription for developers to experiment and test a test subscription for quality assurance, and a production subscription for live customer facing services. Each subscription can have its own rules and permissions, making sure that people can only access the resources they need to do their jobs. So by using subscriptions, you're able to organize your azure resources in a way that aligns with your operational needs and security requirements, ensuring both flexibility and control as you work in the cloud. So just to recap, you have resources. Those

resources can be grouped inside resource groups, and in order to create these resources and resource groups, you basically need a subscription. So let's say you have multiple subscriptions and how can we group these subscriptions?

Subscriptions – Access Control Boundary



Management Groups

01 | Aggregate Azure subscriptions

02 | Streamline and collective management

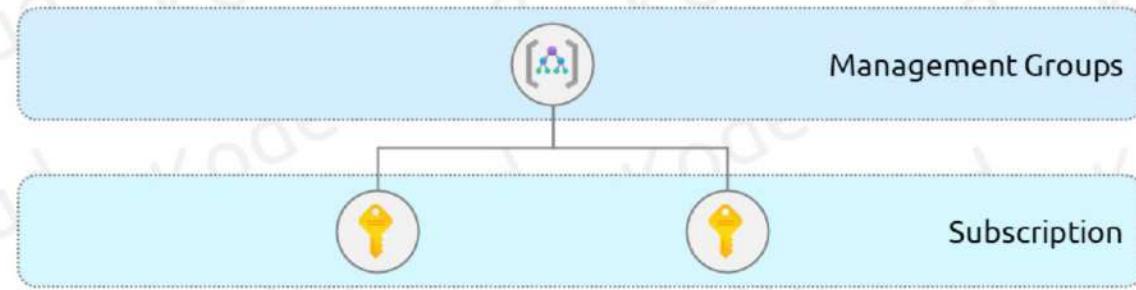
03 | Simplify governance

© Copyright KodeKloud

That's where management groups comes into the picture. As we expand our understanding of Azure's organizational structure, we encounter an important feature known as management groups. These groups are a level above the subscriptions and offer a way to efficiently manage access policies and compliance across multiple Azure subscriptions. So management groups can be quite useful if your environment has multiple subscription. Let's dive into the specifics of management groups. First of all, it is used for aggregating Azure subscriptions. So these are powerful tools that can contain multiple subscriptions. This allows for more streamlined and collective management across your entire organization's azure

resources, simplifying the way you apply governance conditions.

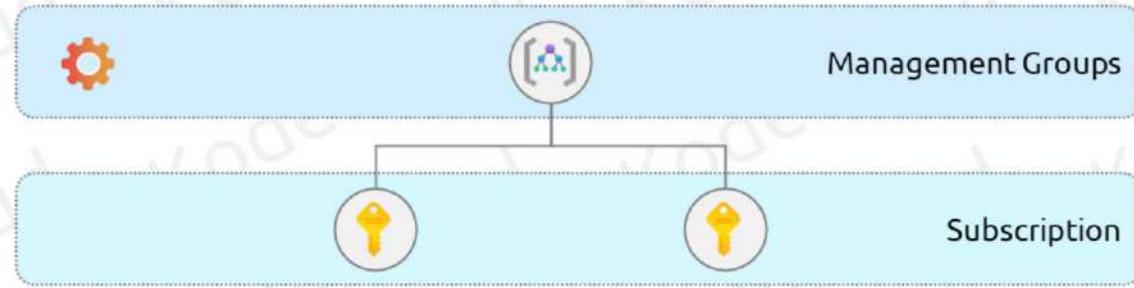
Management Groups – Aggregating Azure Subscriptions



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Management groups have the capability to encompass multiple Azure subscriptions.

Management Groups – Inherited Conditions



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Subscriptions automatically adopt conditions imposed at the management group level.

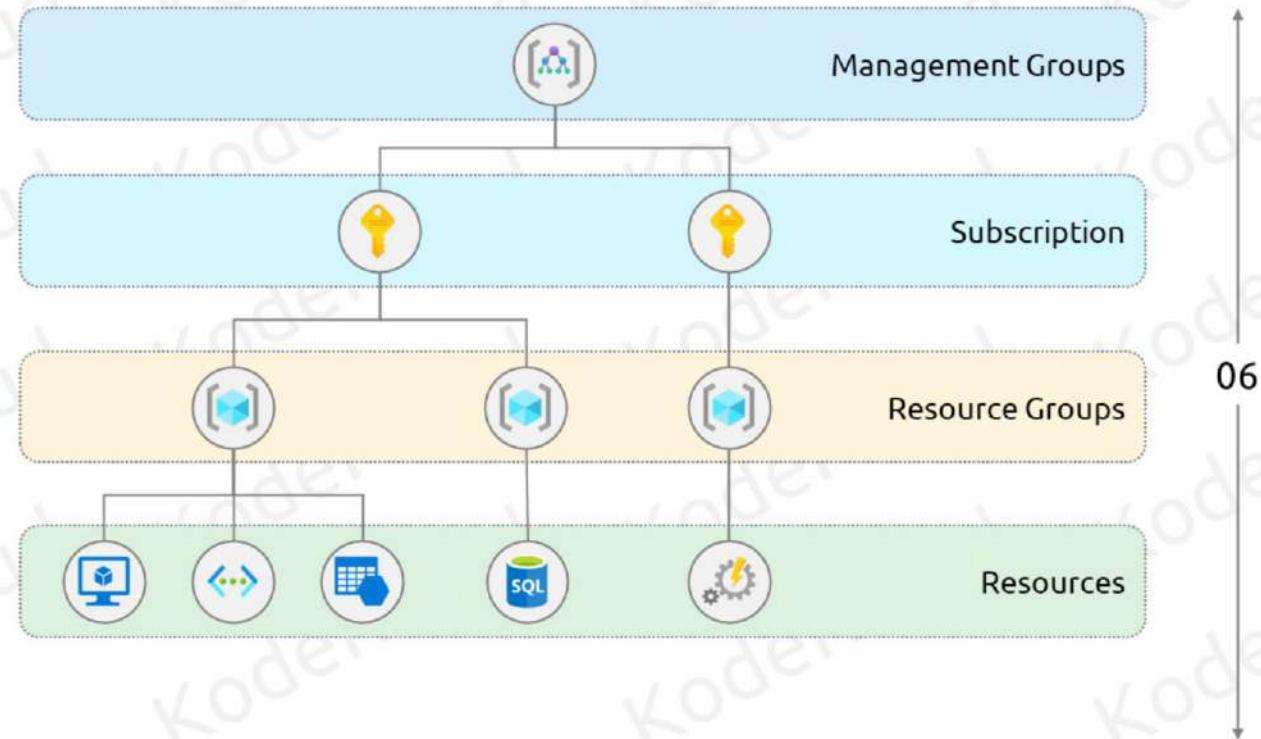
Management Groups – Scalability in Directory



© Copyright KodeKloud

A single directory can accommodate support for up to 10,000 management groups.

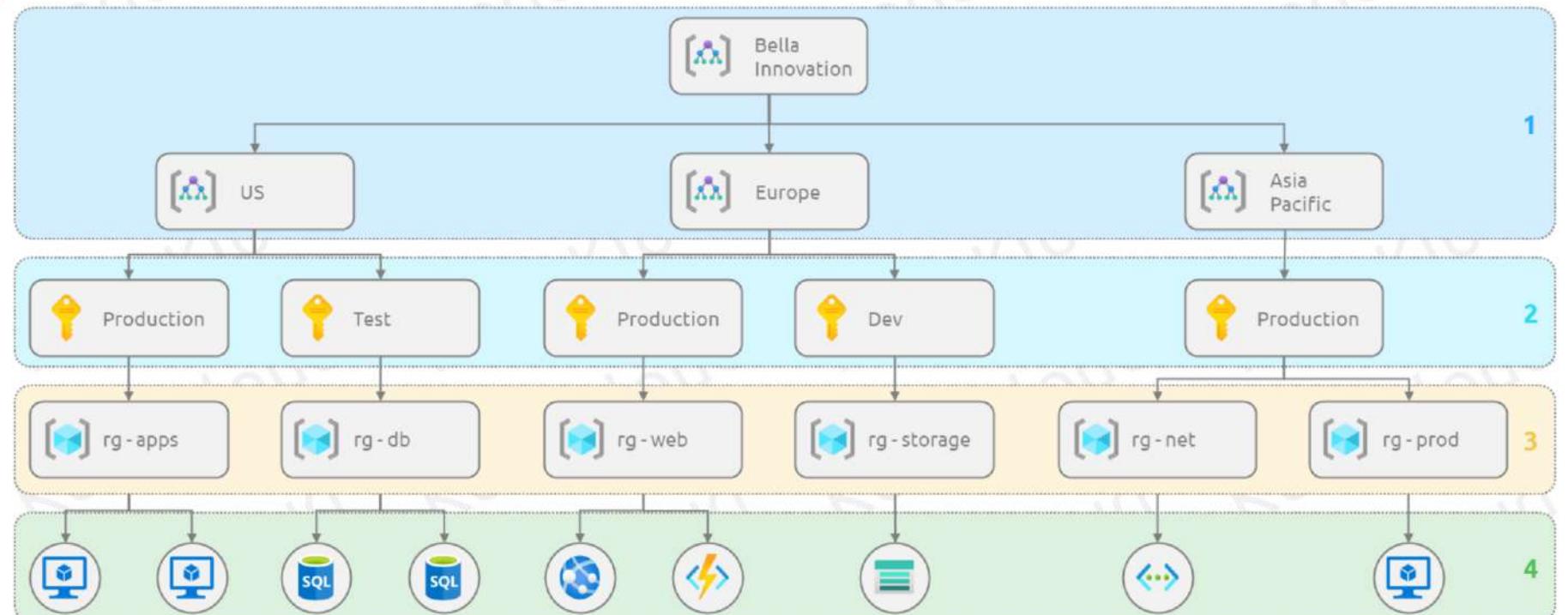
Management Groups – Hierarchical Depth



© Copyright KodeKloud

A management group tree structure can extend up to six levels deep, facilitating organized governance.

Bella Innovation Hierarchy



Compute and Networking

Compute and Networking

© Copyright KodeKloud



Compute and Networking



Compute Types



Virtual Machines and Virtual Machine Scale Sets



Azure Virtual Desktops



Azure App Services



Azure Container Services

Compute and Networking

-  Azure Functions
-  Virtual Networking
-  VPN Gateway
-  ExpressRoute
-  Azure DNS

Compute and Networking

-  Compute Types
-  Virtual Machines and Virtual Machine Scale Sets
-  Azure Virtual Desktops
-  Azure App Services
-  Azure Container Services

Compute and Networking

-  Azure Functions
-  Virtual Networking
-  VPN Gateway
-  ExpressRoute
-  Azure DNS

Azure Compute Services – Challenge



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Bella Innovation now knows how to setup the hierarchy. In on-premises all their applications are deployed in servers. They are wondering what compute and networking options they have in Azure to run their applications.

Compute Types





Compute Types

Flexible



On-Demand



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Azure Compute offers a flexible, on-demand service delivering essential computing resources

Compute Types



Virtual
Machines



App
Services



Container
Instances



Azure Kubernetes
Services (AKS)



Azure Virtual
Desktop



Function Apps

© Copyright KodeKloud

like storage drives, CPUs, RAM, networking capabilities, and operating systems.

Virtual Machines and Virtual Machine Scale Sets



Azure Virtual Machine Scale Set

A software emulation of a physical computer that runs an operating system and applications



Azure Virtual Machine Scale Set – Key Features

01



Variety of Sizes

02



Customizable

03



Integrated Support

Variety of Sizes: Different VM sizes for various workloads (general purpose, compute-optimized, memory-optimized, etc.).

Customizable: Ability to select the OS, memory, and storage configurations.

Integrated Support: Seamless integration with other Azure services like Azure Active Directory, Storage, and SQL Database.

Azure Virtual Machine Scale Set – Benefits

01



Flexibility and
Scalability

02



Cost-Effective

03



Security and
Reliability

Flexibility and Scalability: Easily scale up or down as needed.

Cost-Effective: Pay-as-you-go pricing model, only pay for what you use.

Security and Reliability: Backed by Azure's robust security and support.

Azure Virtual Machine Scale Set – Common Use Cases



01 | Testing and development

02 | Running applications

03 | Extending data centers

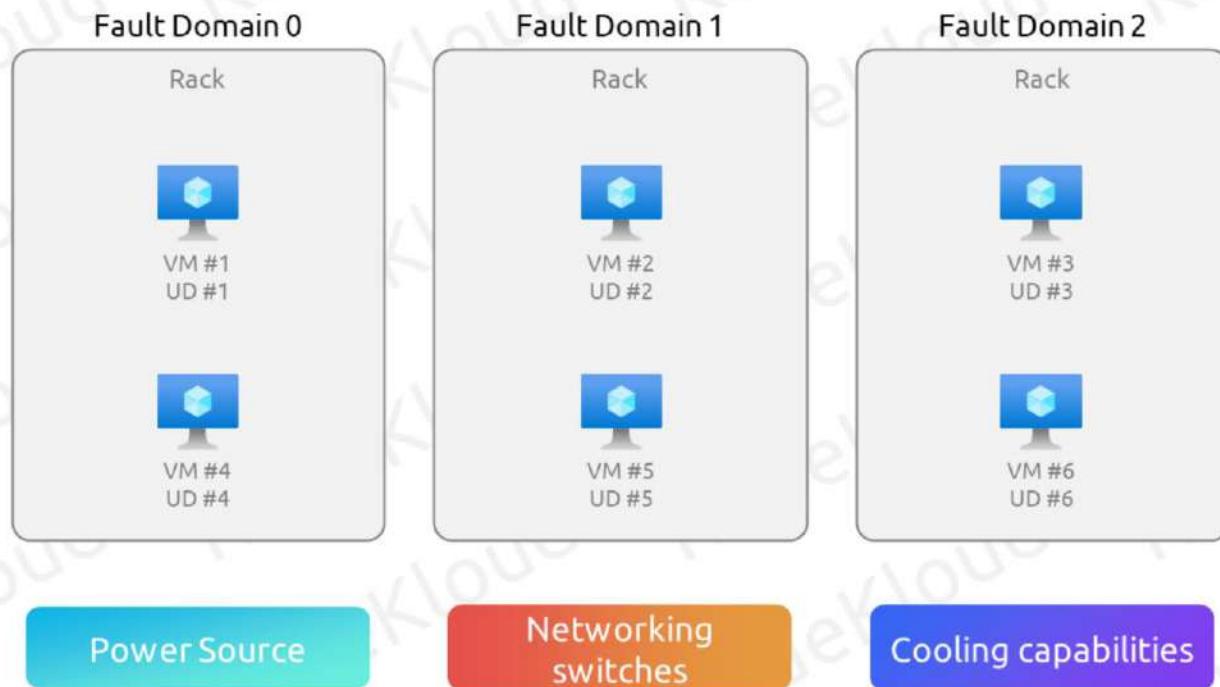
Ideal for testing and development, running applications, and extending data centers.

Availability Sets

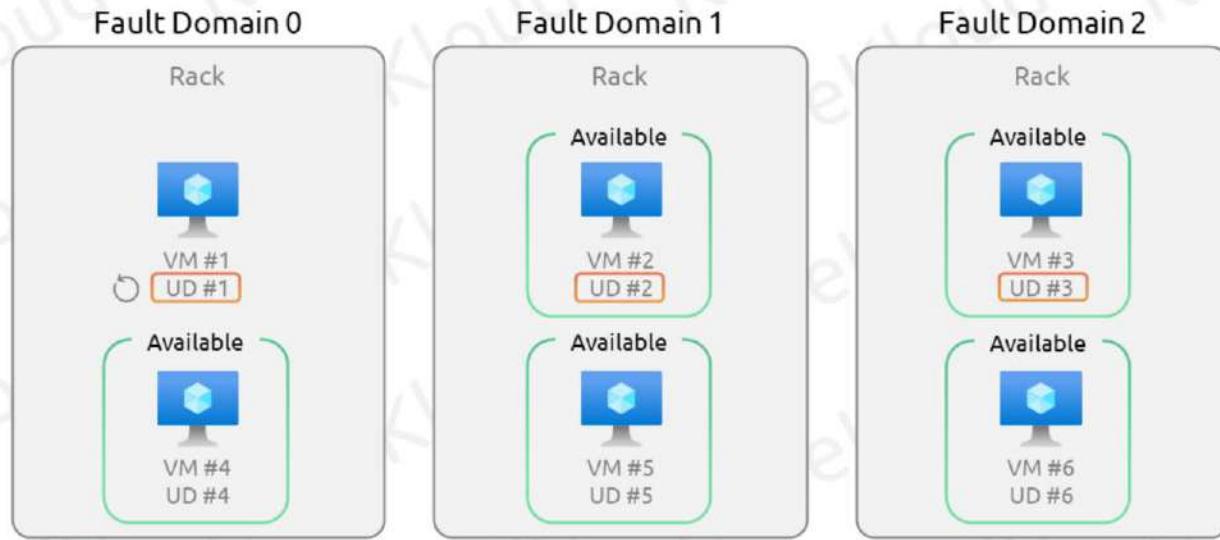
A feature in Azure that ensures your application is available during planned and unplanned maintenance events



Availability Sets



Availability Sets



Availability Sets

Fault Domain

There are three fault domains.

Protects machines from hardware failure

Update Domain

There can be up to 20

Protects machines from plant maintenance

Availability Sets – Core Concepts

Fault Domain (FD)

🔗 Shared power and network

🛡️ Guards against hardware issues

Update Domain (UD)

💻 VM placement groups

⟳ Sequential reboot for maintenance

Fault Domains (FDs): Physical server groups that share common power source and network switch. Helps to protect from hardware failures.

Update Domains (UDs): Logical groups into which VMs are placed. Azure sequentially reboots these groups during planned maintenance.

Availability Sets – Benefits

01



Increased Availability

02



Best Practice

03



Simple to Implement

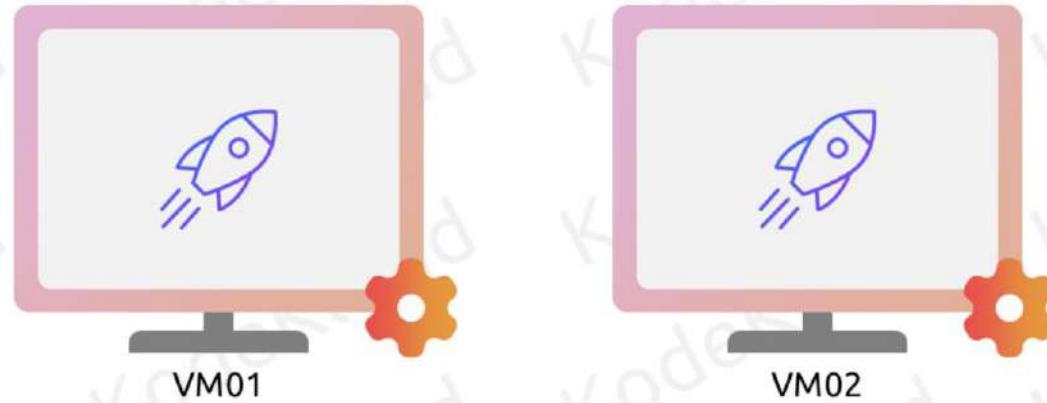
Increased Availability: Reduces the potential of downtime.

Best Practice: Essential for any critical application deployment in Azure.

Simple to Implement: Can be set up with just a few clicks in the Azure portal.

Azure Virtual Machine Scale Set

A service in Azure that allows you to deploy and manage a set of identical, autoscaling virtual machines



Azure Virtual Machine Scale Set – Key Features

01



Automatic Scaling

02



Load Balancing

03



High Availability

© Copyright KodeKloud

Automatic Scaling: VMSS can automatically increase or decrease the number of VM instances in response to demand or a defined schedule.

Load Balancing: Seamlessly works with Azure load balancing to distribute traffic across instances.

High Availability: Ensures your application stays up and running with health and performance monitoring.

Azure Virtual Machine Scale Set – Common Use Cases



01 | High availability

02 | Scalability



© Copyright KodeKloud

Ideal for applications that require high availability and scalability, like web servers, gaming, and data processing.

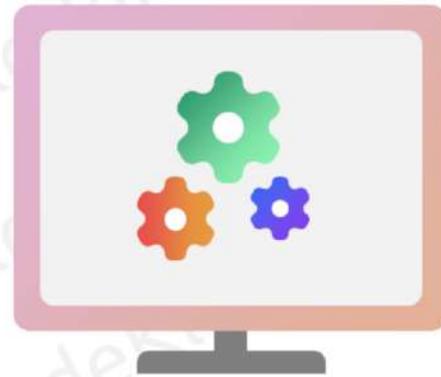
Create a VM

Azure Virtual Desktops



Azure Virtual Desktops

A comprehensive desktop and app virtualization service hosted on Azure





Azure Virtual Desktops



01 | Flexibility to work remotely

02 | Multi-session capability

© Copyright KodeKloud

So think of it like a personal pc running in the cloud. Just to give you an example, sometimes I need to use power Bi desktop, and if I don't have windows with me, I'll not be able to use it. So if I'm on my Mac, what I can do is I can go to AVD from my company and I'll be able to use a Windows ten pc just like that in the cloud, and I can use a power Bi desktop application. Similarly, if I'm traveling or I'm on vacation and I need to access something and I need a Windows ten machine for that, I can simply use my tablet and access a Windows ten machine which is sitting in the cloud. So it gives you more flexibility. And these machines can be joined to the domain and you can make it look like a corporate machine and they can be accessed

from anywhere. So that's what Azure virtual desktop is. So VMS is more for hosting applications and services, while AVD, or virtual desktop as the name implies, is a desktop for you.

Now let's explore what makes Azure Virtual desktop a game changer. First of all, the remote access AVD enables users to access full fledged desktop and applications from any location, giving the flexibility to work remotely without compromising on the experience or tools needed to perform their job. Unlike standard vms that serve one user at a time, AVD allows multiple concurrent users on a single Windows ten virtual machine. So if I am using Azure VM and my colleague is also using the same vm, we can't sign in at the same time.

Azure Virtual Desktops – Key Features

01



Remote Access

02



Multi-Session
Windows 10

03



Security and
Compliance

Remote Access: Enables access to desktops and applications from anywhere.

Multi-Session Windows 10: Allows multiple concurrent users on a single Windows 10 virtual machine.

Security and Compliance: Integrated with Azure's robust security and compliance capabilities.

Azure Virtual Desktops – Benefits

01



Flexibility

02



Cost-Effective

03



Scalability

Flexibility: Users can access their desktops and apps on virtually any device.

Cost-Effective: Optimize costs by using existing licenses and only paying for what you use.

Scalability: Easily scale up or down based on your needs.

Azure Virtual Desktops – Common Use Cases



01 | Remote work

02 | Bring Your Own Device

03 | Regulated access to company data

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Use Cases:

Ideal for remote work, bring-your-own-device (BYOD) scenarios, and providing secure, regulated access to company data.

Demo AVD

Azure App Services



Azure App Services

A fully managed platform for building,
deploying, and scaling web apps



Azure App Services – Key Features

01

Python .NET Core
Java .NET Ruby
Node.js PHP

Multiple Languages
and Frameworks

02

Azure DevOps
GitHub
Docker Hub

DevOps
Optimization

03



Global Scale With
High Availability

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Multiple Languages and Frameworks: Supports .NET, .NET Core, Java, Ruby, Node.js, PHP, Python.

DevOps Optimization: Integration with Azure DevOps, GitHub, Docker Hub for continuous deployment.

Global Scale with High Availability: Scale up or out manually or automatically. Hosted in Microsoft managed datacenters globally.



