Azure Database for PostgreSQL Flex – Resilience Reference Architecture

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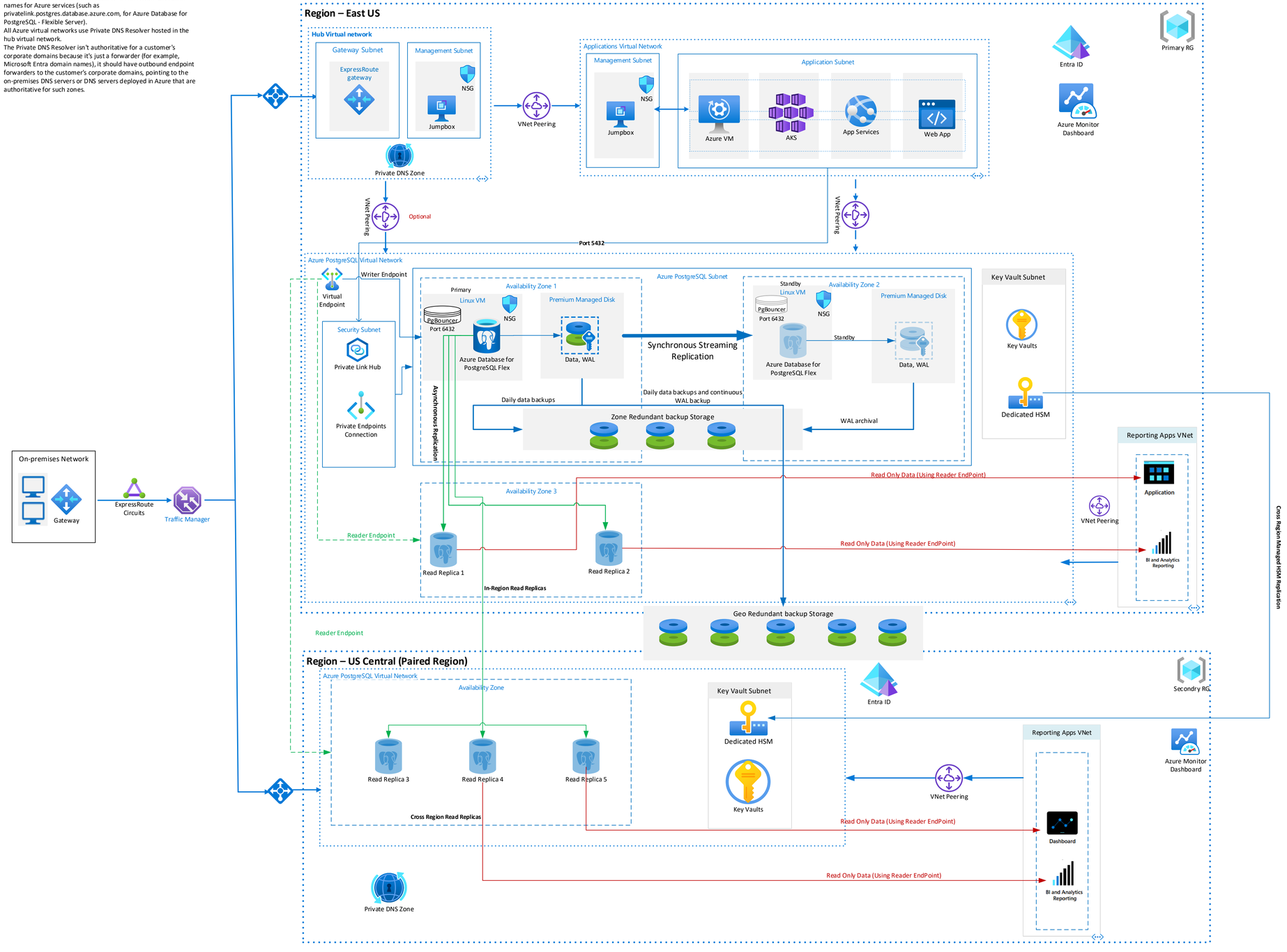

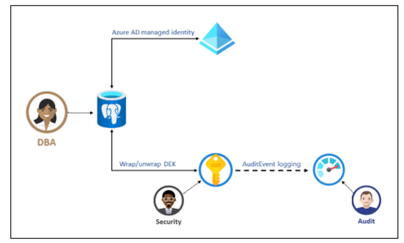

Azure Database for PostgreSQL flexible server uses Azure Storage encryption to encrypt data at rest by default, by using Microsoft-managed keys. For users of Azure Database for PostgreSQL flexible server, it's similar to transparent data encryption in other databases such as SQL Server.

