**AZURE LAB TASK**

1. **Create Resource Groups based on different project environments (e.g. Development, testing, production). Explain the organizational benefits of using Resource Groups.**

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Description automatically generated**

Resource Groups in cloud computing enhance organizational efficiency, governance, cost management, and resource lifecycle management, contributing to a more streamlined and optimized cloud environment.

Some of the benefits of using Resource Groups are as follows:

1. **Logical Grouping**: Resource Groups allow organizations to logically group related Azure resources together. This helps in organizing resources based on projects, environments (such as development, testing, production), or business units, making it easier to manage and track resources.
2. **Management and Governance**: Resource Groups provide a boundary for managing and applying governance policies. Organizations can apply access controls, policies, and tags at the Resource Group level, ensuring consistent management practices across all resources within the group.
3. **Resource Lifecycle Management**: Resource Groups enable organizations to manage the lifecycle of resources as a single unit. This includes provisioning, updating, monitoring, and deleting resources together, simplifying operations and reducing the risk of orphaned resources.
4. **Disaster Recovery and Redundancy**: Resource Groups support disaster recovery and redundancy strategies. By grouping resources together, organizations can easily replicate and manage redundant resources across different regions or availability zones, ensuring high availability and disaster recovery capabilities.
5. **Explore and document the purpose and usage of Availability Zones and Availability Sets in ensuring application reliability without creating VMs.**

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**Availability Sets:**

*Purpose:*

a) An Availability Set is a logical grouping of virtual machines (VMs) within an Azure region.

b) It ensures that VMs are distributed across different fault domains and update domains.

*Usage:*

Fault Domains:

1. Fault domains represent distinct physical hardware within a datacentre.
2. VMs in the same fault domain share common storage, power sources, and network switches.
3. If one fault domain experiences an issue (e.g., hardware failure), VMs in other fault domains remain unaffected.

Update Domains:

1. Update domains group VMs that can be rebooted simultaneously during planned maintenance.
2. VMs in different update domains ensure that not all VMs are updated or rebooted at the same time.

*Benefits:*

1. Improved Availability: By spreading VMs across fault domains and update domains, you reduce the risk of simultaneous failures.
2. Downtime Reduction: Using an availability set decreases acceptable downtime to around 22 minutes per month compared to a single VM deployment.
3. VM Isolation: VMs within an availability set remain isolated from each other.
4. Resource Management: Availability sets apply only to VMs and cannot be used for other Azure resources.
5. Redundancy Planning: Architect your application to fail over to non-impacted VMs for redundancy and business continuity.

**2. Availability Zones:**

*Purpose:*

1. Availability Zones take reliability to the next level by providing high availability across different datacentres within an Azure region.
2. Each zone consists of one or more datacentres.

*Usage:*

1. Zone-Aware Services:

* When you use availability zones, your workload is spread across different zones within an Azure region.
* An Azure region comprises multiple datacentres, and each zone is composed of one or more datacentres.

*Benefits:*

1. 99.99% SLA: With availability zones, your acceptable downtime per month reduces to less than 5 minutes.
2. Zone Resilience: VMs are distributed across different zones, ensuring resilience even if an entire zone experiences issues.
3. Proximity: VMs in an availability set have improved VM-to-VM latencies compared to availability zones.
4. High Availability: Availability zones minimize single points of failure and offer high availability.

In summary, Availability Sets provide a structured way to organize VMs within a single location, while Availability Zones extend reliability by spanning multiple datacentres. Architects can choose the appropriate level of redundancy based on their application requirements and desired SLAs.