Azure App Services – Benefits

01



Ease of Use

02



Fully Managed Platform

03



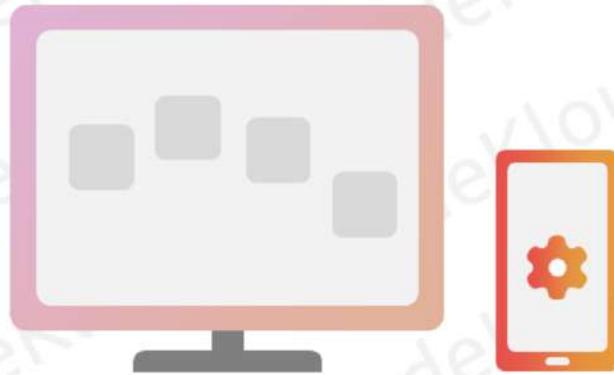
Integrated Services

Ease of Use: Simple and fast to deploy web applications.

Fully Managed Platform: Automatic patching and maintenance, freeing up time to focus on app development.

Integrated Services: Easy integration with Azure services like Azure SQL Database, Azure Active Directory.

Azure App Services – Common Use Cases

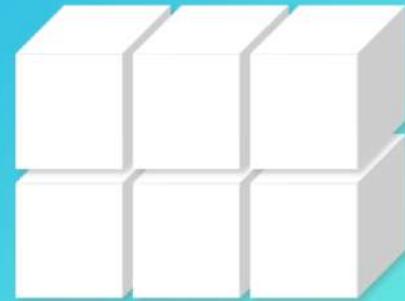


01 | Web apps

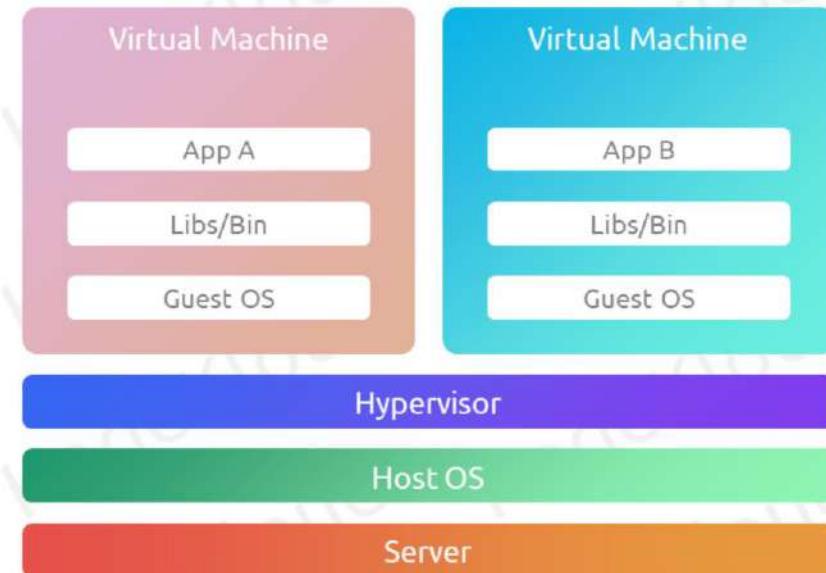
02 | Mobile app backend

03 | Restful API

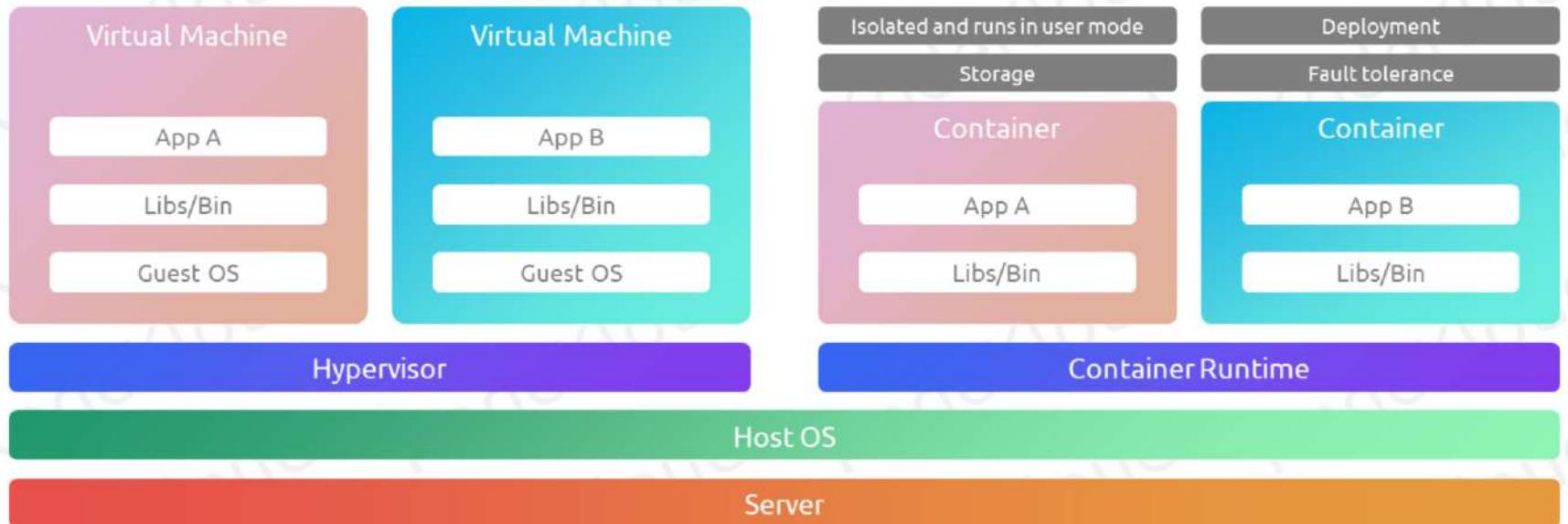
Azure Container Services



Virtual Machines vs Containers

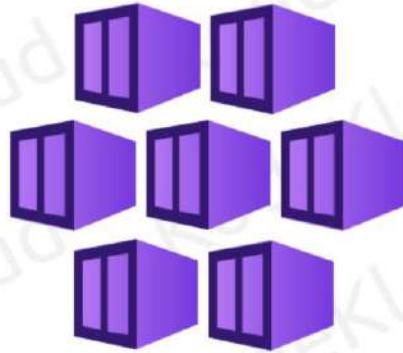


Virtual Machines vs Containers





Azure Container Services



01 | Lightweight virtual environment

02 | No OS management required

03 | Responsive and adaptive

© Copyright KodeKloud

Azure containers offer a lightweight and streamlined virtual environment that eliminates the need for managing an operating system. They are designed to be responsive and adapt efficiently to changing demands.

Azure Container Services – Types

01



Azure Container
Instances

02



Azure Container
Apps

03



Azure Kubernetes
Service

1 Azure Container Instances



01 | Azure PaaS container service

02 | No VM management needed

03 | Fast and simple deployment

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A PaaS service that provides the fastest and simplest way to run a container in Azure, without having to manage any virtual machines or adopt a higher-level service.

1

Azure Container Instances – Key Features

01



Ease of Deployment

02



No VM Management

03



Flexible Sizing

Ease of Deployment: Quickly deploy containers with a single command.

No VM Management: Run your containers without managing or configuring virtual machines.

Flexible Sizing: Choose the exact amount of memory and CPU power your container requires.

1

Azure Container Instances – Benefits

01



Simplicity and Speed

02



Cost-Efficient

03



Secure and Isolated

Simplicity and Speed: Streamlined for quick deployment and management.

Cost-Efficient: Pay only for the resources your container uses.

Secure and Isolated: Containers run in a secure and isolated environment.

1

Azure Container Instances – Use Cases



01 | Ideal for simple applications

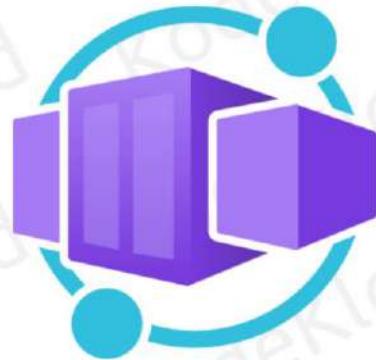
02 | Fast and efficient execution

03 | Suitable for task automation and build jobs

Ideal for applications that require a simple, fast, and efficient method to run in an isolated environment, like simple applications, task automation, and build jobs.

2

Azure Container Apps



01 | PaaS container deployment

02 | Scalable modern apps

03 | Microservices support

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A PaaS container service that enables you to deploy and scale modern apps and microservices using containers.

2 Azure Container Instances – Key Features

01



Scalability

02



Support For
Microservices

03



Integration With
DevOps

Scalability: Automatically scales in response to workload demands.

Support for Microservices: Ideal for microservices architectures with built-in service discovery and traffic routing.

Integration with DevOps: Supports CI/CD pipelines and containerized deployment from various registries.

2 Azure Container Instances – Benefits

01



Simplified Management

02



Scalability and Flexibility

03



Cost-Effective

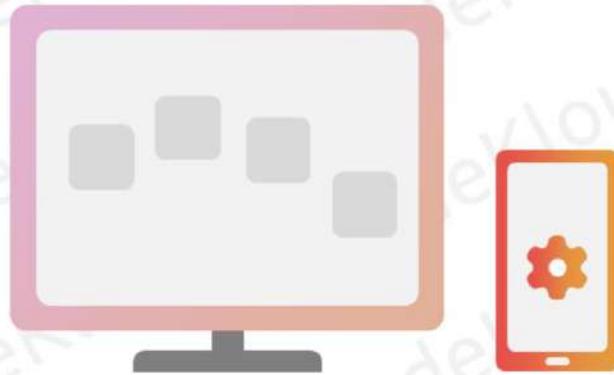
Simplified Management: No need to manage underlying infrastructure.

Scalability and Flexibility: Scale dynamically based on traffic and resource consumption.

Cost-Effective: Pay only for the resources used by the containers.

2

Azure Container Instances – Use Cases



01 | Ideal for modern apps

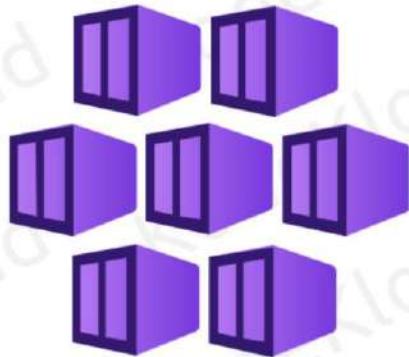
02 | Offers scalability and flexibility

03 | Supports web apps and event-driven architectures

Perfect for modern applications that require scalability and flexibility, like web apps, background processing, and event-driven architectures.

3

Azure Kubernetes Service



01 | Deployment

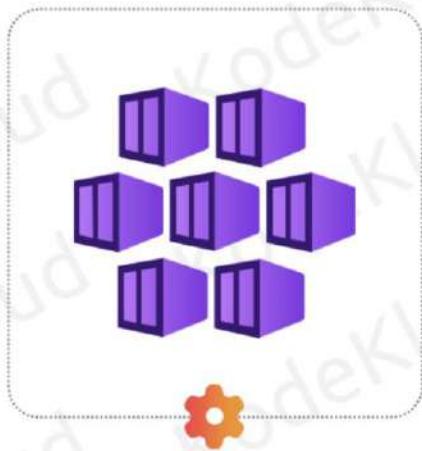
02 | Management

03 | Scaling

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An Azure service that simplifies the deployment, management, and scaling of containerized applications using Kubernetes.

3 Understanding Kubernetes



01 | Deployment

02 | Management

03 | Scaling

An open-source system for automating deployment, scaling, and management of containerized applications.

3

Azure Kubernetes Service – Key Features

01



Automated
Kubernetes
Management

02



Integrated
Developer Tools

03



Advanced
Networking

Automated Kubernetes Management: Automates complex Kubernetes management tasks.

Integrated Developer Tools: Supports CI/CD, Azure DevOps, and other popular dev tools.

Advanced Networking: Offers powerful networking options for high performance.

3

Azure Kubernetes Service – Benefits

01



Simplified Deployment

02



Scalability

03



Security and Compliance

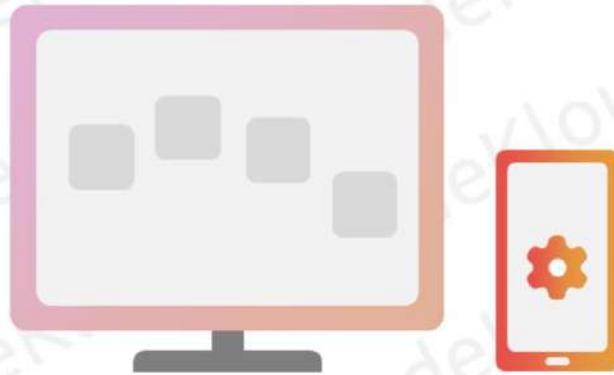
Simplified Deployment: Streamlines the process of deploying and managing Kubernetes.

Scalability: Easily scales resources up or down based on demand.

Security and Compliance: Built-in security features and compliance with Azure's standards.

3

Azure Kubernetes Service – Use Cases



01 | High-availability applications

02 | Scalable microservices

03 | Versatile architecture support

Azure Functions



Azure Functions

A serverless compute service that lets you run event-triggered code without having to explicitly provision or manage infrastructure



© Copyright KodeKloud

A serverless compute service that lets you run event-triggered code without having to explicitly provision or manage infrastructure.



Azure Functions – Key Features

01



Event-Driven
Architecture

02

C# JavaScript
Java Python
PowerShell

Support Multiple
Languages

03



Integration
Capabilities

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Event-Driven Architecture: Execute code in response to triggers such as HTTP requests, database operations, queue messages, and more.

Support for Multiple Languages: Write functions in C#, Java, JavaScript, Python, and PowerShell.

Integration Capabilities: Seamlessly integrates with other Azure services and external systems.



Azure Functions – Benefits

01



Ease of Use

02



Fully Managed Platform

03



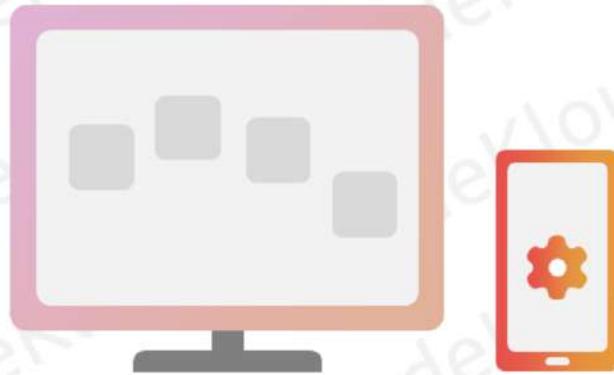
Integrated Services

Ease of Use: Simple and fast to deploy web applications.

Fully Managed Platform: Automatic patching and maintenance, freeing up time to focus on app development.

Integrated Services: Easy integration with Azure services like Azure SQL Database, Azure Active Directory.

Azure Functions – Common Use Cases



01 | Web apps

02 | Mobile app backend

03 | RESTful API

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Perfect for web apps, mobile app backends, RESTful APIs, and more.

Comparing Compute Services



Compute Services – A Comparison

Feature/Service	Virtual Machines	Azure Virtual Desktop	Azure App Service	Containers	Azure Functions
Primary Use					

Virtual Networking



Virtual Networks



01 | Azure private network base

02 | Secure communication

03 | Connectivity to internet and on-premises networks

© Copyright KodeKloud

A fundamental building block for your private network in Azure. It enables Azure resources like VMs to securely communicate with each other, the internet, and on-premises networks.

Virtual Networks – Key Features

01



Isolation and Segmentation

02



Internet Communication

03



Communication With On-Premises

Isolation and Segmentation: Create multiple subnets within a virtual network.

Internet Communication: Control inbound and outbound access to and from VMs over the internet.

Communication with On-Premises: Establish secure cross-premises connectivity.

Virtual Networks – Benefits

01



Customizable
Network Topology

02



Enhanced
Security

03



Integration With
Azure Services

Customizable Network Topology: Configure your network settings based on your specific needs.

Enhanced Security: Use Network Security Groups (NSGs) and firewalls to control traffic flow.

Integration with Azure Services: Seamlessly works with services like Azure Storage and Azure SQL Database.

Virtual Networks – Connectivity Options

01



Public endpoints

02

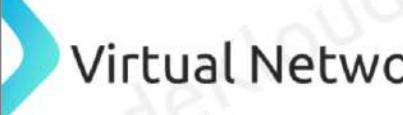


Private Endpoints

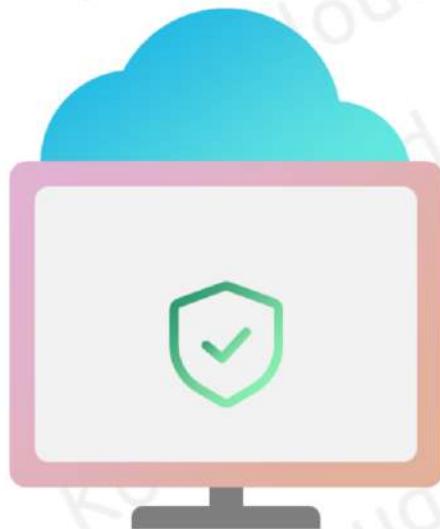
03



Virtual Network
Peering



Virtual Networks – Common Use Cases



01 | Secure Azure service connection

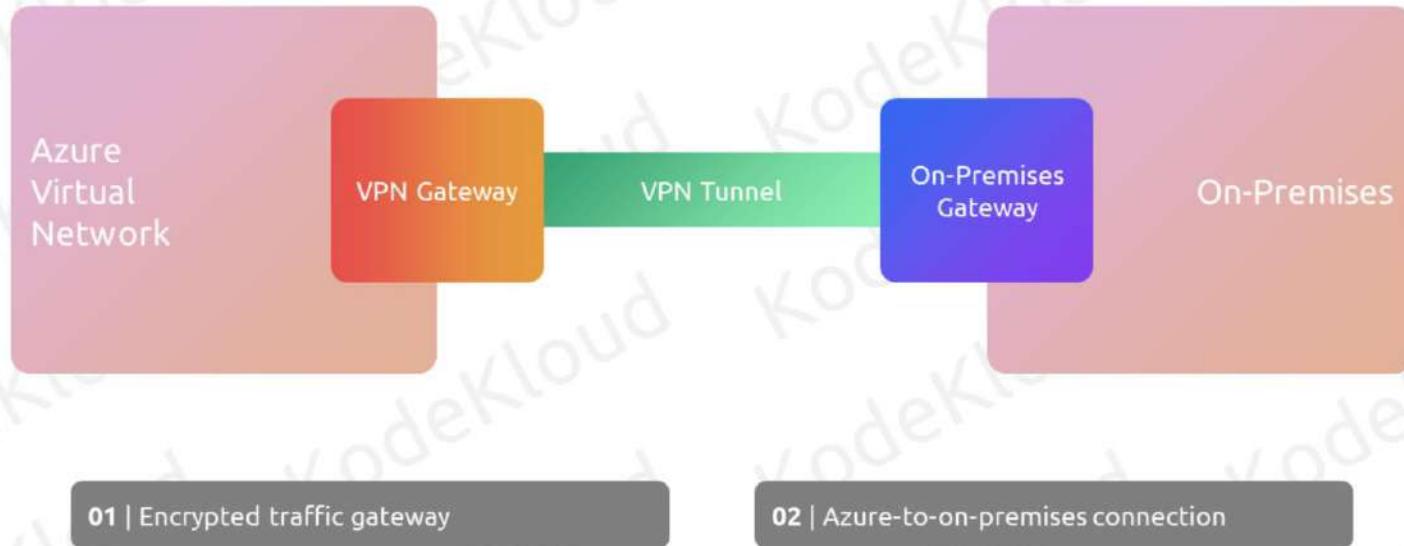
02 | Links to on-premises data centers

Ideal for securely connecting Azure services to each other and to on-premises data centers.

VPN Gateway



VPN Gateway



© Copyright KodeKloud

A specific type of virtual network gateway that is used to send encrypted traffic between an Azure virtual network and an on-premises location over the public Internet.

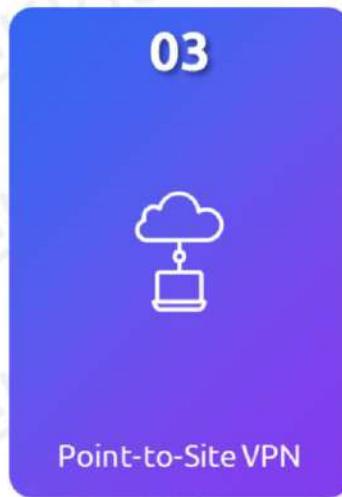
VPN Gateway – Key Features



Secure Connectivity



Site-to-Site VPN



Point-to-Site VPN

Secure Connectivity: Provides a secure connection between Azure and on-premises networks.

Site-to-Site VPN: Connects entire networks to each other, allowing all resources to communicate.

Point-to-Site VPN: Connects individual devices to Azure, useful for remote workers.

VPN Gateway – Benefits

01



Enhanced Security

02



Scalability

03



Integration

Enhanced Security: Uses industry-standard encryption protocols for secure communication.

Scalability: Easily scale up to meet increased demand.

Integration: Works seamlessly with other Azure services and network features.

VPN Gateway – Common Use Cases



01 | Secure on-premises extension

02 | Remote worker access

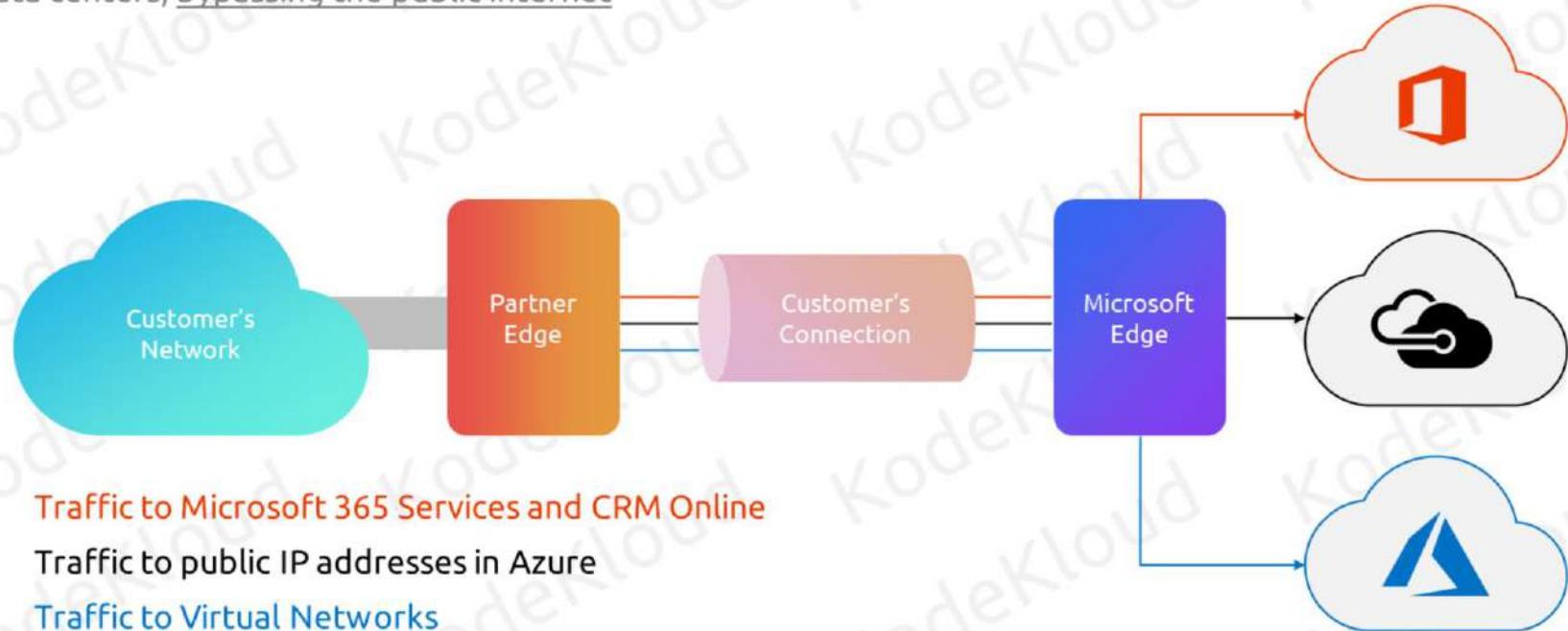
03 | Cross-premises connectivity

ExpressRoute



ExpressRoute

A service that provides a private connection between your organization's infrastructure and Microsoft Azure data centers, bypassing the public internet



© Copyright KodeKloud

A service that provides a private connection between your organization's infrastructure and Microsoft Azure datacenters, bypassing the public internet.