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Tenancy	Multi-Tenant	Multi-Tenant	Single-Tenant
Compliance	FIPS 140-2 level 1	FIPS 140-2 level 2	FIPS 140-2 level 3
High Availability	Automatic	Automatic	Automatic
Use cases	Encryption at Rest	Encryption at Rest	Encryption at Rest
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Microsoft Azure

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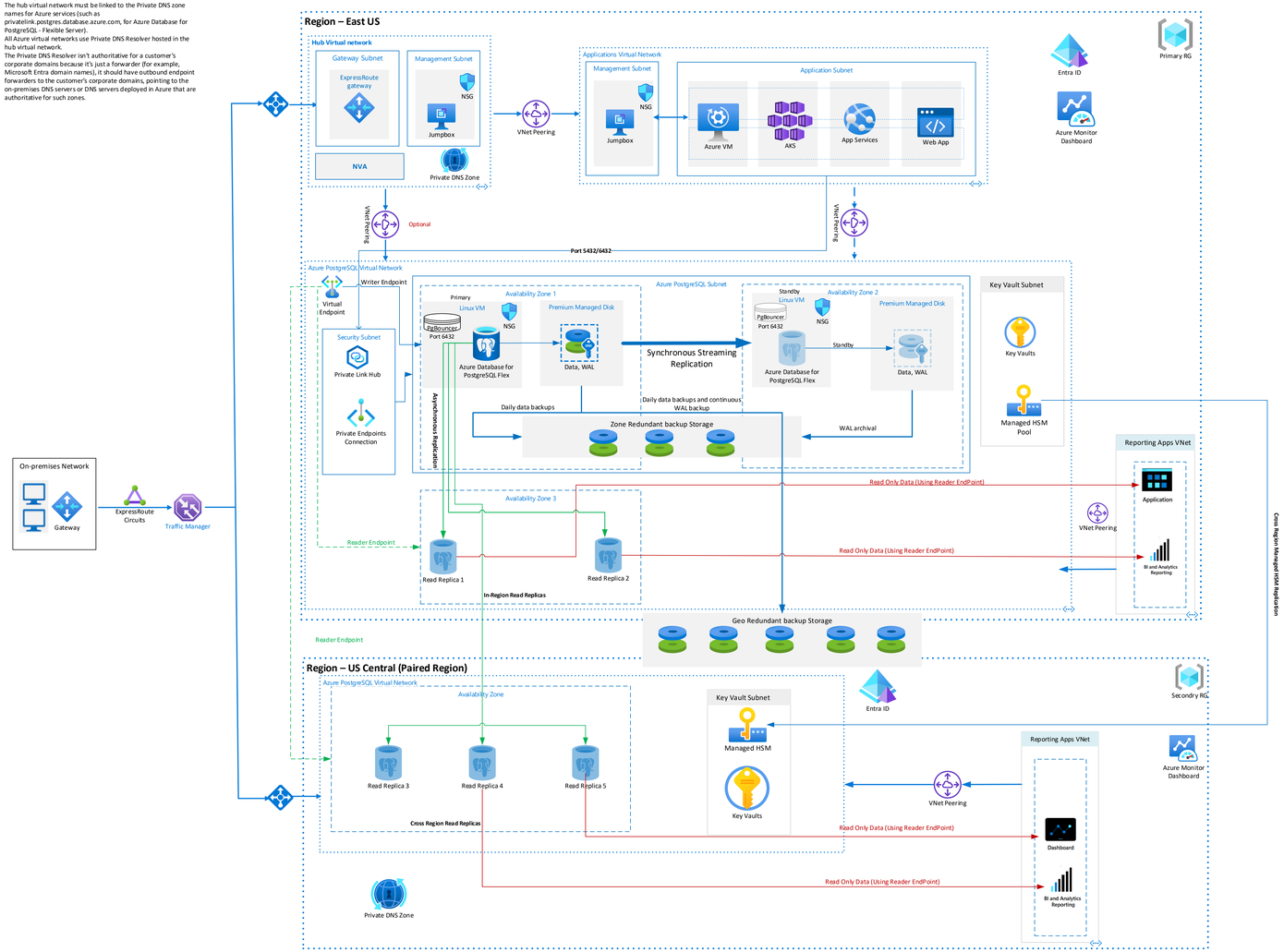