ExpressRoute – Key Features

01



Private Connection

02



High-Speed Connectivity

03



Integration With
Microsoft Cloud
Services

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Private Connection: Bypasses the public internet, offering more reliability, faster speeds, consistent latencies, and higher security.

High-Speed Connectivity: Offers connections ranging from 50 Mbps to 100 Gbps.

Integration with Microsoft Cloud Services: Access all Microsoft Cloud services like Office 365, Dynamics 365.



ExpressRoute – Benefits

01



Reliability

02



Privacy

03



Speed

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Reliability: More consistent network performance.

Privacy: Data does not travel over the public internet.

Speed: Faster speeds suitable for heavy data loads.

ExpressRoute – Common Use Cases



01 | Secure on-premises extension

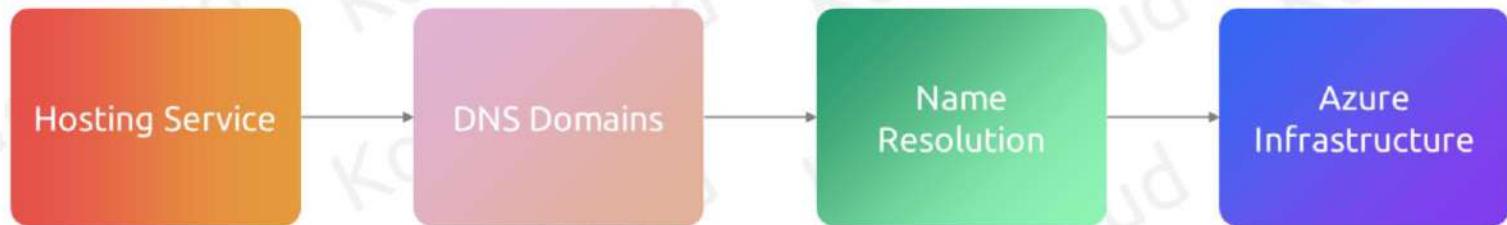
02 | Remote worker access

03 | Cross-premises connectivity

Azure DNS



Azure DNS



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A hosting service for DNS domains that provides name resolution using Microsoft Azure infrastructure.



Azure DNS – Key Features

01



Global Reach

02



Security and
Reliability

03



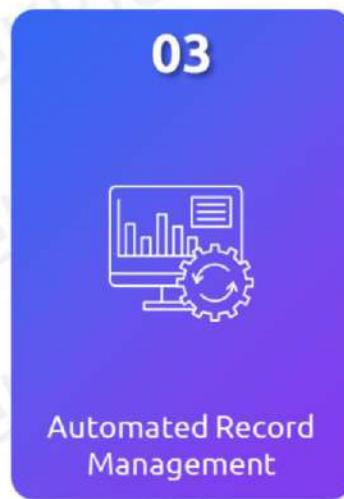
Fast and Scalable

Global Reach: Utilizes the global network of Azure data centers.

Security and Reliability: Integrated with Azure security features for added protection and reliability.

Fast and Scalable: Handles high DNS query volumes with low latency.

Azure DNS – Benefits



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Seamless Integration: Works well with other Azure services like Virtual Machines and Azure Traffic Manager.

Custom Domains: Easily manage and host your own DNS domain names.

Automated Record Management: Update DNS records using Azure APIs or the Azure portal.



Azure DNS – Common Use Cases



01 | Azure DNS management

02 | Records for Azure-hosted apps

03 | Reliable domain resolution

Storage

Storage

- A Storage**
 - Storage Accounts
 - Redundancy Options
 - Storage Services
 - Access Tiers
 - Azure Migrate
 - Azure Data Box
 - File Management and Migration

Storage

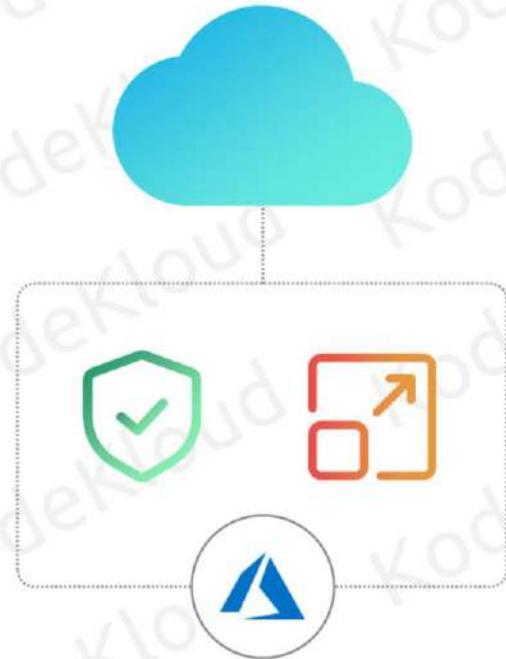
-  Storage Accounts
-  Redundancy Options
-  Storage Services
-  Access Tiers
-  Azure Migrate
-  Azure Data Box
-  File Management and Migration

Storage Accounts



Storage Accounts

A secure and scalable cloud storage solution in Azure that can store large amounts of data in the cloud



© Copyright KodeKloud

A secure and scalable cloud storage solution in Azure that can store large amounts of data in the cloud.

Storage Accounts – Key Features

01



Diverse Storage Options

02



High Durability and Availability

03



Secure

Diverse Storage Options: Includes Blob Storage, File Storage, Queue Storage, and Table Storage.

High Durability and Availability: Data is replicated for protection and accessibility.

Secure: Offers advanced security features like encryption and access controls.



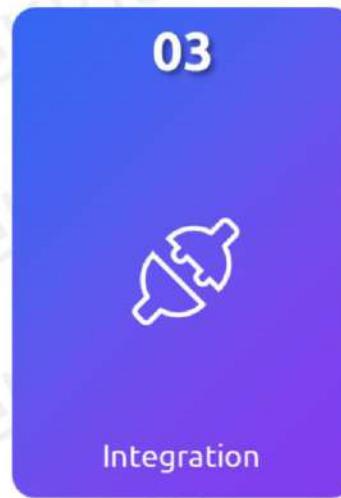
Storage Accounts – Benefits



Scalability



Accessibility



Integration

© Copyright KodeKloud

Scalability: Easily scales to meet the demands of your application.

Accessibility: Accessible from anywhere in the world over HTTP or HTTPS.

Integration: Works well with Azure and third-party applications.

Storage Accounts – Use Cases



01 | Versatile application support

02 | Unstructured data storage

03 | Reliable messaging and NoSQL

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Ideal for a wide range of applications, from storing unstructured data (like videos and images) to reliable messaging and NoSQL storage.

Redundancy Options



Storage Redundancy

A method of ensuring data is replicated and stored in multiple locations to prevent data loss and improve data availability



© Copyright KodeKloud

A method of ensuring data is replicated and stored in multiple locations to prevent data loss and improve data availability.

Storage Redundancy

Redundancy Configuration

Deployment

Durability

Storage Services



Storage Services



01 | Storing

02 | Accessing

03 | Managing data

Azure Storage Services offer a range of solutions for storing, accessing, and managing data in the cloud.

Storage Services

01



Azure Blob

02



Azure Disk

03



Azure Queue

04



Azure Files

05



Azure Tables

Azure Blob: For unstructured data like text, binary data, video, and audio.

Azure Disk: Provides high-performance, durable block storage for Azure Virtual Machines.

Azure Queue: A messaging store for reliable communication between application components.

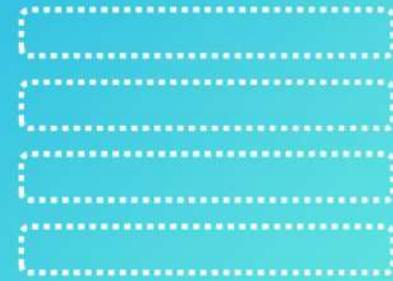
Azure Files: Managed file shares for cloud or on-premises deployments.

Azure Tables: NoSQL store for semi-structured data, ideal for development.

Storage Services

Storage Service	Endpoint
Blob Storage	<code>https://<storage-account-name>.blob.core.windows.net</code>
Azure Files	<code>https://<storage-account-name>.file.core.windows.net</code>
Queue Storage	<code>https://<storage-account-name>.queue.core.windows.net</code>
Table Storage	<code>https://<storage-account-name>.table.core.windows.net</code>

Access Tiers



Access Tiers



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A range of storage options in Azure Blob Storage, tailored to optimize costs based on data access frequency and storage duration.

Access Tiers

Hot	Cool	Cold	Archive
<ul style="list-style-type: none">• Frequently accessed data• Lower access costs• Higher storage costs	<ul style="list-style-type: none">• Infrequent access data• Minimum storage duration: 30 days• Lower storage costs, higher access costs	<ul style="list-style-type: none">• Rarely accessed data• Minimum storage duration: 30 days• Lower storage costs, reasonable access costs	<ul style="list-style-type: none">• Long-term storage• Minimum storage duration: 180 days• Lowest storage cost, higher retrieval costs

Access Tiers – Benefits

01



Cost Management

02



Flexibility

03



High Durability

Cost Management: Choose a tier to balance between access frequency and storage costs.

Flexibility: Switch between tiers based on changing access patterns.

High Durability: Ensures data safety across all tiers.

Access Tiers – Use Cases

Hot

- Data such as streaming content
- Frequently used items

Cool

- Short-term backup
- Infrequent access

Cold

- Data accessed less frequently but more often than archival data

Archive

- Long-term data retention
- Compliance and archival purposes

Hot Tier for data like streaming content, frequently used items.

Cool Tier for short-term backup, infrequent access.

Cold Tier for data accessed less frequently but more often than archival data.

Archive Tier for long-term data retention, compliance, and archival purposes.

Access Tiers – Choosing the Right Tier



01 | Data access patterns

02 | Storage duration

03 | Cost implications

Consider data access patterns, storage duration, and cost implications.

Blobs

Azure Migrate



Azure Migrate

A service that provides tools to assist organizations in migrating their existing on-premises workloads to Azure



© Copyright KodeKloud

A service that provides tools to assist organizations in migrating their existing on-premises workloads to Azure.

Azure Migrate – Key Features

01



Assessment Tools

02



Migration Services

03



Integrated Tools

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Assessment Tools: Analyzes on-premises workloads for migration readiness.

Migration Services: Supports different migration scenarios including servers, databases, web apps, and virtual desktops.

Integrated Tools: Offers a hub of tools from Microsoft and partners for various migration needs.

Azure Migrate – Benefits

01



Streamlined
Migration Process

02



Cost-Effective

03



Flexibility and
Compatibility

Streamlined Migration Process: Simplifies the assessment, planning, and migration stages.

Cost-Effective: Helps estimate and optimize Azure costs before migration.

Flexibility and Compatibility: Supports a wide range of applications and workloads.

Azure Migrate – Use Cases



01 | On-premises infrastructure

02 | Applications

03 | Data

Ideal for moving on-premises infrastructure, applications, and data to Azure.

Azure Databox



Azure Databox

A data transfer solution provided by Azure for moving large amounts of data into Azure storage and compute services



© Copyright KodeKloud

A data transfer solution provided by Azure for moving large amounts of data into Azure storage and compute services.

Azure Databox – Key Features

01



Physical Devices For
Data Transfer

02



Offline Data
Transfer

03



Secure

Physical Devices for Data Transfer: Secure, ruggedized devices with high storage capacities.

Offline Data Transfer: Ideal for transferring large datasets where network transfer is slow or costly.

Secure: Built-in encryption to ensure data security during transit.

Azure Databox – Benefits

01



High-Speed Data Transfer

02



Cost-Effective

03



Ease of Use

High-Speed Data Transfer: Enables quick transfer of terabytes to petabytes of data.

Cost-Effective: Reduces network costs for massive data migration.

Ease of Use: Simple process with Azure portal integration for tracking and management.

Azure Databox – Variants

01

Data Box Disk

Portable SSD disks for
smaller data loads

02

Data Box

Ruggedized appliance
for larger data
volumes

03

Data Box Heavy

For very large-scale
data transfer needs

Data Box Disk: Portable SSD disks for smaller data loads.

Data Box: Ruggedized appliance for larger data volumes.

Data Box Heavy: For very large-scale data transfer needs.

Azure Databox – Use Cases



01 | Large data migration

02 | Data center shutdowns

03 | On-premises backup

03 | Large dataset transfers

Ideal for migrating large volumes of data to Azure, such as datacenter shutdowns, on-premises data backup, or large dataset transfers.

File Management Options



File Management Options

Feature/Tool	AzCopy	Azure Storage Explorer	Azure File Sync
Primary Function	Command-line utility for data transfer between Azure Storage and File Systems	Graphical user interface for viewing and managing Azure Storage data	Synchronizes files across Azure File Shares and on-premises Windows Servers
Use Cases	Bulk data transfer, backup, and archiving to Azure Storage	Browsing, managing, and moving data across Azure Storage services	Centralizing file services in Azure while maintaining local access
Data Transfer	Optimized for high-performance, large-scale data transfer	Ideal for ad hoc transfer and management of data	Continuous synchronization of data with cloud tiering
Ease of Use	Requires command-line knowledge	User-friendly, intuitive graphical interface	Integrates with Windows Server for seamless file sharing
Integration	Works directly with Azure Blob and File Storage	Supports multiple Azure services including Blobs, Files, Queues, and Tables	Integrates with Azure File Shares and on-premises Windows Servers
Best for	Large-scale, scriptable data operations	Interactive data exploration and management	Hybrid cloud storage solutions, reducing on-premises storage footprint

Identity, Access, and Security

Identity, Access and Security

A

Identity, Access, and Security

- Microsoft Entra ID
- Microsoft Entra Domain Services
- Authentication and Authorization
- Multi-Factor Authentication
- Conditional Access

Identity, Access and Security

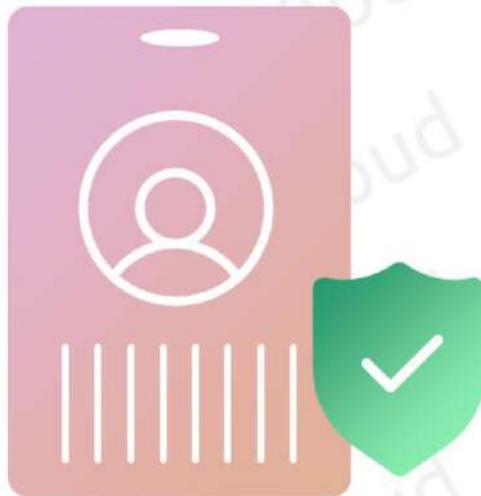
- ◆ B2B and B2C
- ◆ Role-Based Access Control
- ◆ Zero Trust
- ◆ Defense in Depth
- ◆ Microsoft Defender for Cloud

Microsoft Entra ID





Microsoft Entra ID



01 | Comprehensive identity service

02 | Secure user identity management

03 | Access policy control

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A comprehensive identity and access management service, formerly Azure Active Directory, offering secure management of user identities and access policies.

Microsoft Entra ID – Key Features



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Single Sign-On (SSO): Simplifies access to multiple applications with a single set of credentials.

Multi-Factor Authentication (MFA): Enhances security with multiple verification methods.

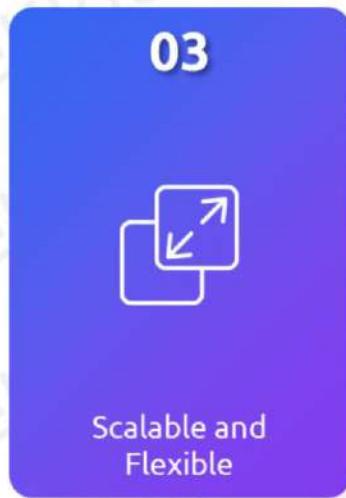
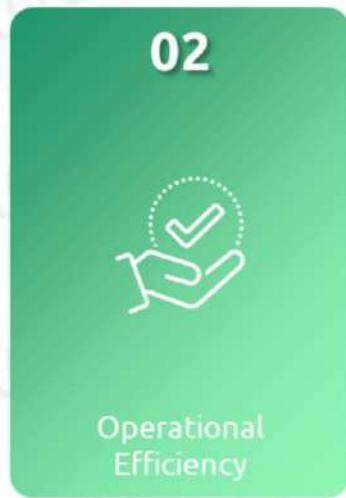
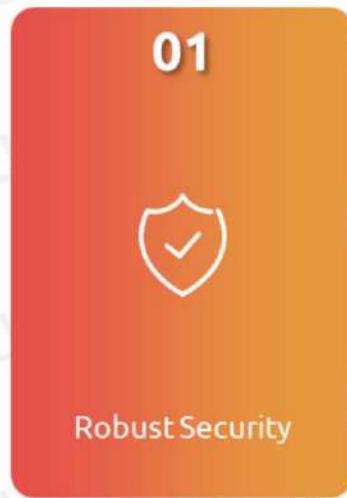
Conditional Access: Custom access policies based on user, location, and device.

B2B Collaboration: Securely manage guest and partner access to resources.

Application Management: Easy integration and management of applications for better access control.

Device Management: Control and secure access from various devices, integrating with device management solutions.

Microsoft Entra ID – Benefits



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Robust Security: Protects against unauthorized access and threats.

Operational Efficiency: Streamlines user and application access management.

Scalable and Flexible: Adapts to business growth and changing IT requirements.



Microsoft Entra ID – Use Cases

01



Secure user access management

02



Partner collaboration

03



Application access control

04



Managing device-based access

Ideal for secure user access management, partner collaboration, application access control, and managing device-based access in various environments.

Microsoft Entra Domain Services





Microsoft Entra Domain Services



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Microsoft Entra domain services think of directory as a service. It's more like a phone book for computer network. Just like the phone book list people name and phone numbers, a directory service lists computers, users and resources on a network and their respective details. It's essential for managing identities and controlling access to resources in a network.

Microsoft Entra Domain Services



Microsoft
Active Directory

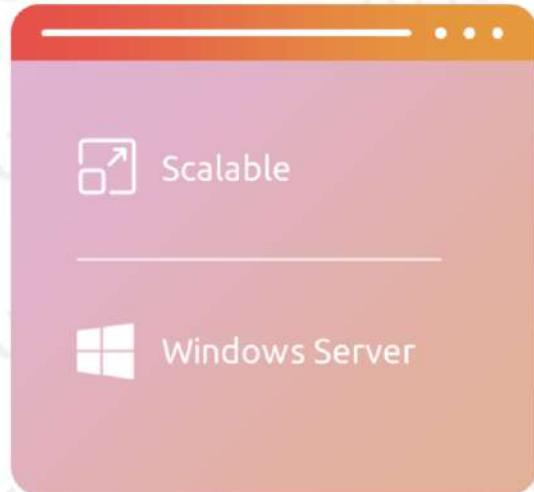


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You might have heard about Windows Active directory. It's a directory service where you will be able to join your PCs. It will have your user information, other attributes. So Windows Active directory is an example for a directory service. There are other directory services available offered by different Windows, but the prominent one is Windows active directory or active directory domain services. Now let's introduce Microsoft Entra domain services. Microsoft Entra Domain Services is a modern managed domain service. The word managed means that you don't have to worry about the underlying infrastructure like the Windows servers or anything.



Microsoft Entra Domain Services



01 | Managed domain service

02 | Scalable and high availability

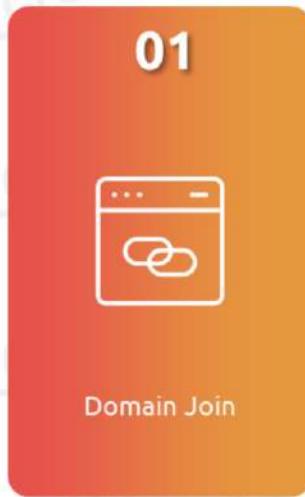
03 | Compatibility with Windows Server

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A managed domain service that provides scalable, high-availability domain services with compatibility for existing Windows Server technologies.



Microsoft Entra Domain Services – Key Features



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Domain Join: Enables Windows servers and computers to join a domain without needing a domain controller.

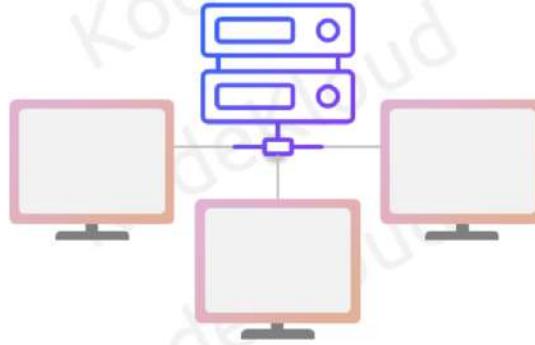
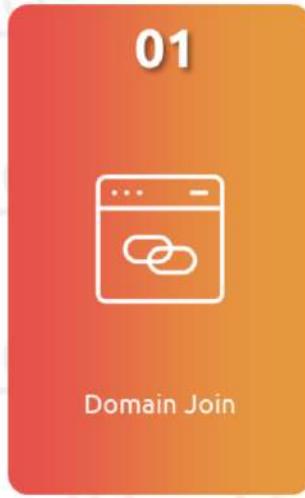
Group Policy: Manage your network's users and computers with Group Policy.

LDAP and Kerberos/NTLM Authentication: Support for legacy protocols for a wide range of applications and services.

Integrated Management: Seamlessly integrates with existing Azure services.



Microsoft Entra Domain Services – Key Features



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This feature allows Windows servers and computers to join a secure domain without the need for traditional domain controller. This makes easier to manage your network's identity infrastructure. If you ever worked in an organization, you might have heard about domain joined computers or domain joined PCs. So what happens is there will be something called a domain controller. As the name implies it is supposed to control the domain and the devices uses everything. So basically your administrator will be joining your device to that domain. Now instead of managing those Windows servers manually. Microsoft Entra domain Services offers this enter suite as a service for you with managed infrastructure. As a customer you

don't have to worry about the unflying Windows servers. Now this makes it easier to manage your domain join process. You don't have to make sure that the Windows server is up and running because it's Microsoft's responsibility. Next is group policy.

Microsoft Entra Domain Services – Key Features



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Domain Join: Enables Windows servers and computers to join a domain without needing a domain controller.

Group Policy: Manage your network's users and computers with Group Policy.

LDAP and Kerberos/NTLM Authentication: Support for legacy protocols for a wide range of applications and services.

Integrated Management: Seamlessly integrates with existing Azure services.