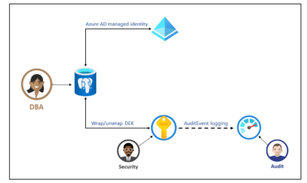

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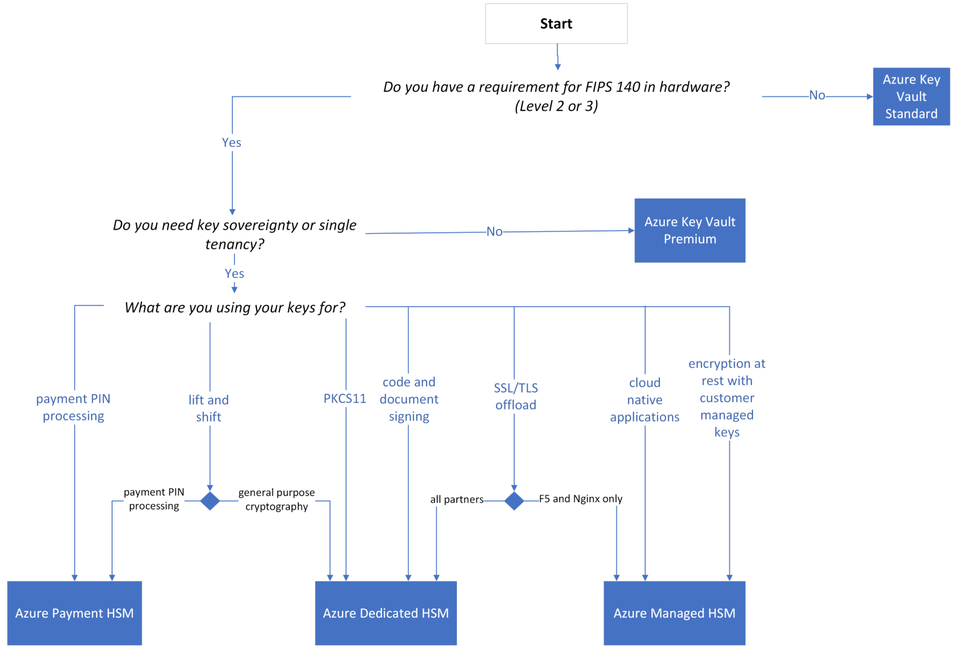

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Microsoft Azure

Azure Database for PostgreSQL Flex – Hi Availability (HA) - Resilience Reference Architecture