Microsoft Entra Domain Services – Benefits

01



Simplified
Administration

02



Scalability and
Reliability

03



Security and
Compliance

Simplified Administration: Reduces the need for traditional domain controller management.

Scalability and Reliability: Provides a highly available domain services environment.

Security and Compliance: Ensures secure and compliant domain services management.

Microsoft Entra Domain Services – Use Cases

01



Active directory
migration

02



Maintain group
policy

03



Authentication for
legacy apps

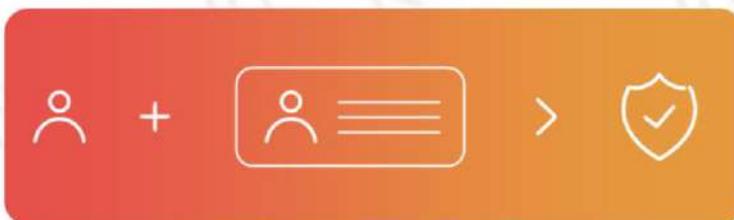
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Ideal for organizations looking to migrate on-premises Active Directory roles to the cloud while maintaining group policy and authentication for legacy applications.

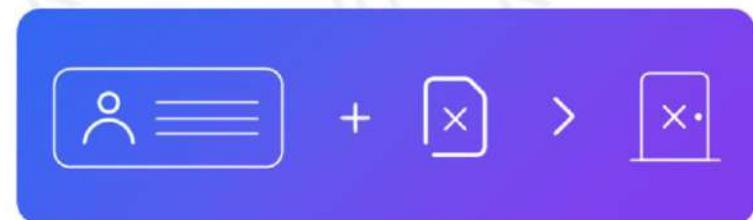
Authentication and Authorization



Authentication and Authorization



Authentication



Authorization

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Authentication is the process of verifying the identity of a user or service. Authorization is the process of determining what permissions an authenticated user or service has.

Authentication and Authorization – Key Differences

Authentication

- Confirms who you are
- Methods include passwords, tokens, and biometrics

Authorization

- Determines what you are allowed to do
- Involves settings like user roles, access controls, and permissions

Authentication: Confirms who you are. Methods include passwords, tokens, biometrics.

Authorization: Determines what you are allowed to do. It involves settings like user roles, access controls, and permissions.

Authentication and Authorization – Azure's Approach

01



Azure employs Microsoft
Entra for authentication

02



Authorization via RBAC,
policies, and rules

Azure uses integrated identity services like Microsoft Entra for robust authentication.
Authorization in Azure is managed through role-based access control (RBAC), policies, and access rules.

Authentication and Authorization – Benefits

01



Enhanced Security

02



Fine-Grained
Access Control

03



Compliance and
Governance

Enhanced Security: Proper authentication and authorization ensure only legitimate access to resources.

Fine-Grained Access Control: Allows precise management of user actions and resource accessibility.

Compliance and Governance: Adheres to security standards and regulations.

Authentication and Authorization – Use Cases

01



User login authentication

02



Access control for Azure
resources for authorization

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Authentication for user logins to Azure services and applications.

Authorization for controlling access to Azure resources like VMs, databases, and applications.

Multi-Factor Authentication





Multi-Factor Authentication (MFA)



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A security system that requires more than one method of authentication from independent categories of credentials to verify the user's identity for a login or other transaction.

Azure integrates MFA as part of Microsoft Entra, providing enhanced security for user sign-ins and transactions.

Multi-Factor Authentication – Benefits

01



Increased Security

02



Flexibility

03



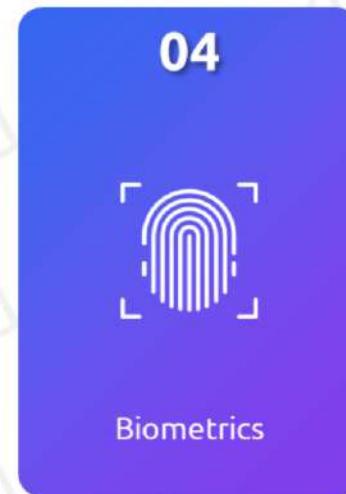
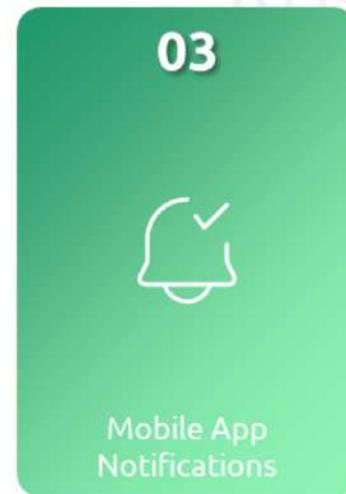
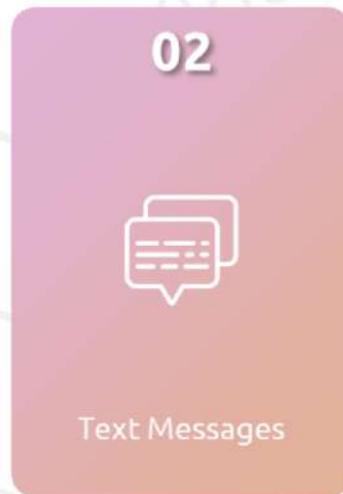
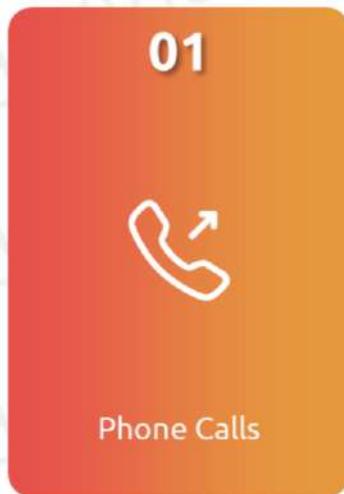
Compliance

Increased Security: Reduces the chances of unauthorized access.

Flexibility: Offers various authentication methods to suit different user needs.

Compliance: Helps meet regulatory requirements for data protection.

Multi-Factor Authentication – Common Methods





Multi-Factor Authentication – Use Cases

01



Securing cloud access

02



Remote work security

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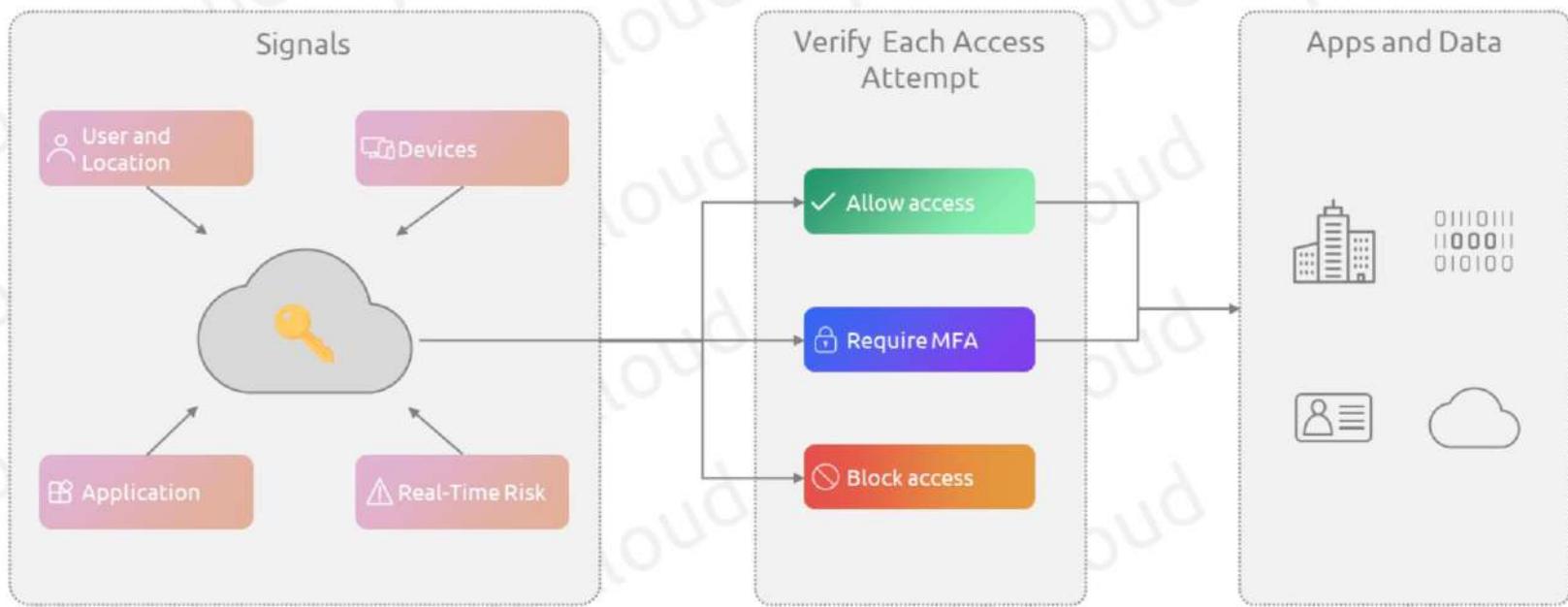
Critical for securing access to sensitive data and applications in the cloud.

Essential for remote work scenarios, ensuring secure access to corporate resources.

Conditional Access



Conditional Access



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A security feature in Azure that helps enforce access controls on cloud applications based on specific conditions or criteria.

Conditional Access – Key Features

01



User and Group-
Based Policies

02



Location-Based
Policies

03



Device-Based
Policies

04



Risk-Based Policies

User and Group-Based Policies: Tailor access policies for specific users or groups.

Location-Based Policies: Restrict or allow access based on user location.

Device-Based Policies: Set policies based on whether a device is compliant with corporate standards.

Risk-Based Policies: Integrate with Azure Risk Detection to apply policies based on real-time risk assessment.

Conditional Access – Benefits

01



Enhanced Security

02



Flexibility and Control

03



Streamlined User Experience

Enhanced Security: Adds a layer of security by ensuring only the right person under the right conditions can access resources.

Flexibility and Control: Customize access policies to fit specific organizational needs.

Streamlined User Experience: Minimizes friction for legitimate users while preventing unauthorized access.

Conditional Access – Use Cases

01



Protecting sensitive data

02

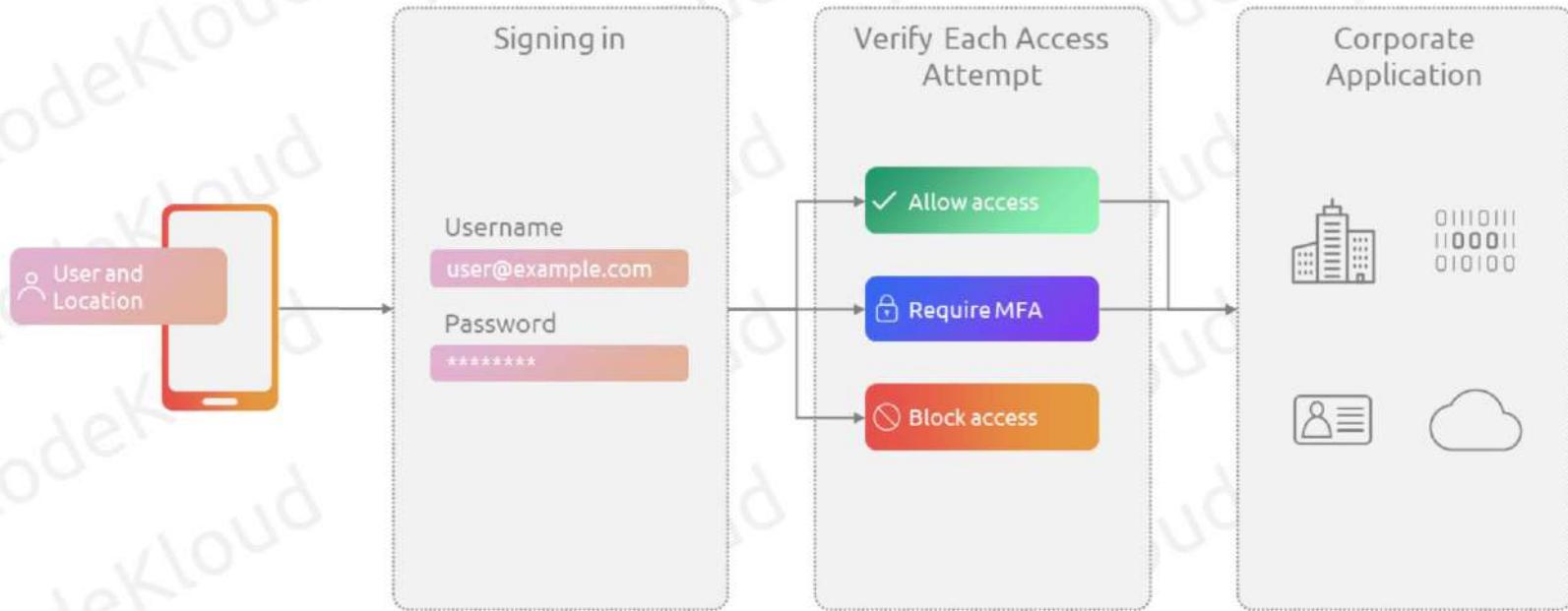


Remote work and
BYOD security

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Essential for protecting sensitive data in scenarios like remote work, BYOD policies, and cloud-based application access.

Conditional Access – Use Cases



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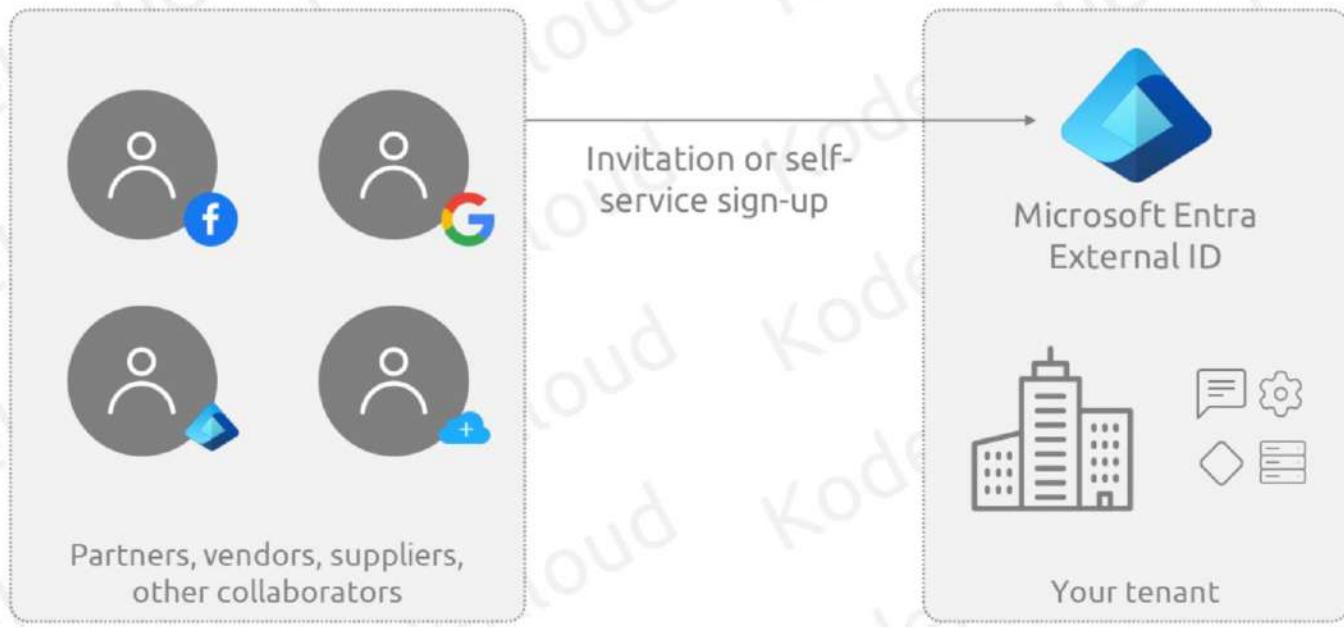
In addition to that, it will help you protect in certain scenarios like remote work or bring your own device policies if the user is outside the corporate network or they are using a personal device. Let's say we can enforce MFA whenever they try to access a corporate application, or we can in fact block them. So just as MFA, ask who you are in various ways before granting access, conditional access ask what's the situation to determine if access should be allowed or not. So end of the day, conditional access is just if then statement. If the user is signing in from this location, then allow access, block access, or require MFA. So it's a if then statement. Alright with that, we have completed conditional access. Let's talk about b2B and b2C in Microsoft

intro.

Microsoft Entra External Identities – B2B and B2C



Microsoft Entra External Identities – B2B



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Consider this scenario. Your company is working with a supplier to develop a new product. You need to share project plans and progress reports securely. Microsoft Entra B2B makes this possible. So always remember, this is not for users within your organization. This is for external users. So you can invite them or direct them to a self-service sign-off page. So users will be able to sign up or they can redeem the invitation to join your organization. They will appear as external users in your Microsoft Entra ID. So end of the day, you don't manage them. They have their own password and the account is managed by their organization, but they are invited for collaboration. So the key features of Entra External Identities for B2B include:

cross organization collaboration. So it's like giving a visitor a guest pass to enter specific areas of your office building. So external users are allowed to access your azure resources, but only there you permit them self service signup self service signup so this enables external partners to sign up and manage their profiles.

Microsoft Entra External Identities – B2B



Microsoft Entra External Identities – B2B



Microsoft Entra External Identities – B2B – Key Features

01



Cross-Organization
Collaboration

02



Self-Service Sign-up

03



Customizable User
Experience

Cross-Organization Collaboration: Allows external users to access your Azure resources.

Self-Service Sign-Up: Enables external partners to sign up and manage their profiles.

Customizable User Experience: Tailor the access experience based on the role or relationship of the external user.

Microsoft Entra External Identities – B2B – Benefits

01



Enhanced Security
and Compliance

02



Simplified
Management

03



Improved
Collaboration

Enhanced Security and Compliance: Maintains control over who accesses your resources and how.

Simplified Management: Streamlines the process of managing external access.

Improved Collaboration: Facilitates secure and efficient collaboration with external entities.

Microsoft Entra External Identities – B2B – Use Cases

01



Collaborative project sharing

02



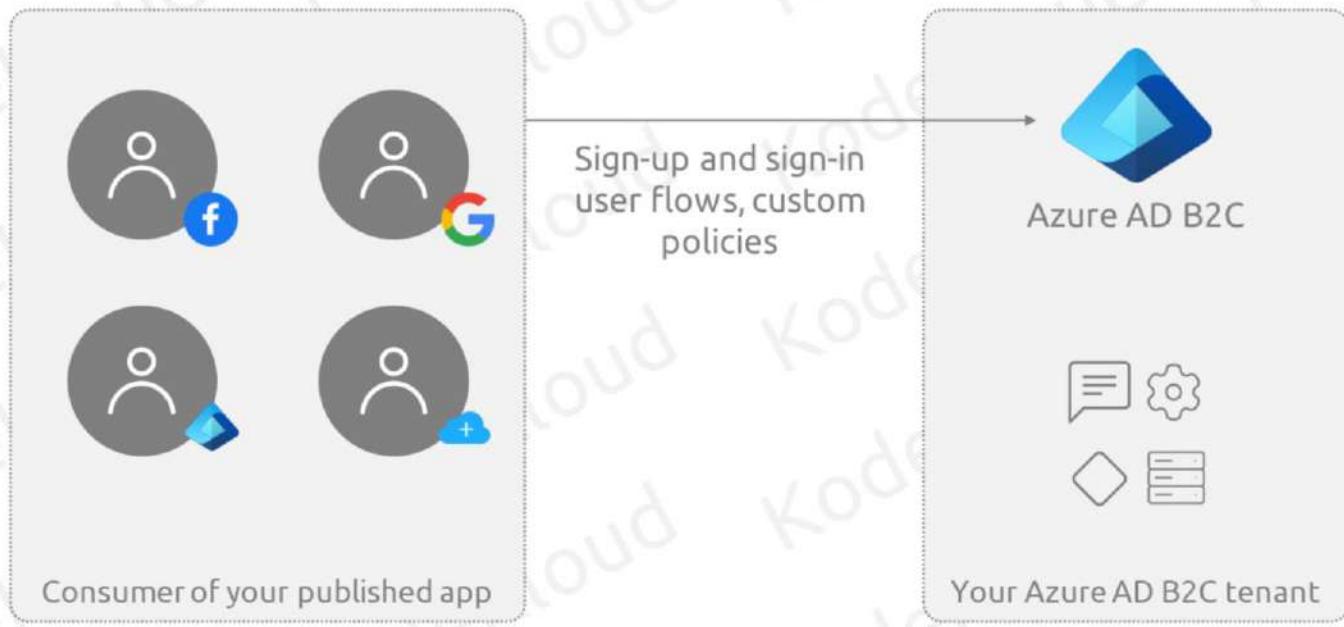
External partner resource access

03



Customer portal access

Microsoft Entra External Identities – B2C



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A feature within Microsoft Entra that enables organizations to securely collaborate with external users such as partners, suppliers, and customers by giving them access to internal resources.

Microsoft Entra External Identities – B2C – Key Features

01



Customizable User Journeys

02



Social Identity Providers

03



Strong Authentication

Customizable User Journeys: Create tailored sign-up and sign-in experiences for customers.

Social Identity Providers: Allow customers to sign in with existing social accounts like Facebook, Google, or LinkedIn.

Strong Authentication: Supports various authentication methods, including multi-factor authentication.

Microsoft Entra External Identities – B2C – Benefits

01



Enhanced User Experience

02



Scalability

03



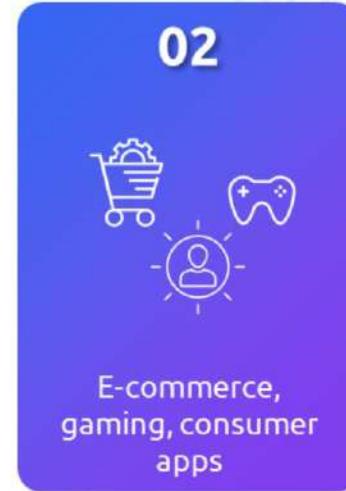
Security and Compliance

Enhanced User Experience: Provides a seamless, intuitive sign-up and sign-in process.

Scalability: Manages millions of customer identities and interactions.

Security and Compliance: Adheres to global standards and regulations for data protection.