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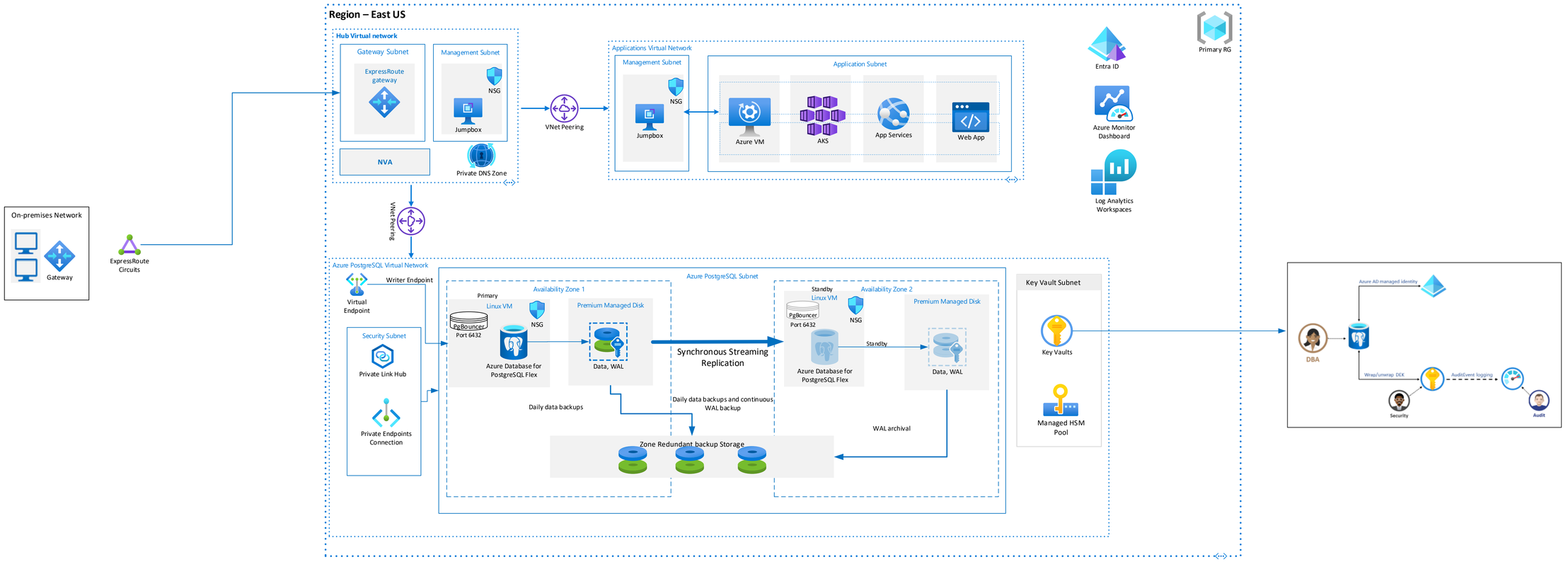

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Azure Database for PostgreSQL Flex – High Availability (HA) with Read Replica in the same Region - Resilience Reference Architecture

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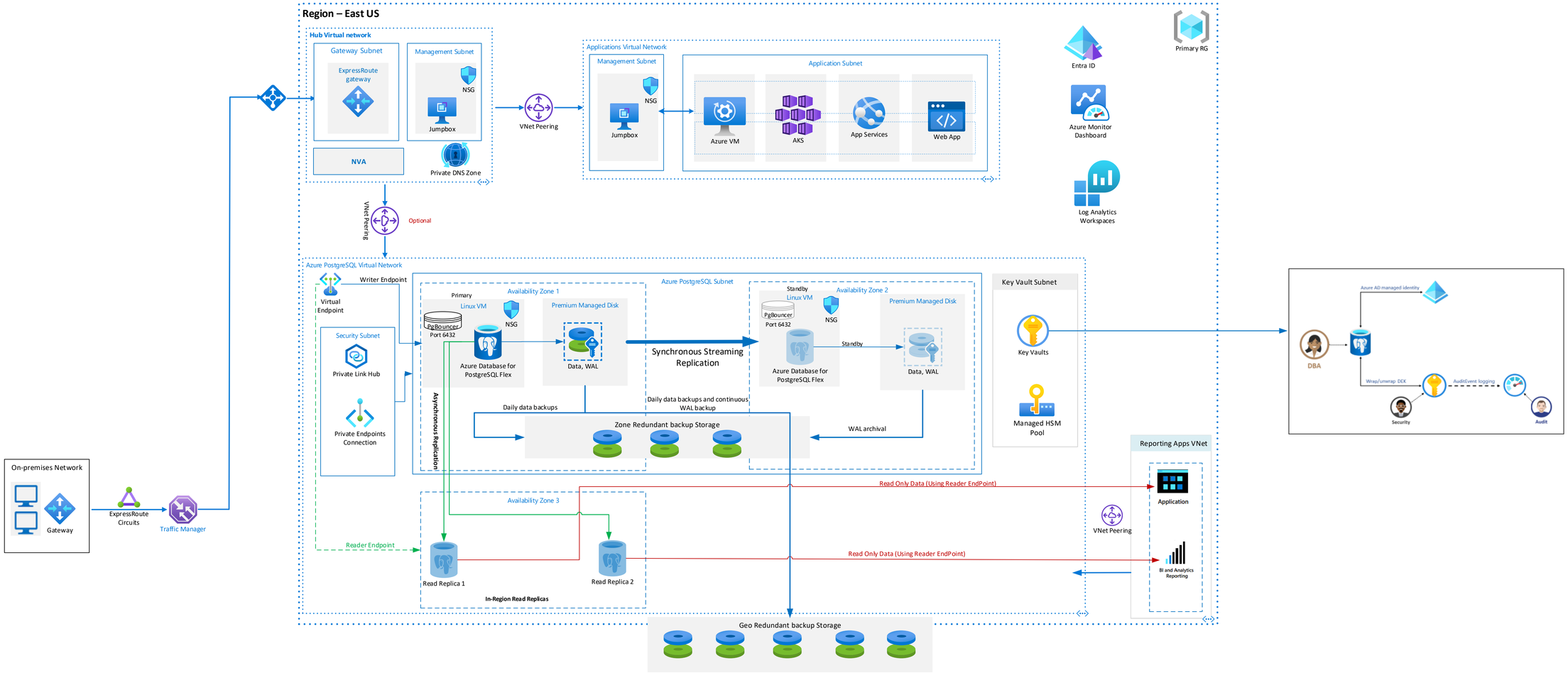