Microsoft Entra External Identities – B2C – Use Cases



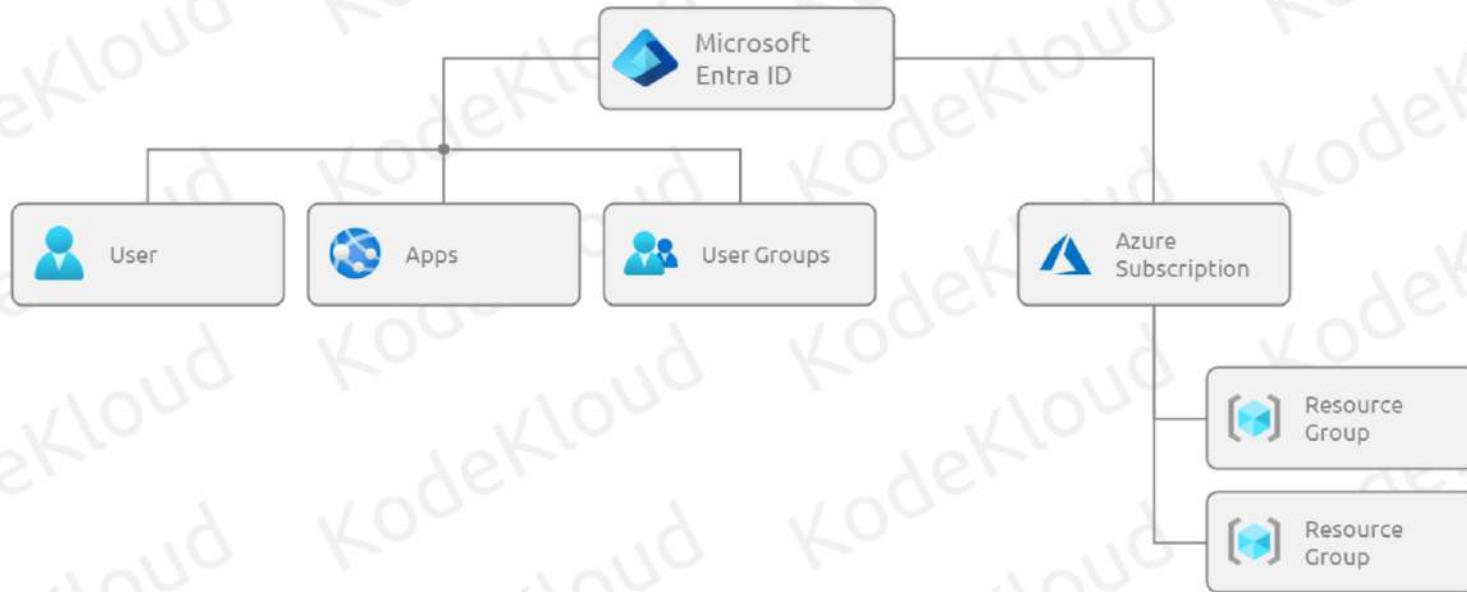
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Ideal for consumer-facing applications like e-commerce sites, gaming platforms, and consumer apps.

Role-Based Access Control



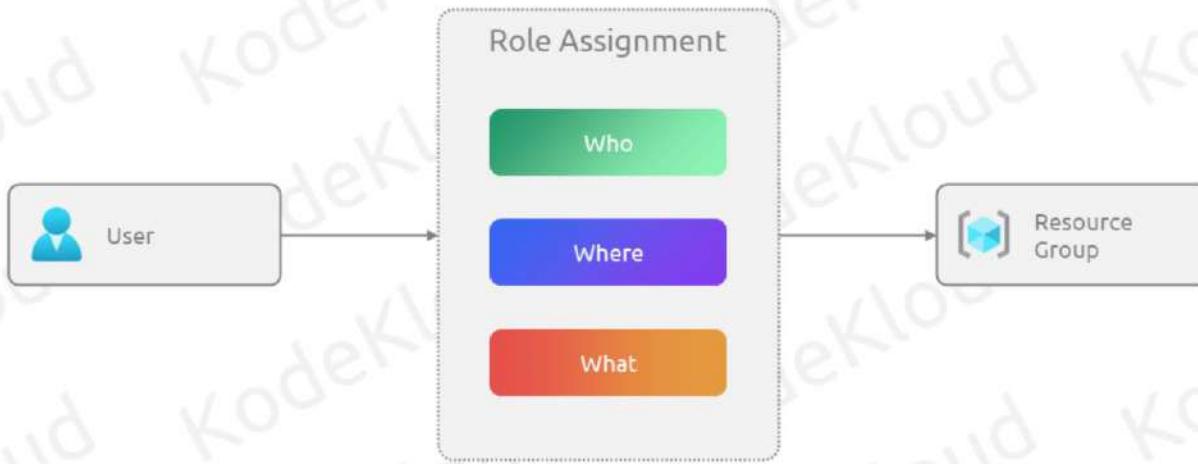
Role-Based Access Control



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A method of restricting network access based on the roles of individual users within an Azure environment. It ensures that only authorized users have access to specific resources, services, and operations.

Role-Based Access Control



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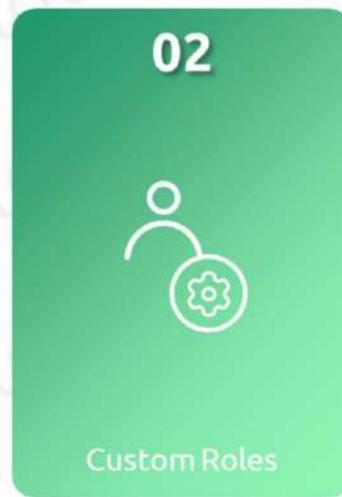
Now, RBAC is used by users service principles and groups to authorize access to our Azure subscription and resource groups. Again, so if a user wants to access a resource group, there should be something called RBAC, also known as a role assignment. So for a role assignment, you need to have answers for three questions, who, what and where? Who is like, is it a user group or service principal? Where is where exactly you want to access? In our case, it's a resource group. And finally, what what means what action you would like to do? Are you trying to delete a virtual machine? Are you trying to create a database? That's what what this so when you have answers for all three, that makes a role assignment. For example, user one

wants to create VMs in resource group one. So basically for this we need to create a role assignment. And there are multiple roles available. In Azure, there are built in roles like honor contributor, reader, and you can also create custom roles. So once you assign this role to that user, the user will be able to perform that action on the resource group. So three questions, who, where, and what? Once you have answers for this, that's what creates RBAC.

Role-Based Access Control – Key Features



Predefined Roles



Custom Roles



Scope of Access

Predefined Roles: Includes roles like Owner, Contributor, Reader, and more.

Custom Roles: Ability to create custom roles tailored to specific needs.

Scope of Access: Assign roles at different scopes – subscription, resource group, or resource.

Role-Based Access Control – Benefits

01



Least Privilege

02



Streamlined
Management

03



Improved
Compliance

Least Privilege: Minimizes risks by ensuring users have only the access they need.

Streamlined Management: Simplifies user and permission management.

Improved Compliance: Helps maintain necessary compliance standards.

Role-Based Access Control – Use Cases

01



Multi-user environments

02



Large organizations

03



Projects requiring
strict access control

Ideal for managing access to Azure resources in scenarios like multi-user environments, large organizations, and projects requiring strict access control.

Summary



Azure RBAC ensures strong safeguards by defining who can do what within the Azure environment.



Authentication with Entral ID gets you inside Azure, but without RBAC authorization, you can't perform tasks.

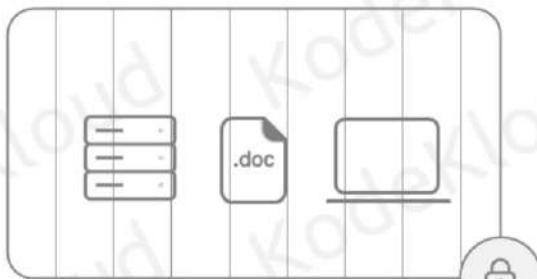


Entral ID helps access, RBAC enables daily tasks.

Zero Trust

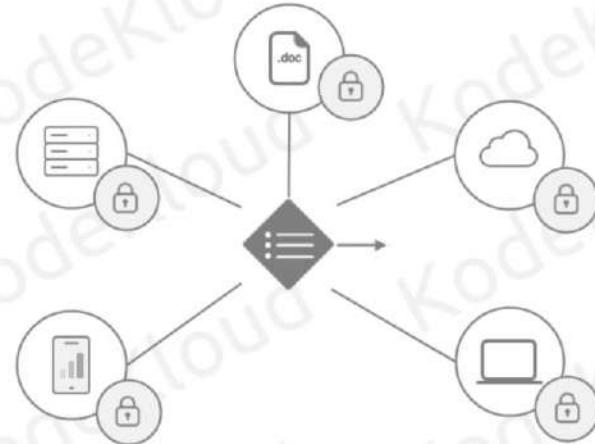


Zero Trust



Classic Approach

Restrict everything to a "secure" network



Zero Approach

Protect assets anywhere with a central policy

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A security concept centered on the belief that organizations should not automatically trust anything inside or outside their perimeters and instead must verify anything and everything trying to connect to its systems before granting access.

Principles of Zero Trust

01

Verify explicitly

02

Use least
privilege access

03

Assume breach

1 Principles of Zero Trust – Verify Explicitly

01

Authenticate and authorize with all data points

02

Consider user identity, location, device health

03

Also consider workload, data classification, anomalies

Always authenticate and authorize based on all available data points, including user identity, location, device health, service or workload, data classification, and anomalies.

2 Principles of Zero Trust – Use Least Privilege Access

01

Limit access with
just-in-time policies

02

Apply just-enough-
access policies

03

Utilize risk-based
adaptive policies

Limit user access with just-in-time and just-enough-access, risk-based adaptive policies, and data protection to protect both data and productivity.

3

Principles of Zero Trust – Assume Breach

01

Segment access by network, user, and devices

02

Ensure encrypted sessions

03

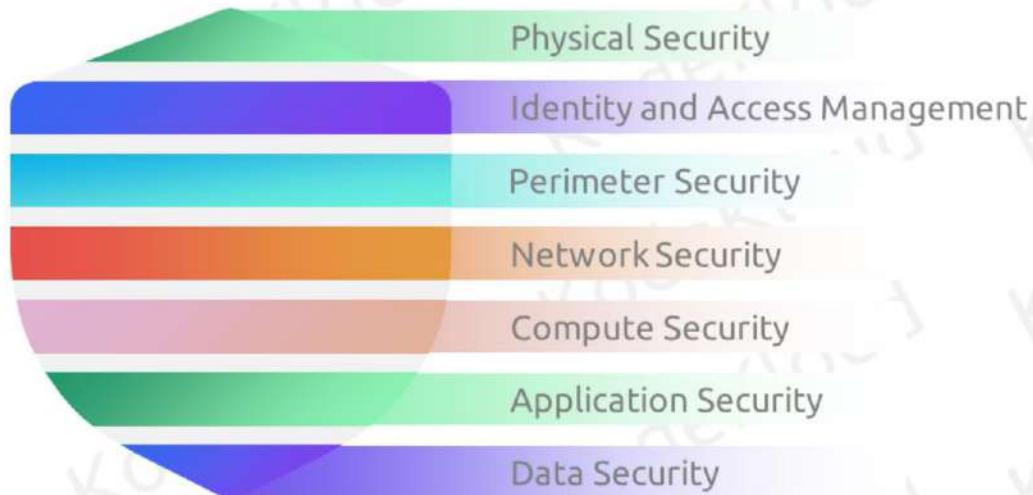
Utilize analytics for threat detection

Minimize the impact of breaches by segmenting access by network, user, devices, and application awareness. Verify all sessions are encrypted and use analytics to get visibility, drive threat detection, and improve defenses.

Defense in Depth



Defense in Depth



© Copyright KodeKloud

A comprehensive security strategy that employs multiple layers of defense, each designed to detect, deter, or delay threats at various points.

1

Physical Security



01 | Physical hardware protection

02 | Data center facility security

© Copyright KodeKloud

Protects the physical hardware and data center facilities.

2 Identity and Access Management



01 | Authorized user access control

© Copyright KodeKloud

Ensures only authorized users can access your systems.

3

Perimeter Security



01 | Tools: Firewalls, DDoS protection

© Copyright KodeKloud

Includes tools like firewalls and DDoS protection.



01 | Network safeguarding: Segmentation

Involves safeguarding the network with controls like network segmentation.

5

Compute Security



01 | Protection for VMs, containers, serverless

© Copyright KodeKloud

Protects your virtual machines, containers, and serverless computing services.

6

Application Security



01 | Application-focused security

© Copyright KodeKloud

Focuses on securing applications from external threats.



01 | Data protection: Encryption in transit and at rest

Involves protecting data at rest and in transit, using encryption and other methods.

Defense in Depth – Benefits

01



Robust Protection

02



Risk Mitigation

03



Holistic Security Approach

Robust Protection: Creates multiple layers of defense against cyber threats.

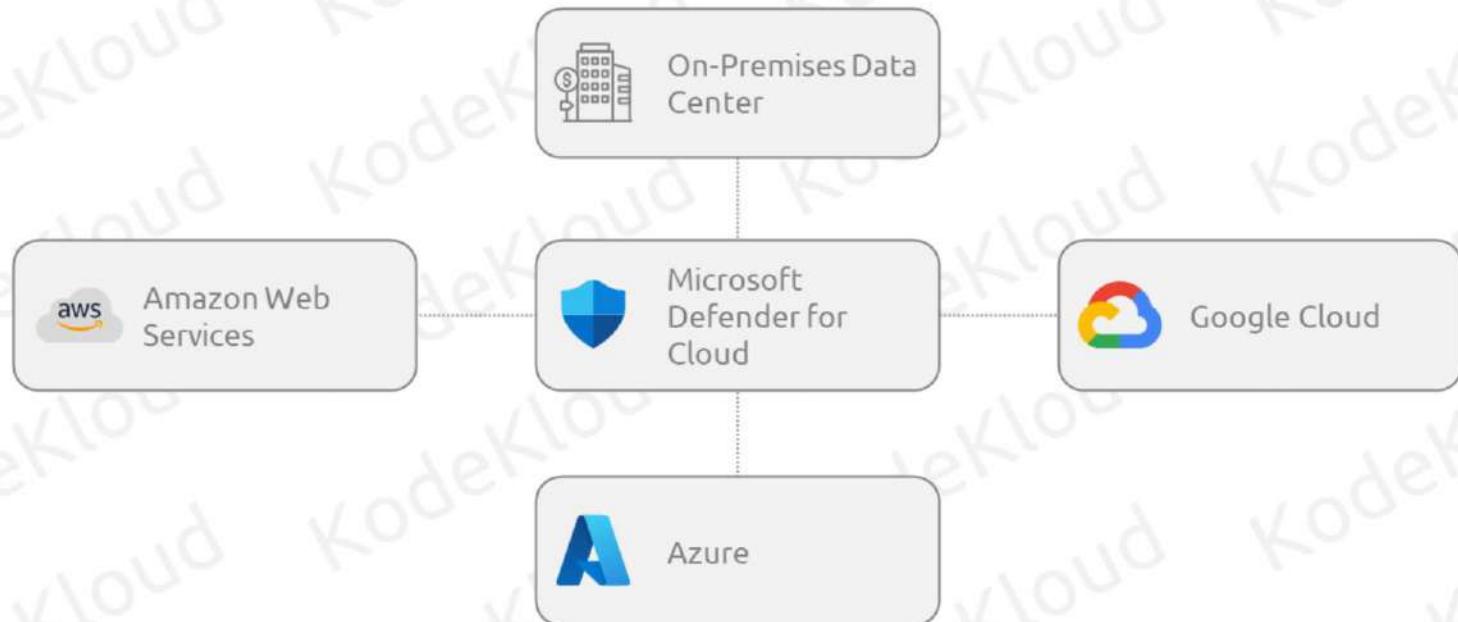
Risk Mitigation: Reduces the chance of a successful attack.

Holistic Security Approach: Covers a wide array of potential vulnerabilities.

Microsoft Defender for Cloud



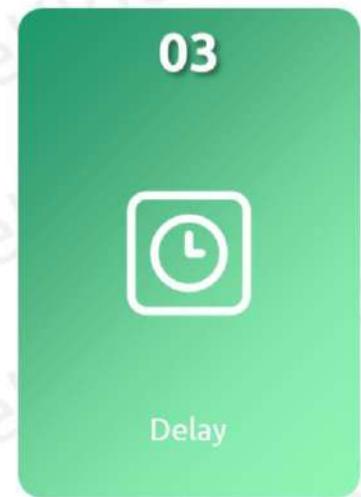
Microsoft Defender for Cloud



© Copyright KodeKloud

A method of restricting network access based on the roles of individual users within an Azure environment. It ensures that only authorized users have access to specific resources, services, and operations.

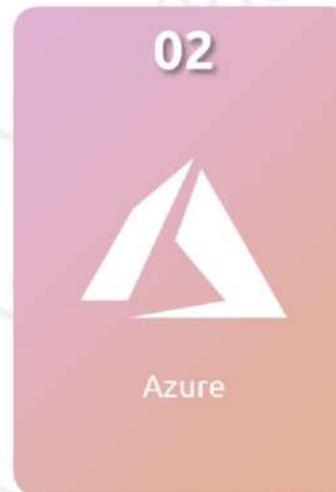
Microsoft Defender for Cloud



© Copyright KodeKloud

Microsoft Defender for Cloud this platform is a comprehensive security strategy that employs multiple layers of defense, each designed to detect, deter, or delay threats at various points. And the good thing is, it's not only for Azure resources. You can monitor resources that are deployed in Amazon Web Services, Google Cloud on Premise data center.

Microsoft Defender for Cloud



© Copyright KodeKloud

In addition to this, you can connect your GitHub Azure DevOps Gitlabs to Microsoft Defender for cloud to generate security recommendation. Imagine Defender for cloud as an advanced security system for modern high rise building, constantly monitoring, assessing risk and taking action to ensure the safety of its occupants. Now let's explore the key features of Defender for cloud. By the way, Defender for cloud was previously known as Security center. Now it has been rebranded as Microsoft Defender for Cloud

Microsoft Defender for Cloud – Key Features

01



Continuous Assessment

02



Threat Protection

03



Secure Score

04



Regulatory Compliance Dashboards

© Copyright KodeKloud

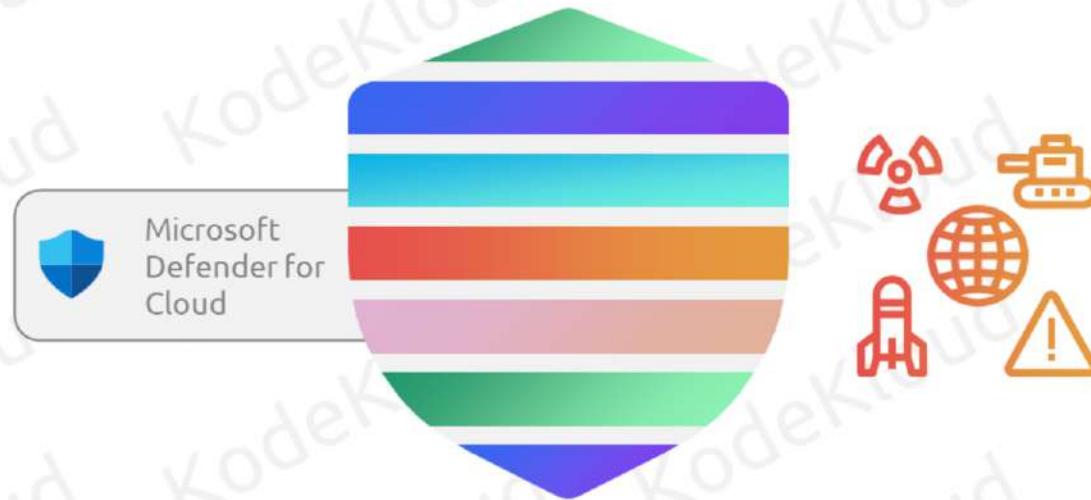
Continuous Assessment: Automatically assesses the security of your Azure, on-premises, and other cloud environments.

Threat Protection: Detects and responds to threats across Azure services and connected cloud workloads.

Secure Score: Provides recommendations and a score to help improve your security posture.

Regulatory Compliance Dashboards: Offers insights into your compliance with regulatory standards.

Microsoft Defender for Cloud – Benefits



© Copyright KodeKloud

Now the benefits of using Microsoft Defender for cloud ideally, Defender for cloud is useful for organizations where they don't have a dedicated security team because nowadays the security threats are increasing and they're improvising and it's not easy for someone to keep up with all these sophisticated techniques. That's where Microsoft Defender for cloud steps in so comprehensive security protecting against a broad spectrum of threats and vulnerabilities.



Microsoft Defender for Cloud – Benefits

01



Comprehensive
Security

02



Centralized
Management

03



Automated
Recommendations

Comprehensive Security: Protects against a wide range of threats and vulnerabilities.

Centralized Management: Offers a single pane of glass for security management.

Automated Recommendations: Helps enhance security with actionable steps.



Microsoft Defender for Cloud – Use Cases

01



Cloud workload security

02



Compliance
management

03



Strengthening cloud
security

Management and Governance

Cost Management

© Copyright KodeKloud



Cost Management

- Factors Affecting Cost
- Azure Marketplace
- Pricing Calculator
- TCO Calculator
- Azure Cost Management
- Resource Tags

Course Introduction



Governance and Compliance

- ◆ Azure Blueprints
- ◆ Azure Policies
- ◆ Resource Locks
- ◆ Service Trust Portal

Course Introduction



Resource Deployment Tools

- Portal, PowerShell, and Azure CLI
- Azure Arc
- Azure Resource Manager



Monitoring Tools

- Azure Advisor
- Azure Service Health
- Azure Monitor

Cost Management

Course Introduction

-  Factors Affecting Cost
-  Azure Marketplace
-  Pricing Calculator
-  TCO Calculator
-  Azure Cost Management
-  Resource Tags

Factors Affecting Cost



What affects costs? – Challenge



Type of Resources

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Now that Bella Innovation knows the type of resources



What affects costs? – Challenge



Type of Resources



Right Solutions

What affects costs? – Challenge



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to host their application,

What affects costs? – Challenge



© Copyright KodeKloud

the next thing that concerns them is the cost of deploying these resources.

What affects costs? – Challenge



© Copyright KodeKloud

They want to know what factors will affect their cost.