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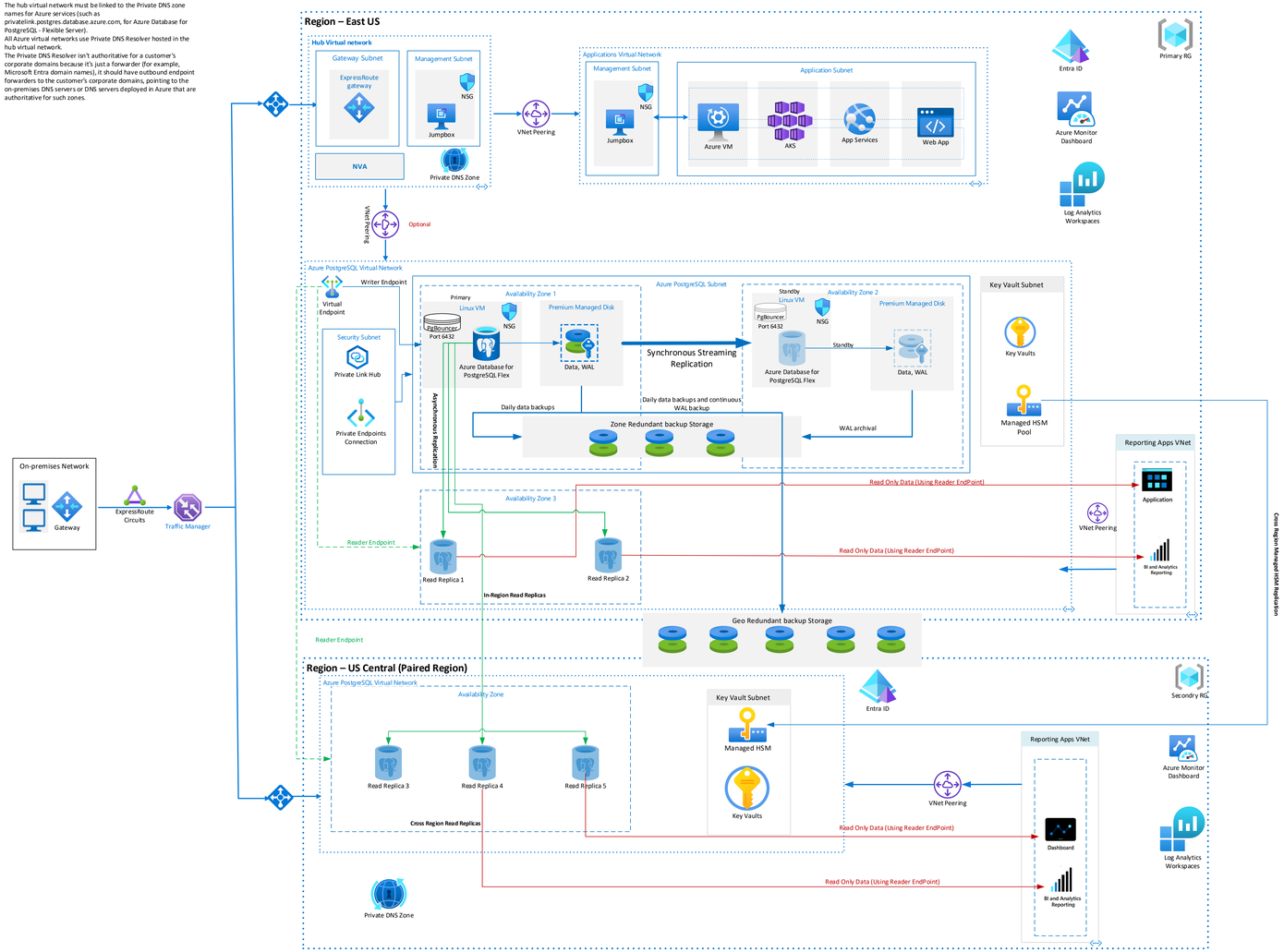

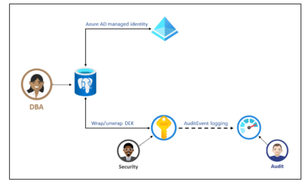

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Microsoft Azure

Azure PostgreSQL Flexible Server is designed to handle failover scenarios both within a region and across regions, ensuring high availability and resilience for your databases. Here's a detailed look at how failover is managed and the considerations involving Azure Key Vault (AKV) with private endpoints:

Within-Region Failover
High Availability Configuration: Azure PostgreSQL Flex allows you to configure a standby replica of your primary server within the same region but in a different availability zone. This setup ensures that in the event of a zone failure, the standby can automatically take over with minimal downtime.

Automatic Failover: The service automatically handles failover to the standby server if the primary server becomes unavailable due to maintenance or outages.

DNS Caching: When using private endpoints, DNS caching can affect how quickly applications can reconnect to the database post-failover. It’s crucial to configure your DNS settings properly to handle the updated pointers that direct to the new primary server.

Cross-Region Failover
Geo-Redundancy: Cross-region failover can be facilitated by setting up a geo-redundant standby server in a different region. This is particularly important for disaster recovery scenarios where regional continuity is at risk.

Manual Failover: Typically, cross-region failover is not automatic and requires manual intervention to promote a standby server in another region to become the new primary server.

DNS and Endpoint Configuration:

Using AKV with private endpoints complicates cross-region failover due to the need for proper DNS management. Since AKV uses regional DNS zones, you need to ensure that your DNS setup can handle the change in regions without significant delays.
Consider implementing traffic manager profiles or using Azure DNS to manage DNS failover and health checks, ensuring that the DNS can quickly resolve to the new primary server’s location.
Integration with Azure Key Vault
When integrating Azure PostgreSQL Flex with AKV for managing encryption keys and secrets, consider the following:

AKV Resilience: Rely on AKV’s built-in high availability and redundancy features to ensure that it remains accessible even during regional outages.

DNS Requirements: For AKV, especially when accessed via private endpoints, ensure that your DNS setup aligns with AKV's failover mechanism to maintain connectivity during and after failovers. This might involve configuring DNS settings to support rapid changes in endpoint addresses.

Cross-Region Considerations: If your DR strategy includes cross-region failover, ensure that your AKV setup can replicate secrets and keys across regions or that you have equivalent key vaults in multiple regions with synchronized data.

By addressing these considerations, you can enhance the resilience and availability of your Azure PostgreSQL Flexible Server deployments, ensuring they remain robust even in complex scenarios involving regional outages and failovers.