Factors Affecting Cost

01



Type of Resource

02



Consumption Model

03



Lack of Maintenance

04



Region

05



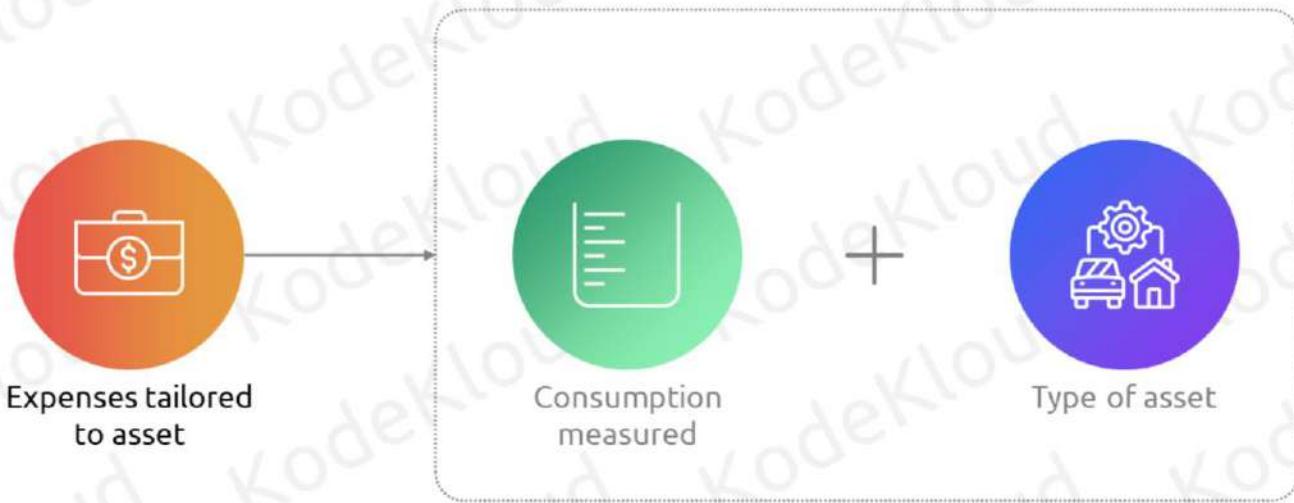
Ingress and Egress

06



Type of Subscription

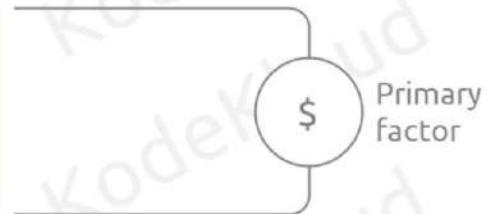
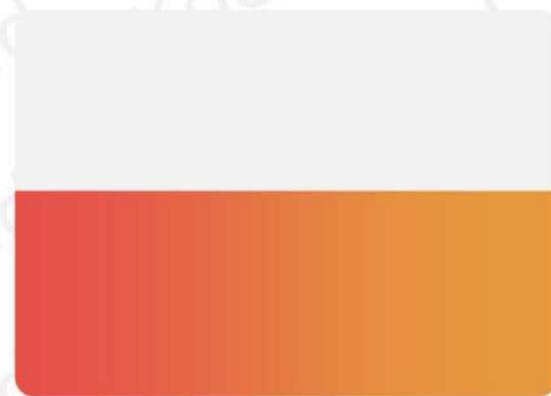
1 Type of Resource



© Copyright KodeKloud

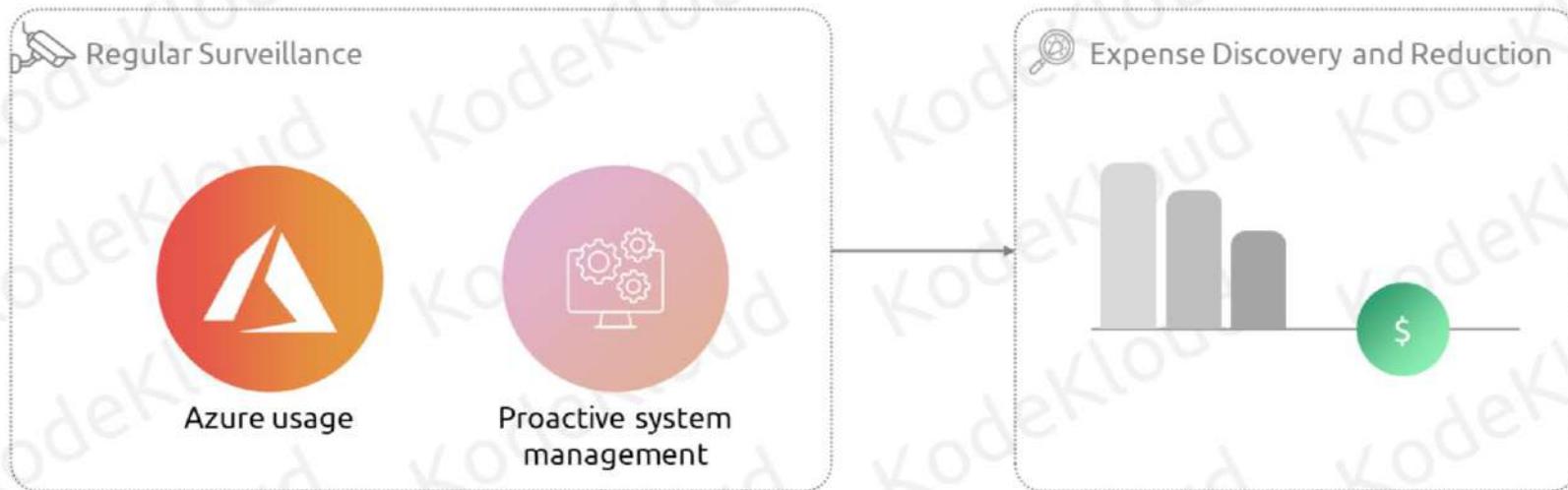
Expenses are tailored to the asset, which means the consumption measured and the quantity of measuring devices linked to an asset are dependent on the type of asset.

2 Consumption Model



In a pay-as-you-go model, the level of usage stands as a primary factor in driving up expenses.

3 Lack of Maintenance



© Copyright KodeKloud

Regular surveillance of your Azure usage and proactive system management can lead to the discovery and reduction of unnecessary expenses, like the decommissioning of seldom-utilized virtual machines.

4 Region



Type of Resource

|

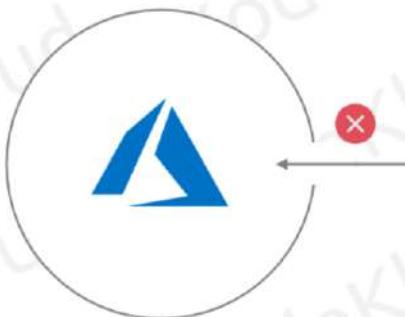


Location impacts Azure pricing

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The cost of a specific type of resource may vary based on the region it's hosted in, as different locations can influence the overall pricing on the Azure platform.

5 Ingress and Egress



Ingress (incoming data transfer)



Egress (outgoing data transfer)

© Copyright KodeKloud

Ingress, or incoming data transfer, is typically without charge, but expenses are incurred for egress or transfer of data outside the Azure facilities, which is calculated based on the zones of billing.

6 Type of Subscription



© Copyright KodeKloud

Your chosen Azure subscription type can influence the cost of the resources. For instance, Dev/Test subscriptions offers discounted rate for testing services than a regular subscription.

Azure Marketplace



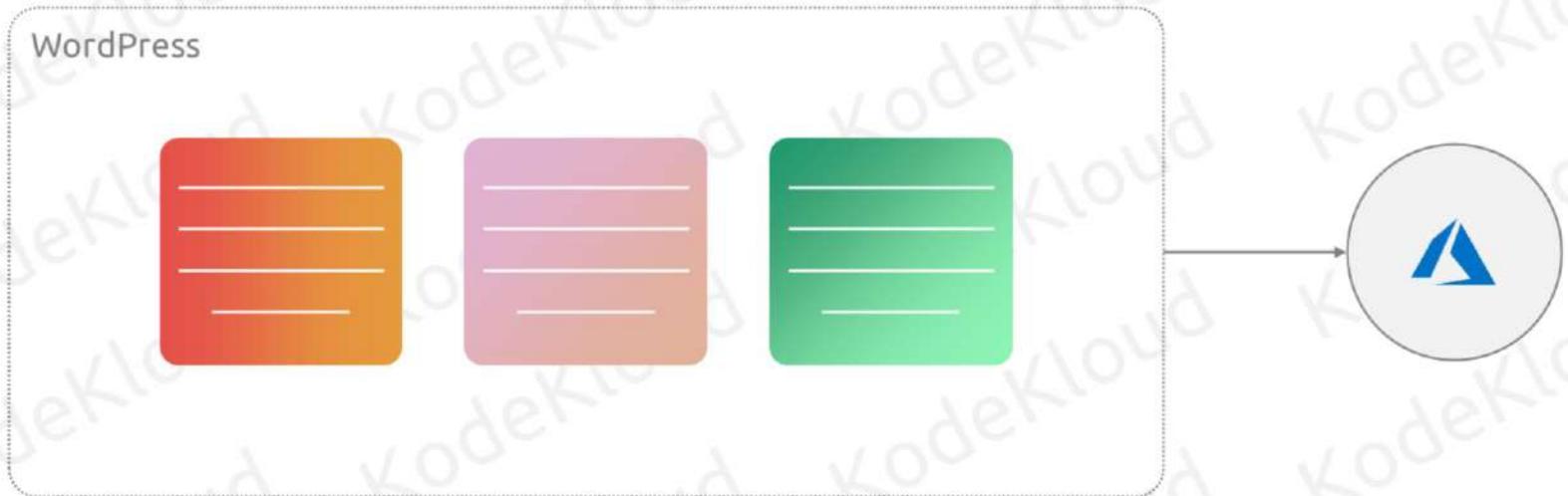
Need for Custom Solutions – Challenge



Factors to control costs

Bella Innovations now knows the factors they need to consider to control costs.

Need for Custom Solutions – Challenge



© Copyright KodeKloud

Next challenge is, most of their applications are using WordPress for content publishing. They want to know if they have WordPress offering available in Azure.

Azure Marketplace



© Copyright KodeKloud

An online store that offers applications and services designed to integrate with and enhance Azure-based solutions.

Azure Marketplace – Key Features

- 01**

Wide Range of Products
- 02**

Categorized Solutions
- 03**

Community and Partner Contributions

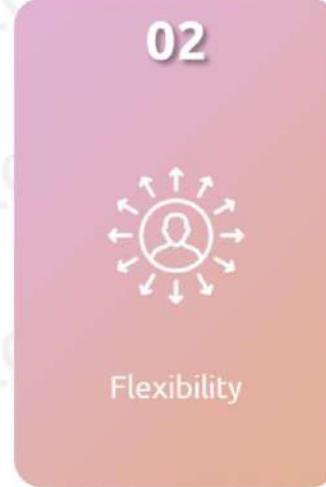
© Copyright KodeKloud

Wide Range of Products: Offers thousands of IT software products, services, and solutions.

Categorized Solutions: Includes categories like AI, Machine Learning, Analytics, Security, and more.

Community and Partner Contributions: Solutions provided by Microsoft and its partners, as well as community developers.

Azure Marketplace – Benefits



© Copyright KodeKloud

Easy Integration: Solutions are designed to work seamlessly with Azure services.

Flexibility: Provides options for various business needs and scenarios.

Quality and Compliance: Solutions are vetted by Microsoft for quality, compatibility, and security.

Azure Marketplace – Use Cases

01



Discover and deploy
Azure extensions

02



Enhance capabilities
in infrastructure,
analytics, cybersecurity

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Ideal for finding and deploying software solutions that extend Azure capabilities in areas like infrastructure management, data analytics, and cybersecurity.

Pricing Calculator



Estimating Cost – Challenge

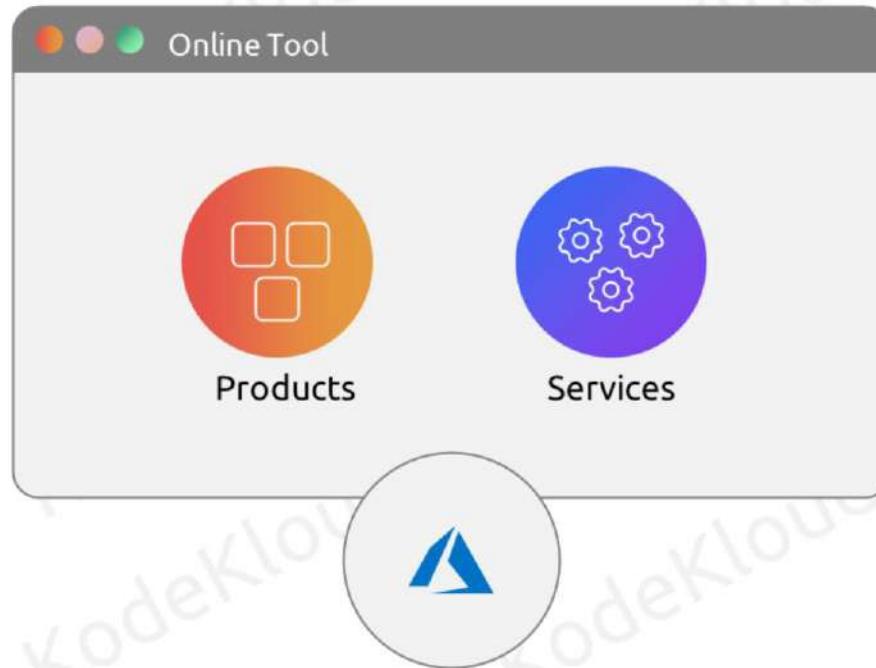


© Copyright KodeKloud

Bella Innovations need to estimate the cost of services to build an estimate and send to Finance team for approval



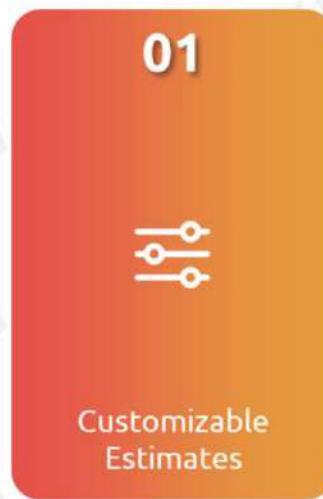
Azure Pricing Calculator



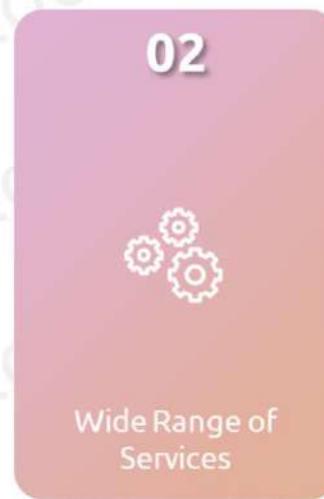
© Copyright KodeKloud

An online tool that helps estimate the cost of Azure products and services based on specific usage scenarios.

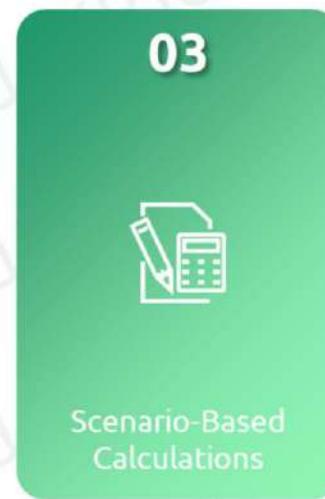
Azure Pricing Calculator – Key Features



Customizable
Estimates



Wide Range of
Services



Scenario-Based
Calculations

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Customizable Estimates: Allows users to select and configure Azure services to match their needs, providing a customized cost estimate.

Wide Range of Services: Covers a broad spectrum of Azure services, including compute, storage, networking, and more.

Scenario-Based Calculations: Offers the ability to simulate various usage scenarios to see how they impact costs.

Azure Pricing Calculator – Benefits



Budget Planning



Transparency



Flexibility

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Budget Planning: Assists in forecasting and managing cloud spending.

Transparency: Provides clear visibility into potential Azure costs.

Flexibility: Adjust parameters to explore different cost options.

Azure Pricing Calculator – Use Cases

01



Azure migration planning

02



Cost comparison for Azure configurations

03



Optimization of existing Azure solutions

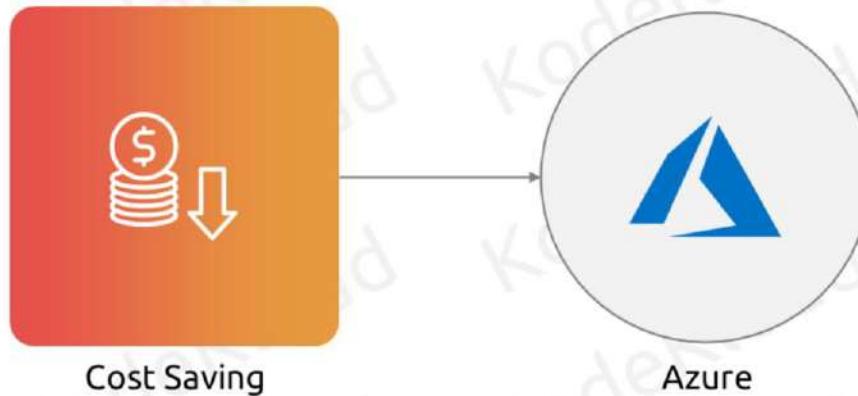
© Copyright KodeKloud

Ideal for businesses planning a migration to Azure, comparing costs of different Azure configurations, or optimizing existing Azure solutions.

Total Cost of Ownership (TCO) Calculator



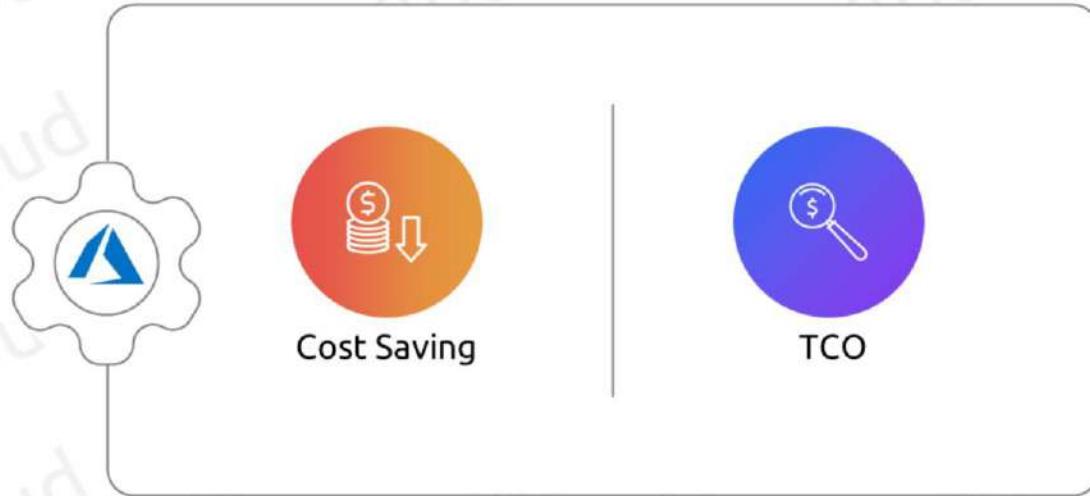
Estimating Total Cost of Ownership (TCO) – Challenge



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Bella Innovations need to estimate cost savings they can realize by migrating to Azure.

TCO Calculator



© Copyright KodeKloud

A tool provided by Azure that helps estimate the cost savings of migrating to Azure, by comparing the total cost of ownership of on-premises infrastructure with Azure.

KodeKloud

TCO Calculator



© Copyright KodeKloud

Let's see how we can resolve this issue using TCO calculator. So TCO calculator is a pivotal tool that guides you through the financial considerations of migrating to Azure. This tool estimates the potential cost savings by comparing the cost of ownership of on-premise with Azure. So end of the day, once you run the tool, you will know what is the cost of owning, let's say 20 servers in on-premises versus the cost of deploying them in Azure. So this is a key factor or a driver that helps organizations to decide whether it should go for Azure or should they stick to their on-premise infrastructure. End of the day, everything boils down to numbers for business. They need to have some benefit or profit by moving to the cloud, and TCU

calculator will help them to take that decision. Let's have a look at the key features of TCU calculator.

TCO Calculator – Key Features

01



Comprehensive Cost Analysis

02



Customizable Inputs

03



Detailed Reports

Comprehensive Cost Analysis: Estimates costs for compute, storage, and networking resources.

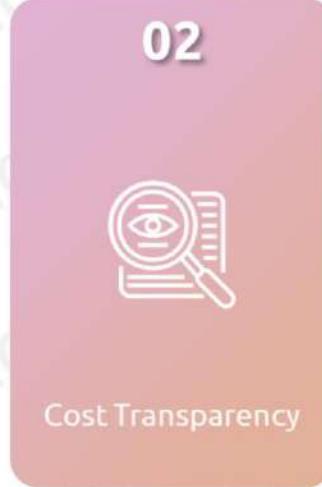
Customizable Inputs: Allows users to input specific details about their current on-premises environment.

Detailed Reports: Provides a detailed cost breakdown and a summary report.

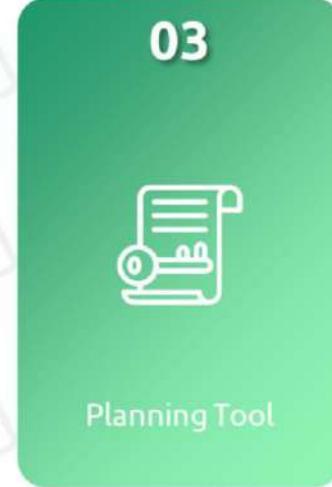
TCO Calculator – Benefits



Informed Decision Making



Cost Transparency



Planning Tool

Informed Decision Making: Helps understand the financial impact of migrating to Azure.

Cost Transparency: Offers clear insight into potential savings and expenses.

Planning Tool: Assists in budgeting and planning for cloud migration.

Using TCO Calculator



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Steps include entering details about your current infrastructure, specifying your future Azure services, and then viewing and analyzing the cost report.

TCO Calculator – Use Cases

01



Assess Azure
migration costs

02



Understand benefits
for organizations

Azure Cost Management





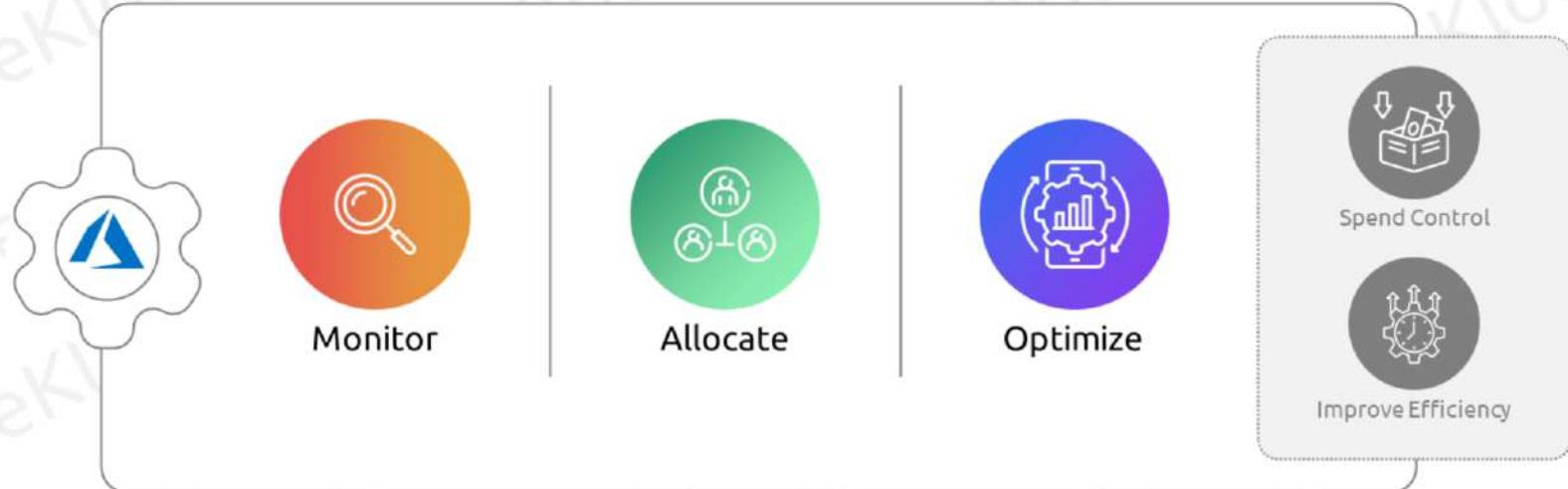
Analyzing Billing Reports – Challenge



© Copyright KodeKloud

Bella Innovations need to analyze their billing reports and export for analysis.

Azure Cost Management



© Copyright KodeKloud

A solution that provides tools to monitor, allocate, and optimize cloud costs in Azure, helping organizations control their spending and improve cost efficiency.

Azure Cost Management – Key Features

01



Cost Analysis

02



Budgets

03



Recommendations

Cost Analysis: Detailed insights into your Azure spending.

Budgets: Set and manage budgets to control cloud spending.

Recommendations: Provides suggestions for cost savings and efficiency.



Azure Cost Management – Benefits



© Copyright KodeKloud

Transparency: Gain visibility into your cloud spending patterns.

Cost Control: Helps prevent budget overruns with proactive budgeting tools.

Optimization: Identifies underutilized resources for cost-saving opportunities.

Azure Cost Management – Use Cases

01



Track cloud spending

02



Manage budgets
effectively

03



Optimize Azure
investments

Azure Resource Tags



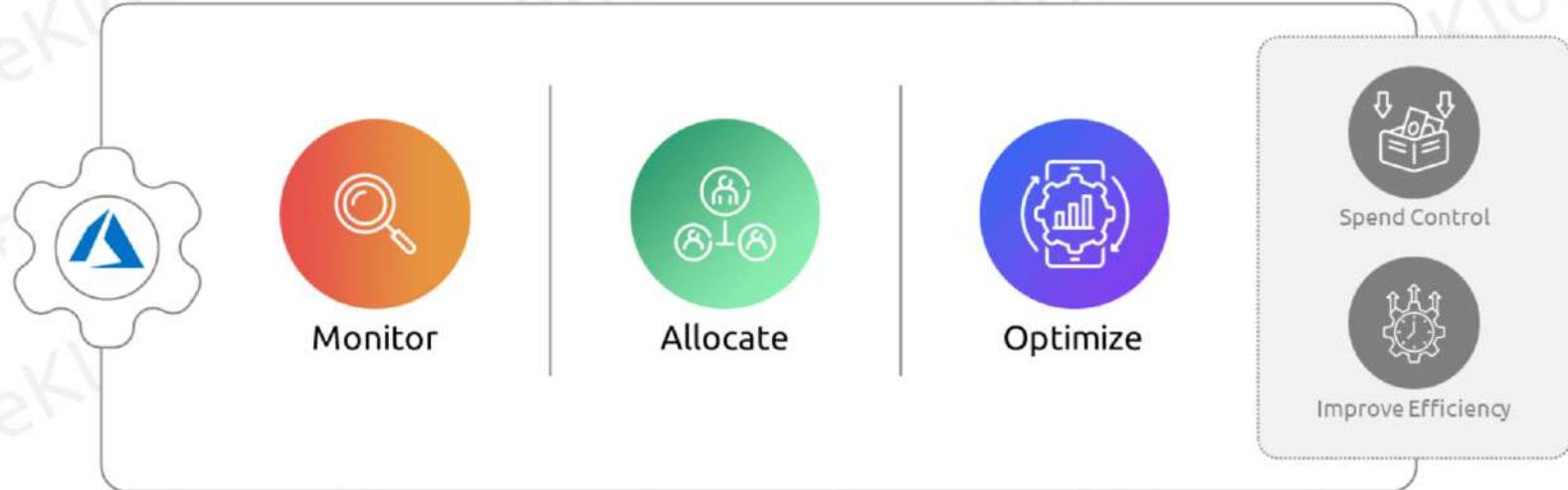
Labeling Resources – Challenge



© Copyright KodeKloud

Bella Innovations need to label their resources so that they can split the cost to different departments like HR, Marketing, Finance etc.

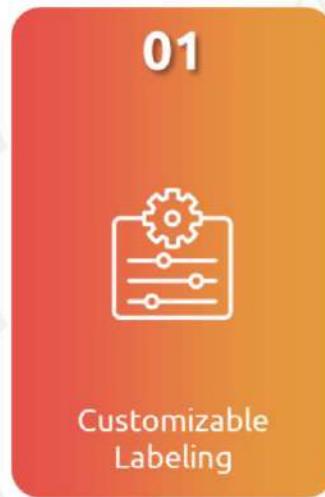
Azure Resource Tags



© Copyright KodeKloud

A solution that provides tools to monitor, allocate, and optimize cloud costs in Azure, helping organizations control their spending and improve cost efficiency.

Azure Resource Tags – Key Features



Customizable
Labeling



Resource
Management



Cost Allocation and
Reporting

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Customizable Labeling: Create and assign tags based on your organizational needs.

Resource Management: Simplify the management and monitoring of resources.

Cost Allocation and Reporting: Assist in tracking costs by grouping resources.

Azure Resource Tags – Benefits

01



Improved
Organization

02



Enhanced Cost
Management

03



Automation Support

Improved Organization: Easier to manage and locate resources within a large environment.

Enhanced Cost Management: Facilitate detailed cost tracking and budgeting.

Automation Support: Can be used in automation rules and policies.

Azure Resource Tags – Use Cases

01



Resource categorization for billing

02



Ownership and usage tracking

03



Automate resource lifecycle

Ideal for categorizing resources for billing or management purposes, tracking ownership and usage, and automating resource lifecycle.

Governance and Compliance

Governance And Compliance

-  Azure Blueprints
-  Azure Policies
-  Resource Locks
-  Service Trust Portal

Azure Policies



Enforcing Organizational Standards – Challenge

Organizational Standards



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Bella Innovations need to implement several organizational standards which will help them to assess compliance and industry standards such as ISO:27001, PCI-DSS etc.



Azure Policies



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Azure policy ensures your resources remain compliant with your organization standard and service level agreements. Just to give you an example, a simple one, let's say my organization wants to deploy resources only in east US and west us. So if I have the permission to deploy resource, I can deploy in any region, but I don't want my users to deploy in let's say central us or West Europe. So what I can do is I can simply create a policy and say that these are the list of allowed regions, east us and west us. So even though I have the permission to deploy anywhere at the time of deployment, I can only choose east us or west us. If I choose any other region other than this, the validation will fail. Remember the validation phase which happens

during the resource deployment. So at that point there is a validation run against the policies to ensure that whatever we are doing is following the organizational standards. If it does not, then we will be stopped from deploying that particular resource. We will get to see that in a second. This is just for you to get a good understanding about Azure policies. Now let's have a look at the key features of Azure policy, starting with policy definitions.

Azure Policies



Azure Policies – Key Features



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Policy Definitions: Specifies the rules and the effect that occurs when those rules are violated.

Policy Assignment: Assign policies to resource groups, subscriptions, or a management group.

Compliance Reporting: View the compliance status of your resources with respect to the policies applied.

Azure Policies – Benefits

01



Enforce Compliance

02



Prevent Configuration Drift

03



Customizable Control

Enforce Compliance: Ensures resources stay compliant with corporate and regulatory standards.

Prevent Configuration Drift: Automatically manage and prevent unwanted changes.

Customizable Control: Tailor policies to meet specific organizational needs.



Azure Policies – Use Cases

01



Maintain security standards

02



Control costs effectively

03



Enforce company policies in Azure

Ideal for maintaining security standards, ensuring cost control, and enforcing company policies across the Azure environment.

Resource Locks



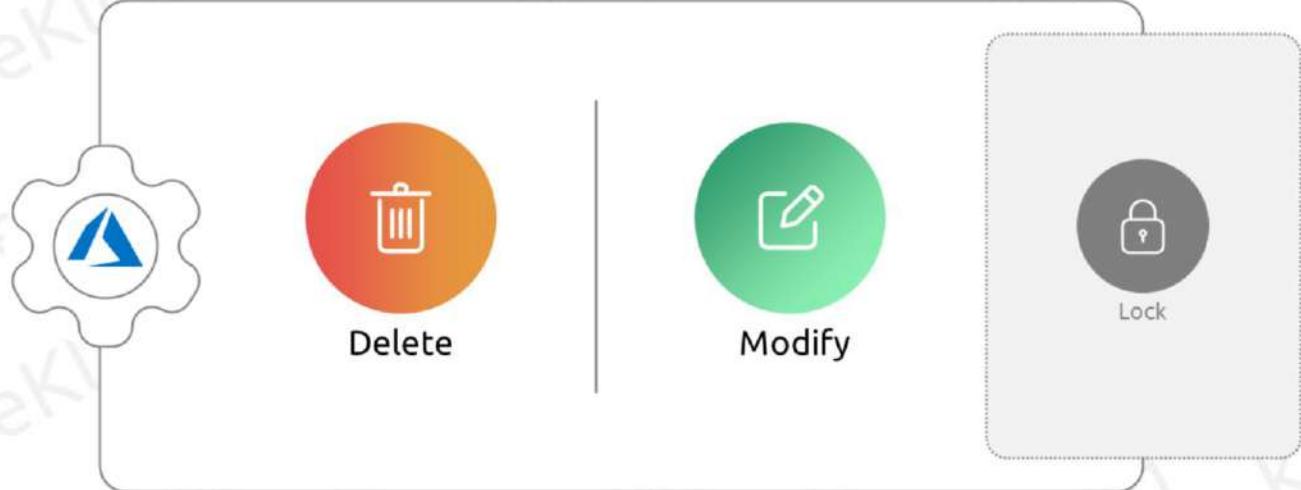
Preventing Resource Accidents – Challenge



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Bella Innovations need to make sure critical resources are not accidentally deleted or modified.

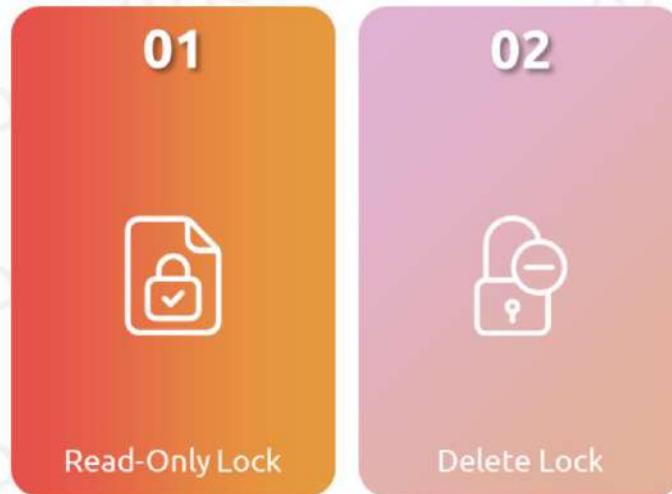
Resource Locks



© Copyright KodeKloud

A feature in Azure that helps prevent accidental deletion or modification of Azure resources by placing a lock at different levels of the resource hierarchy.

Resource Locks – Types



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Read-Only Lock: Prevents users from making changes to the resource, but they can still read from it.

Delete Lock: Ensures the resource cannot be deleted, but modifications are still possible.

Resource Locks – Key Features

01



Scope of Application

02



Flexible Control

Scope of Application: Can be applied to subscriptions, resource groups, and individual resources.

Flexible Control: Different types of locks can be applied based on the required level of protection.

Resource Locks – Benefits

01



Protection Against
Accidental Actions

02



Customizable
Security

03



Enhanced
Governance

Protection Against Accidental Actions: Reduces the risk of unintentional deletions or changes.

Customizable Security: Apply locks according to specific operational needs.

Enhanced Governance: Supports compliance and governance strategies.

Resource Locks – Use Cases

01



Protect critical
resources

02



Secure production
databases

03



Safeguard key
network
components

Service Trust Portal



Finding Microsoft Compliance Docs – Challenge



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Bella Innovations wants to review the compliance standards of Microsoft cloud so that they can make sure the platform is compliant.



Service Trust Portal



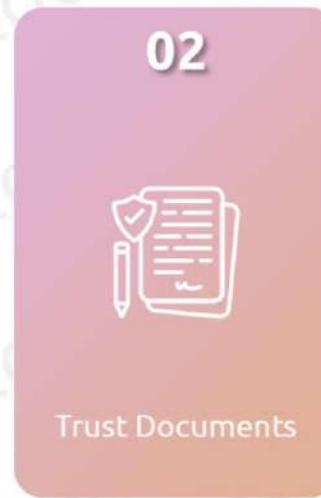
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An online resource provided by Microsoft that offers a variety of compliance-related information and resources for Microsoft cloud services.

Service Trust Portal – Key Features



Compliance Reports



Trust Documents



Compliance Guides
and Whitepapers

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Compliance Reports: Access to various reports like audit, penetration tests, and assessments.

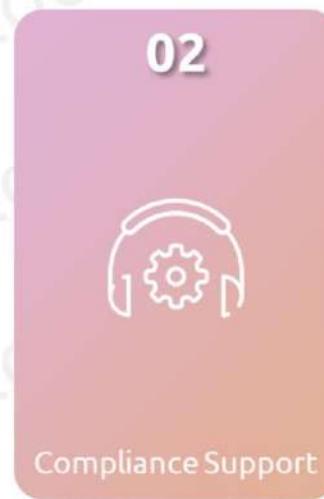
Trust Documents: Provides detailed information on Microsoft's implementation of controls and processes.

Compliance Guides and Whitepapers: Resources to help understand regulatory obligations and improve compliance.

Service Trust Portal – Benefits



Transparency



Compliance Support



Resource Hub

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Transparency: Offers in-depth insight into Microsoft's data protection measures.

Compliance Support: Helps organizations meet their compliance requirements.

Resource Hub: Central location for security, privacy, and compliance information.

Service Trust Portal – Use Cases

01



Information for IT
professionals

02



Compliance officers'
resources

03



Auditors' guidance
on compliance

© Copyright KodeKloud

Ideal for IT professionals, compliance officers, and auditors needing detailed information on Microsoft's cloud services' compliance and security practices.

Microsoft Purview





Implementing Data Governance – Challenge



© Copyright KodeKloud

Bella Innovations wants to make sure that there is data governance, and all meets compliance requirements.



Microsoft Purview



© Copyright KodeKloud

An online resource provided by Microsoft that offers a variety of compliance-related information and resources for Microsoft cloud services.

Microsoft Purview – Key Features

01



Data Discovery and
Classification

02



Data Governance

03



Advanced Data
Security

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Data Discovery and Classification: Automatically discovers, classifies, and labels data across various sources.

Data Governance: Provides tools for data mapping, cataloging, and compliance management.

Advanced Data Security: Includes sensitive data monitoring, risk assessment, and data protection insights.

Microsoft Purview – Benefits

- 01**


Enhanced Data Governance
- 02**


Compliance and Risk Management
- 03**


Insightful Data Analysis

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Enhanced Data Governance: Streamlines the management of data assets across different environments.

Compliance and Risk Management: Helps meet regulatory requirements and reduces risks associated with data.

Insightful Data Analysis: Offers insights into data usage, patterns, and potential issues.

Microsoft Purview – Use Cases

01



Holistic view of data landscape

02



Enhanced data protection

03



Regulatory compliance assurance

Ideal for organizations looking to get a holistic view of their data landscape, enhance data protection, and ensure regulatory compliance.

Resource Deployment Tools

Resource Deployment Tools



Portal, PowerShell, and Azure CLI



Azure Arc



Azure Resource Manager

Tools for Interacting With Azure





Interacting With Azure – Challenge



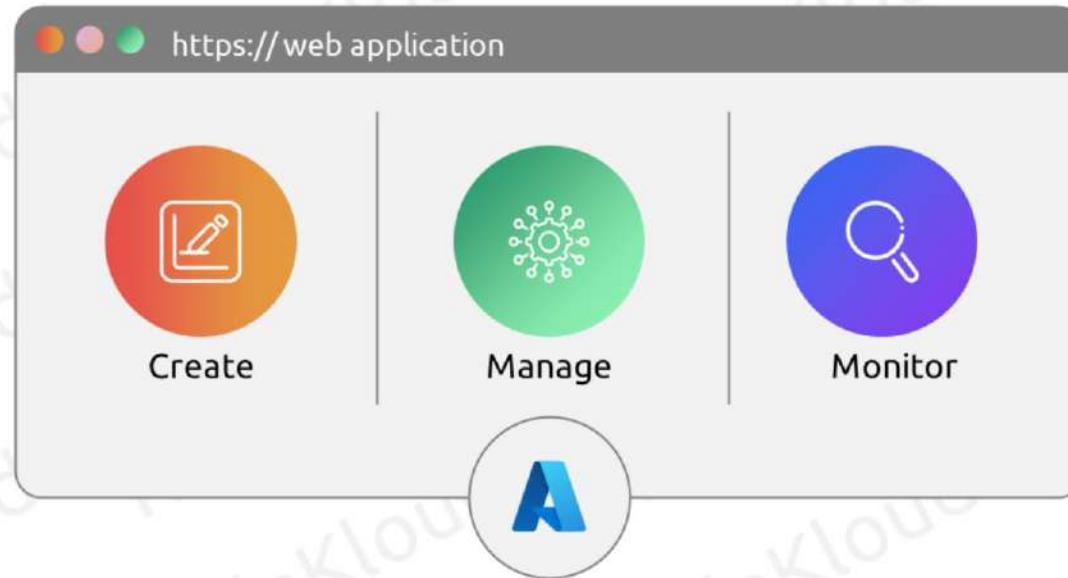
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Bella Innovations needs to interact with Azure. Some users prefer to access it via portal, while others are looking to access programmatically.

Tools for Interacting With Azure

- 01  Azure Portal
- 02  Azure PowerShell
- 03  Azure Cloud Shell
- 04  Command-Line Interface (CLI)

1 Azure Portal



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Azure Portal:

A web-based, user-friendly interface for managing all Azure services. It allows you to create, manage, and monitor everything from simple web apps to complex cloud deployments.

2 Azure PowerShell



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Azure PowerShell:

A module offering cmdlets to manage Azure resources directly from the PowerShell command line.

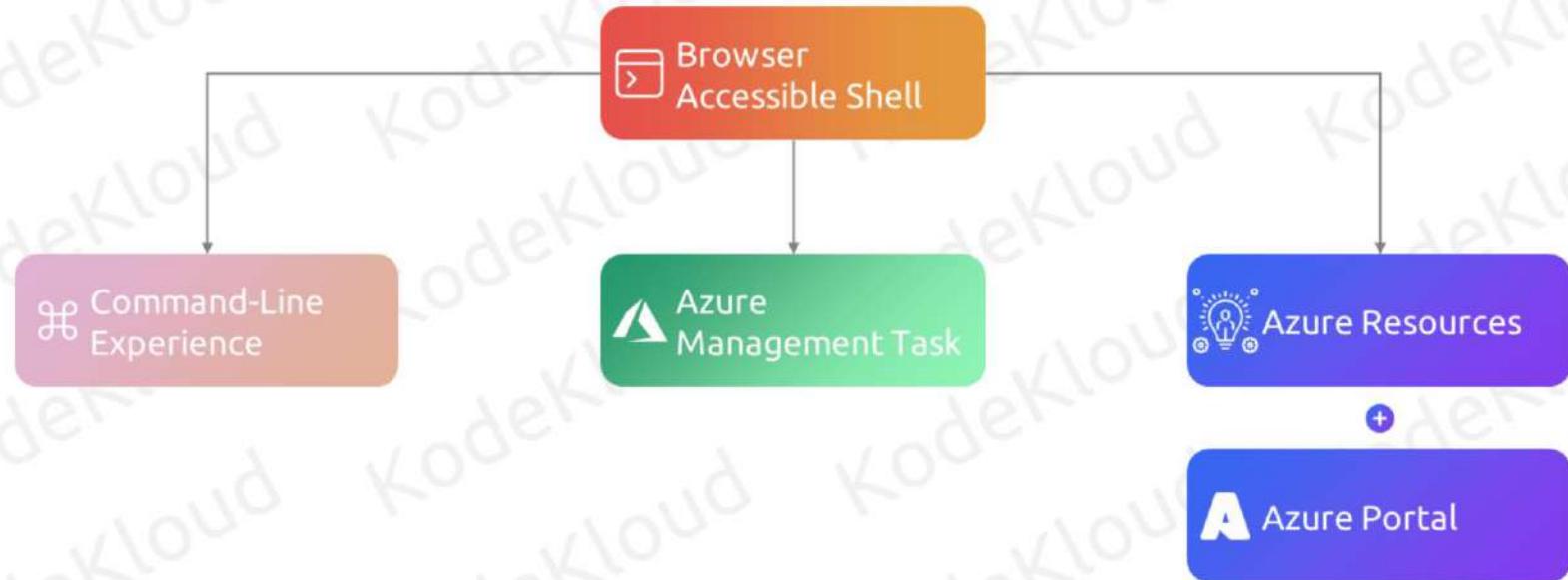
2 Azure PowerShell



© Copyright KodeKloud

Ideal for automating complex, repetitive tasks through scripting.

3 Azure Cloud Shell



© Copyright KodeKloud

Azure Cloud Shell:

A browser-accessible shell that gives you a command-line experience built with Azure management tasks in mind. It comes preconfigured to access Azure resources and is integrated into the Azure Portal.

4 Command-Line Interface (CLI)



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Command-Line Interface (CLI):

A cross-platform command-line program that connects to Azure and executes administrative commands on Azure resources. Great for Linux users or those who prefer a command-line interface.

Interacting With Azure – Choosing Your Tool



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Choosing Your Tool:

The choice depends on your workflow, operating system, and preference for graphical vs. command-line interfaces.

Tools for Interacting With Azure – Best Practices



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Best Practices:

- Use the Azure Portal for quick tasks and visual monitoring.
- Leverage Azure PowerShell and CLI for automation and scripting.
- Utilize Azure Cloud Shell for a fully configured, ready-to-go management environment without local installation.

Azure Arc



Managing Multi-Cloud and On-Prem Resources – Challenge



On-Premises

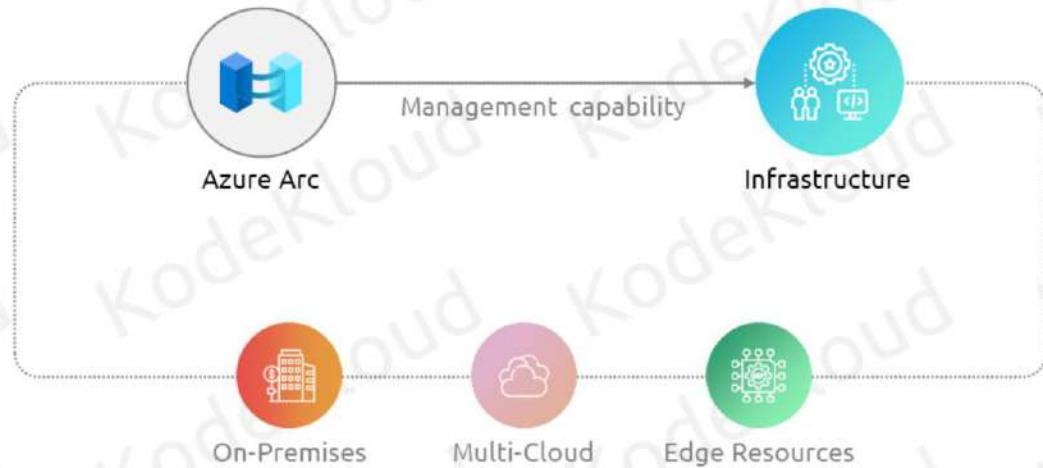


Cloud Environment

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Bella Innovations would like to manage their servers in on-premises and other cloud provider environments from Azure.

Azure Arc



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Azure Arc extends Azure's management capabilities to any infrastructure, enabling you to manage your on-premises, multi-cloud, and edge resources with a single platform.



Azure Arc – Key Features



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Unified Management: Centralize the management of your resources across multiple environments.

Extend Azure Services: Bring Azure services and management to any infrastructure.

Policy-Driven Governance: Apply Azure Policy to non-Azure resources for consistent governance.

Azure Arc – Benefits

01



Flexibility and
Interoperability

02



Streamlined
Operations

03



Comprehensive
Security

Flexibility and Interoperability: Manage resources across on-premises, edge, and multi-cloud environments.

Streamlined Operations: Use familiar Azure tools and practices universally.

Comprehensive Security: Extend Azure security and identity services anywhere.

Azure Arc – Use Cases

01



Hybrid cloud
deployments

02



On-premises
infrastructure
modernization

03



Edge resource
management

Azure Resource Manager



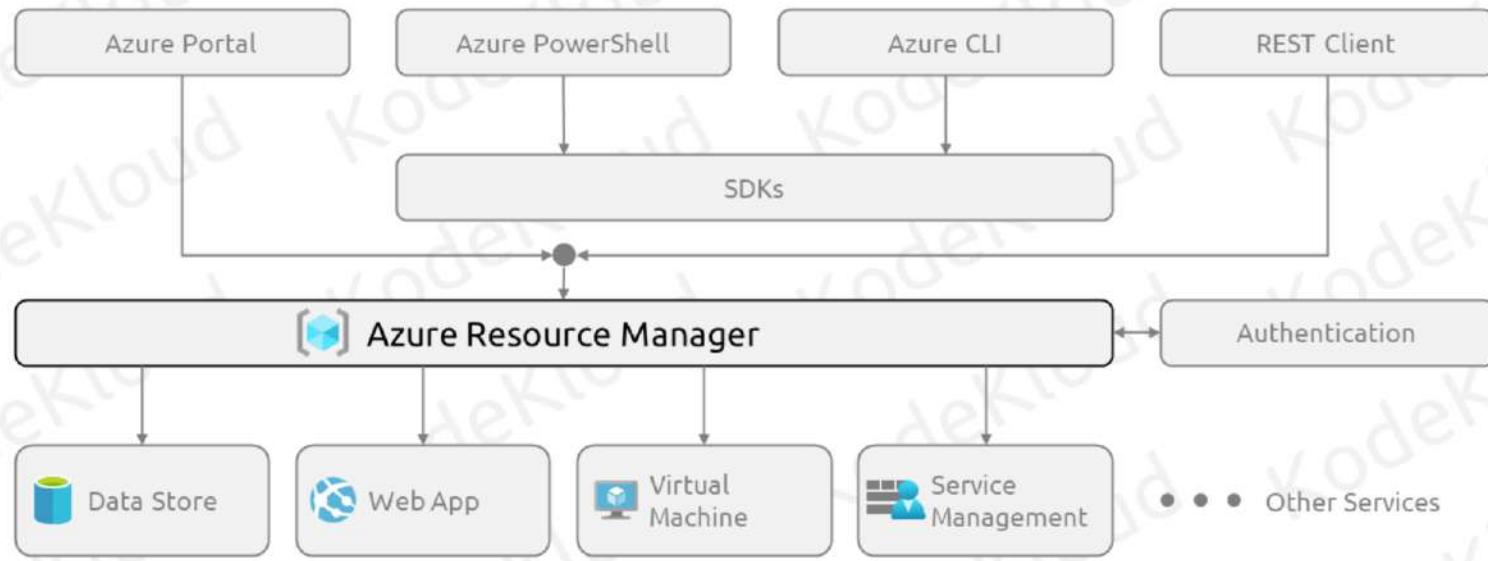
How Azure Manages Operations – Challenge



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IT Team at Bella Innovation is curious to know how Azure is managing all the requests to create, update or delete these resources.

Azure Resource Manager



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Azure Resource Manager is the deployment and management service for Azure. It provides a management layer that enables you to create, update, and delete resources in your Azure account.

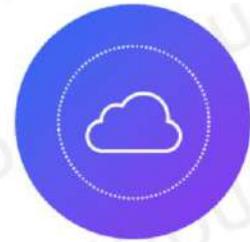
Infrastructure as Code



Ensuring Consistent Deployments – Challenge



Avoid manual deployment

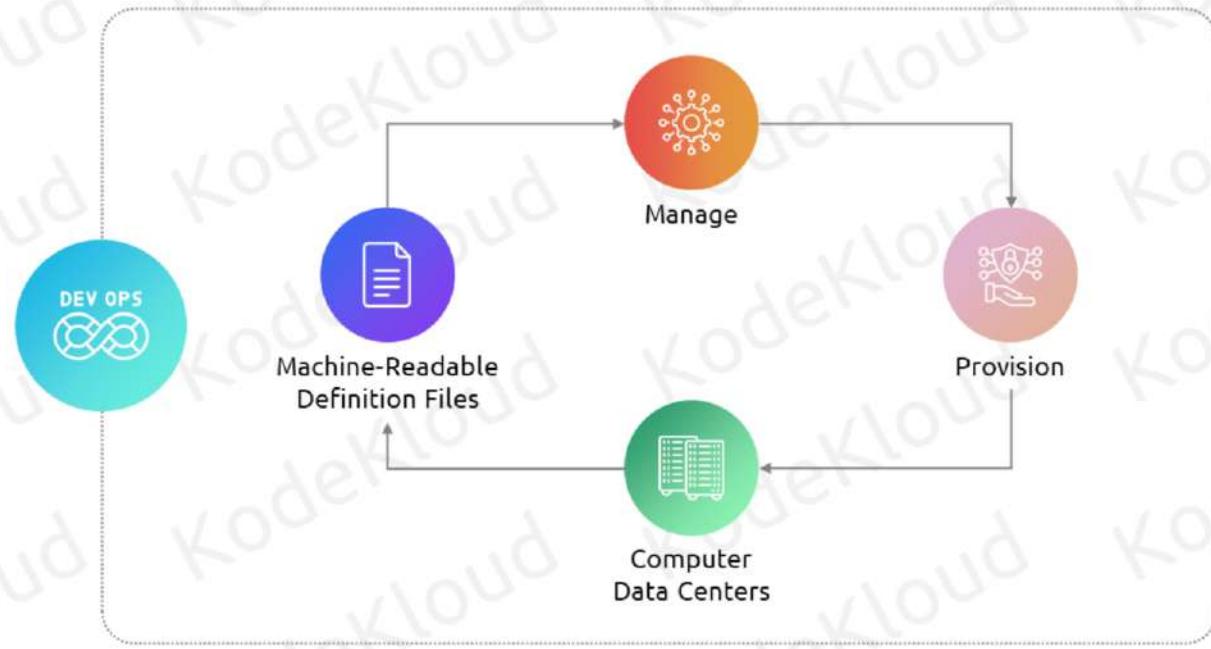


Consistent across
cloud environment

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Bella Innovation would like to avoid manual deployment of resources and to bring in consistent across their cloud environment.

Infrastructure as Code



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Infrastructure as Code is a key DevOps practice that involves managing and provisioning computer data centers through machine-readable definition files, rather than physical hardware configuration or interactive configuration tools.



Infrastructure as Code – Key Features

01



Azure Resource
Manager
Templates

02



Azure Bicep

03



Terraform

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Azure Resource Manager Templates: JSON files that define the resources you need to deploy for your solution.

Azure Bicep: A domain-specific language that deploys Azure resources declaratively and is easier to understand and use than ARM Templates.

Terraform: An open-source tool that is used with Azure to define, preview, and deploy cloud infrastructure with declarative configuration files.

Infrastructure as Code – Benefits

01



Speed and
Simplicity

02



Consistency and
Accuracy

03



Reusability and
Scalability

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Speed and Simplicity: Quickly deploy and manage infrastructure with minimal manual intervention.

Consistency and Accuracy: Eliminate environment drift and manual errors.

Reusability and Scalability: Leverage templates to replicate environments across different geographies or Azure subscriptions.

Infrastructure as Code – Use Cases

01



Automated
environment setup

02



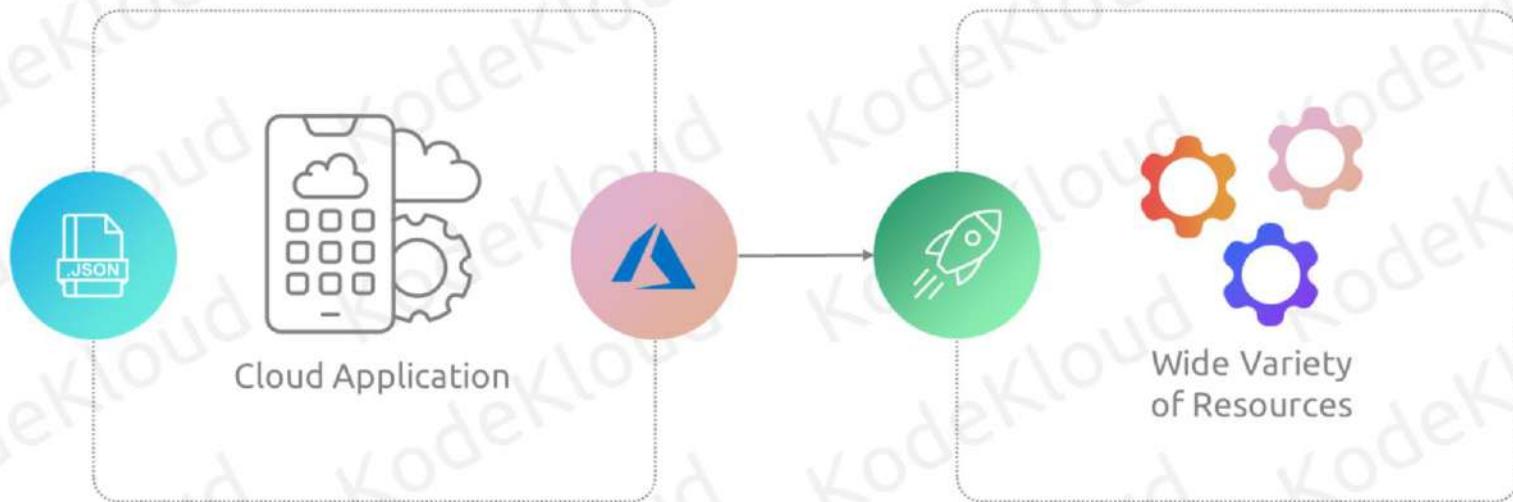
Managing multi-
cloud environments

03



Implementing
DevOps practices

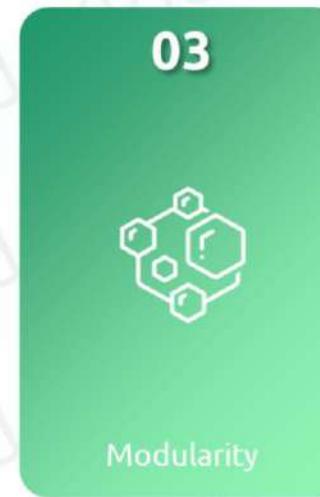
ARM Templates



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JSON files that define the resources you need for your cloud application in Azure. They allow you to deploy a wide variety of resources together in a coordinated manner.

ARM Templates – Key Features



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Declarative Syntax: Describe what resources are needed using a declarative format, rather than the sequence of commands to create them.

Idempotency: Repeatedly deploy your template without worry; it will produce the same environment every time.

Modularity: Reuse existing templates or build modular templates to simplify management.

ARM Templates – Benefits

- 01 
Automation and Scalability
- 02 
Consistency
- 03 
Source Control

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Automation and Scalability: Automate the deployment of complex environments and easily replicate them.

Consistency: Ensure environments are deployed consistently with no deviations.

Source Control: Track changes to environments and tie back to your CI/CD pipeline.

ARM Templates – Use Cases



© Copyright KodeKloud

Perfect for setting up repeatable deployments like development, testing, staging, and production environments.



JSON files that define the resources you need for your cloud application in Azure. They allow you to deploy a wide variety of resources together in a coordinated manner.

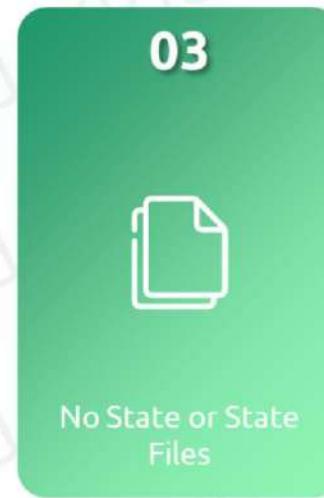
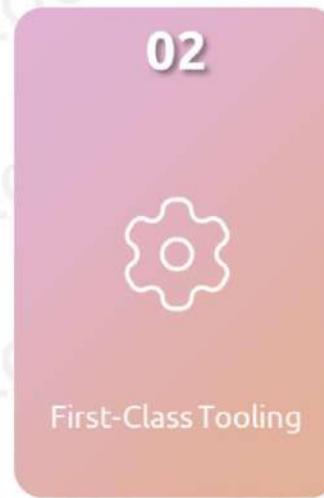
Bicep



© Copyright KodeKloud

A domain-specific language (DSL) for deploying Azure resources declaratively. It's designed to simplify the authoring experience and provide a transparent abstraction over ARM templates.

Bicep – Key Features



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Simplified Syntax: Cleaner code and easier to read compared to JSON syntax of ARM templates.

First-Class Tooling: Integrated support in Visual Studio Code and Azure CLI.

No State or State Files: Direct integration with Azure Resource Manager.

Bicep – Key Features

Terraform



Maintains state
of resources



State file
dependency

Bicep



No need for state
management



Directly integrating
with Azure Resource
Manager

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So if we take terraform for example, what it does is it maintains state of resources. Whenever I run the file, it cross checks with the state and verify if everything written on the file is created or not. So it's like a database. So this is what we call as a state management altogether. But in the case of bicep, there is no need for state management. If I try to deploy something it is directly querying the azure resource manager, so it is not querying a file like terraform.

In the case of terraform, if my state file is deleted or modified, it will not be able to fetch the state of my resources. But in

the case of bicep, what happens is it is directly integrating with Azure resource manager and can pull the status of the resource now the benefits of bicep over on template it's easier to understand.

Bicep – Benefits

- 01  Easier to Understand
- 02  Less Boilerplate Code
- 03  Transparent Abstraction
- 04  Strong Typing and Validation

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Easier to Understand: Bicep's syntax is more concise and readable, making it easier for newcomers to grasp.

Less Boilerplate Code: Removes much of the complexity and verbosity found in ARM templates.

Transparent Abstraction: Compiles down to standard ARM Template JSON, allowing you to leverage all the power of ARM with less complexity.

Strong Typing and Validation: Provides real-time error checking and IntelliSense, reducing the likelihood of deployment errors.

Bicep – Use Cases

01



Efficient resource provisioning

02



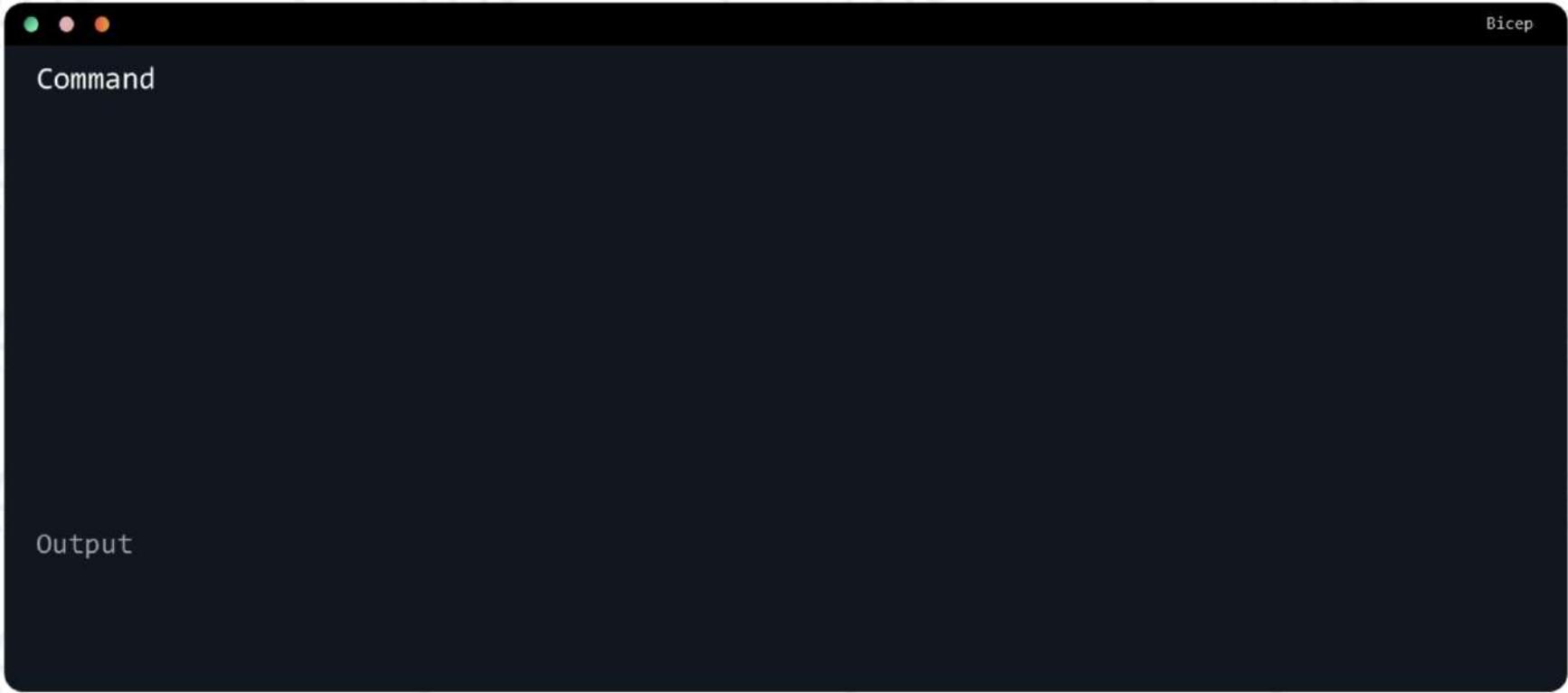
Reliable Azure
resource
deployment

03



Targeted at
developers and
cloud engineers

Bicep



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A domain-specific language (DSL) for deploying Azure resources declaratively. It's designed to simplify the authoring experience and provide a transparent abstraction over ARM templates.

Monitoring Tools

Monitoring Tools

-  Azure Advisor
-  Azure Service Health
-  Azure Monitor

Azure Advisor



Best Practices and Recommendations – Challenge

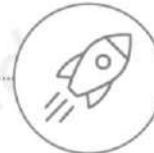
Bella Innovations IT Team



Best Practices



Recommendations



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Bella Innovations IT team would like to check if they are following the best practices and recommendations while deploying resources.

Azure Advisor



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Azure Advisor is a personalized cloud consultant that helps you follow best practices to optimize your Azure deployments.

Azure Advisor



© Copyright KodeKloud

It analyzes your resource configuration and usage to provide recommendations in five key areas

Azure Advisor



High Availability



Security



Performance



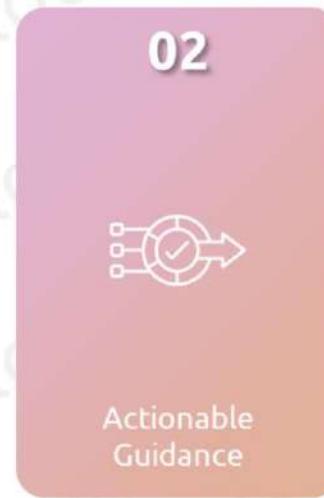
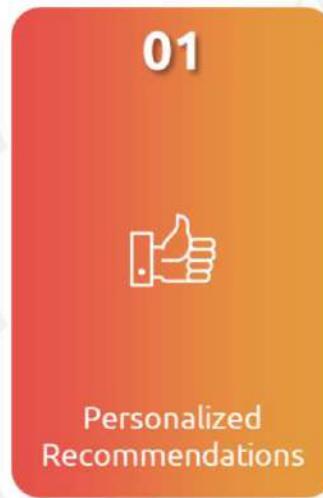
Cost



Operational Excellence

high availability, security, performance, cost, and operational excellence.

Azure Advisor – Key Features



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Personalized Recommendations: Tailored advice based on your usage and configurations.

Actionable Guidance: Direct links to implement recommendations.

Integrated Experience: Available in the Azure portal with no additional charge.



Azure Advisor – Benefits

01



Cost
Optimization

02



Performance
Improvement

03



Enhanced
Security

04



High
Availability

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Cost Optimization: Identifies underutilized resources to help reduce costs.

Performance Improvement: Suggests enhancements to increase the efficiency and responsiveness of your applications.

Enhanced Security: Recommends actions to secure your resources.

High Availability: Helps ensure and improve the continuity of your business-critical applications.



Azure Advisor – Use Cases

01



Ongoing Azure
environment
assessment

02



Refining
deployments

03



Implementing best
practices

Azure Service Health



Determining the Health of Resources – Challenge

Bella Innovations IT Team



Ensure service
health



Platform
independent



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Bella Innovations IT team would like to ensure that the services are healthy and is not affected by any platform issues or planned maintenance in Azure.

Azure Service Health



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A suite of experiences that provide personalized guidance and support when issues with Azure services affect you.

Azure Service Health



© Copyright KodeKloud

It includes Azure Service Health, Azure Resource Health, and Azure Status.

Azure Service Health – Features

01



Personalized
Alerts

02



Service Issues

03



Planned
Maintenance

04



Health
History

Personalized Alerts: Notifications about issues affecting your resources.

Service Issues: Tracks ongoing problems with Azure services.

Planned Maintenance: Provides advance notice of maintenance that may impact your resources.

Health History: Shows the historical health of your resources for troubleshooting.

Azure Resource Health – Features



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Resource Status: Gives detailed information about the current and past health of your resources.
Guided Troubleshooting: Offers steps to help resolve issues specific to your resources.



Azure Status – Features

01



Global View

02



Real-Time Status

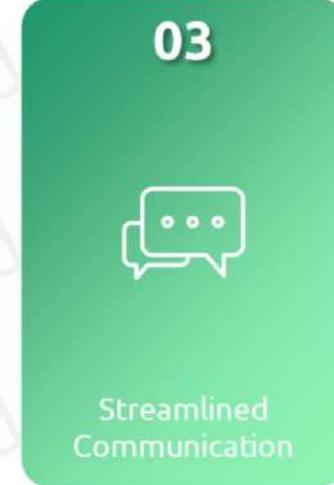
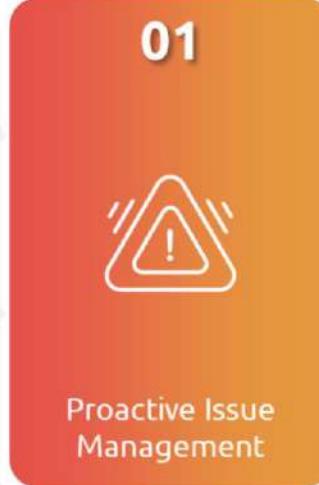
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Global View: Provides a global view of the health of Azure services.

Real-Time Status: Offers real-time information on service availability.



Azure Service Health – Benefits



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Proactive Issue Management: Helps identify and respond to issues before they impact services.

Enhanced Visibility: Gives a clear view of the health and performance of individual resources and Azure services as a whole.

Streamlined Communication: Ensures up-to-date information during Azure events for informed decision-making.

Azure Service Health – Use Cases

01



IT professionals'
management

02



Azure services
monitoring

03



Smooth
operation

Ideal for IT professionals who manage and monitor Azure services and resources, ensuring they operate smoothly and efficiently.

Azure Monitor



Building Observability and Monitoring – Challenge



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Bella Innovations IT team need to monitor the CPU, memory and disk usage of their servers.

Azure Monitor



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Azure Monitor is a comprehensive solution that collects, analyzes, and acts on telemetry data from your Azure and on-premises environments.



Azure Monitor



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It helps ensure performance and availability by providing actionable insights into your applications, infrastructure, and network.

Azure Monitor – Key Features

01



Data Collection

02



Alerts and Notifications

03



Dashboards and Visualization

04



Log Analytics

05



Application Insights

Data Collection: Gathers performance and operational telemetry from various Azure resources.

Alerts and Notifications: Configurable alerts for proactive issue resolution.

Dashboards and Visualization: Customizable dashboards for monitoring resource states and metrics.

Log Analytics: Deep diagnostics and query capabilities to troubleshoot issues.

Application Insights: Application performance management for live web apps.

Azure Monitor – Benefits

01



Centralized Monitoring

02



Automated Responses

03



Performance Optimization

04



Unified Diagnostic Tool

Centralized Monitoring: Collects data from all monitored resources in Azure.

Automated Responses: Automates responses to certain events with triggered actions.

Performance Optimization: Helps identify performance bottlenecks and opportunities for optimization.

Unified Diagnostic Tool: Offers integrated views for network, application, and infrastructure diagnostics.



Azure Monitor – Use Cases

01



IT operations
monitoring

02



DevOps
infrastructure
tracking

03



Application
health
management



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